

CHAPTER III

PERSON TRIPS BY PUBLIC TRANSPORT

This chapter deals with the parameters of person trips by two modes of public transport in the study area: origins, destinations, purpose of trip, reason for choice of mode, etc. Estimates of daily person trips made by mini-buses and city buses were obtained from expansion of the trip samples through the use of screen counts and bus dispatchers' daily reports. From the results there was gained an understanding of the movements and characteristics of passengers using public transport in the study area.

Method of Collecting Origin-Destination Data

A survey was conducted during this research by making sample interviews of passengers engaged in trips on mini-buses or city buses. The questionnaire was composed of 11 items as shown in Appendix A, Table Ap/A 1. The survey of mini-bus passengers could be conveniently made as the interviewer rode in the back of a mini-bus while the driver cruised in customary fashion in search of passengers. The interviews of city-bus passengers could be made only when there were unoccupied seats due to the difficulty of recording information whilst standing in a

moving bus. Thus, most of the interviews of city-bus passengers were obtained during off-peak periods. The samples of city-bus passengers were stratified in accordance with the size of bus fleet of each of the three city-bus lines.

The survey of mini-bus passengers took place from the 4th to 16th June 1975, from 07.00 to 18.00 hrs. City-bus passengers were interviewed on the 16th to 20th July 1975, from 06.00 to 19.00 hrs. With experience the questionnaire could be completed in about one minute. By this method, successful interviews were achieved from about 155 mini-bus passengers per day, and 80 city-bus passengers per day. Table 12 and Fig. 17 show the hourly variation of sample interviews of mini-bus and city-bus passengers during the observation periods. The survey yielded a total of 2,019 interviews of mini-bus passengers and 391 interviews of city-bus passengers. These samples of passengers were assumed to represent all passengers who travelled by these two modes of public transport in the study area.

Designation of Traffic Zones

To analyze travel data, it is necessary to establish zones of origins and destinations ; that is, to group trips having more-or-less common origins or destinations. The size and location of each origin or destination zone must incorporate an unique

Table 12 Hourly Variation of Sample Interviews of Passengers

Time hrs	No. of Passengers Interviewed on:	
	Mini-Bus (4 th-16 th June 1975)	City Bus (16 th-20 th July 1975)
06.00 - 07.00	-	27
07.00 - 08.00	90	14
08.00 - 09.00	227	26
09.00 - 10.00	280	25
10.00 - 11.00	257	23
11.00 - 12.00	187	28
12.00 - 13.00	189	61
13.00 - 14.00	211	53
14.00 - 15.00	225	58
15.00 - 16.00	162	12
16.00 - 17.00	115	11
17.00 - 18.00	76	23
18.00 - 19.00	..	30
Total	2,019	391

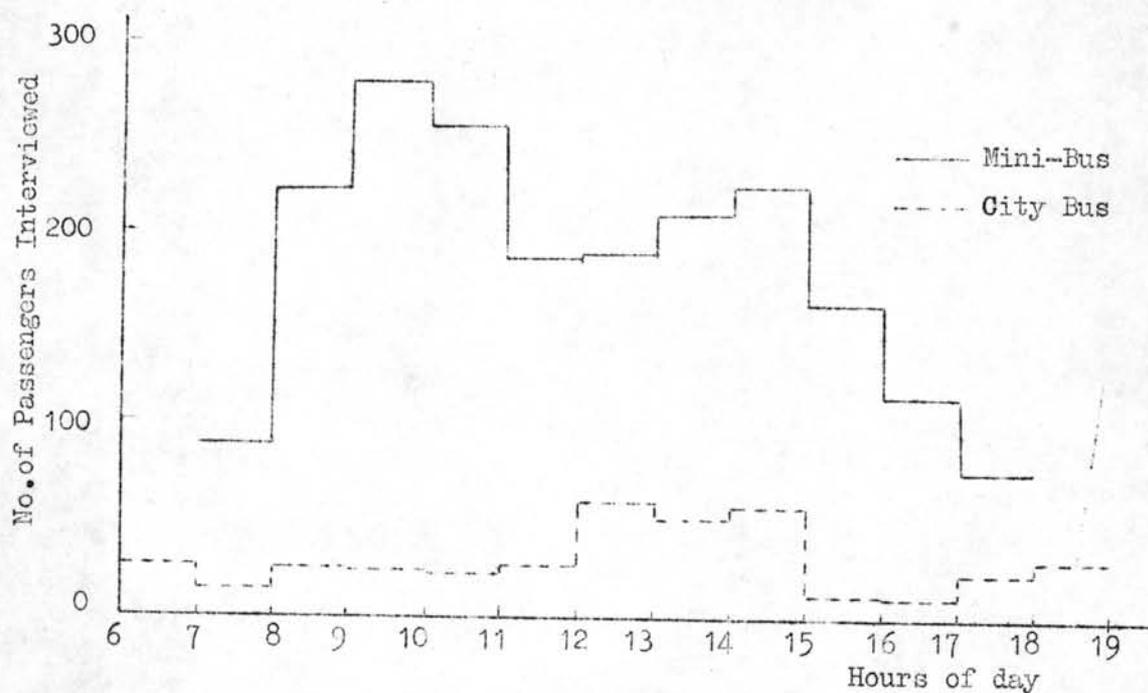


Fig. 17 Hourly Variation of Sample Interviews during the Observation Period

combination of position and activity. In the delineation of zone boundaries for this research, attention was paid to the samples of places of trip attraction and trip generation, the location of residential areas, land use generally, and relative economic well-being of the proposed zones.

Depending on the type of land use, a zone must be of a size sufficient to provide a number of trips which is statistically acceptable for sampling purposes. The results showed that there could be 16 such zones in the study area, of which three lay within the city walls. The zone boundaries selected are shown in Fig.4. From further investigation, some basic characteristics of the study-area zones were obtained ; these are given in Table 13.

Analysis of Origin-Destination Data

The data were analyzed to obtain five types of information: travel desires, trip purposes, demographic characteristics, reason for choice of mode, and frequency of using individual modes of public transport. The loads carried by passengers were neglected in this analysis as observation showed that most of the passengers carried only a knapsack, satchel or similar small packages.

Travel Desires

The origins and destinations of person trips obtained from

Table 13 Basic Details of Traffic Zones

Zone No.	Location	Predominant land uses	Accessibility*
01	Within - the - walls	Residential, historic places	Medium
02	Within - the - walls	Residential, government	Good
03	Within - the - walls	Residential, business	Good
04	Taiwang	Business, government	Good
05	City center	Market, business	Good
06	Loi Kroa	Residential, business	Good
07	Montfort School	Education, residential	Medium
08	Tippanetr	Residential, business	Good
09	Suan Dork	Education, residential	Good
10	Huey Kaco Road	Residential	Good
11	Chang Puak Gate	Market, business	Good
12	Pa Phang	Residential	Poor
13	Nakorn Phing Bridge, east	Education, hospital, residential	Good
14	Nawarat Bridge, east	Business, workshops, military	Good
15	Huey Kaco	Education, residential	Good
16	Koang Singha	Residential, village	Medium

* As served by public transport

the questionnaire were grouped by traffic zone and the results assembled into a triangular table. The intra-zonal and inter-zonal movements, by percentage of the successful samples, are shown for mini-bus and city bus in Tables 14 and 15, respectively. Figs. 18 and 19 show the travel desire lines by percentage of person trips by mini-bus and city bus, respectively. These desire lines, drawn between centroids of the zones of origin and destination, illustrate the demand for travel facilities between each pair of zones, regardless of exact street locations. The volume of each inter-zonal movement is indicated by the line width. The volume of each intra-zonal movement is indicated by the area of the circle drawn at the centroid of each zone; a square indicates no observed intra-zonal movements. As seen in Table 15, zones 01 and 12 are not served by city-bus routes so no city-bus passenger trips originate or terminate at these zones. The most interesting feature of the inter-zonal, public transport person trips is that mini-buses are predominantly used to carry passengers for short distances, whereas the city-bus trips tend to longer distances. This may be explained by the fact that the city-bus fare is fixed, and that mini-bus drivers generally avoid trips to zones that are remote from the city center because of the low probability of finding passengers for the return trip.

