Japan International Cooperation Agency (JICA)
Department of Transportation and Communications (DOTC)

The Project for Capacity Development on Transportation Planning and Database Management in the Republic of the Philippines

MMUTIS Update and Enhancement Project
(MUCEP)

Technical Report

Transportation Demand Characteristics Based on MUCEP Person Trip Survey

December 2015

ALMEC Corporation

Oriental Consultants Global Co., Ltd

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Abbreviations

AUV	Asian utility vehicle
DOTC	Department of Transportation and Communications
EDSA	Epifanio de los Santos Avenue
EW	east–west
h	hour
HIS	household interview survey
HOV	high-occupancy vehicle
JICA	Japan International Cooperation Agency
JPT	JICA Project Team
LRT	light rail transit
MRT 3	Metro Rail Transit Line 3
MUCEP	MMUTIS Update and Capacity Enhancement Project
MMUTIS	Metro Manila Urban Transportation Integration Study
NAIA	Ninoy Aquino International Airport
NCR	National Capital Region
NS	north–south
OD	origin-destination
PCU	passenger car unit
PHP	Philippine peso
PNR	Philippine National Railways
UV	utility vehicle

1 INTRODUCTION

1.1 Background

The MMUTIS database has been updated as part of the "MMUTIS Update and Capacity Enhancement Project (MUCEP)," a technical assistance grant from the Japan International Cooperation Agency (JICA). The updating started with the implementation of the person trip surveys in two phases. The purpose of the surveys was also to develop the capacity of the Counterpart Project Team for survey implementation.

The first phase of the surveys was conducted from May to August 2012 in the City of Manila for the HIS, as well as the cordon and screen line surveys. The surveys were commissioned to Transport and Traffic Planners Inc. and implemented under the supervision of JICA Project Team (JPT). The second phase, which was solely for HIS, was carried out in the rest of the MUCEP area (except Manila) from October 2013 to April 2014. This time, the survey was commissioned to the consortium of Woodfields Consultants, Inc. and GHD Philippines. The survey was funded by the DOTC and was managed by the DOTC counterparts under the technical supervision of the JICA Project Team.

From June 2014 up to January 2015, the survey results were processed and elaborated as the core of the MUCEP database.

1.2 Outline of the Person Trip Survey

The Person Trip Survey has three components: (i) Household Interview Survey (HIS), (ii) Cordon Line Survey, and (iii) Screen Line Survey.

The HIS aims to obtain basic data needed in formulating comprehensive urban and transportation plans. HIS results can be utilized to analyze existing travel behaviors of people and forecast traffic demand.

The Cordon Line Survey is an auxiliary survey that aims to determine trips to or from the survey area made by non-residents and calibrate the distributed traffic volume obtained from the HIS. In order to obtain such data for MUCEP, roadside origin-destination (OD) interview, traffic count, and vehicle occupancy surveys were conducted on survey area boundaries.

The Screen Line Survey is another auxiliary survey with the purpose of providing vehicular and passenger traffic information to calibrate the distributed traffic volume obtained from the HIS. In MUCEP, traffic count and vehicle occupancy surveys were conducted at road sections crossing the screen lines in Metro Manila.

1.3 Household Interview Survey

1) Survey Items

The HIS questionnaire comprises the following forms:

(a) **Form 1 - Household Information:** This questionnaire covers the socio-economic characteristics of households such as their structure, car ownership, income levels, location of residence, number of years in said residence, etc.

(b) **Form 2 - Household Member Information:** This questionnaire covers the socio-economic characteristics of each household member 5 years old and above, such as

age, gender, occupation, work and/or school address, and income.

(c) **Form 3 - Daily Trip Information:** This questionnaire covers the characteristics of weekday trips made by each household member 5 years old and above. Included in the form are trip origin and destination, trip purpose, travel mode, transfers, as well as departure and arrival times.

(d) **Form 4 - Perception Survey on Transportation Development:** This questionnaire covers public opinion on current conditions of traffic, traffic safety, public transportation, and transportation measures.

Table 1.1: Summary of Cordon and Screen Line Surveys

Item	Cordon Line Survey		Screen Line Survey
	Outer	Inner	
Boundary/Line	MUCEP Area	Metro Manila	Pasig River, San Juan River/PNR
Survey Type	- Traffic Count - Vehicle Occupancy - OD Interview (except inner station)		- Traffic Count - Vehicle Occupancy
Survey Stations	Total = 20 stations - 6 on roads - 13 on expressways - 1 on rail	Total = 29 stations - 18 on roads - 3 on expressways - 3 at ferry terminals - 4 at airports - 1 on railway	Total = 50 stations - 18 on EW (Pasig River) - 17 NS (San Juan River) - 15 NS (PNR)
Survey Period	24 h (3 stations) 16 h (17 stations)	24 h (10 stations) 16 h (19 stations)	24 h (16 stations) 16 h (34 stations)
Vehicle Type	17 types		
Field Survey	June–July 2012		

Source: JICA Project Team

2) Survey Method

Prior to the implementation of the survey, surveyors were trained by the consultant then conducted dry runs to ensure better understanding of the survey methods. Survey forms were finalized based on the results of the dry runs. The JICA Project Team provided detailed survey manuals and forms as well as data entry and error checking systems.

HIS was conducted by interview survey. Households were selected by area sampling at a rate of 1.0% in all barangays, which is about four (4) households, within the survey area. Interviewers visited selected households and interviewed each household member 5 years old and above according to the prepared survey forms. The first household to be surveyed was randomly selected and the succeeding samples were chosen based on area density.

The JICA Project Team provided zone codes that were used by encoders to assign barangays that represent a respondent's residence, work place, and trip origin and destination. Encoders also inputted answers into the database and carefully checked for errors.

3) Survey Coverage

HIS covered the whole MUCEP area, and households from each barangay were selected by area sampling. The number of household respondents from each barangay was derived from the 2012 population forecast based on the 2007 and 2010 census. The sampling rate was 1.0% with a total of 51,188 sample households (4,966 in Manila and 46,222 in the rest of the MUCEP area).

The survey was conducted among household members who are 5 years of age and older. However, only the household head or representative was asked to provide answers to Form 1, besides forms 2 to 4.

1.4 Cordon Line Survey

1) Survey Items

The following items were surveyed simultaneously at each survey station:

- Vehicular traffic count;
- Vehicle occupancy; and
- Trip information (e.g., origin and destination, purpose, freight, access/egress mode, etc.).

2) Survey Method

The consultant visited each survey station, designed detailed layouts of the respective stations, and obtained approval from the police and other concerned authorities to conduct surveys. Trainings and dry runs were also conducted similar to the HIS survey method. Detailed survey manuals were prepared by the JICA Project Team and provided to the survey team.

Vehicular traffic was enumerated every 30 minutes by traffic counters. For vehicle occupancy survey, traffic counters recorded the number of passengers of the surveyed vehicles chosen at random by hour, vehicle type, and direction. Trip information from private transportation drivers, public transportation passengers and drivers, and freight mode drivers were collected in the roadside OD interview.

Vehicles were classified as shown in Table 1.2.

Table 1.2: Classification of Vehicles

1	Private Vehicle	Bicycle
2		Motorcycle
3		Car/Owner-type Jeep
4	Public Vehicle	Pedicab
5		Tricycle
6		Taxi
7		Filcab
8		Jeepney
9		High-occupancy vehicle (HOV) or Asian utility vehicle (AUV)
10		Minibus
11		Standard Bus
12		School/Company Bus
13		Tourist Bus
14	Commercial Vehicle	Pickup/Delivery Van
15		Truck
16		Trailer
17		Others (to be specified)

Source: JICA Project Team

3) Survey Coverage

There are 29 survey stations located on the Metro Manila boundary (inner cordon) and

20 stations on the outer boundaries of the adjoining areas (outer cordon). Survey stations were mostly located on roads with some on expressways and ferry and airport terminals in the inner cordon. Survey stations and durations are listed in Tables 1.2 and 1.3, while their locations are shown in Figure 1.1.

