

## 1.2.2 Travel Demand and Characteristics

### (1) Overall Travel Demand

It is estimated, based on the 2007 HIS, that a total of 2.87 million trips (including all modes of travel) a day is made in Dar es Salaam, of which 2.13 million trips (74 % of the total) are made by motorized modes of transport. An average gross trip rate is calculated at 1.2 trips per day.

**Table 1.2.8 Overall Travel Demand**

Item	Male	Female	Total
Population aged 7 yrs old and above (1,000)	1,211.1	1,198.8	2,409.9
No. of Trip Makers (1,000)	730.8	434.9	1,165.7
Trip Maker Ratio (%)	60.3	36.3	48.4
Total Trip Generation (1,000)	1,823.6	1,049.0	2,872.6
Total Motorized Trips (1,000)	1,416.7	711.5	2,128.2
Trip Rate (Gross)	1.5	0.9	1.2
Trip Rate (excluding walk trip)	1.2	0.6	0.9

Source: 2007 HIS by JICA Study Team

### (2) Hourly Trip Generation

Travel demand pattern by hour of day is shown in Figure 1.2.8 (by purpose) and Figure 1.2.9 (by mode).

There observed two travel demand peaks in the morning and late afternoon. The highest morning peak hour is observed in 06:00 – 07:00 hours, reaching at 18% of the total day demand, which is mostly consisted of “to work” and “to school” trips. The second largest peak hour is also found in the morning between 7:00 to 8:00 hours with 13% concentration. The late afternoon peak can be seen at periods between 14:00 to 19:00 hours, which is mostly consisted of “to home” trips.

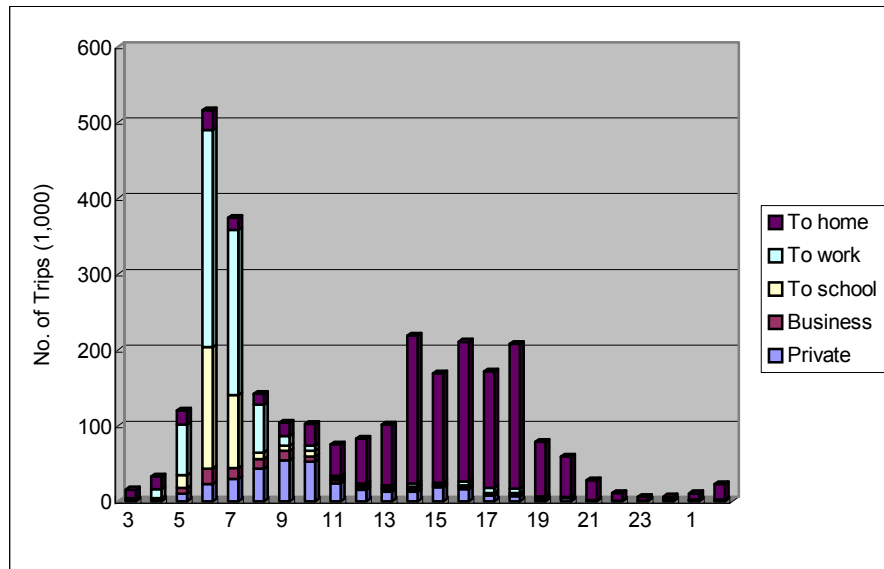


Figure 1.2.8 Hourly Trip Generation by Trip Purpose

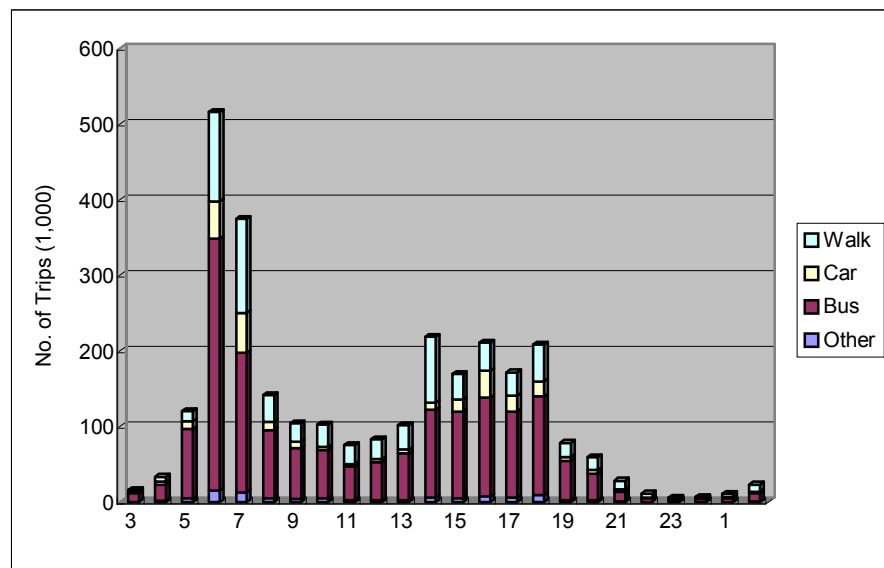


Figure 1.2.9 Hourly Trip Generation by Trip Mode

Table 1.2.9 shows the peak ratio and peak hour by travel purpose. A peak ratio of both “to work” and “to school” trips is extremely high, while the rest of trips are not so high. The peak hour of “Business” trips is also observed in the early period in the morning.

Table 1.2.9 Peak Ratio

	To work	To school	Business	Private
Peak Hour	6:00-7:00	6:00-7:00	6:00-7:00	9:00-10:00
Peak Ratio (%)	40.5	50.7	19.9	15.5

Source: 2007 HIS by JICA Study Team

### (3) Demand Characteristics by Super Zone

Figure 1.2.10 shows trip generation (production and attraction) by trip purpose by super zone. In these figures, the size of the pie chart expresses the number of trip generation while the composition of trip purpose is expressed by colour.

Trip production pattern in terms of space is almost same as the population distribution, while a large number of trip attractions with “to work” and “to school” purpose is observed in the Central area.

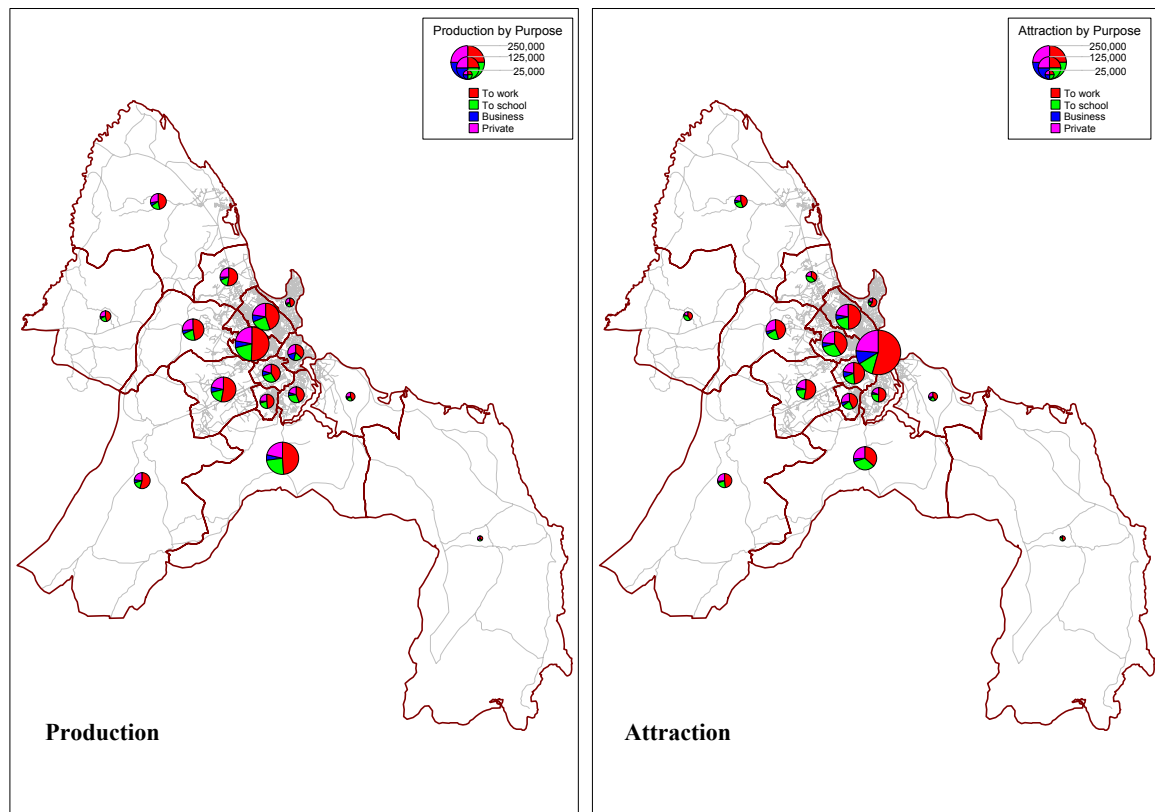


Figure 1.2.10 Trip Generation by Trip Purpose

Figure 1.2.11 shows trip generation and attraction by mode of transport. A relatively higher share of car use is observed in Msasani and Bagamoyo area in the trip production, and in the central area in the trip attraction. Most of the trip makers in the western and southern part of Dar es Slaam use buses.