Special consideration should be given to the inter-zonal

Table 14 Percentage Distribution of Person Trips by Mini-Bus

Zones	01																
01	0	02															
02	0.20	0	03														
03	0.10	0.45	0.30	04													
04	0.05	0.15	0.30	0	05												
05	0.64	2.77	4.16	1.38	3.47	06											
06	0.30	0.74	1.33	0.44	3.91	0.25	07										
07	0.10	0	0.15	0.15	1.68	0.20	0	08									
08	0.20	0.60	1.53	0.15	5.25	1.59	0.25	0.30	09								
09	0.20	0.15	1.09	0.05	4.85	0.55	0	0.74	0.30	10							
10	0	0.30	0.45	0.20	1.48	0.35	0	0.50	0.64	0.35	11						
11	0.30	1.87	2.77	1.08	7.62	1.63	0	0.94	1.88	0.50	2.03	12					
12	0	0	0	0.05	0.20	0	0	0	0.05	0	0.15	0	13				
13	0	0.10	0.30	0.49	1.78	0.25	0.10	0.20	0.15	0	0.35	0	0.30	14			
14	0	0.35	0.74	0.30	4.95	1.18	0.15	0.88	0.40	0	1.28	0	0.93	0.74	15		
15	0.10	0.35	1.30	0.20	4.21	0.30	0	0.45	0.50	1.63	2.73	0	0	0.15	0.15	16	
16	0	0.05	0.45	0.10	1.03	0.20	0	0.20	0.10	0.15	2.37	0.05	0.30	0.30	0.15	0.20	
Total ↓	2.19	7.88	14.87	4.59	40.43	6.50	0.50	4.21	4.02	2.63	8.91	0.05	1.53	1.19	0.30	0.20	
Total →	0	0.20	0.85	0.50	12.42	6.97	2.28	9.87	7.93	4.27	20.62	0.45	4.02	11.90	12.07	5.65	
Total Trip Ends	2.19	8.08	15.72	5.09	52.85	13.47	2.78	14.08	11.95	6.90	29.53	0.50	5.55	13.09	12.37	5.85	
Total Trips	1.10	4.04	7.86	2.54	26.42	6.74	1.39	7.04	5.98	3.45	14.77	0.25	2.77	6.54	6.18	2.93	

Table 15 Percentage Distribution of Person Trips by City Bus

Zones	01																
01	0	02															
02	0	0	03														
03	0	0	0	04													
04	0	0	0	0	05												
05	0	1.02	0.26	0	0.51	06											
06	0	0.51	0	0	0.26	0	07										
07	0	0	1.02	0	3.84	0.51	0	08									
08	0	0	0.77	0.77	2.81	0	0	1.02	09								
09	0	1.54	1.54	0.26	5.63	1.54	0	3.07	0	10							
10	0	0.51	0.77	0	1.02	0	0	0	0	0	11						
11	0	0.26	0.77	0	3.58	0.51	3.32	1.02	2.30	0	0	12					
12	0	0	0	0	0	0	0	0	0	0	0	0	13				
13	0	0.77	0.77	0.51	3.84	0	0	1.02	0	1.02	0	0	0.51	14			
14	0	2.04	1.28	0	4.39	0.51	0	2.56	6.39	1.28	2.30	0	1.79	0.51	15		
15	0	1.79	0.51	0	5.37	0	0	0	0	0.26	0.77	0	4.34	5.37	0.26	16	
16	0	0	1.28	0	4.09	0.51	1.02	0	0	0	2.30	0	0	0	0	0	0
Total ↓	0	8.44	8.97	1.54	35.04	3.58	4.34	8.69	8.69	2.56	5.37	0	6.64	5.88	0.26	0	
Total →	0	0	0	0	1.79	0.77	5.37	5.37	13.58	2.30	11.76	0	8.44	22.75	18.67	9.20	
Total Trip Ends	0	8.44	8.97	1.54	36.83	4.35	9.71	14.06	22.27	4.86	17.13	0	15.08	28.63	18.93	9.20	
Total Trip	0	4.22	4.49	0.77	18.41	2.18	4.85	7.03	11.14	2.43	8.57	0	7.54	14.31	9.46	4.60	

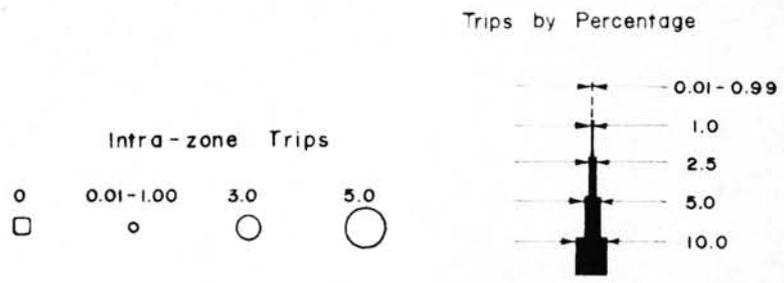
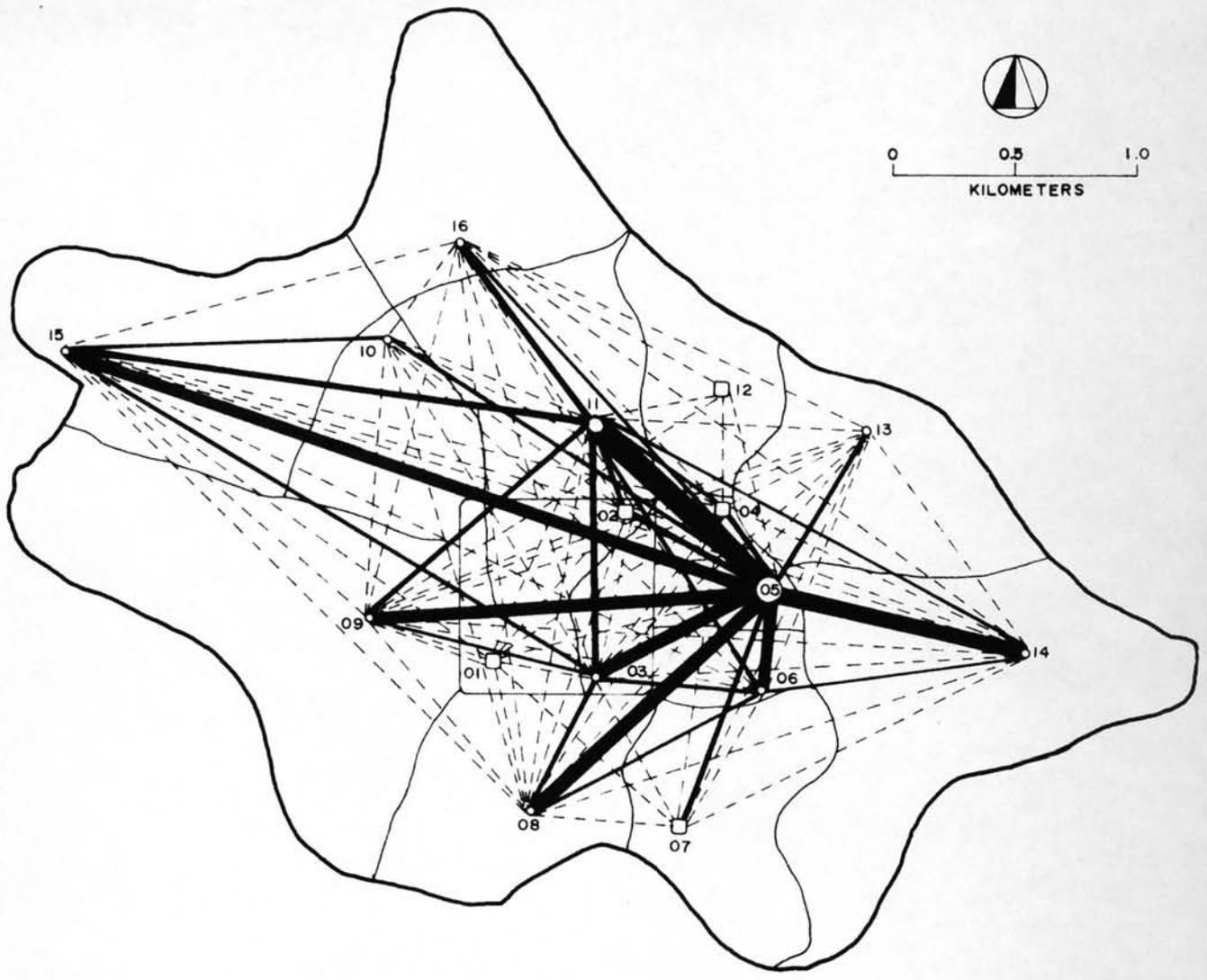