Table 1.3: List of Inner Cordon Line Survey Stations

Seq.	Category	Code			Survey Period (hours)		
					Traffic Count	Vehicle Occupancy	OD Interview
1	General Road	GR01	F. Navarette	Boundary of Malabon & Obando (Bulacan)	Survey Station	Location	-
2		GR02	Panghulo Road	Boundary of Valenzuela & Obando (Bulacan)			-
3		GR03	Gen. Vililla	Boundary of Valenzuela & Obando (Bulacan)	16	16	-
4		GR04	McArthur Highway	Boundary of Valenzuela & Meycauayan (Bulacan)	24	24	-
5		GR05	Quirino Highway	Boundary of Quezon City & San Jose D.M. (Bulacan)	16	16	-
6		GR06	Manila Gravel Pit Road	Boundary of Quezon City & Rodriguez	16	16	-
7		GR07	Batasan-San Mateo Road	Boundary of Quezon City & San Mateo	16	16	-
8		GR08	Marikina-San Mateo Road	Boundary of Marikina & San Mateo (Rizal)	16	16	-
9		GR09	Marikina-Cogeo Road	Outside of intersection of Marcos & Sumulong Highway	16	16	-
10		GR10	Antipolo Road	Outside of intersection of Marcos & Sumulong Highway	24	24	-
11		GR11	Imelda Avenue	Boundary of Pasig & Cainta (Rizal)	16	16	-
12		GR12	Ortigas Avenue	Boundary of Pasig & Cainta (Rizal)	24	24	-
13		GR13	East Bank Road	Boundary of Pasig & Cainta (Rizal)	16	16	-
14		GR14	Afonso Sandoval Avenue	Boundary of Pasig & Cainta (Rizal)	16	16	-
15		GR15	San Pedro	Boundary of Muntinlupa & Laguna	16	16	-
16		GR16	Daang Hari	Boundary of Muntinlupa & Imus & Las Pinas	16	16	-
17		GR17	M. Alvarez Avenue	Boundary of Las Pinas & Bacoor (Cavite)	16	16	-
18		GR18	Bacoor	Boundary of Las Pinas & Bacoor (Cavite)	16	16	-
19	Expressway	EW01	North Luzon Expressway	Boundary of Valenzuela & Meycauayan	24	24	-
20		EW02	South Luzon Expressway	Boundary of Muntinlupa & San Pedro	24	24	-
21		EW03	Manila-Cavite Expressway	Boundary of Las Pinas & Bacoor (Cavite)	24	24	-
22	Ferry Terminal	FT01	Ferry Terminal (Pier 2)	North harbor Pier No. 2	16	-	16
23		FT02	Ferry Terminal (Pier 12)	North harbor Pier No. 12	16	-	16
24		FT03	Ferry Terminal (Pier 15)	South harbor Pier No. 15	16	-	16
25	Airport	AP01	Ninoy Aquino Int'l Airport	Terminal 1	-	-	24
26		AP02	Ninoy Aquino Int'l Airport	Terminal 2	-	-	24
27		AP03	Ninoy Aquino Int'l Airport	Terminal 3	-	-	24
28		AP04	Ninoy Aquino Int'l Airport	Manila Domestic Terminal	-	-	24
29	Railway	RW	Alabang Station - Muntinlupa Station	Between PNR Alabang Station - Muntinlupa Station	16	-	16

Source: JICA Project Team

Table 1.4: List of Outer Cordon Line Survey Stations

Seq.	Code	Survey Station	Location	Survey Period (hours)		
				Traffic Count	Vehicle Occupancy	OD Interview
1	OC01	Calumpit-Apalit [1]	Boundary of Calumpit (Bulacan) & Apalit (Pampanga)	16	16	16
2	OC02	North Luzon Expressway	Pulilan Exit	16	16	16
3	OC03	North Luzon Expressway	Sta. Rita Exit	16	16	16
4	OC04	North Luzon Expressway	Bocaue Exit	16	16	16
5	OC05	North Luzon Expressway	Bocaue Toll Plaza	24	24	24
6	OC06	Pulilan-Baliuag	Boundary of Pulilan & Baliuag (Bulacan)	16	16	16
7	OC07	Plaridel-Bustos	Boundary of Plaridel & Bustos (Bulacan)	16	16	16
8	OC08	Plaridel-Angat	Boundary of Norzagaray & Angat (Bulacan)	16	16	16
9	OC09	Pililla-Mabitac	Boundary of Pililla & Mabitac (Rizal)	16	16	16
10	OC10	Los Banos-Bay	Boundary of Los Banos & Bay (Laguna)	16	16	16
11	OC11	South Luzon Expressway	Saimsim Toll Plaza	24	24	24
12	OC12	Calamba-Santo Tomas	Boundary of Calamba (Laguna) & Santo Tomas (Batangas)	16	16	16
13	OC13	Silang-Tagaytay 1	Boundary of Silang & Tagaytay City (Cavite)	16	16	16
14	OC14	Silang-Tagaytay 2	Boundary of Silang & Tagaytay City (Cavite)	16	16	16
15	OC15	Gen. Trias-Amadeo	Boundary of General Trias & Amadeo (Cavite)	16	16	16
16	OC16	Trece Martires-Indang	Boundary of Trece Martires City & Indang (Cavite)	16	16	16

17	OC17	Naic-Indang	Boundary of Naic & Indang (Cavite)	16	16	16
18	OC18	Naic-Maragondon	Boundary of Naic & Maragondon (Cavite)	16	16	16
19	OC19	College station-San Pablo station	Between PNR College station - San Pablo station	16	-	8[1]
20	OC20	North Luzon Expressway	Boundary of Pulilan and Apalit	24	-	-

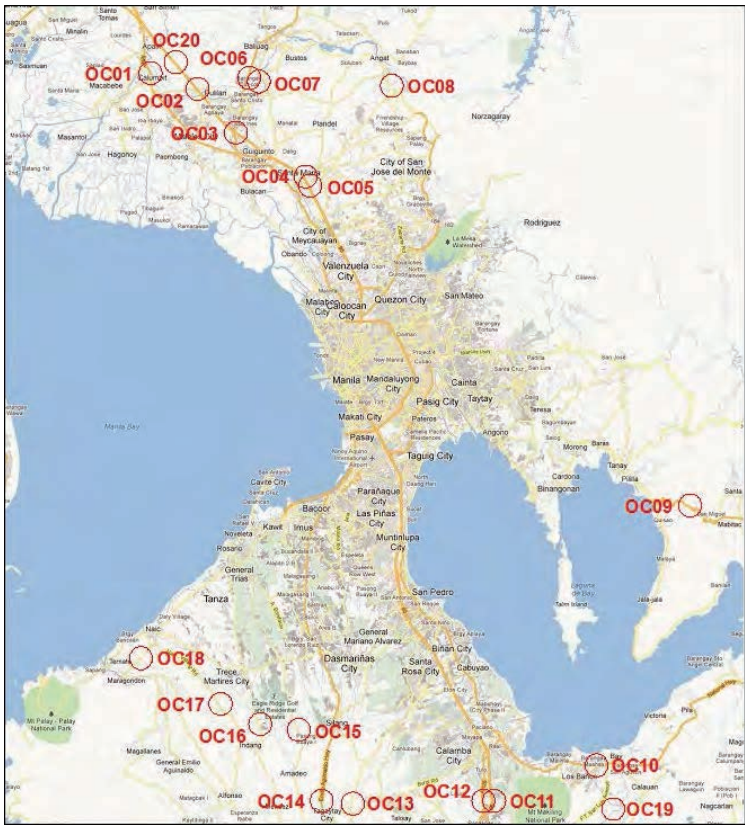
Source: JICA Project Team

For the roadside survey in the inner cordon sites, a 24-hour traffic count and vehicle occupancy survey were conducted at 6 stations, while 16-hour surveys were conducted for the rest of the 15 stations in the Metro Manila boundary.

Figure 1.1: Location of Cordon Line Survey Stations

(1) Inner Cordon Line

(2) Outer Cordon Line



Source: JICA Project Team

Additionally, a 16-hour passenger count and OD interview survey were conducted at three ferry terminals and on PNR trains, while a 24-hour OD interview survey was conducted at the four Ninoy Aquino International Airport Terminals.

In the outer cordon sites, a 24-hour traffic count, vehicle occupancy survey, and OD interview were conducted at 2 stations, while 16-hour surveys were conducted for the rest of the 17 stations on the outer boundaries of the adjoining areas. The 16-hour surveys were conducted from 6:00 a.m. to 10:00 p.m. with two 8-hour shifts. The 24-hour surveys were conducted with three 8-hour shifts.

1.5 Screen Line Survey

1) Survey Items

The following surveys were carried out simultaneously at each survey station:

- Vehicular traffic count; and
- Vehicle occupancy

2) Survey Method

Before survey implementation, surveyors visited and designed detailed layouts of each survey station. The consultant also trained surveyors and conducted dry runs to ensure

better understanding of the survey method. The JICA Project Team provided detailed survey manuals.