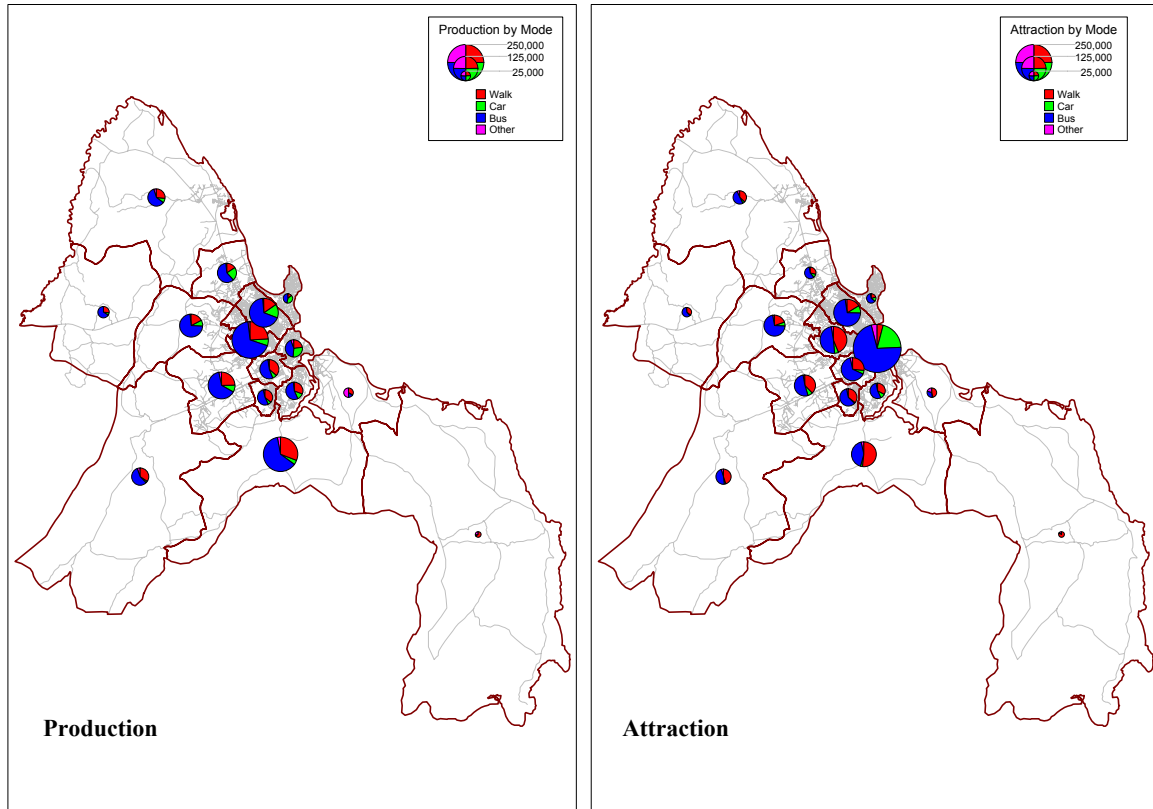


Figure 1.2.11 Trip Generation by Mode of Transport

(4) Trip Purpose and Modal Share

Table 1.2.10 shows the composition of trip purposes. “To go to usual work place” trips and “To school” trips account for 25% and 11% respectively. The ratio of “To school” trip seems to be low because HIS was conducted during school holydays, which indicates necessity of adjustment in producing OD matrices.

Table 1.2.10 Trips by Trip Purpose

Trip Purpose	All Mode Trips			Excluding Walk Trips		
	(1,000)	% to total	% to total	(1,000)	% to total	% to total
To go home	1,397.6	48.7		1,028.1	48.3	
To go to usual work place	706.2	24.6	47.9	569.4	26.8	51.8
To school	315.1	11.0	21.4	164.7	7.7	15.0
Business activities	93.5	3.3	6.3	80.3	3.8	7.3
Back to working place	10.6	0.4	0.7	8.4	0.4	0.8
Private activities	339.2	11.8	23.0	268.5	12.6	24.4
Pick up of send off	10.4	0.4	0.7	8.9	0.4	0.8
<b>Total</b>	<b>2,872.6</b>	<b>100.0</b>		<b>2,128.2</b>	<b>100.0</b>	

Source: 2007 HIS by JICA Study Team

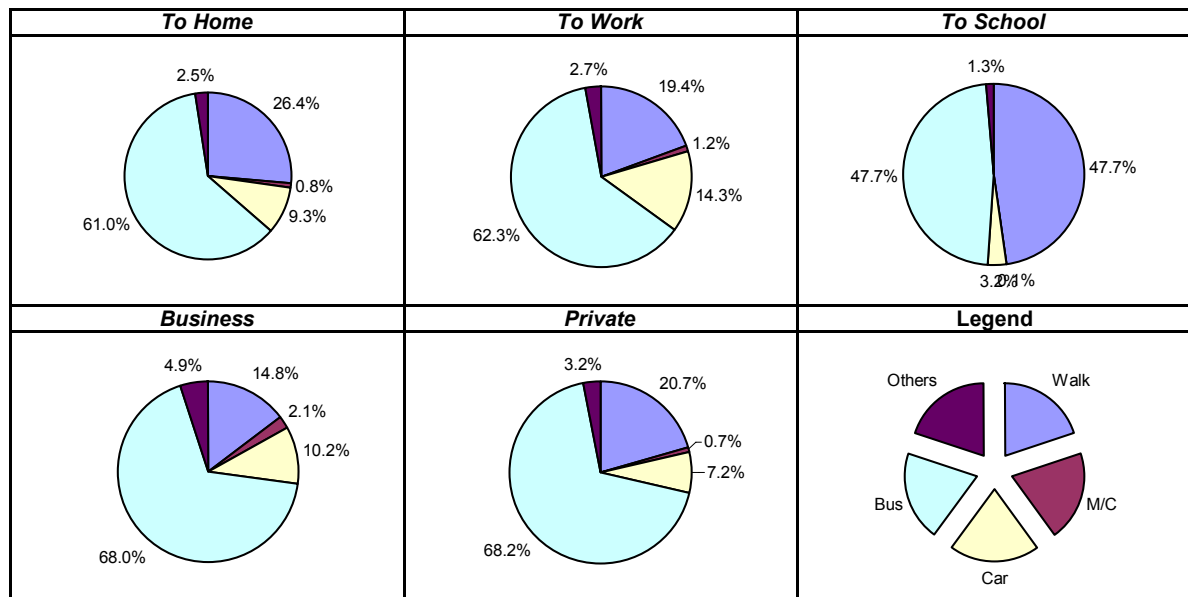
Table 1.2.11 shows trips by representative modes of transport. The share of “walking” is about 26%. When the “walking” trips are excluded from the calculation, the share of public modes of transport is calculated at 82.3%, and most of these trips are made by Dala Dala.

**Table 1.2.11 Trips by Representative Transport Mode**

Transport Mode	No. of Trips (1,000)	% to total	% to total (excluding walking)
Walking	744.3	25.9	
Private Mode	376.5	13.1	17.7
Bicycle	39.5	1.4	1.9
Motorcycle	24.6	0.9	1.2
Passenger car	158.1	5.5	7.4
Pick-up, van	99.4	3.5	4.7
Taxi	18.2	0.6	0.9
Others	36.6	1.3	1.7
Public Mode	1,751.7	61.0	82.3
Dala dala	1,714.6	59.7	80.6
Intercity bus	2.4	0.1	0.1
School bus	34.7	1.2	1.6
Total	2,872.6	100.0	

Source: 2007 HIS by JICA Study Team

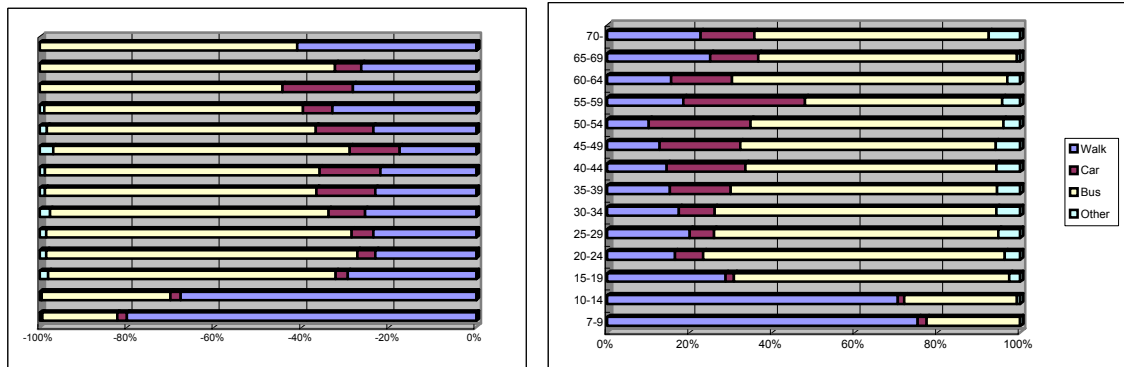
Figure 1.2.12 shows modal share by trip purpose. About 60% of the “to work” trips and about 50% of the “to school” trips are made by buses. A relatively high modal share of “passenger car” is observed in the “to work” trips, reaching at around 14%. About half of the “to school” trips are made by “walk”.