Fig. 18 DESIRE LINES OF PERSON TRIPS BY MINI-BUS

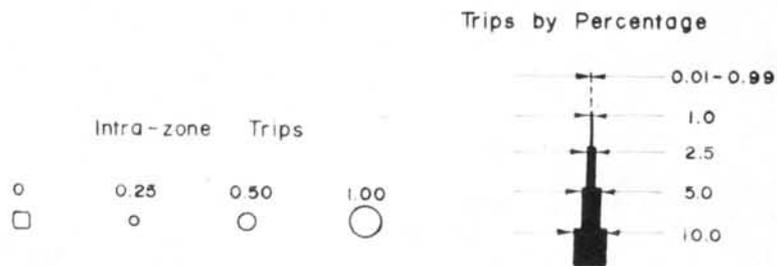
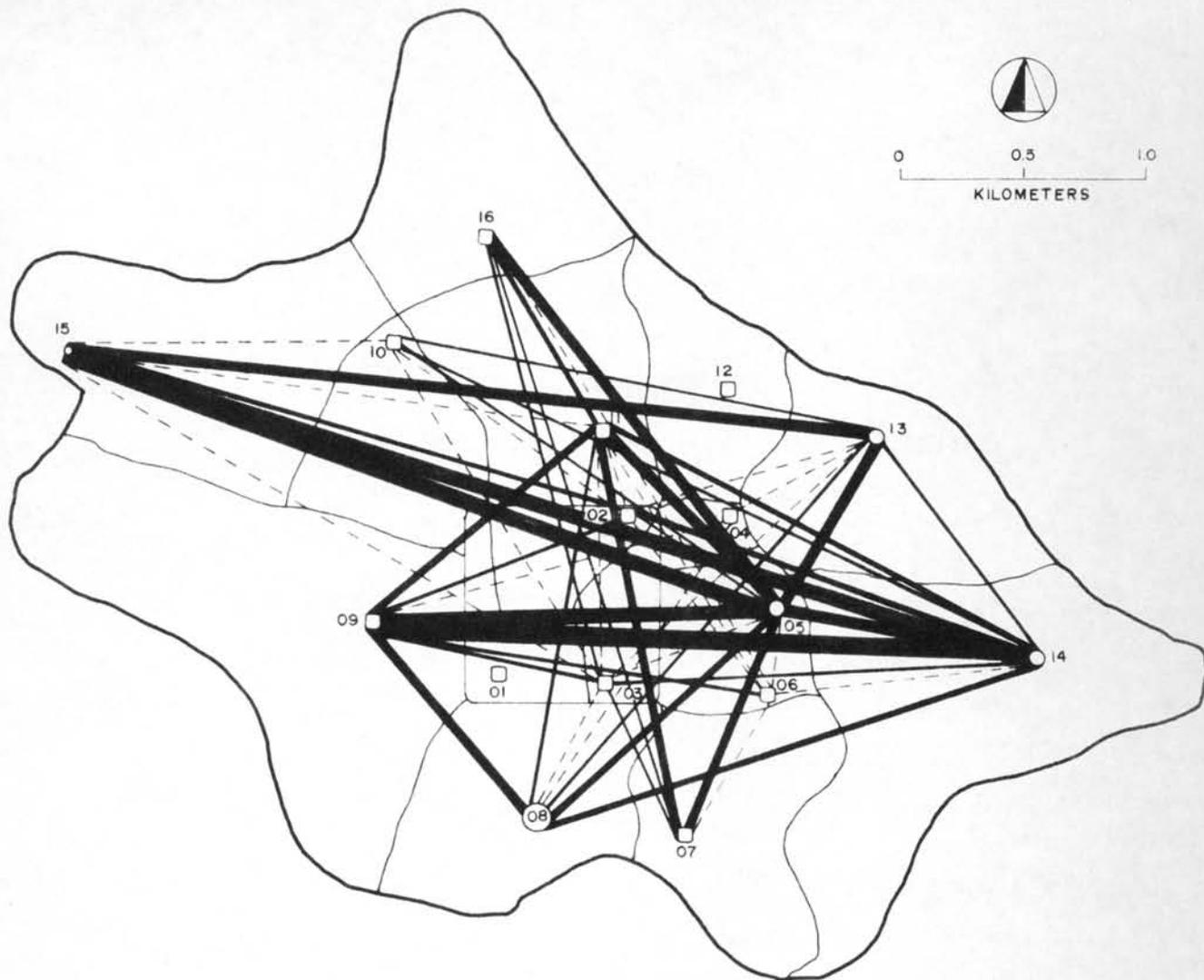


Fig.19 DESIRE LINES OF PERSON TRIPS BY CITY-BUS

person trips by mini-bus between zone 05 (city center) and the zone 15. Although the distance to zone 15 is the longest link from zone 05 (3.07 km), the movements between these two zone were the third largest of all person trips between zone 05 and all other zones. This results from the high generation and attraction of places situated in zone 15, in particular, Chiang Mai University and the Northern Technical College. A similar, though less pronounced, situation occurs in zone 09, where the Suan Dork Hospital and part of Chiang Mai University are located.

According to Tables 14 and 15, about 26 percent of all person trips by mini-bus, and 18 percent of all those by city bus, either began or ended in zone 05. This finding was expected because zone 05 covers the city center and is composed mostly of shopping and business areas. For mini-buses, zone 11 has the second largest percentage of trip ends, but for city buses zone 14 has the second largest percentage of trip ends. The area within the city walls proved less attractive or generative of the trip movements. This may be explained by the fact that the area within the walls is now a low-density residential area and there are many historic but relatively inactive places within.

Trip Purposes

Each trip recorded during the survey was assigned to one of

five purpose categories as follows :

- (1) Work
- (2) School (students only)
- (3) Personal business (i.e. to have one's hair cut or other business)
- (4) Social (i.e. to theater, to watch horse race, to funeral, to make merit, to play at sports)
- (5) Shopping

Home trips were not classified in this study as the questions asked during the survey dealt only with the causes of trips. It is expected that work trips and school trips occur every weekday, whereas personal business, social, and shopping trips probably occur less frequently. An hourly variations by percentage of purpose of person trips by mini-bus and city bus are given in Tables 16 and 17, respectively; these were also plotted and are shown in Figs. 20 and 21. From these drawings it can be seen that the percentage of passengers using mini-buses for work trips and school trips is lower than that of passengers using city buses for the same purposes¹. Social trips are by far the main use made of public transport during the off-peak periods; this is especially pronounced for mini-bus services.

¹ Attention is called to the substantial public transport service provided by queue mini-buses for longer trips. Data for queue mini-buses whose routes cross the Ping River are shown in Appendix B, Table Ap/B 17.

Table 16 Hourly Variation by Percentage of Purpose of Person Trips
by Mini-Bus

Trip Purpose Hrs of Day	Work	School	Personal business	Social	Shopping
	07.00 - 08.00	33.4	22.2	11.1	13.3
08.00 - 09.00	32.6	18.1	16.7	14.1	18.5
09.00 - 10.00	10.0	6.8	24.3	33.6	25.3
10.00 - 11.00	7.8	6.2	19.9	38.5	27.6
11.00 - 12.00	4.8	1.6	20.3	53.5	19.8
12.00 - 13.00	2.6	4.2	26.5	52.4	14.3
13.00 - 14.00	5.2	9.0	27.5	35.5	22.8
14.00 - 15.00	6.2	6.7	25.8	37.3	24.0
15.00 - 16.00	11.1	6.2	20.3	38.3	24.1
16.00 - 17.00	18.3	14.8	29.5	18.3	19.1
17.00 - 18.00	14.5	7.9	28.9	32.9	15.8

Table 17 Hourly Variation by Percentage of Purpose of Person Trips
by City Bus

Trip Purpose Hrs of Day	Work	School	Personal business	Social	Shopping
	06.00 - 07.00	51.9	22.2	0	3.7
07.00 - 08.00	42.9	35.7	0	14.3	7.1
08.00 - 09.00	34.6	15.4	19.2	15.4	15.4
09.00 - 10.00	16.0	4.0	16.0	28.0	36.0
10.00 - 11.00	8.7	4.3	13.1	26.1	47.8
11.00 - 12.00	3.6	14.3	14.3	46.4	21.4
12.00 - 13.00	8.2	27.9	8.2	37.7	18.0
13.00 - 14.00	17.0	9.4	22.7	26.4	24.5
14.00 - 15.00	8.6	19.0	22.4	27.6	22.4
15.00 - 16.00	16.7	8.3	16.7	33.3	25.0
16.00 - 17.00	18.2	18.2	9.1	36.3	18.2
17.00 - 18.00	34.8	13.1	8.7	21.7	21.7
18.00 - 19.00	23.3	3.3	20.0	30.0	23.4