The hourly vehicular traffic volume by vehicle type and direction was counted at the roadside survey stations. The classification of vehicles used is the same as that in the cordon line survey (i.e., bicycle, motorcycle, car/owner-type jeep, pedicab, tricycle, taxi, filcab, jeepney, HOV, minibus, standard bus, school/company bus, tourist bus, pickup/delivery van, truck, trailer, and others).

The number of passengers in vehicles chosen at random were observed and recorded by the hour and by vehicle type. The target sample rate was at least 10% of the total traffic volume by vehicle type.

3) Survey Coverage

Survey stations were located on road sections at or near roads crossing the screen lines, i.e., Pasig River, San Juan River, and the Philippine National Railways (PNR) track. There was a total of 50 survey stations located on bridges, at PNR crossings, and at railway (PNR and LRT/MRT) stations. The survey stations are listed in Table 1.5, while their locations are indicated in Figure 1.2.

The traffic count and vehicle occupancy survey were conducted for 24 hours at 16 stations and 16 hours at 34 stations. Surveys at the 16-hour sites were carried out from 6:00 a.m. to 10:00 p.m. with two 8-hour shifts. Surveys at the 24-hour stations were implemented with three 8-hour shifts. At railway stations, only the passenger count surveys were done.

1.6 Zoning

Barangays were used as the smallest zones for surveys because they may be easily converted and integrated into larger zones, whenever necessary, as long as barangay names, dwelling address, working place, schooling place, origin and destination of trips and such are available. As of May 1994, there are 3059 barangays in the study area of which 897 are in Manila City. Although survey per barangay zone is convenient, there are too many to analyze for trip data. Therefore, three zoning systems are created by integrating the barangay zones to small, medium and large zones. The relation of the three zones is listed in the appendix to Chapter 1.

1) Survey Coverage

Small zones were used for most analytical works and database development. For this reason, this zoning is almost consistent with MMUTIS zoning. Tabulation of OD matrices and network assignment are done using this zoning as shown in Figure 1.3.

2) Medium Zones (City/Municipality Zone)

Zones were divided basically by 17 cities in NCR and municipalities outside of NCR. However, Manila City and Quezon City are each subdivided into four zones. Caloocan City is also subdivided into north and south because they are geographically separated. This zoning is shown in Figure 1.4. This is also mainly used for mapping.

3) Large Zones (Provincial Zones)

Metro Manila (NCR) and its adjacent provinces of Bulacan, Rizal, Cavite, and Laguna were regarded as one zone. This zoning is used to take a broad view of regional

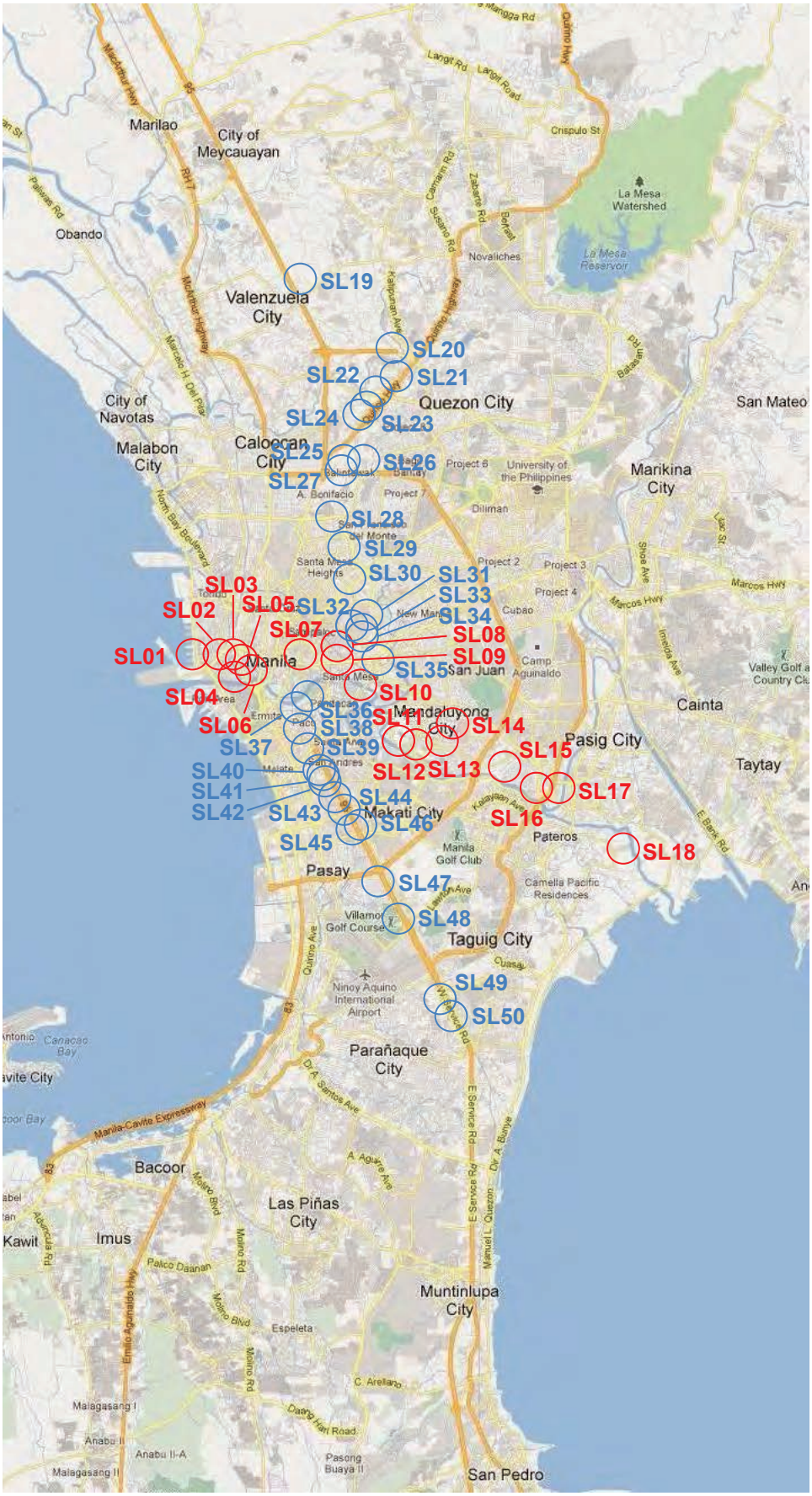
characteristics and compare with the MMUTIS data. This is shown in Figure 1.5.