**Figure 1.2.12 Modal Share by Trip Purpose**

**(5) Modal Share by Age and Sex**

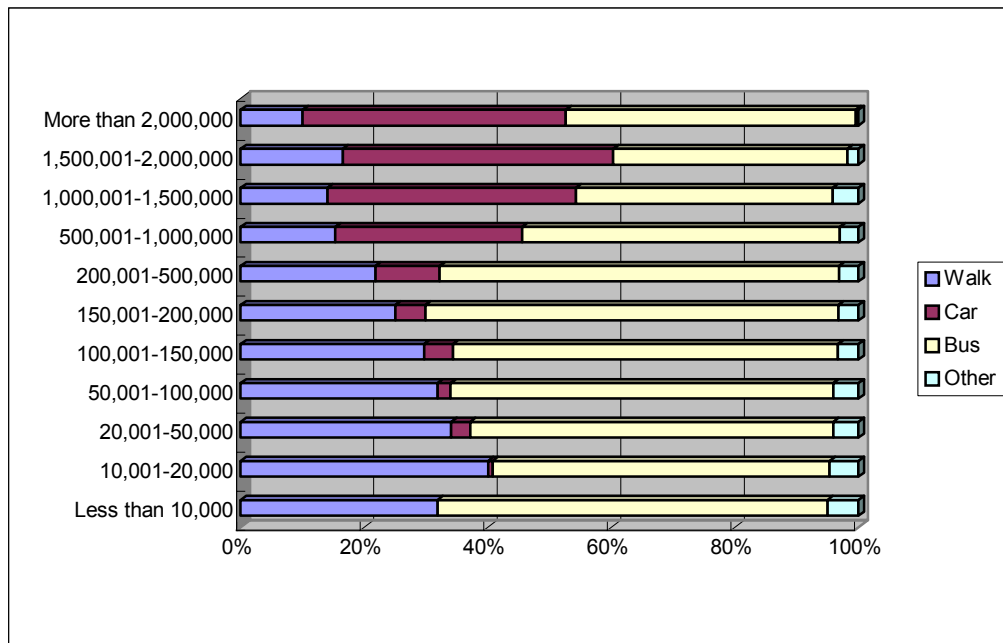
Figure 1.2.13 illustrates the modal share by age and sex. It is clearly observed that a share of walk trips in each age group is higher in the female group. While the share of car trips is higher in the male group in general.



**Figure 1.2.13 Modal Share by Age Group and Sex (Left: Female, Right: Male)**

**(6) Modal Share by Income Group**

The modal share by income group is shown in Figure 1.2.14. Cars are mainly used by the groups of over 500,000 Tsh. Income per month, while the people in lower income groups use buses. The walk trip share tends to be higher in the lower income groups.

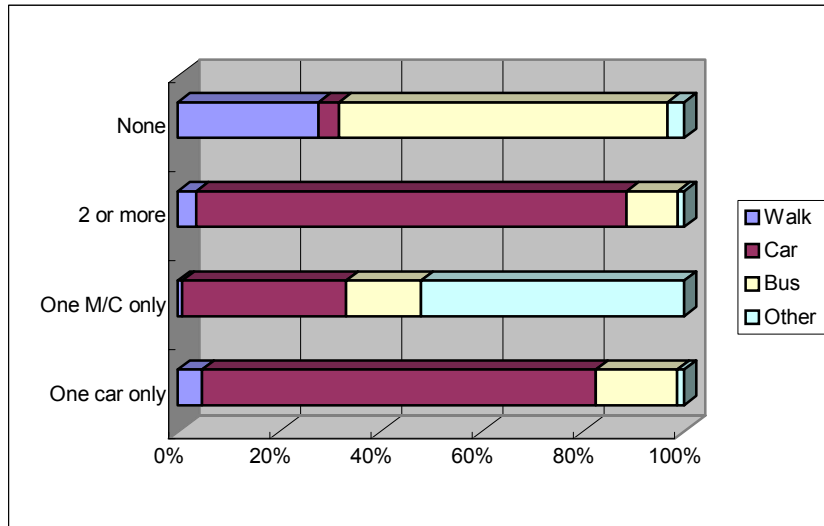


**Figure 1.2.14 Modal Share by Household Income Level**

**(7) Modal Share and Car Availability**

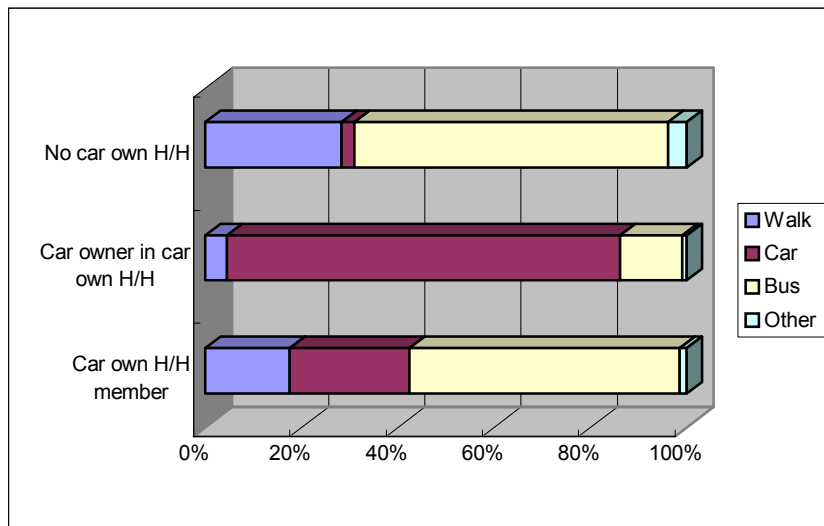
Figure 1.2.15 shows the modal share by individual vehicle ownership, whilst Figure 1.2.12 shows the modal share of members of the car owning households.

85% of the people in the households owning “more than one car” make a trip by car, while 78% in the households owning “one car only” travel by car.



**Figure 1.2.15 Modal Share by Individual Car Ownership**

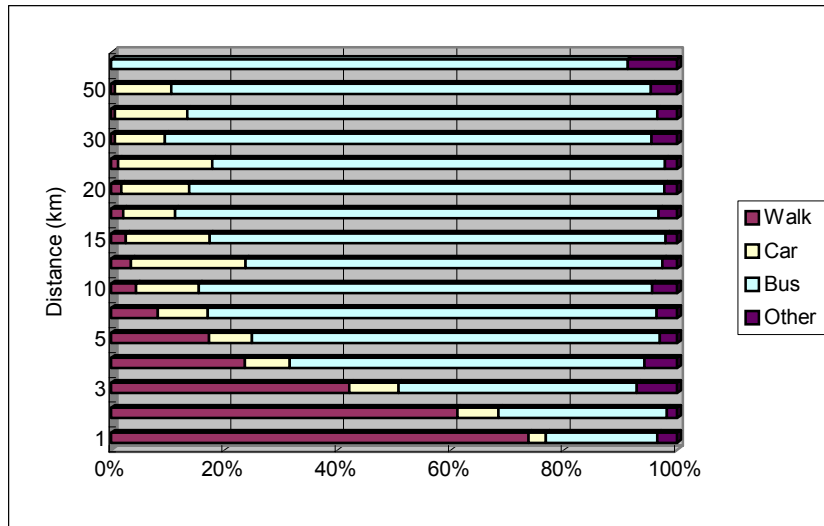
In fact, it is not necessary for all household members can use the car at the same time. As shown in Figure 1.2.16, most of the car owners (more than 80%) in the car owning household travel by the car, while modal share of other household members is about 24%.