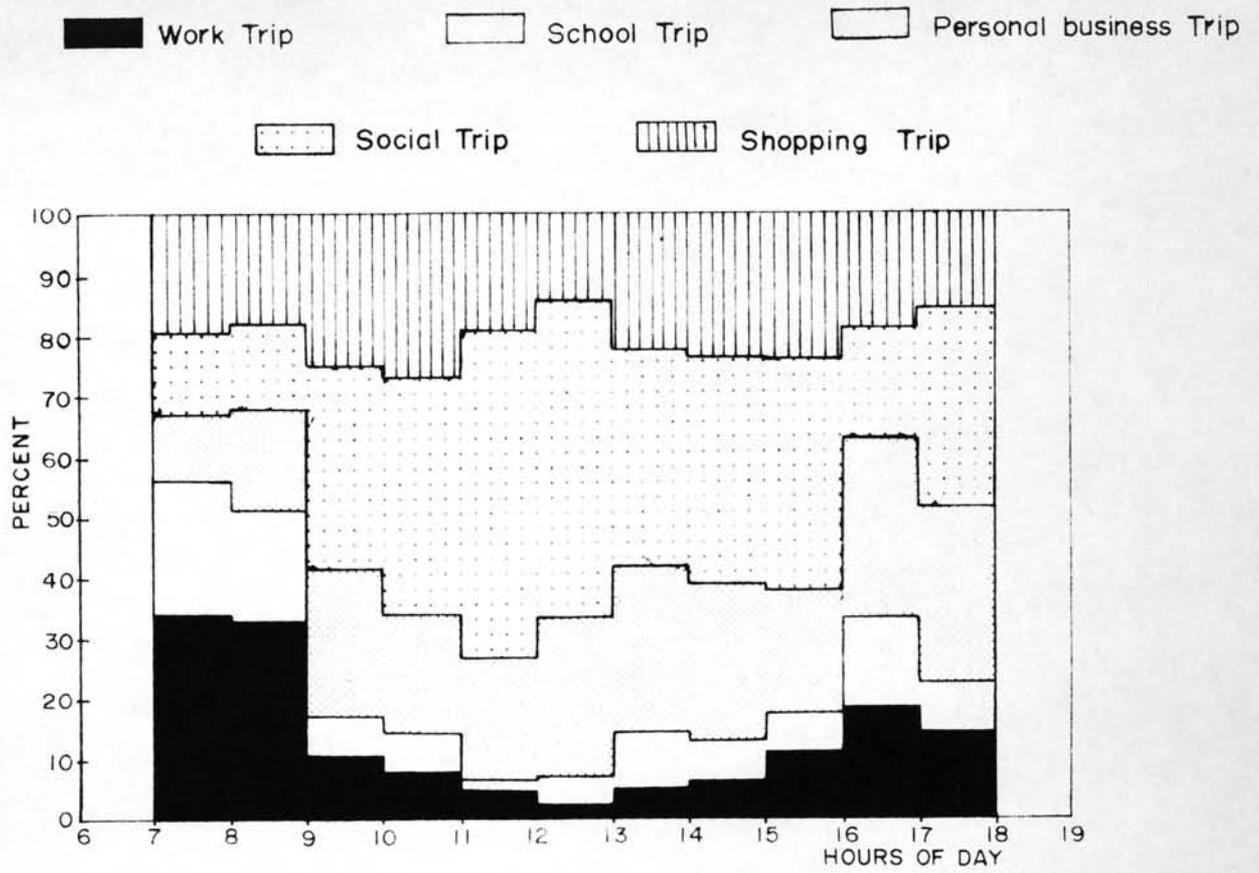


Fig. 20 HOURLY VARIATION OF PURPOSE OF PERSON TRIPS BY MINI-BUS

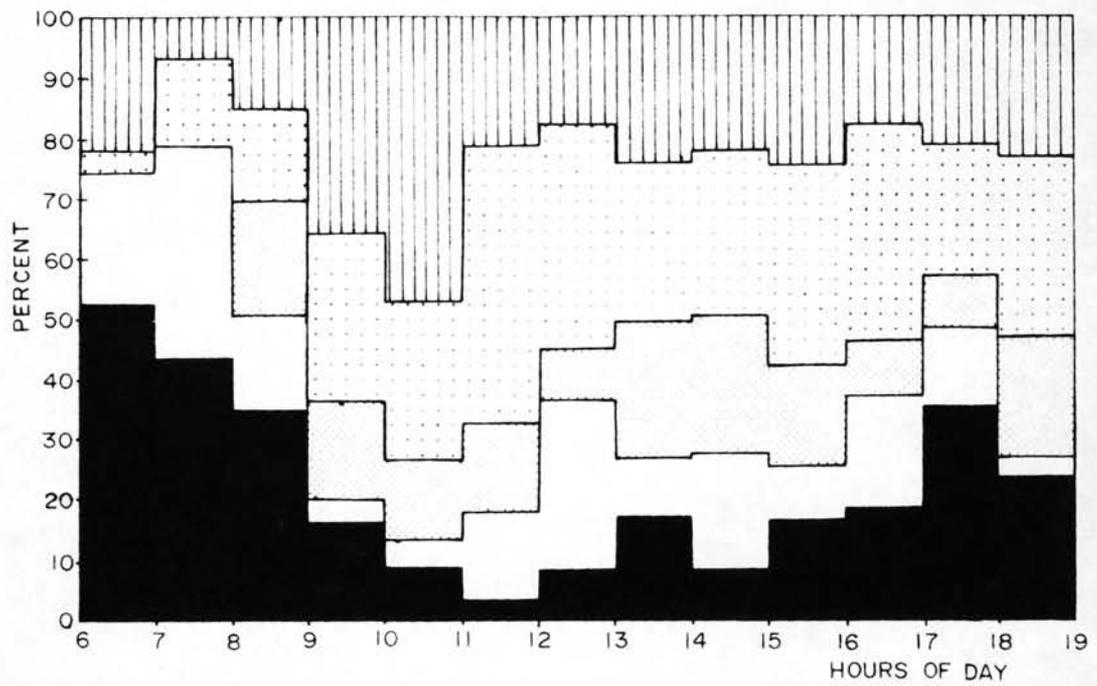


Fig. 21 HOURLY VARIATION OF PURPOSE OF PERSON TRIPS BY CITY BUS

Demographic Characteristics

In addition to the origin, destination, and trip purpose questions, the demographic characteristics of passengers using the public transport services were obtained for four types of information : sex, level of education achieved, age, and occupation. Table 19 gives a summary of the demographic characteristics by percentage distribution; the results are illustrated in the histograms of Figs. 22, 23, 24, and 25 for the distribution of sex, education, age, and occupation, respectively. The survey showed the dominance (63 %) of females travelling by mini-bus, in contrast with the travellers on city buses who are mostly (72 %) males. This may be due to a bias in obtaining the sample interviews. The distributions of level of education of mini-bus and city-bus respondents differed only slightly. However, it appears that mini-bus respondents are somewhat better educated (and consistently so) than city-bus respondents.

The age distributions of persons using mini-buses and city buses are nearly the same though the median age of mini-bus passengers was slightly older than that of city-bus passengers. The largest group of respondents was of age 18 to 25 years. Table 18 shows the age distribution of the population in Changwat Chiang Mai and the Chiang Mai Municipal Area in 1975. These data were obtained from the NATIONAL STATISTICAL OFFICE (1970) using the 1970

Table 18 Estimated Age Distribution of the Population in 1975

Age, yrs	Changwat Chiang Mai		Municipal Area	
	Number	Percent	Number	Percent
5 - 12	211,286	24.4	12,891	18.0
13 - 17	154,294	17.8	10,807	15.0
18 - 25	187,653	21.7	18,632	26.0
26 - 35	121,415	14.1	13,483	18.8
36 - 50	190,069	22.0	15,951	22.2
Total	864,717	100.0	71,764	100.0

age distributions of populations and adding five years to each single-year age group. Individuals younger than five years and older than 50 years were excluded from the sub-total from which the percentage distributions were obtained. The occupations reported during the survey were grouped into eight categories as shown in Table 19. In these categories, "trading" means an owned business, and "employees" includes builders, mechanics, etc. Respondents using city-bus services comprised 72 percent students and employees. This high percentage may be explained by the lower income levels of these occupation categories which require the individuals to economize on their transportation expenses. It appears that mini-bus passengers come from a broader spectrum of educational and occupation levels than the city-bus passengers.

Reason for Choice of Mode

The respondents reasons for riding mini-buses, and city buses, were assigned to one of seven categories as shown in Table 20 and illustrated in Fig. 26.

According to the responses from passengers on mini-buses, convenience is the main reason (71 %) for their use of the mini-bus service. However, 11.5 percent of those interviewed stated that they use mini-buses because there are no buses operating along the desired routes. It is noticeable that 15.7 percent of the respondents stated that mini-buses provided a faster journey. Details of a separate set of measurements of waiting time, travel time, and delays en route are presented in Chapter 4.