Table 1.5: List of Screen Line Survey Stations

Screen Line	Seq.	Code No.	Survey Station	Location	Survey Period (hours)	
					Traffic Count	Vehicle Occupancy
East-West Screen (Pasig) River)	1	SL01	Roxas Bridge (Del Pan Bridge)	Pasig River – Bonifacio Drive	24	24
	2	SL02	Jones Bridge	Pasig River – Taft Avenue	16	16
	3	SL03	McArthur Bridge	Pasig River – Rizal Avenue	16	16
	4	SL04	Central Terminal Station	LRT Line 1 Central Terminal Station	24	-
	5	SL05	Quezon Bridge	Pasig River – Quezon Boulevard	24	24
	6	SL06	Ayala Bridge	Pasig River – Ayala Boulevard	16	16
	7	SL07	Nagtahan Bridge	Pasig River – Nagtahan	24	24
	8	SL08	Sta. Mesa Station	PNR Sta. Mesa Station	16	-
	9	SL09	Pandacan Bridge	Pasig River – Paco-Sta. Mesa Road	16	16
	10	SL10	Lambingan Bridge	Pasig River – New Panaderos	16	16
	11	SL11	Makati-Mandaluyong Bridge	Pasig River – Makati Avenue	16	16
	12	SL12	New Bridge near Rockwell	Pasig River – Estrella	16	16
	13	SL13	Guadalupe Bridge	Pasig River – EDSA	24	24
	14	SL14	Guadalupe Station	MRT Line 3 Guadalupe Station	24	-
	15	SL15	C5 Bridge	Pasig River – C5	24	24
	16	SL16	Bambang	Pasig River – R. Jabson	16	16
	17	SL17	Arsenio Jimenez Bridge	Pasig River – M. Jimenez	16	16
	18	SL18	Ejercito Avenue	Boundary of Pasig City & Taytay (Rizal)	16	16
North-South Screen (San Juan River)	19	SL19	Bagbaguin Road	Boundary of Valenzuela & Kalookan	16	16
	20	SL20	Quirino Highway	Quezon City	16	16
	21	SL21	Mindanao Avenue	Dario Creek – Mindanao Avenue	16	16
	22	SL22	Tandang Sora Avenue	Dario Creek –Tandang Sora Avenue	16	16
	23	SL23	Shorthorn	Dario Creek – Shorthorn	16	16
	24	SL24	Road 20	Dario Creek – Road 20	16	16
	25	SL25	EDSA	Dario Creek – EDSA	24	24
	26	SL26	Roosevelt Station	LRT Line 1 Roosevelt Station	24	-
	27	SL27	Caroline	San Francisco River – Caroline	16	16
	28	SL28	Engr. B. A. Aquino Bridge	San Francisco River – Del Monte Avenue	16	16
	29	SL29	Quezon Avenue Bridge	San Francisco River – Quezon Avenue	24	24
	30	SL30	Mariblo Bridge	San Juan River – E. Rodriguez Avenue	16	16
	31	SL31	Lambingan Bridge	San Juan River – Aurora Boulevard	24	24
	32	SL32	V. Mapa Station	MRT Line 2 V. Mapa Station	24	-
	33	SL33	San Juan – Sta. Mesa Boundary Bridge	San Juan River – N.Domingo	16	16
	34	SL34	Old Sta. Mesa Bridge	San Juan River – Old Sta. Mesa	16	16
	35	SL35	Sevilla Bridge	San Juan River – Shaw Boulevard	16	16
North-South Screen (PNR)	36	SL36	Dr. M. L. Carreon	Crossing of PNR & Dr. M. L. Carreon	16	16
	37	SL37	Pedro Gil Street	Crossing of PNR & Pedro Gil	16	16
	38	SL38	San Andres	Crossing of PNR & San Andres	16	16
	39	SL39	Zobel Roxas Avenue	Crossing of PNR & Zobel Roxas Avenue	16	16
	40	SL40	Malugay Street	Crossing of PNR & Malugay Street	16	16
	41	SL41	Buendia Avenue	Crossing of PNR & Buendia Avenue	24	24
	42	SL42	Dela Rosa	Crossing of PNR & Dela Rosa	16	16
	43	SL43	Pasay Road	Crossing of PNR & Pasay Road	16	16
	44	SL44	Don Bosco	Crossing of PNR & Don Bosco	16	16
	45	SL45	EDSA	Crossing of PNR & EDSA	24	24
	46	SL46	Magallanes Station	MRT Line 3 Magallanes Station	24	-
	47	SL47	Nichols McKinley Road	Crossing of PNR & Nichols McKinley	16	16
	48	SL48	C5	Crossing of PNR & C5	24	24
	49	SL49	Dona Soledad Avenue	Crossing of PNR & Dona Soledad	16	16
	50	SL50	Sta. Maria Avenue	Crossing of PNR & Sta. Maria Avenue	16	16

Source: JICA Project Team

Figure 1.2: Location of Screen Line Survey Stations



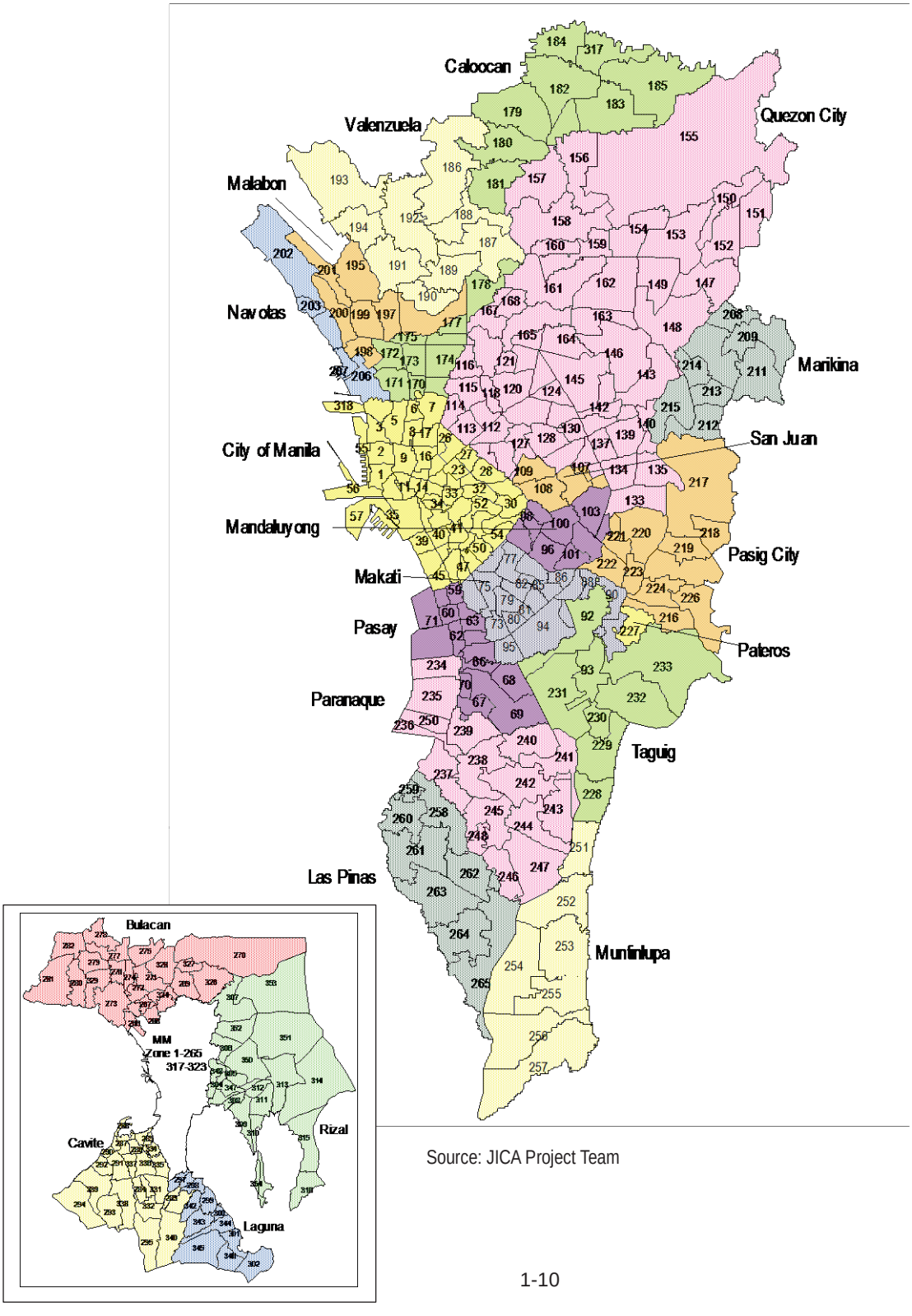
Source: JICA Project Team

Table 1.6: MUCEP Zoning System

Zoning System		Number of Zones			
		MUCEP Study Area		Outside the Study Area	Total
		NCR	Provinces		
1	Small Zones	272	82	67	432
2	Medium Zones	24	51	14	89
3	Large Zones	1	4	3	8