**Figure 1.2.16 Modal Share by Car Availability**

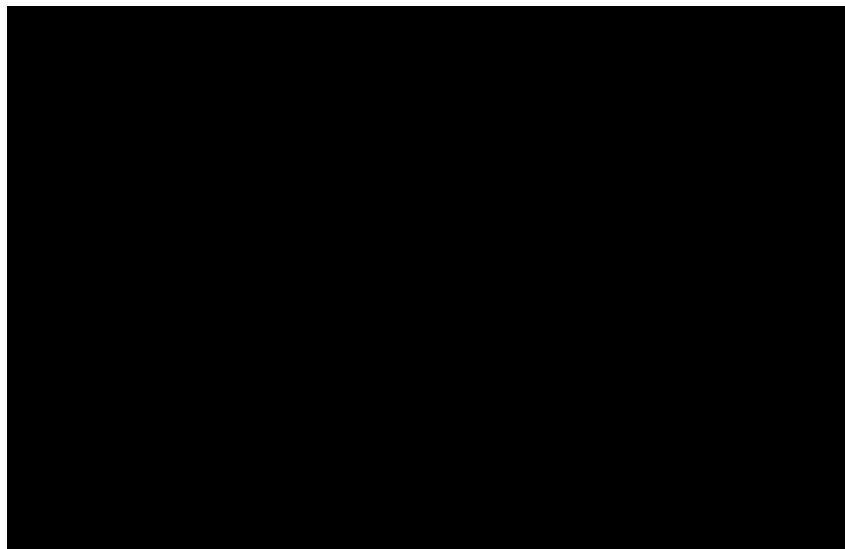
**(8) Modal Share by Travel Distance**

Figure 1.2.17 shows the modal share by travel distance, which are calculated based on the computerized transport network in STRADA model. The walk trip shows a clear tendency in the modal share by travel distance, that is, walk trips are made less than 5 km.



**Figure 1.2.17 Modal Share by Travel Distance**

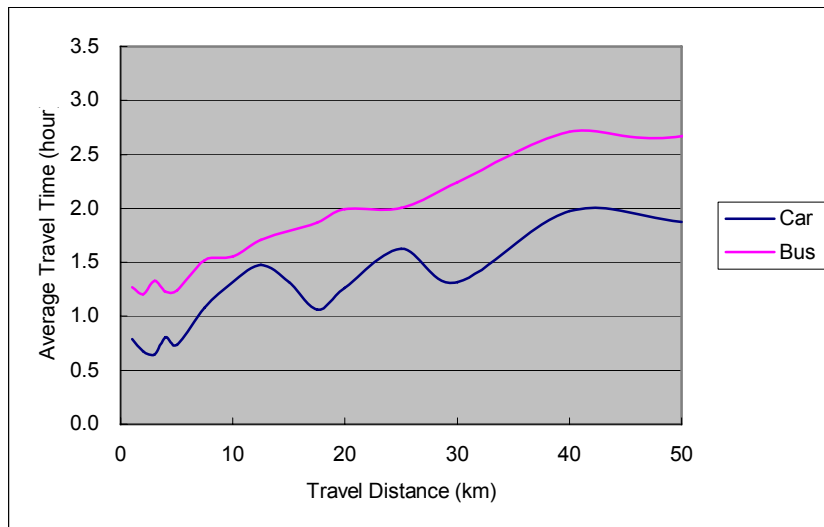
Figure 1.2.18 shows the trip length distribution of whole trips including walk trips. 70% of the whole trips are made within 12.5 km length and 80% is within 16 km. An average travel distance of the whole trips is estimated at 10.6 km.



**Figure 1.2.18 Travel Length Distribution**

Figure 1.2.19 shows travel time by car users and bus users. It is very clear that the travel time of bus users are longer than that of car users.





**Figure 1.2.19 Travel Length Distribution**

### **(9) Modal Share by Super Zone**

Figure 1.2.20 illustrates modal share by travel purpose and by super zone. Cars are relatively highly used in the Central, Msasani, Bagamoyo corridor and Kawe area for “to work”, “business” and “private” purpose. The “to school” trips are mainly made by walk or by bus in every zone. Kigambobi has a unique characteristics in the modal share, that is, many people use ferry to cross the bay to reach their destinations.

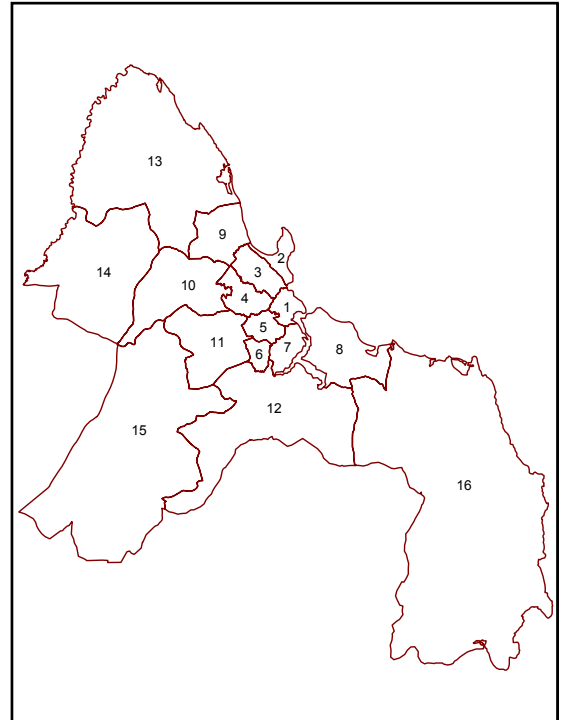
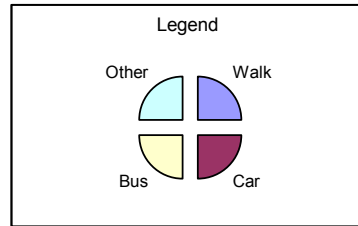
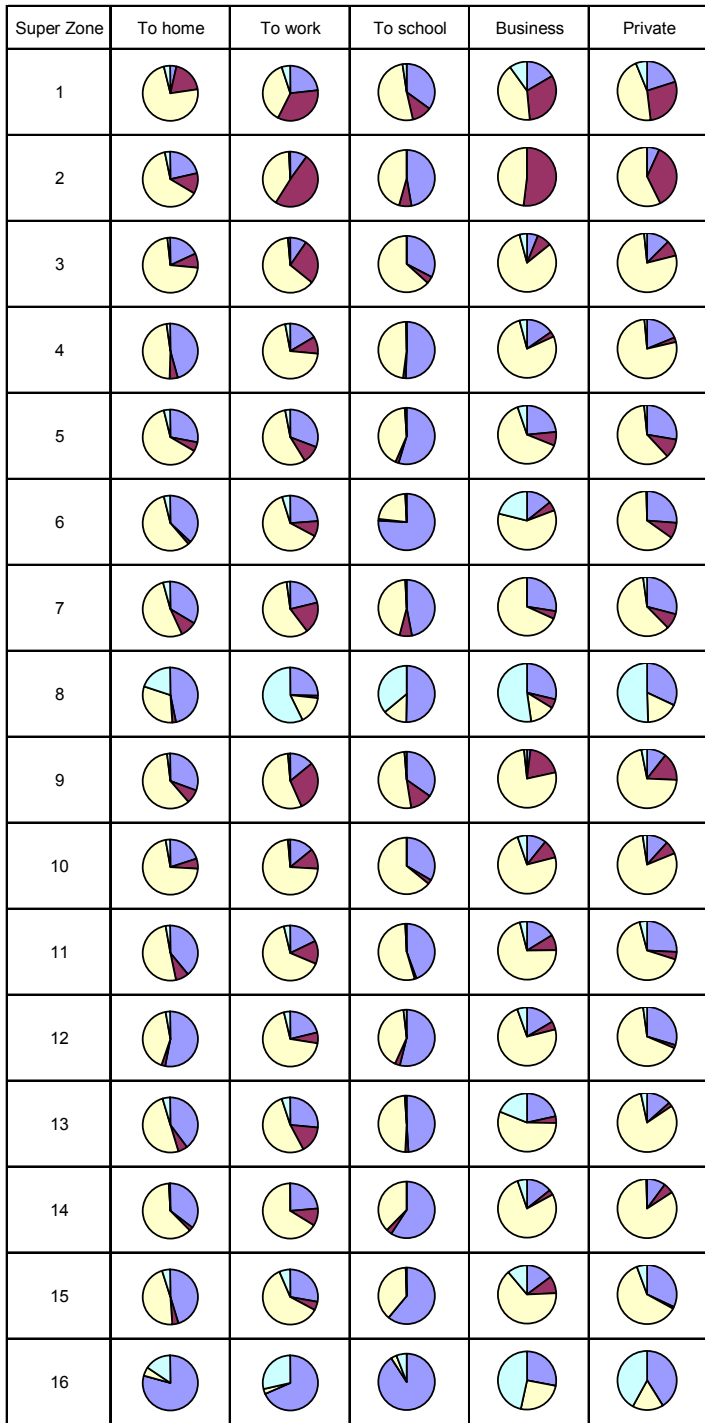


Figure 1.2.20 Modal Share by Super Zone and by Purpose

### (10) Travel Time

Table 1.2.12 shows average travel time by travel purpose. The average travel time of all purpose in the Study area is estimated at 82 minutes. The travel time of “to home” trips is the longest in average, reaching at 88 minutes. The “to work” trip is also long, but lower than the average. The average travel time of “to school” is the shortest in average, but it is close to one hour.