According to the responses from passengers on city buses, cost played a major role (73 %) in their decision to use city buses. Interestingly, 11.8 percent of those interviewed said that mini-bus drivers generally wouldn't go to the passengers' destination because of long distances or the low probability passengers on the return trip.

The relationships between demographic characteristics of the passengers and the reasons for riding mini-buses or city buses are shown in Appendix B, Tables Ap/B1 to Ap/B8. From these data, it can be seen that the demographic characteristics of passengers using either mini-buses or city buses were found to be somewhat related to the reason for riding them.

Frequency

The frequencies (in trips per week) of using mini-buses and city buses were placed in eight categories as shown in Table 21 and illustrated in Fig. 27. The results were obtained by asking the trip-making habits of interviewed passengers. The "once in a long period" trip frequency means that such a trip would occur less frequently than once per week, or the respondents could not provide a more definitive answer during the interview. The distributions of frequency of trip-making by mini-bus and city-bus respondents were but slightly different. Fig. 27 shows the dominance of "everyday" and "once in a long period" responses by public transport passengers. From this study, trip frequency seems to be an unimportant indicator of the relative roles of the two public transport systems.

Relationships between demographic characteristics and the frequency of using mini-buses and city buses are shown in Appendix B, Tables Ap/B 9 to Ap/B 16. The age and occupation of persons using public transport services were found to be positively related to trip-making. Education appears to have a slight positive correlation with trip-making.

Table 19 Demographic Characteristics

Characteristics	Mini-Bus %	City Bus %
Sex		
(1) Female	63.2	27.9
(2) Male	36.8	72.1
Education, yrs		
(1) 1 - 4	23.1	31.7
(2) 5 - 7	8.3	11.8
(3) 8 - 10	23.1	20.2
(4) 11 - 12	17.0	15.3
(5) 13 - 15	20.5	17.7
(6) >15	8.0	3.3
Age, yrs		
(1) 0 - 4	0	0
(2) 5 - 12	0.5	1.0
(3) 13 - 17	9.5	15.1
(4) 18 - 25	39.9	45.0
(5) 26 - 35	27.1	18.7
(6) 36 - 50	19.2	13.6
(7) >50	3.8	6.6
Occupation		
(1) Trading	22.6	11.0
(2) Student	25.5	36.1
(3) Government official	10.8	8.7
(4) Employee	15.7	35.5
(5) Housewife	11.0	1.8
(6) Teacher	5.0	1.3
(7) Farmer	4.5	2.0
(8) Unemployed	4.9	3.6

Table 20 Reason for Using Mini-Buses and City Buses

Reason	Mini-Bus %	City Bus %
(1) Faster journey	15.7	0
(2) Buses are crowded	1.4	0
(3) Not on a bus route	11.5	0
(4) Cheap fare	0	73.1
(5) Mini-bus generally won't go	0	11.8
(6) Convenience	71.4	11.8
(7) Safety	0	3.3

Table 21 Frequency Distribution of Mini-Bus and City Bus Usage

Frequency	Mini-Bus %	City Bus %
(1) Everyday	29.0	27.1
(2) Everyday except Sundays	2.2	6.9
(3) Everyday except Saturdays and Sundays	7.0	7.7
(4) 4 - 5 days a week	1.6	0.8
(5) Alternate days	1.2	0.8
(6) A few days a week	13.9	14.0
(7) Once a week	3.6	13.3
(8) Once in a long period	41.5	29.4