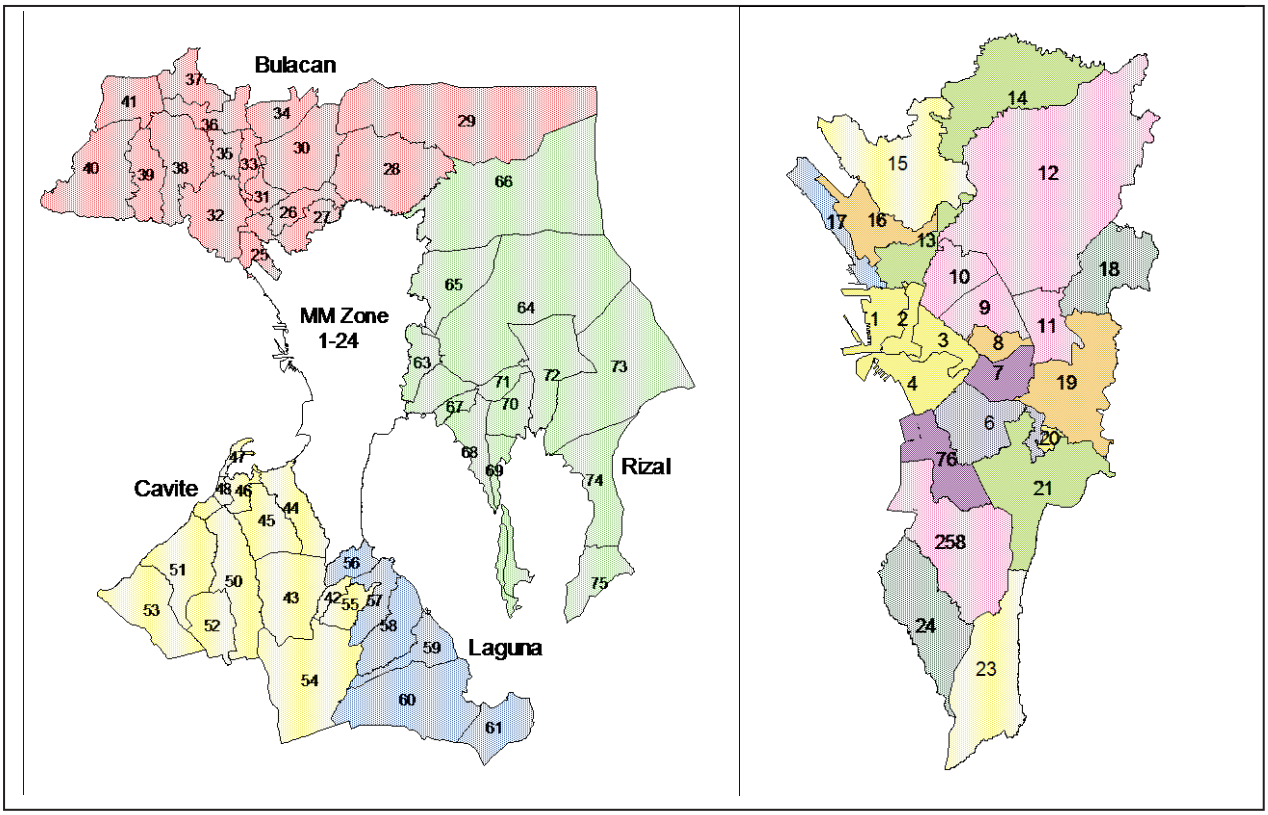
Source: JICA Project Team

Figure 1.3: MUCEP Zoning System: Small Zones



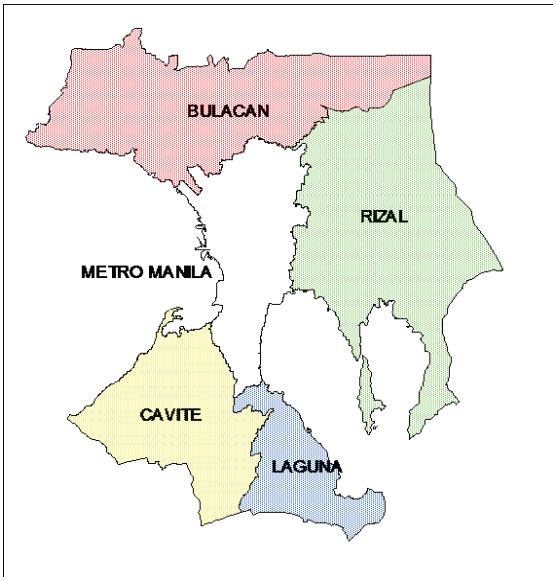
Source: JICA Project Team

Figure 1.4: MUCEP Zoning System: Medium Zones (City/Municipal Zones)



Source: JICA Project Team

Figure 1.5: MUCEP Zoning System: Large Zones (Provincial Zones)



Source: JICA Project Team

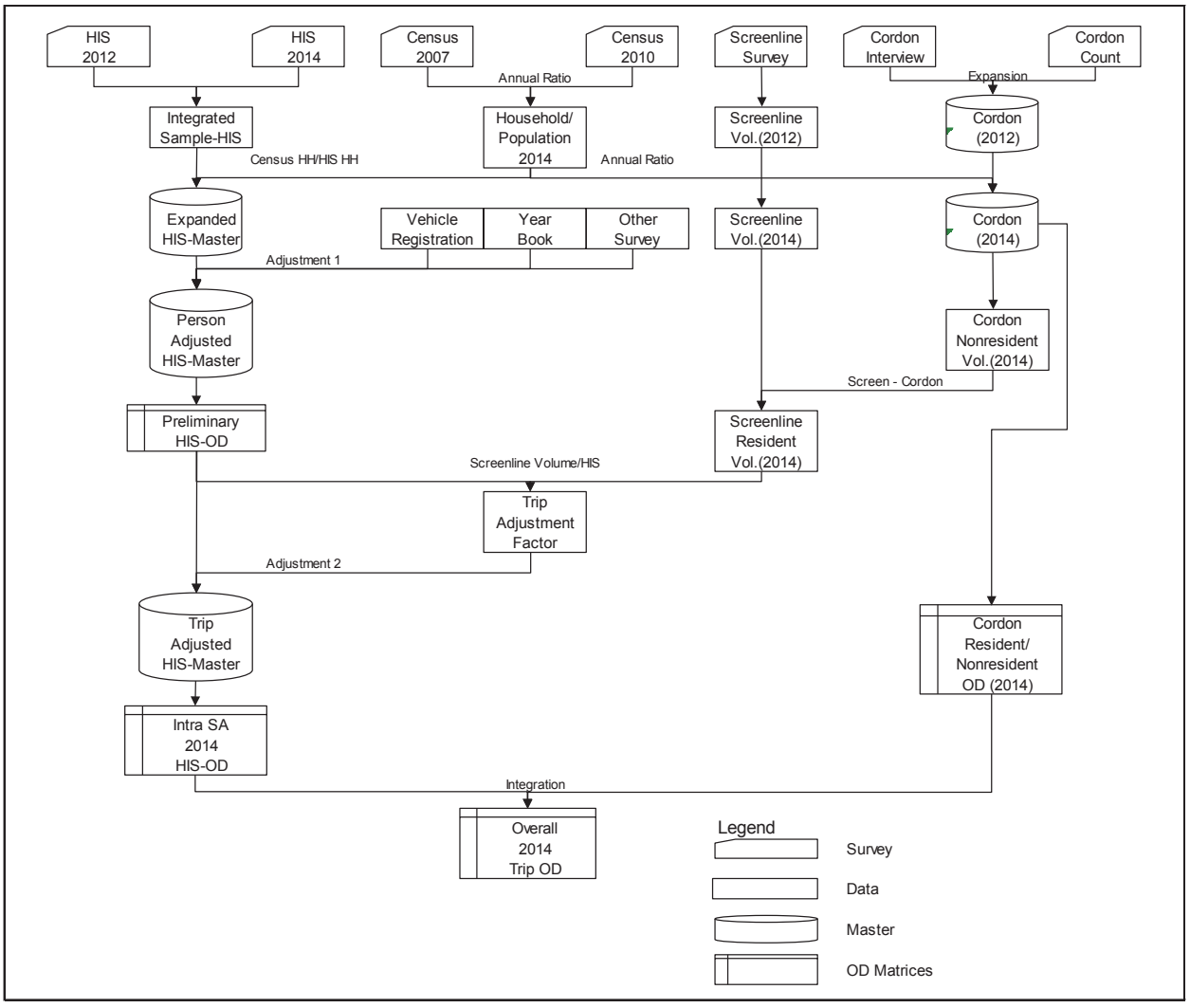
2 DEVELOPMENT OF MUCEP PERSON TRIP MASTER FILE

The MUCEP HIS data was processed after data cleaning through a workflow as shown in Figure 2.1. The data processing relevant to the person trip survey can be roughly divided into four (4) blocks: Expansion, addition of non-resident trips by cordon line survey data, adjustment to reliable socio-economic data, and screen line adjustment.

1) Expansion

The person trip survey results were expanded to its three component surveys. The household samples were expanded by zone to the total households and the person and trip data to the population of age 4 years old and above.

Figure 2.1: Workflow to Develop the MUCEP HIS Master File



Source: JICA Project Team

2) Cordon Line Adjustment

The purpose of this adjustment is two-fold – Addition of non-residents' trips to OD matrices and adjustment of expansion factors for the trips of residents crossing the cordon lines. Pasig River, PNR and a hypothetical east-west line at the NAIA are the three cordon lines used in this study.