**Table 1.2.12 Average Travel Time by Purpose**

Travel Purpose	Travel Time (min.)
To home	87.9
To work	80.6
To school	59.6
Business	80.2
Private	82.6
<i>All Purpose</i>	<i>82.0</i>

Source: 2007 HIS by JICA Study Team

Table 1.2.13 shows average travel time by mode of transport. The average travel time of all modes in the Study area is estimated at 76.5 minutes. The longest travel time makers are bus users, reaching at 95 minutes. A rather long travel time in comparison with other cities is made by walk trips, being 37.4 minutes in average. Cars users travel almost one hour for one trip in average.

**Table 1.2.13 Average Travel Time by Mode**

Travel Mode	Travel Time (min.)
Walk	37.4
Car	62.7
Bus	95.1
Others	77.7
<i>All Mode</i>	<i>76.5</i>

Source: 2007 HIS by JICA Study Team

Figure 1.2.21 shows average travel time of the trips made from each respective area by traffic analysis zone (TAZ). This figure indicates accessibility to destinations from each zone.

In general trips generated in suburban areas tend to be longer, while trips generated in the areas close to CBD are shorter in travel time. The trips generated along New Bagamoyo road are shorter in travel time, while those along Morogoro and Kilwa are relatively long.

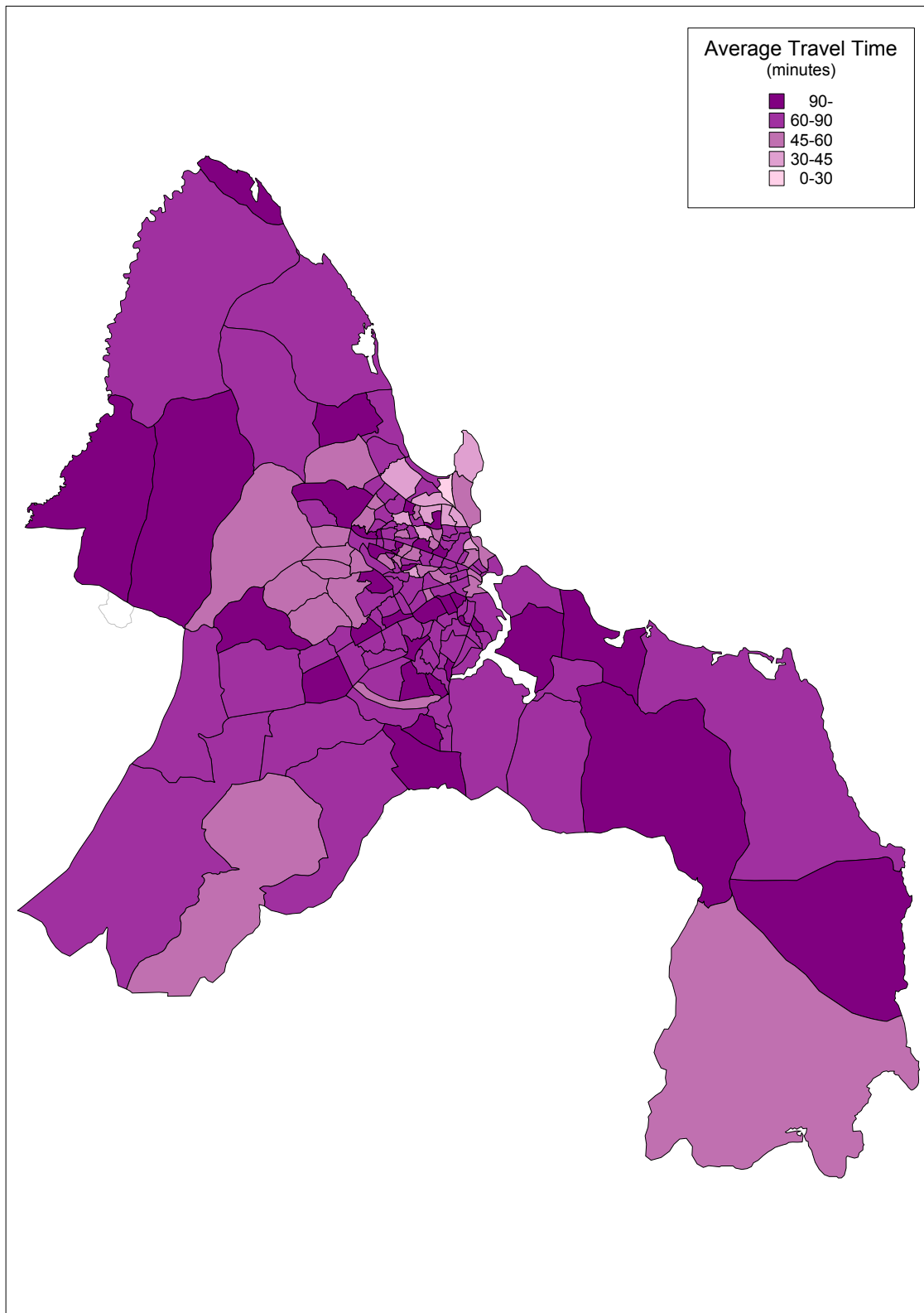


Figure 1.2.21 Average Travel Time by TAZ

### (11) Travel Time by Super Zone

The average travel time by travel purpose and by super zone is summarized in Table 1.2.14.

The longest “to work” travel time is observed in zone 8 (Kigamboni) and 12 (Outer South), reaching more than one hour and half, while the shortest travel time is observed in zone 5: Nyerere corridor zone.

Relatively long “to school” trips are observed in zone 2 (Msasani), 7(Kilwa), 11(Tabata), and 12(Outer South).

**Table 1.2.14 Average Travel Time by Purpose**

Unit: minutes per trip

Super Zone	To home	To work	To school	Business	Private
1	109.6	81.7	59.2	65.7	48.7
2	93.6	71.2	84.9	47.2	48.1
3	87.9	78.0	59.4	80.0	89.6
4	68.4	82.0	48.6	76.1	79.3
5	88.6	57.4	63.6	62.1	79.0
6	80.0	79.7	45.0	62.6	66.9
7	80.2	70.0	69.6	63.1	59.2
8	69.0	95.5	61.0	61.5	106.2
9	82.0	78.2	55.5	73.2	74.8
10	82.4	73.6	57.7	69.3	84.9
11	78.2	83.8	71.5	116.6	94.1
12	72.5	95.6	68.1	97.9	83.8
13	87.0	79.2	67.2	84.6	113.4
14	67.3	84.6	38.6	70.6	95.2
15	80.8	77.5	49.8	95.5	84.0
16	58.8	59.2	49.3	64.9	127.7
Total	87.9	80.8	59.6	80.2	82.6

Source: 2007 HIS by JICA Study Team

### (12) Transport Modes in One Linked Trip

Table 1.2.15 describes what transport modes are used to make one linked trip. 76% of the whole trips use only one transport mode, while 24% use two or more modes of transport in making one linked trip.

Dala Dala, Intercity Bus and Ferry users need to use other modes of transport to complete one linked trip as follow, while majority of car and motorcycle users use one (representative) mode only.

- 27.4% (24.6% + 2.8%) of Dala Dala buses users (as a representative mode) need to use other modes of transport to complete one linked trip.

- 71.1% (60.1% + 11.0%) of the intercity bus users need to use other modes.
- 80.7% (50.3% + 30.4%) of the ferry users need to use other modes.

**Table 1.2.15 Modes of Transport in One Linked Trip**

Trip Makers by Representative Transport Mode	1 mode only		2 modes		3 modes and more	
	No. of Trips (1,000)	Rate (%)	No. of Trips (1,000)	Rate (%)	No. of Trips (1,000)	Rate (%)
Bicycle	39.4	99.7	0.1	0.3	0.0	0.0
Motorcycle	24.6	100.0	0.0	0.0	0.0	0.0
Passenger car	153.5	97.1	4.3	2.7	0.3	0.2
Pick-up, van	99.3	99.8	0.2	0.2	0.0	0.0
Taxi	17.8	97.9	0.1	0.6	0.3	1.6
Bhajaj	0.8	92.0	0.1	8.0	0.0	0.0
Dala dala	1,244.3	72.6	421.9	24.6	48.3	2.8
Intercity bus	0.7	28.9	1.5	60.1	0.3	11.0
School/company bus	29.6	85.2	3.9	11.2	1.2	3.6
2 axles truck	1.0	58.7	0.6	36.5	0.1	4.8
3 axles truck	0.5	100.0	0.0	0.0	0.0	0.0
Trailer truck	0.8	83.1	0.0	0.0	0.2	16.9
Railway	0.0	0.0	0.1	100.0	0.0	0.0
Ferry	6.3	19.3	16.3	50.3	9.8	30.4
Total	1,618.6	76.1	449.1	21.1	60.5	2.8

Source: 2007 HIS by JICA Study Team

### 1.2.3 Origin and Destination of Trips

#### (1) Origin and Destination (OD) Matrix

The base year OD matrices developed from HIS are composed of 270 traffic zones, 7 travel purposes and 15 transport modes. To understand the OD patterns easily the matrices are aggregated into a 16 super zone system.