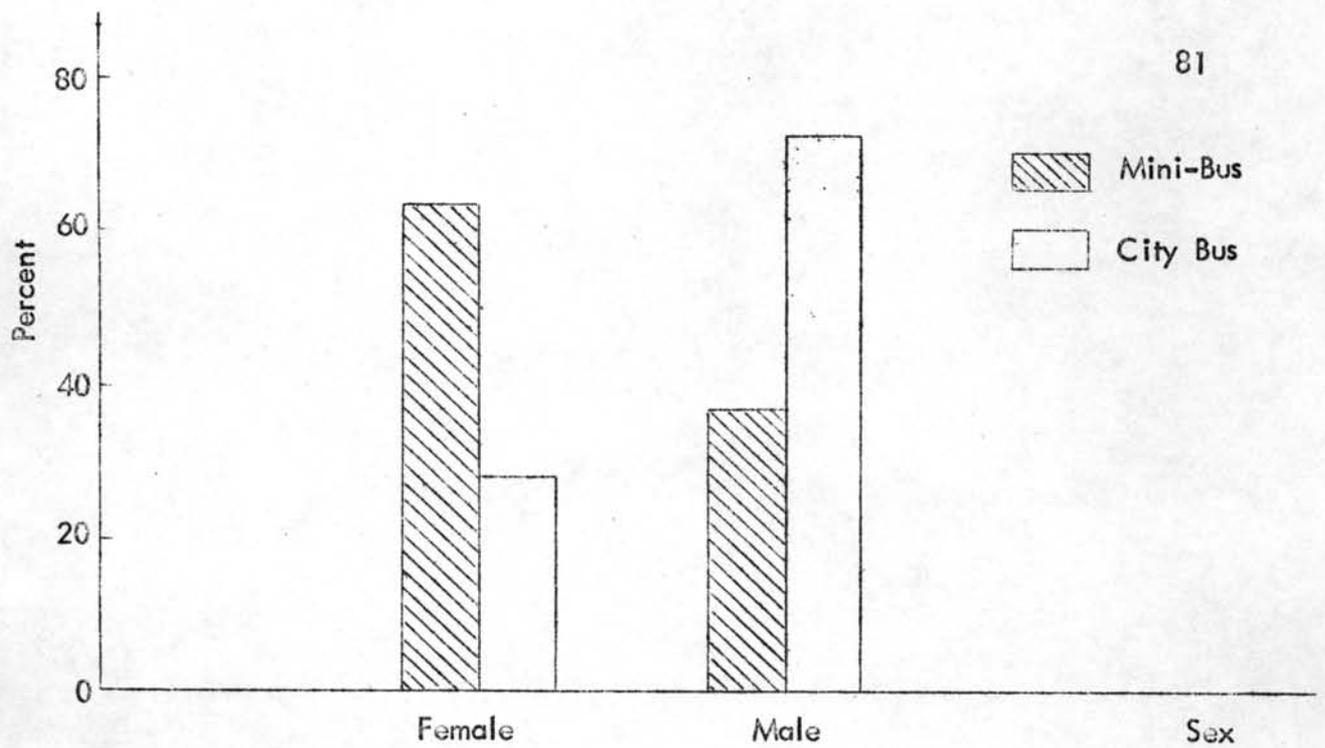


Fig. 22 Sex Distribution of Person Trips

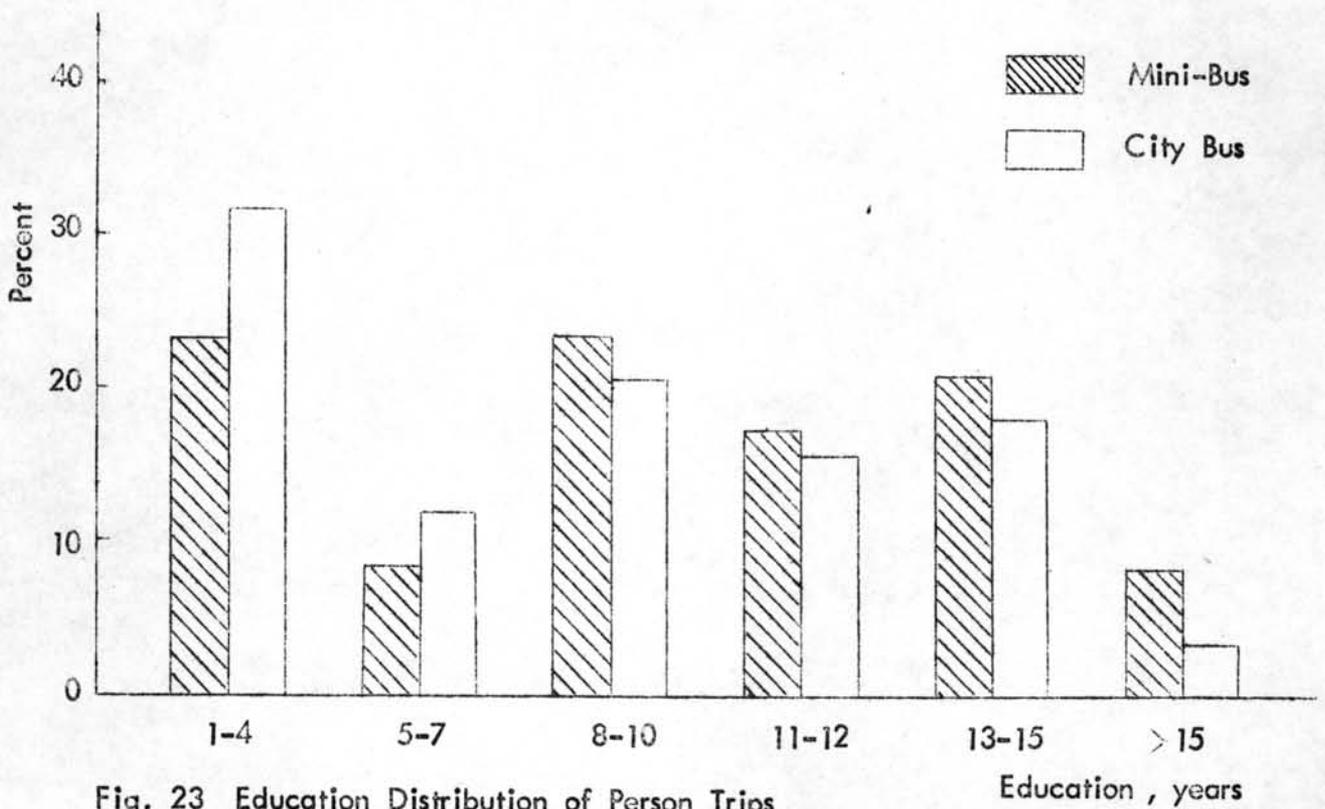


Fig. 23 Education Distribution of Person Trips

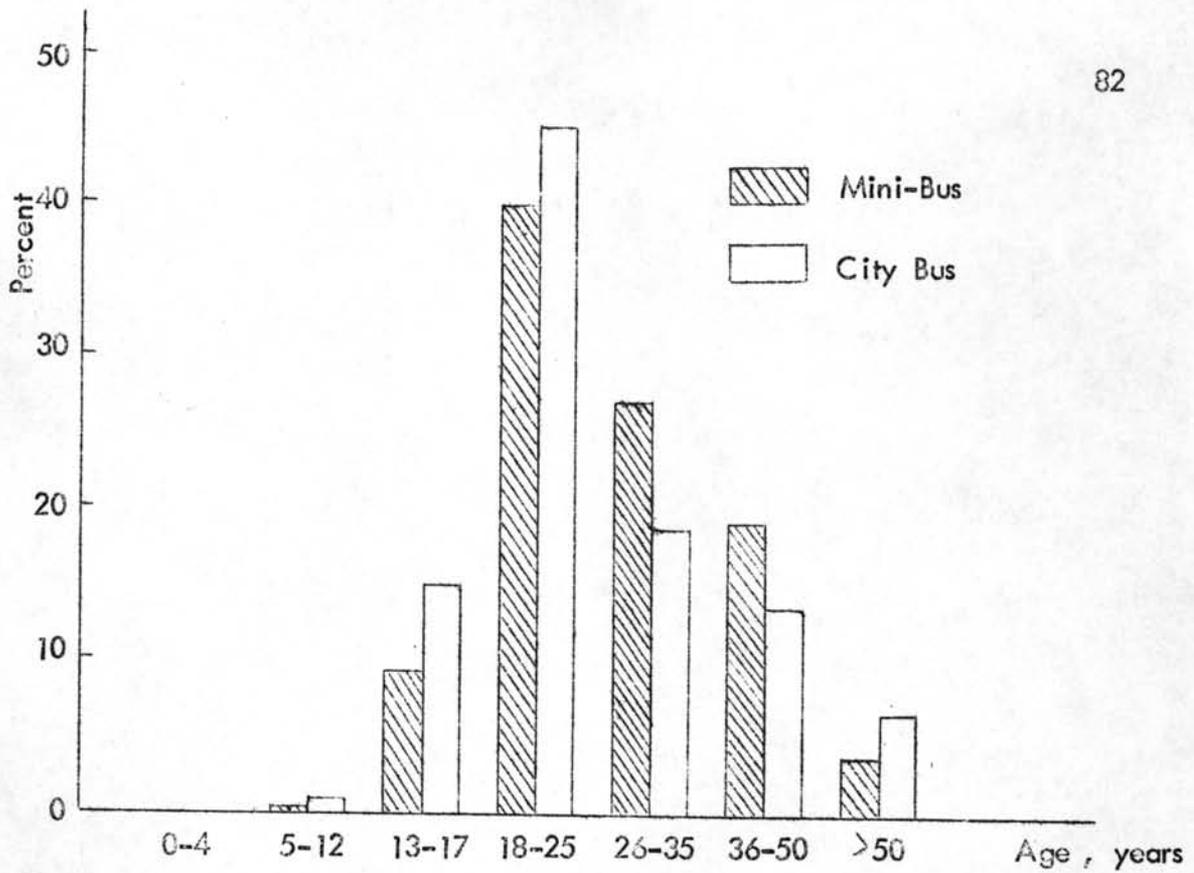


Fig. 24 Age Distribution of Person Trips

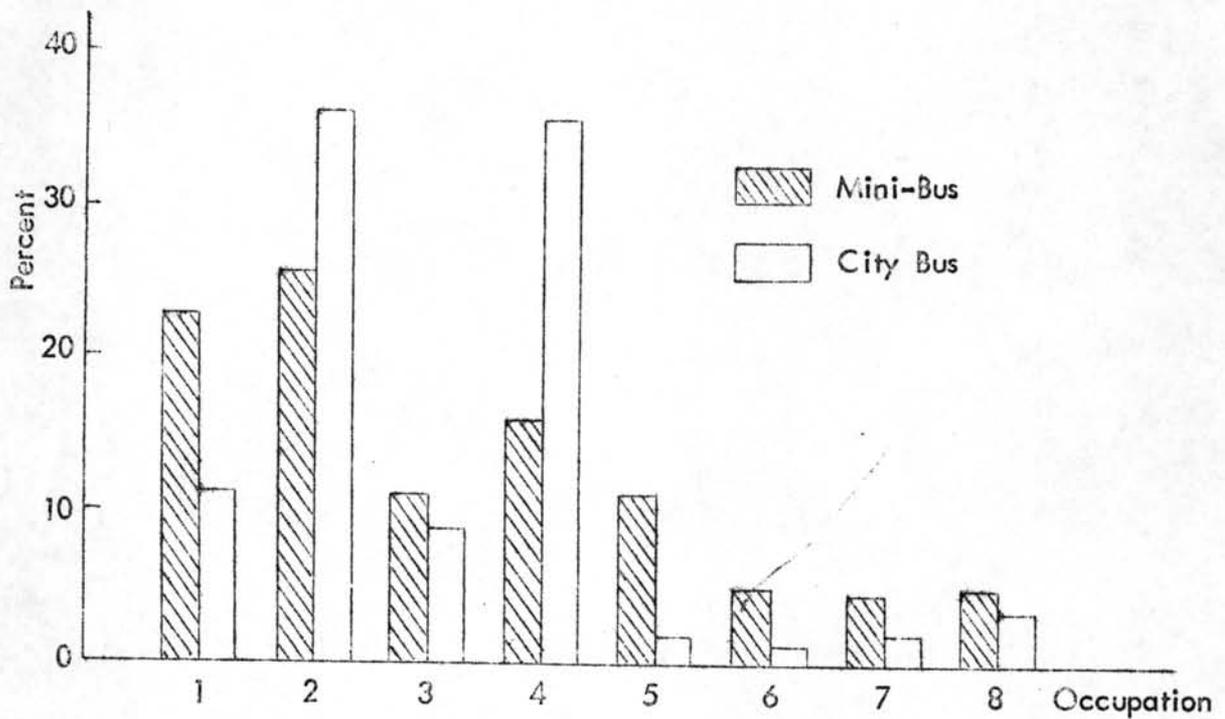


Fig. 25 Occupation Distribution of Person Trips

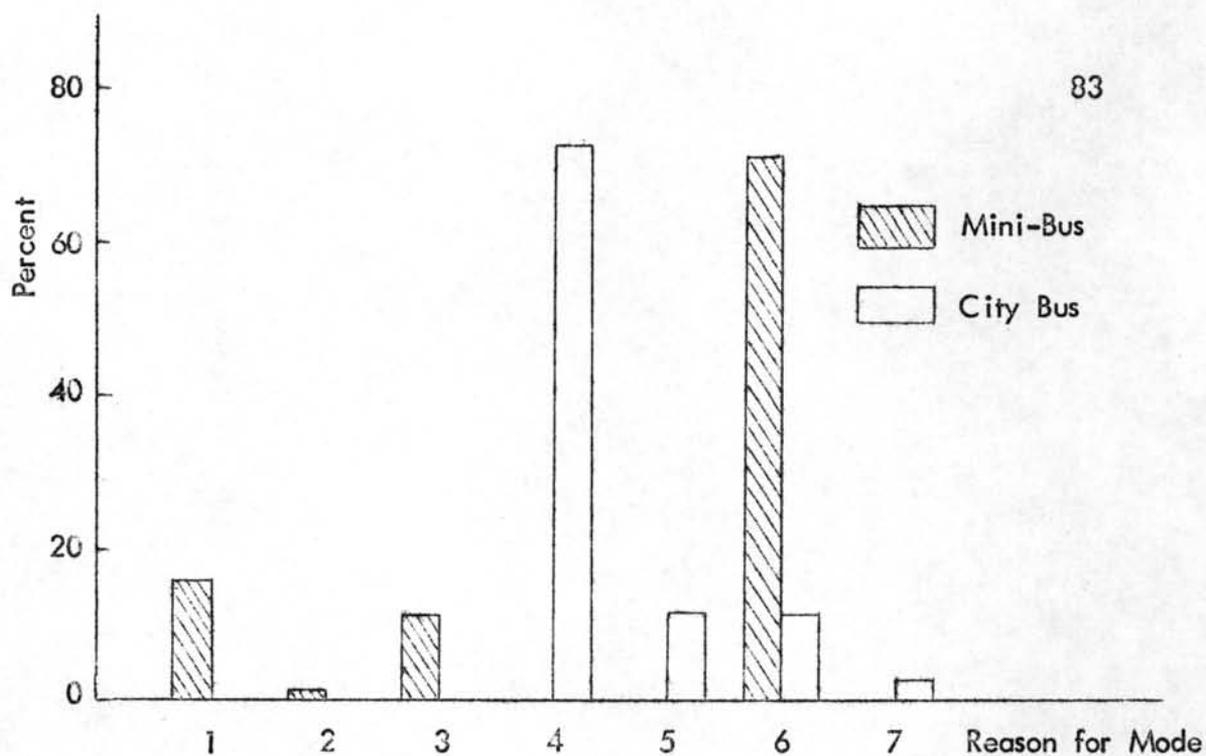


Fig. 26 Reason for Mode Distribution of Person Trips

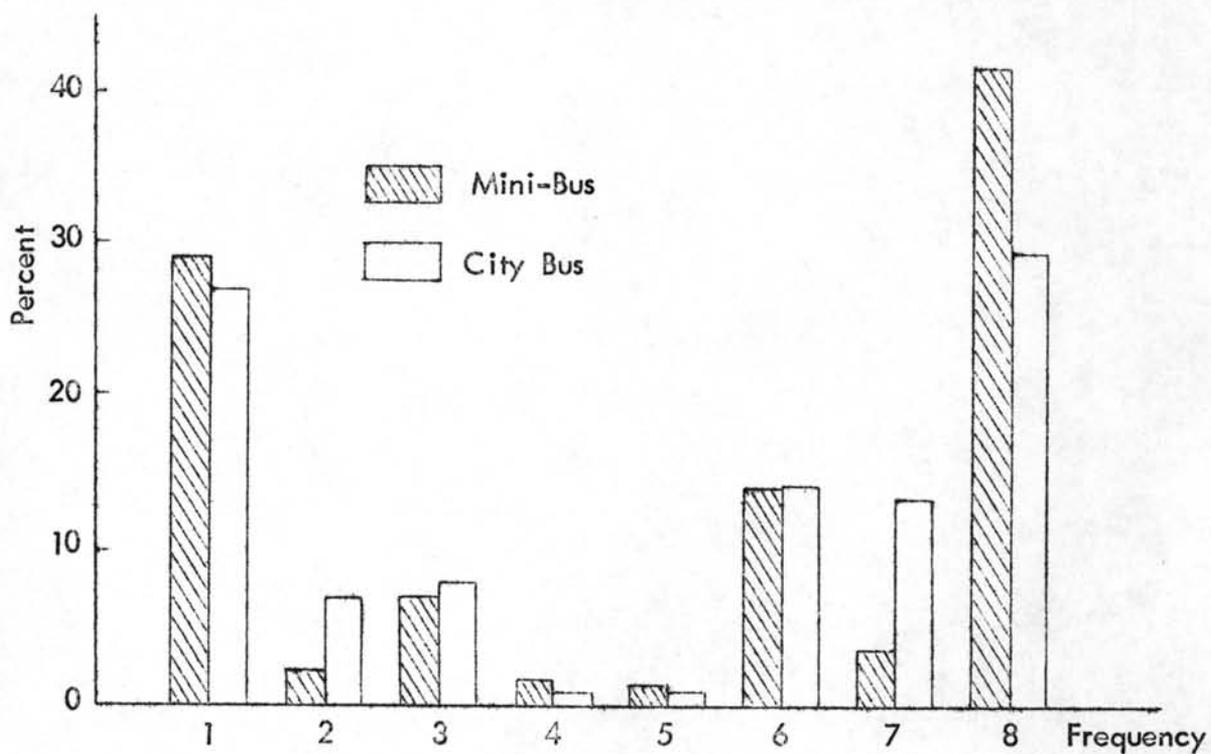


Fig. 27 Frequency Distribution of Person Trips

Screen Line Survey

For this study the Ping River was chosen as a screen line across the study area. Although there are four bridges across the river within the study area, only the Nakorn Phing and Nawarat Bridges were employed as check points because these two bridges serve as the principal transportation arteries between the city center and the area east of the Ping River. A screen line survey was performed on 3rd December 1975 from 06.30 to 20.30 hrs. This observation period was chosen as it covered nearly all of the operating hours of the public transport services. Eight observers were formed into four teams of two men each; each team observed traffic moving in one direction. Each team had to count and record the number of passengers crossing the Ping River by the several modes of public transport. The headings of the form used for this survey are shown in Appendix A, Table Ap/A 3. The results of the screen line survey of person trips by modes of public transport are shown in Appendix B, Table Ap/B 17. The hourly variation of passengers crossing the Ping River in each direction by mini-bus and by city bus were plotted and are shown in Figs. 28 and 29, respectively. It appears that slightly more than half of the two modes of public transport trips are made during the two peak periods.