Table 2.1: Cordon Line Trips of Residents and Non-Residents

(1) Car

Area	No.	1	2	3	4	5	6	7	Total
Metro Manila	1	17,002	505	617	1,889	4,344	1,063	8,859	34,279
Intermediate (North)	2	474	0	0	0	7,113	23	413	8,023
Intermediate (East)	3	780	0	0	0	78	134	349	1,341
Intermediate (South)	4	1,447	0	0	4	209	505	22,822	24,987
Outside (North)	5	6,823	6,552	125	200	2,464	12	352	16,528
Outside (East)	6	889	76	86	161	6	0	90	1,308
Outside (South)	7	7,969	328	391	22,142	234	33	1,624	32,721
Total		35,384	7,461	1,219	24,396	14,448	1,770	34,509	119,187

(2) Jeepney

Area	No.	1	2	3	4	5	6	7	Total
Metro Manila	1	1,026	14	59	86	326	0	610	2,121
Intermediate (North)	2	6	0	0	2	11,679	0	0	11,687
Intermediate (East)	3	36	0	0	0	273	0	452	761
Intermediate (South)	4	95	0	0	19	0	210	55,078	55,402
Outside (North)	5	247	15,541	0	0	211	0	0	15,999
Outside (East)	6	0	0	0	928	0	0	0	928
Outside (South)	7	170	112	390	59,805	0	56	1,463	61,996
Total		1,580	15,667	449	60,840	12,489	266	57,603	148,894

(3) Bus

Area	No	1	2	3	4	5	6	7	Total
Metro Manila	1	2,766	198	141	843	62,683	13,833	58,365	138,829
Intermediate (North)	2	272	0	0	2	2,663	0	3,155	6,092
Intermediate (East)	3	138	0	0	0	78	188	94	498
Intermediate (South)	4	1,152	0	0	0	44	3,471	27,919	32,586
Outside (North)		61,813	6,680	0	395	393	0	357	69,638
Outside (East)	6	6,919	0	0	0	0	0	0	6,919
Outside (South)	7	53,234	3,268	115	38,446	0	0	536	95,599
Total		126,294	10,146	256	39,686	65,861	17,492	90,426	350,161

(4) Truck

Area	No.	1	2	3	4	5	6	7	Total
Metro Manila	1	2,766	198	141	843	62,683	13,833	58,365	138,829
Intermediate (North)	2	272	0	0	2	2,663	0	3,155	6,092
Intermediate (East)	3	138	0	0	0	78	188	94	498
Intermediate (South)	4	1,152	0	0	0	44	3,471	27,919	32,586
Outside (North)	5	61,813	6,680	0	395	393	0	357	69,638
Outside (East)	6	6,919	0	0	0	0	0	0	6,919
Outside (South)	7	53,234	3,268	115	38,446	0	0	536	95,599
Total		126,294	10,146	256	39,686	65,861	17,492	90,426	350,161

Source: JICA Project Team
Note: Unit is trips/day

3) Adjustment to Socio-Economic Data

After expansion, all survey items are estimated by zone and some, although limited in number, can be compared with existing statistic data. If MUCEP estimates were significantly different from the statistic data, as these are reliable or official, the estimates would have to be adjusted. The main adjusted data would be as follows.

(a) **Airport Passenger**

The average number of daily airport passengers was estimated based on air passenger statistics. This is imposed to the MUCEP master file of the airport zone in Pasay and distributed in the same OD pattern of passengers interviewed at the airports.

(b) **Age Structure**

The age structure of MUCEP database shows a relatively very small population of ages 5 to 9 years old while the national census data does not show such imbalance. This is possibly because some surveyors hesitated to interview children from those ages. These children do not also attend school. Accordingly, the expansion factor was enlarged to normalize the age structure and the increase in population by the adjustment was deducted from the population of age 10 and over.

(c) **Single Trip per Day**

There are many persons who make only one commuting trip a day – Those who go to work and not return home on the same day. This single trip data is likely because of workers in factories located in industrial areas that operate 24 hours with three shifts. Night shift workers will commute to factories at night and return home the following day. The commuting time of such data was checked. Trips made later than 21:00 were regarded as third shift workers and the trips made returning home were inserted. With this adjustment, about 680 trips were corrected out of the 980 single trips.

(d) **Car Ownership**

MUCEP database showed, unrealistically, low car ownership. This was partially caused by frequent refusal to cooperate to the HIS. The total number of vehicles was then adjusted to the registered number of vehicles.

(e) **Low Trip Maker Ratio in Cavite**

In Cavite Province, about 35% of population of age over 4 years makes no trip per day which is unnaturally high compared to the other area. Therefore, the trip maker ratio was raised to the same level as in the other areas.

4) Screen Line Adjustment

This adjustment first calculates the traffic volume by vehicle type crossing the screen lines from the expanded person trip results and then compares them with the actually counted traffic volume on screen lines. The initially identified expansion factors are then adjusted based on this comparison. Table 2.2 shows this comparison and adjustment factors. Even though the factors are very small, they are not adopted for this adjustment in case the vehicle type is used only locally.

In order to convert vehicle traffic crossing the screen line, load factors and passenger car units (PCU) shown in Table 2.3 were used. The load factors were estimated based on the occupancy survey conducted at the screen line.

Table 2.2: Trips Crossing Pasig River Screen Line and Adjustment Factor

Mode	Screen Line Survey Counted by Direction (trips/day)			Trips by Nonresidents (trips/day)	Trips by Resident (trips/day)	Adjustment to be 2014 (d) (trips/day)	Person Trips from HIS (trips/day)	Preliminary Adj. Factor	Applied Screen Line Adj. Factor
	N->S	S->N	Total (a)	(b)	(c=a-b)	1.0345	(e)	(f=d/e)	
Pedicab	178	147	325	0	325	336	22,012	0.015	1.000
Bicycle	9,994	10,651	20,645	11	20,634	21,346	60,321	0.354	1.000
MC	100,817	100,130	200,947	1,179	199,768	206,660	478,742	0.432	1.000
Filcab+Tricycle	14,940	16,771	31,711	239	31,472	32,558	475,937	0.068	1.000
Jeepney	205,377	227,185	432,562	1,803	430,759	445,620	1,422,218	0.313	1.000
Mini-Bus+Bus	297,146	312,152	609,298	56,653	553,098	572,180	347,487	1.647	1.647
Taxi	47,042	42,498	89,540	939	88,601	91,658	64,646	1.418	1.418
UV-HOV	39,870	46,603	86,473	251	86,222	89,197	62,430	1.429	1.429
Car	294,774	284,068	578,842	12,623	566,219	585,754	444,696	1.317	1.317
Van/Pickup	14,434	12,681	27,115	1,937	25,178	26,047	20,919	1.245	1.245
Truck	21,165	21,934	43,099	3,514	39,585	40,951	16,704	2.452	2.452
Other	0	0	0	6,981	-6,981	-7,222	22,201	-0.325	1.000
PNR	22,171	22,171	44,342	1,534	42,808	44,285	25,734	1.721	1.721
LRT/MRT	366,231	331,398	697,629	0	697,629	721,697	268,875	2.684	2.684

Source: JICA Project Team

Table 2.3: Load Factors and PCUs

Mode	Load Factor (Seat Occupancy)			PCU/ Vehicle	
	MMUTIS ('96)	MUCEP ('14)		MMUTIS	MUCEP
	Average Occupancy	24 hours	Peak Hour		
Standard Bus	50.62	34.19	44.63	2.0	2.5
Minibus	28.96	1.63	3.56	1.5	1.5
Jeepney	14.98	8.84	8.96	1.5	1.3
Tricycle	2.64	0.94	1.24		0.3
Pedicab	1.38	0.14	0.34		0.3
Car/Jeep	1.75	1.58	1.57	1.0	1.0
Taxi	2.17	0.81	0.88	1.0	1.0
HOV Taxi	4.49	6.06	5.35		1.3
Utility Vehicle	3.12	-			
Truck/Trailer	2.07	2.17	2.17	2.0	2.0
Private Bus	20.72	11.28	5.96		2.5
Motorcycle/Bicycle	1.12	1.20	1.19	0.5	0.3
Others	1.36	2.67	2.43		