Table 1.2.16 shows OD of all daily person trips in 2007. The central area is the largest trip generation (production + attraction) area, and followed by Morogoro corridor and Outer North. The largest intra zonal trips are observed in the Outer South zone, reaching at around 186 thousand.

Large travel demands are observed between zone 1: Central and zone 4: Morogoro corridor, between zone 1: Central and zone 3: Bagamoyo corridor, between zone 1: Central and zone 11: Tabata area, and between zone 1: Central and zone 12: Outer south zone.

**Table 1.2.16 Number of Trips Traveling between Aggregated Analysis Zones**

Unit: 1,000 trips per day

Origin \ Destination	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Production Total
1 Central area	56	12	67	86	22	9	16	9	24	31	39	35	15	8	12	1	443
2 Msasani area	12	12	8	3	2	0	2	0	2	1	2	2	1	1	1	0	50
3 Bagamoyo corridor	63	8	93	28	13	5	6	1	22	17	10	14	17	6	3	0	307
4 Morogoro corridor	88	3	28	181	17	4	6	1	6	28	14	8	4	5	6	0	397
5 Nyerere corridor	23	2	13	17	65	8	5	1	2	8	21	14	1	2	4	0	186
6 Temeke area	9	0	5	5	8	37	8	0	1	3	6	26	0	0	2	1	111
7 Kilwa corridor	16	2	6	6	6	8	49	1	3	3	2	18	1	0	1	0	122
8 Kigamboni area	9	0	1	1	1	0	1	26	0	1	1	3	0	0	0	2	46
9 Kawe area	24	2	22	6	2	1	3	0	36	7	2	2	5	1	1	0	113
10 Ubungo area	30	1	17	28	7	3	3	1	7	78	8	11	3	9	3	0	211
11 Tabata area	39	2	11	14	22	6	3	1	2	8	101	10	2	1	12	0	233
12 Outer south	35	2	14	8	14	26	18	3	2	11	10	186	2	2	3	1	335
13 Outer north	15	1	18	4	1	0	1	0	5	3	2	1	56	1	1	0	111
14 Outer west	8	1	6	5	2	0	0	0	1	9	1	1	1	27	0	0	62
15 Outer southwest	12	1	3	5	5	1	1	0	1	4	12	3	1	0	62	0	112
16 Outer southeast	1	0	0	0	0	0	0	2	0	0	0	1	0	0	0	15	20
Attraction Total	441	50	313	396	186	111	122	46	114	211	231	335	110	62	111	20	2,859

Source: 2007 HIS by JICA Study Team

Table 1.2.17 shows OD matrix of motorized trips, that is, excluding walking trips, hence excluding majority of intra zonal trips. This matrix shows travel demand between two zones more clearly.

**Table 1.2.17 Number of Motorized Trips Traveling between Aggregated Analysis Zones**

Unit: 1,000 trips per day

Origin																Production Total	
Destination	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1 Central area	30	12	66	86	18	9	16	9	24	30	39	35	15	8	12	1	411
2 Msasani area	12	5	6	3	2	0	2	0	2	1	2	2	1	1	1	0	40
3 Bagamoyo corridor	63	6	47	26	12	5	6	1	21	16	10	14	17	6	3	0	253
4 Morogoro corridor	88	3	27	57	16	4	6	1	5	26	13	8	4	5	5	0	267
5 Nyerere corridor	19	2	13	16	15	6	4	1	2	8	17	13	1	2	4	0	125
6 Temeke area	9	0	5	5	7	6	5	0	1	3	5	21	0	0	1	1	68
7 Kilwa corridor	15	2	6	6	4	5	15	1	3	3	2	17	1	0	1	0	81
8 Kigamboni area	9	0	1	1	1	0	1	8	0	1	1	3	0	0	0	1	26
9 Kawe area	24	2	21	5	2	1	3	0	14	7	2	2	5	1	1	0	89
10 Ubungu area	30	1	17	26	7	3	3	1	7	41	8	11	3	9	3	0	171
11 Tabata area	39	2	10	14	18	5	3	1	2	8	37	9	2	1	11	0	160
12 Outer south	35	2	14	8	13	22	16	3	2	11	8	61	2	2	2	0	201
13 Outer north	15	1	18	4	1	0	1	0	5	3	2	1	17	1	1	0	71
14 Outer west	8	1	6	5	2	0	0	0	1	9	1	1	1	8	0	0	43
15 Outer southwest	12	1	3	5	4	1	1	0	1	4	11	2	1	0	18	0	65
16 Outer southeast	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
Attraction Total	409	40	260	266	124	69	82	26	89	170	159	200	71	43	64	4	2,075

Source: 2007 HIS by JICA Study Team



## **(2) Travel Demand by Super Zone**

Figure 1.2.22 shows travel demand by band-width between the super zones. In these diagrams, “to home” trips are excluded.

Major travel indicators and characteristics of each super zone is summarized as follows:

- a) Super Zone 1 (Central area)
  - Total trip generation: 443 thousand (including “to home” trips)
  - Total trip generation: 63 thousand (excluding “to home” trips)
  - Intra-zonal trips: 34 thousand (54.5%)
  - This is the largest trip generation zone.
- b) Super Zone 2 (Msasani area)
  - Total trip generation: 50 thousand (including “to home” trips)
  - Total trip generation: 28 thousand (excluding “to home” trips)
  - Intra-zonal trips: 6 thousand (22.2%)
  - Strong relation with Super Zone 1 (12 thousand)
- c) Super Zone 3 (Bagamoyo corridor)
  - Total trip generation: 307 thousand (including “to home” trips)
  - Total trip generation: 164 thousand (excluding “to home” trips)
  - Intra-zonal trips: 47 thousand (28.4%)
  - Strong relation with Super Zone 1 (61 thousand)
  - Super Zone 4 (10 thousand)
- d) Super Zone 4 (Morogoro corridor)
  - Total trip generation: 397 thousand (including “to home” trips)
  - Total trip generation: 259 thousand (excluding “to home” trips)
  - Intra-zonal trips: 91 thousand (34.9%)
  - Strong relation with Super Zone 1 (86 thousand)
  - Super Zone 3 (19 thousand)
  - Super Zone 10 (19 thousand)
- e) Super Zone 5 (Nyerere corridor)
  - Total trip generation: 186 thousand (including “to home” trips)
  - Total trip generation: 81 thousand (excluding “to home” trips)
  - Intra-zonal trips: 33 thousand (41.0%)
  - Strong relation with Super Zone 1 (20 thousand)
- f) Super Zone 6 (Temeke area)
  - Total trip generation: 111 thousand (including “to home” trips)
  - Total trip generation: 49 thousand (excluding “to home” trips)
  - Intra-zonal trips: 19 thousand (38.0%)

Strong relation with Super Zone 1 (9 thousand)

- g) Super Zone 7 (Kilwa corridor)  
Total trip generation: 122 thousand (including “to home” trips)  
Total trip generation: 65 thousand (excluding “to home” trips)  
Intra-zonal trips: 25 thousand (38.4%)  
Strong relation with Super Zone 1 (15 thousand)
- h) Super Zone 8 (Kigamboni area)  
Total trip generation: 46 thousand (including “to home” trips)  
Total trip generation: 26 thousand (excluding “to home” trips)  
Intra-zonal trips: 13 thousand (49.5%)  
Strong relation with Super Zone 1 (9 thousand)
- i) Super Zone 9 (Kawe area)  
Total trip generation: 113 thousand (including “to home” trips)  
Total trip generation: 77 thousand (excluding “to home” trips)  
Intra-zonal trips: 18 thousand (23.3%)  
Strong relation with Super Zone 1 (23 thousand)  
Super Zone 3 (16 thousand)
- j) Super Zone 10 (Ubungo area)  
Total trip generation: 211 thousand (including “to home” trips)  
Total trip generation: 113 thousand (excluding “to home” trips)  
Intra-zonal trips: 39 thousand (34.8%)  
Strong relation with Super Zone 1 (30 thousand)  
Super Zone 3 (11 thousand)  
Super Zone 4 (10 thousand)
- k) Super Zone 11 (Tabata area)  
Total trip generation: 233 thousand (including “to home” trips)  
Total trip generation: 146 thousand (excluding “to home” trips)  
Intra-zonal trips: 51 thousand (34.7%)  
Strong relation with Super Zone 1 (38 thousand)  
Super Zone 5 (17 thousand)
- l) Super Zone 12(Outer south)  
Total trip generation: 335 thousand (including “to home” trips)  
Total trip generation: 218 thousand (excluding “to home” trips)  
Intra-zonal trips: 94 thousand (43.0%)  
Strong relation with Super Zone 1 (35 thousand)  
Super Zone 6 (24 thousand)  
Super Zone 7 (14 thousand)