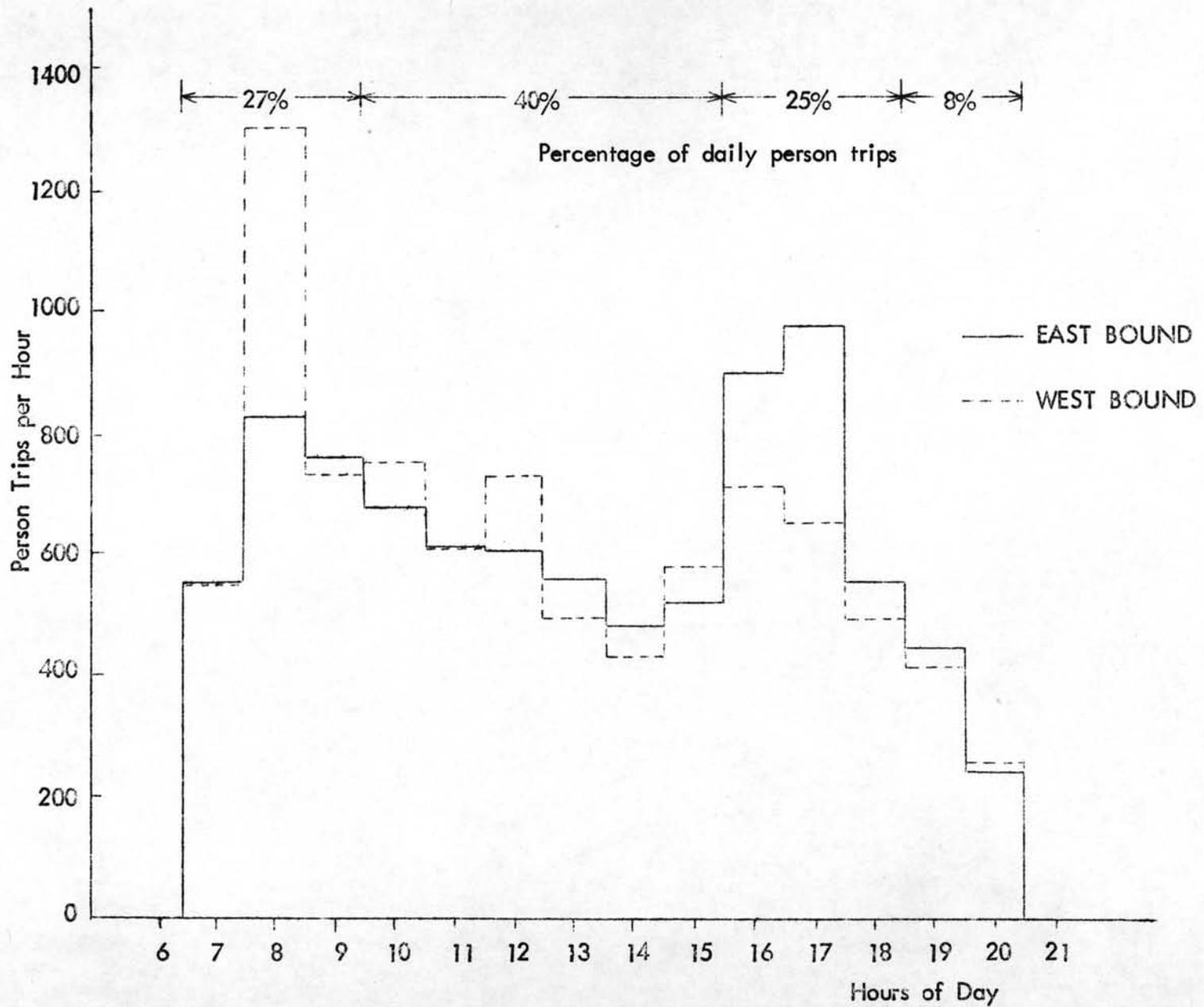


Fig. 28 Hourly Variation of Person Trips by Mini-Bus Crossing the Ping River

Source : Screen Line Survey

3 rd December 1975

Note: Not including queue mini-bus passengers

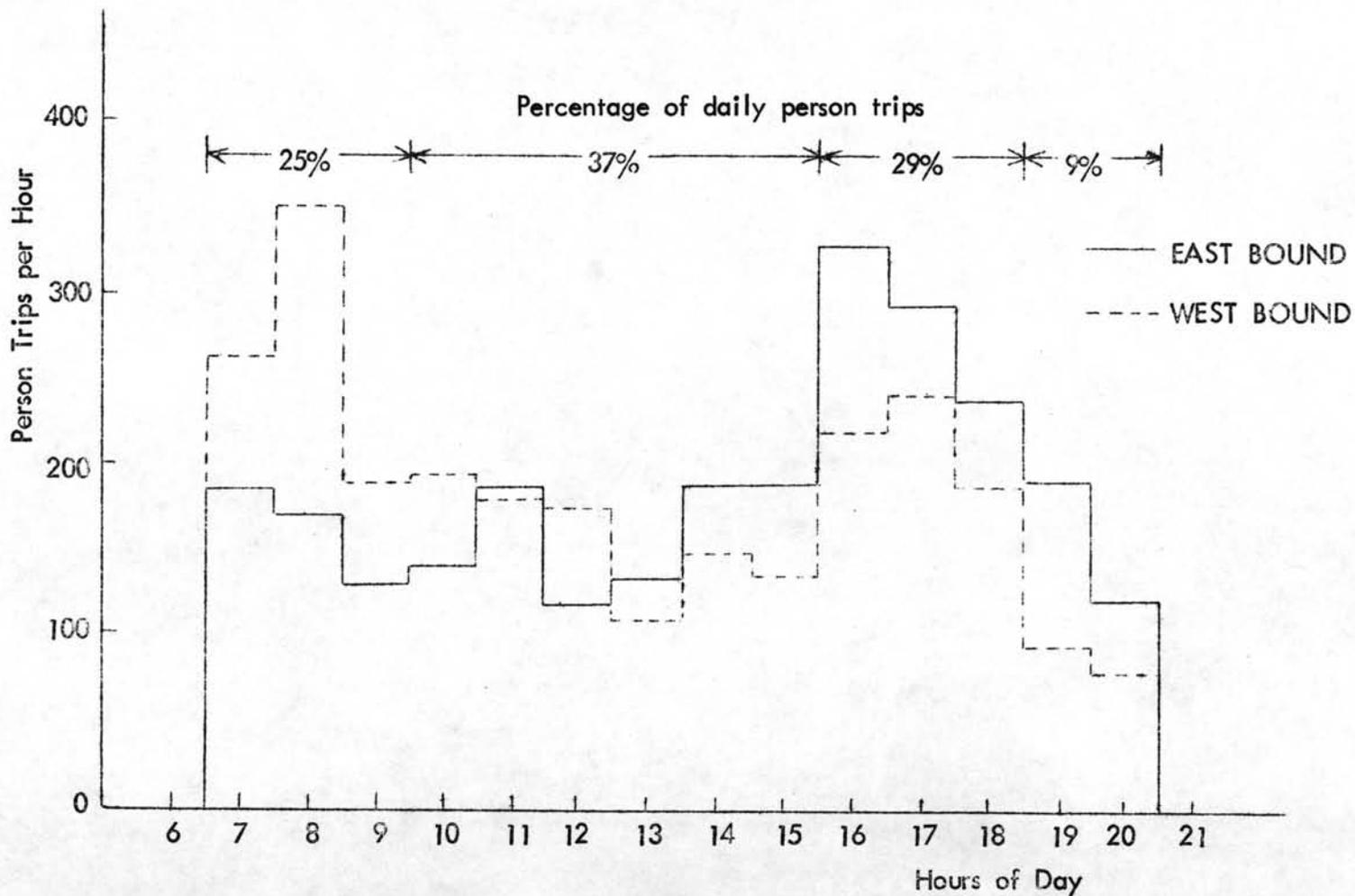


Fig. 29 Hourly Variation of Person Trips by City Bus Crossing the Ping River

Source: Screen Line Survey

3rd December 1975

Note: Not including queue mini-bus passengers

Table 22 Total Person Trips Crossing the Ping River by
Mini-Bus and City Bus

Mode	Sample (1)	Screen Line* (2)	Expansion Factor (3) = $\frac{(2)}{(1)}$
Mini-Bus	297	17,445	58.7
City Bus	149	5,211	35.0
Queue Mini-Bus	-	18,388	-

* 14-hour survey (06.30 - 20.30 hrs)

To estimate the daily person trips in the entire study area, the data from the passenger interview surveys were first analyzed to give a total of the inter-zonal movements that required a crossing of the Ping River; these trips were separated into mini-bus and city-bus trips. The results are shown in column (1) of Table 22. This table also shows the results from the screen line survey of the numbers of passengers who crossed the river by mini-bus and by city bus (column 2). An initial estimate of the expansion factor was made by dividing the total number of passengers per day crossing the Ping River observed from screen line survey by the number of cross-river journeys obtained from the inter-zonal movements reported in the passenger interviews (column 3). The resulting preliminary expansion factors are 58.7 and 35.0 for person trips by mini-bus and city bus, respectively. It can be seen that the preliminary expansion factor for person trips by mini-bus is 1.68 times that of person trips by city bus.

From the city-bus company dispatchers' daily reports, an independent source, the total person trips by city bus averaged 23,263 trips per day for the three city-bus lines, as shown in Table 3. From the sample interview survey, a total of 391 successful interviews were obtained from passengers who travelled by city bus. From these figures, the final expansion factors for total person trips by city bus and by mini-bus were estimated as follows:

$$\text{Expansion factor for city bus} = \frac{23,263}{391} = 59.5$$

$$\text{Expansion factor for mini-bus} = 1.68 \times 59.5 = 100.0$$

These two expansion factors were accepted as the factors to be applied to all city-bus and mini-bus passenger interviews to obtain the total daily person trips by city buses and mini-buses in the study area. Table Ap/B 18 and Ap/B 19 show the daily person-trip distributions by mini-bus and city bus, respectively. Thus, approximately 225,000 person trips are made daily on the public transportation services* in the study area. About 202,000 person trips per day (90 percent) were made on mini-buses, and 23,000 person trips per day (10 percent) were made by city buses. Table Ap/B 20 shows the estimated lengths of inter-zonal and intra-zonal trips. Inter-zonal trip lengths were approximated by measuring the straight-line distances between the centroids of the zones, regardless of actual street locations. For the intra-zonal trip lengths, the approximate distance between the two main places of

* Trips made on city buses and free-running mini-buses. In addition, a substantial number of intercity and city/suburban trips are made by queue-based mini-buses; see pp. 35-38

attraction in each zone was taken as the length of each intrazonal trip. Table 23 shows the average person trip lengths by mini-bus and city bus ; these results were obtained by calculation from Tables Ap/B 18, Ap/B 19, and Ap/B 20. These results support the finding that mini-buses are used predominantly to carry short-distance passengers whereas the city buses serve somewhat longer distance passengers, as was found in the analysis of travel desires.

Table 23 Estimated Average Person Trip Lengths

Mode	Pass./day	Pass.-km/day	Avg Trip Length (km)
Mini-Bus	201,900	245,694	1.21
City Bus	23,294	42,046	1.80