Source: JICA Project Team

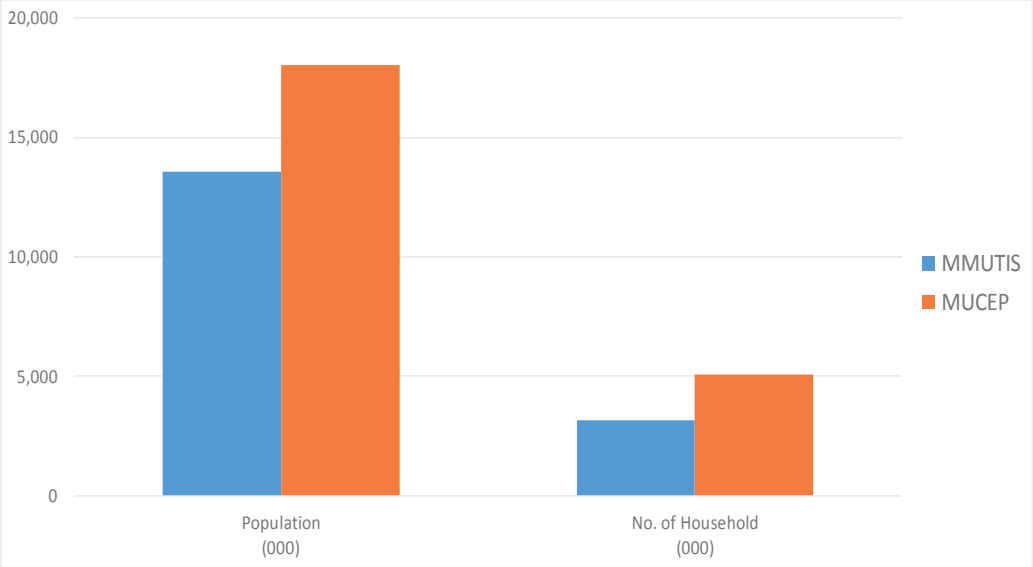
3 DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

Socio-economic conditions in the study area were analyzed based on the MUCEP database. As the sample data was expanded and adjusted using the 2014 population forecast, the characteristics stated below are considered as of the end of 2014 even though the HIS and other surveys were conducted in 2012 to 2013.

3.1 Population and Households

Table 3.1 shows the population from 4 years old and above and the number of households in the study area during MMUTIS in 1996 and MUCEP in 2014. During the 18-year study period, population has increased 1.33 times at 1.6% per annum. In the same period, Metro Manila increased population by 1.17 times and the adjacent provinces by 1.62 times. There was a bigger population increase in the suburban area than in Metro Manila.

Figure 3.1: Demographic Comparison Between MMUTIS and MUCEP



Source: Estimated by the JICA Project Team based on census data.

Table 3.1: Population and Number of Households in the Study Area

Study	Area	Population (000)	No. of Households (000)	Ave. Household Members
MMUTIS (1996)	Metro Manila	8,899	2,095	4.25
	Province	4,666	1,060	4.40
	Survey Area Total	13,565	3,155	4.30
MUCEP (2014)	Metro Manila	10,421	2,893	3.60
	Province	7,589	2,205	3.44
	Survey Area Total	18,010	5,099	3.53

Note: Population does not include age those younger than 4 in 1996 and 5 in 2014.
Source: Estimated by the JICA Project Team based on census data.

The average number of persons per household has become noticeably smaller from 4.30 in 1996 to 3.53 in 2014. This decrease is noteworthy, taking into consideration the difference in population coverage between the two studies. The rapid increase of households has begun in Metro Manila similar to other megacities worldwide.

3.2 Gender and Age Composition

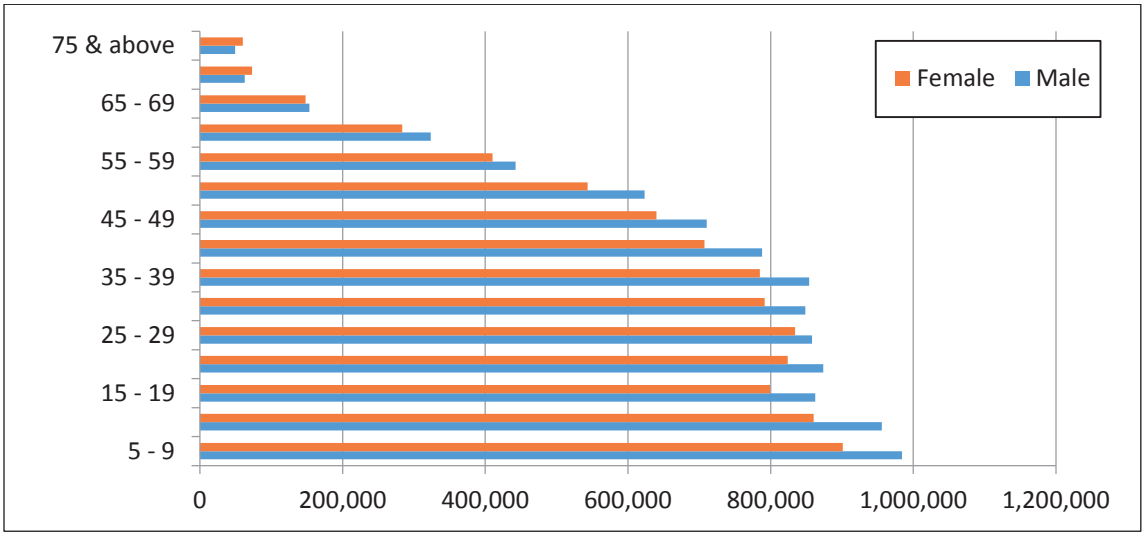
In the total population by gender and age group, 52% are male and 48% are female. Table 3.2 and Figure 3.2 show that people in the age bracket of 20 to 50 years old have dominantly transmigrated to Metro Manila since the male population is higher than female population in each age bracket.

Table 3.2: Population by Gender and Age Group

Age Group	Male		Female		Total		2014	Annual
	No.	%	No.	%	No.	%	/1996	Rate
4 Years old	-		-		-		-	-
5 - 9	984,138	10.5	901,256	10.4	1,885,394	10.4	103.1%	0.17%
10 - 14	955,647	10.2	860,269	9.9	1,815,916	10.1	124.3%	1.22%
15 - 19	862,325	9.2	799,053	9.2	1,661,377	9.2	101.8%	0.10%
20 - 24	873,700	9.3	823,673	9.5	1,697,373	9.4	102.9%	0.16%
25 - 29	858,084	9.1	834,082	9.6	1,692,166	9.4	111.7%	0.62%
30 - 34	848,665	9.0	791,639	9.1	1,640,304	9.1	135.1%	1.69%
35 - 39	853,775	9.1	784,913	9.1	1,638,688	9.1	144.9%	2.08%
40 - 44	787,970	8.4	707,188	8.2	1,495,158	8.3	185.6%	3.50%
45 - 49	710,475	7.6	639,932	7.4	1,350,407	7.5	196.9%	3.84%
50 - 54	623,269	6.6	543,199	6.3	1,166,468	6.5	254.8%	5.33%
55 - 59	442,585	4.7	409,981	4.7	852,566	4.7	259.7%	5.45%
60 - 64	323,324	3.4	283,558	3.3	606,881	3.4	194.8%	3.77%
65 - 69	153,349	1.6	148,157	1.7	301,506	1.7	146.5%	2.14%
70 - 74	62,644	0.7	73,045	0.8	135,688	0.8	177.9%	3.25%
75 & above	49,233	0.5	60,062	0.7	109,296	0.6	144.9%	2.08%
Total	9,389,183	52.0	8,660,006	48.0	18,049,190	100.0	133.1%	1.60%

Source: Estimated by the JICA Project Team based on census data.

Figure 3.2: Age and Gender Composition in the Study Area



Source: Estimated by JICA Project Team based on census data.

The productive age population of 15 to 65 years old is 13.8 million while the dependent population of below 14 years old and above 65 years old is 4.2 million. The dependent population ratio (dependent population to productive age population) excluding population of ages 0 to 4 years old is 30.8%. If the population of that age bracket would be included, then the ratio would be 44.5%. This means the productive age population per capita has

to shoulder 0.44.5 person socio-economically. Metro Manila, therefore, has a young population. While in Japan with an aging society, the independent population ratio is estimated at 63.3% as of 2015 and it is forecasted to be 95.7% after 40 years or in 2055.

3.3 Geographical Distribution

Among the cities in Metro Manila, the most populous are Manila, Quezon, and Caloocan. Outside Metro Manila, Cavite has the largest population followed by Bulacan and Rizal (refer to Table 3.3 and Figure 3.3). This order has not changed since MMUTIS in 1995.