Super Zone 5 (12 thousand)

m) Super Zone 13(Outer north)

Total trip generation: 111 thousand (including “to home” trips)

Total trip generation: 66 thousand (excluding “to home” trips)

Intra-zonal trips: 28 thousand (43.1%)

Strong relation with Super Zone 1 (14 thousand)

Super Zone 3 (14 thousand)

n) Super Zone 14(Outer west)

Total trip generation: 62 thousand (including “to home” trips)

Total trip generation: 36 thousand (excluding “to home” trips)

Intra-zonal trips: 13 thousand (37.4%)

Strong relation with Super Zone 1 (8 thousand)

o) Super Zone 15(Outer southwest)

Total trip generation: 112 thousand (including “to home” trips)

Total trip generation: 65 thousand (excluding “to home” trips)

Intra-zonal trips: 32 thousand (48.6%)

Strong relation with Super Zone 1 (12 thousand)

p) Super Zone 16 (Outer southeast)

Total trip generation: 20 thousand (including “to home” trips)

Total trip generation: 11 thousand (excluding “to home” trips)

Intra-zonal trips: 8 thousand (68.1%)

The total trip generation in this zone is quite small, hence no strong demand relationship with other zones.

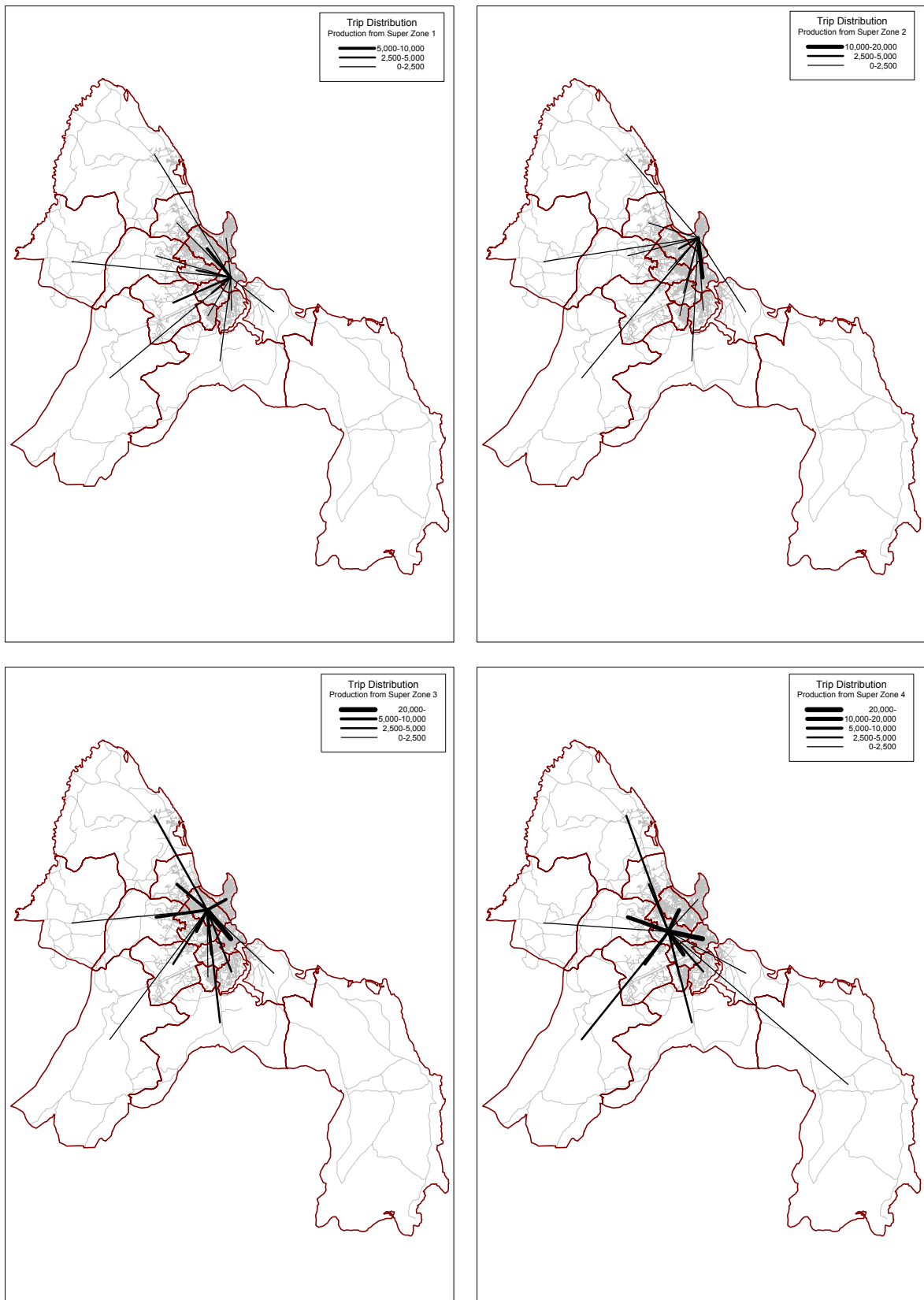


Figure 1.2.22 Trip Demand between Super Zones

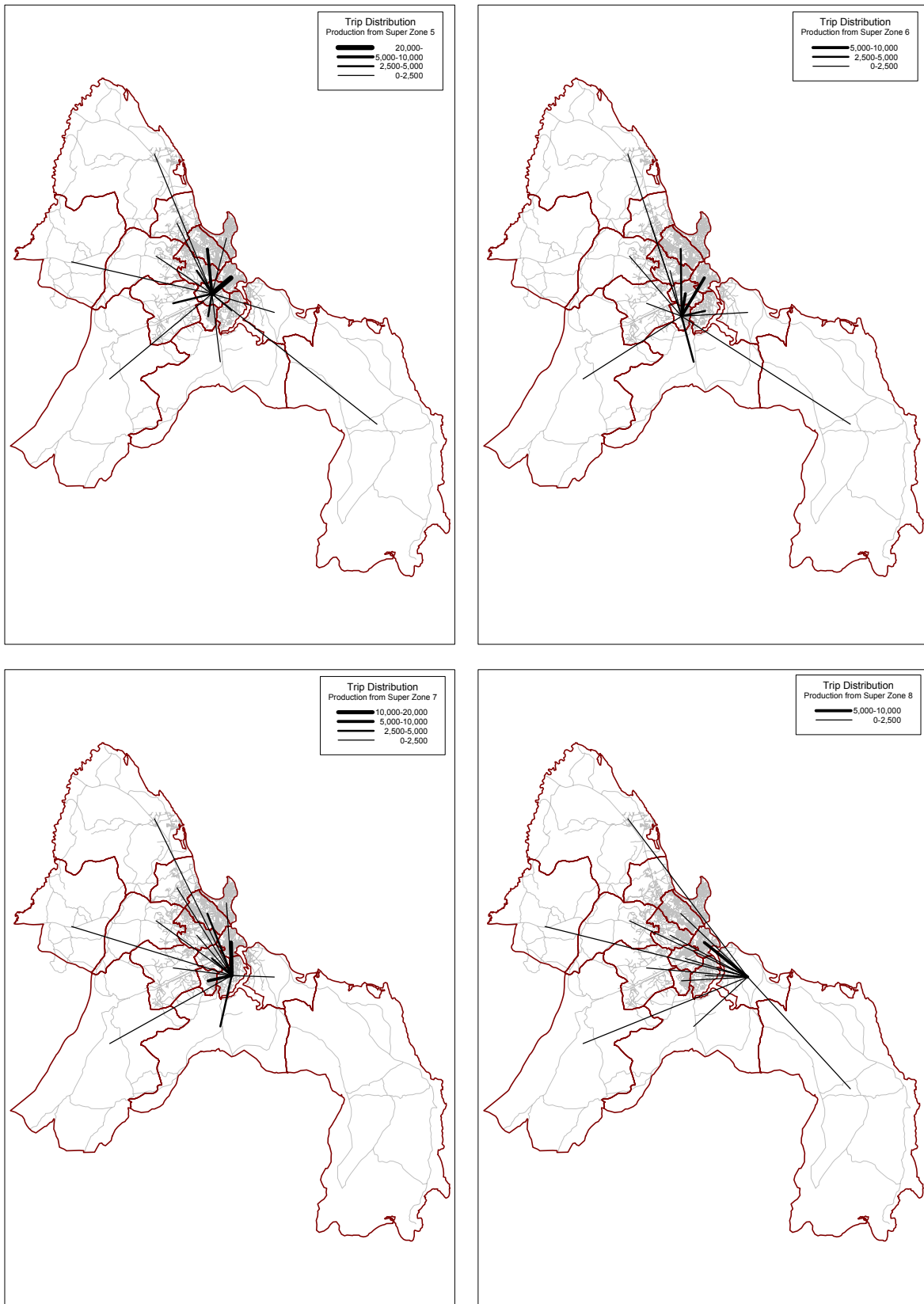


Figure 1.2.22 Trip Demand between Super Zones (continued)

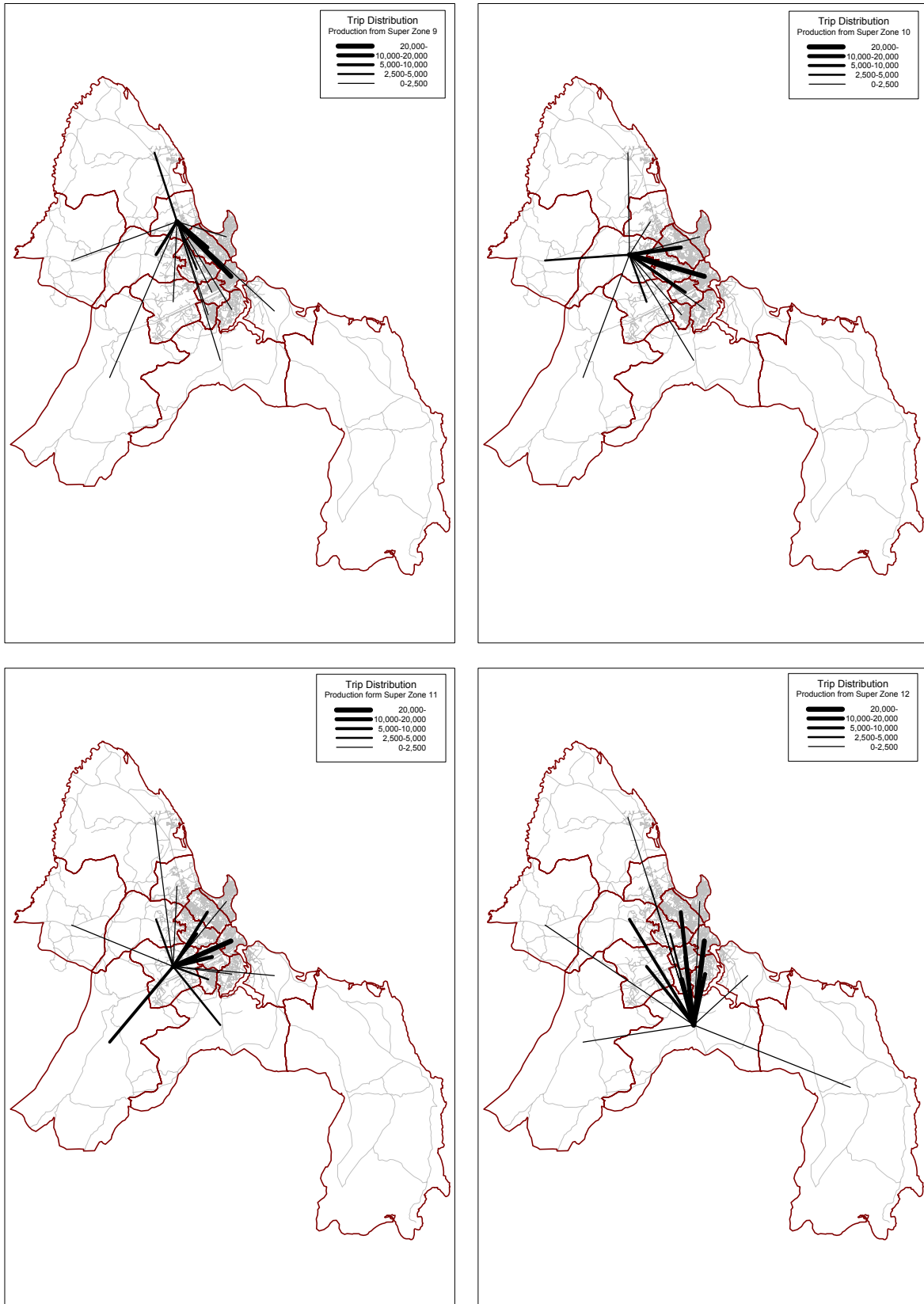


Figure 1.2.22 Trip Demand between Super Zones (continued)

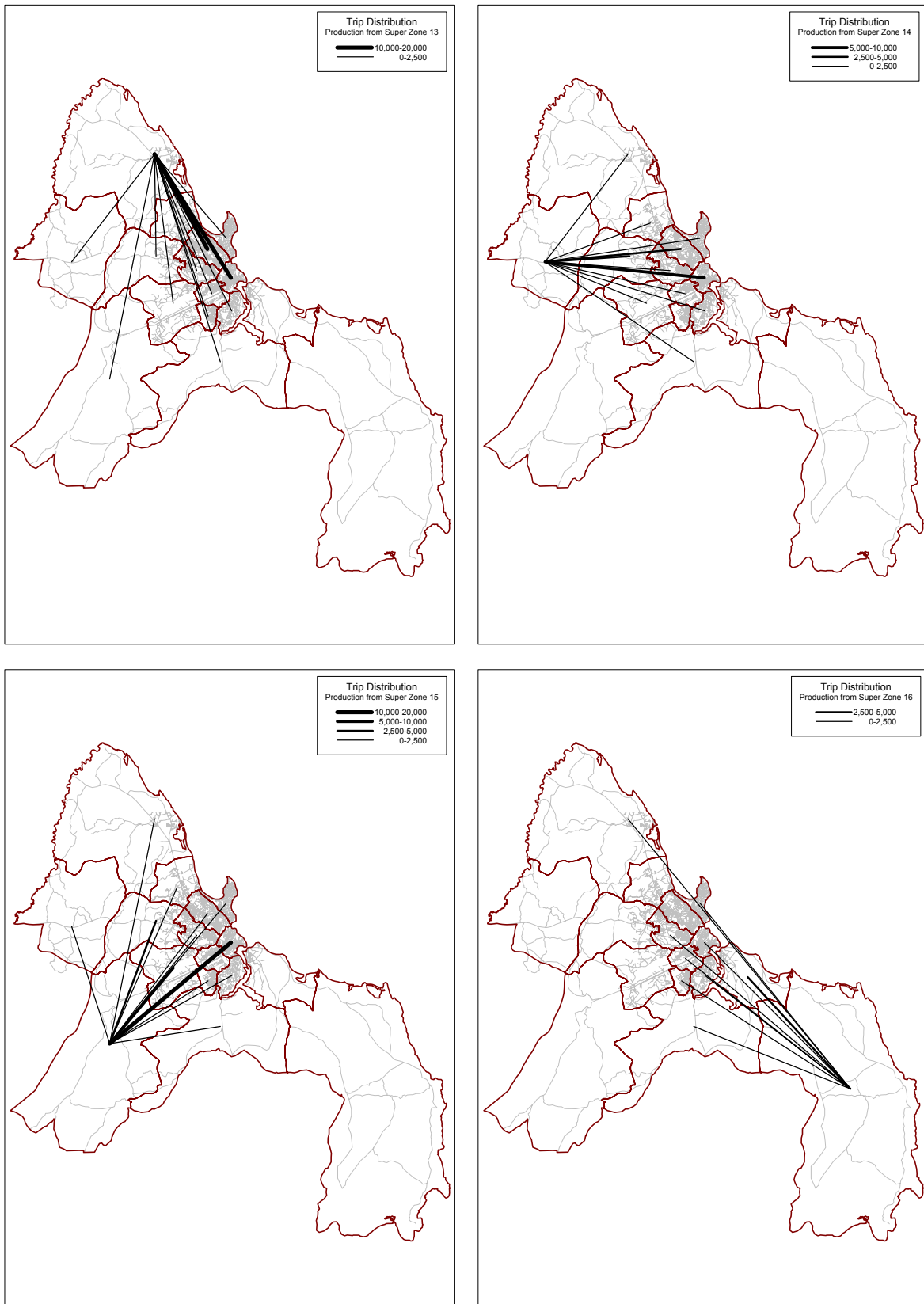


Figure 1.2.22 Trip Demand between Super Zones (continued)