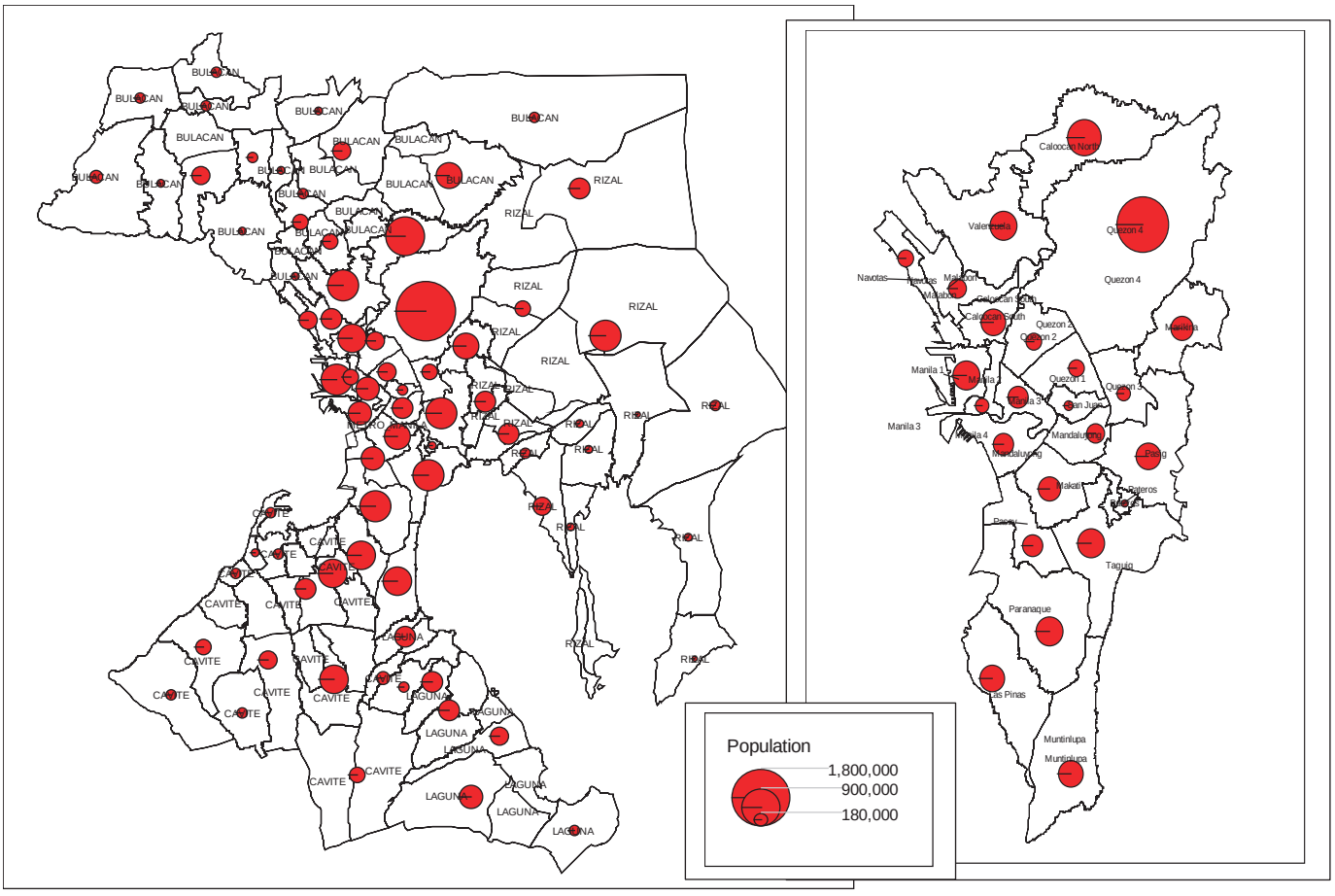
Metro Manila held 65.6% of the total population of the study area in 1995 and decreased to 57.9% in 2014. The population in the surrounding provinces of the study area has, instead, increased from 34.4% to 42.1% in the same period.

3.4 Labor Force and Occupations

Labor force is defined as the population of 15 years old and above, willing or able to work. The composition of the labor force is presented in Figure 3.4 and Table 3.4. Those unable or unwilling to work such as housewives, students, or the sick and disabled are not included in labor force.

Thirty (30) percent of workers are in the commercial (wholesale and retail) sector followed by social services at 15.5% and construction at 9.3%.

Figure 3.3: Population Distribution in the Study Area



Source: Estimated by JICA Project Team based on census data.

Table 3.3: Population Distribution in the Study Area

City/Municipality	Male	Female	Total (Person, %)	
City of Manila	688,383	679,071	1,367,454	7.6
1st	265,730	269,012	534,742	0.0
2nd	77,182	72,650	149,832	0.0
3rd	163,504	158,590	322,094	0.0
4th	181,966	178,819	360,785	0.0
Pasay	158,349	161,805	320,154	2.1
Makati	213,294	203,579	416,873	2.4
Mandaluyong	143,168	137,601	280,769	1.7
San Juan	49,466	47,308	96,774	0.6
Quezon City	1,216,232	1,119,111	2,335,343	13.4
I	116,846	117,633	234,479	0.0
II	132,364	105,429	237,793	0.0
III	76,518	75,393	151,912	0.0
IV	890,503	820,655	1,711,159	0.0
Caloocan City	671,088	640,533	1,311,621	7.7
South	253,849	250,907	504,756	0.0
North	417,239	389,626	806,865	0.0
Valenzuela	259,368	257,830	517,198	2.9
Malabon	146,813	140,645	287,458	1.6
Navotas	123,193	107,182	230,375	1.3
Marikina	203,294	175,975	379,269	2.1
Pasig City	295,048	288,299	583,347	3.2
Pateros	27,572	28,923	56,495	0.3
Taguig	290,242	279,207	569,449	3.2
Parañaque	281,693	276,896	558,589	3.1
Muntinlupa	226,776	215,800	442,576	2.5
Las Piñas	242,458	251,265	493,723	2.7
	5,236,438	5,011,029	15,261,884	58.3
Bulacan	1,062,304	919,370	1,981,674	10.5
Cavite	1,385,712	1,065,500	2,451,212	10.8
Laguna	726,641	690,174	1,416,816	8.2
Rizal	1,105,798	1,097,427	2,203,225	12.3
Provinces Total	4,280,456	3,772,471	8,052,926	41.7
Survey Area Total	9,516,893	8,783,500	18,300,393	100.0

Source: Estimated by JICA Project Team based on census data.

Table 3.4: Number of Workers by Industrial Sector

Industry	Workers			
	1)	(000)	2)	%
Agriculture & Forestry		188		2.3
Fishing		73		0.9
Mining & Quarrying		10		0.1
Manufacturing		570		6.9
Electricity, Gas & Water		197		2.4
Construction		764		9.3
Wholesale & Retail Trade		2,514		30.5
Hotels & Restaurants		387		4.7
Transport, Storage & Comm.		884		10.7
Financial Intermediation		143		1.7
Real Estate & Renting Business		181		2.2
Public Adm. & Defense		422		5.1
Education		180		2.2
Health & Social Work		197		2.4
Other Social Service		1,280		15.5
Private Households		233		2.8
Extra-territorial Organizations		18		0.2
Total		8,240		100.0

Source: JICA Project Team

Table 3.5: Number of Workers by Occupation

Occupation	Male		Female		Total	
	No. (000)	%	No. (000)	%	No. (000)	%
Official of Govt., Manager & Supervisors	360	3.8	191	2.2	551	3.1
Professionals	234	2.5	220	2.5	454	2.5
Technicians & Assoc. Professionals	237	2.5	100	1.2	337	1.9
Clerical Worker	208	10.0	202	10.0	410	10.0
Service, Shop & Market Workers	1,574	10.0	1,002	10.0	2,576	10.0
Farmers, Forestry Workers & Fishermen	142	10.0	18	10.0	159	10.0
Trades & Related Workers	487	5.2	542	6.3	1,029	5.7
Machine Operators & Assemblers	348	3.7	43	0.5	391	2.2
Laborers & Unskilled Workers	1,926	20.5	727	8.4	2,653	14.7
Others	260	2.8	178	2.1	438	2.4
Sub-total	5,776	61.6	3,223	37.3	8,999	49.9
Student (Elem.)	1,581	16.9	1,411	16.3	2,992	16.6
Student (H.S. & Univ.)	1,078	11.5	1,015	11.7	2,093	11.6
Housewife/Husband	162	1.7	2,191	25.3	2,353	13.0
Jobless	786	8.4	813	9.4	1,598	8.9
Sub-total	3,607	38.4	5,429	62.7	9,036	50.1
Total	9,383	100.0	8,653	100.0	18,035	100.0

Note: Population include persons aged 5 Years and above
Source: JICA Project Team

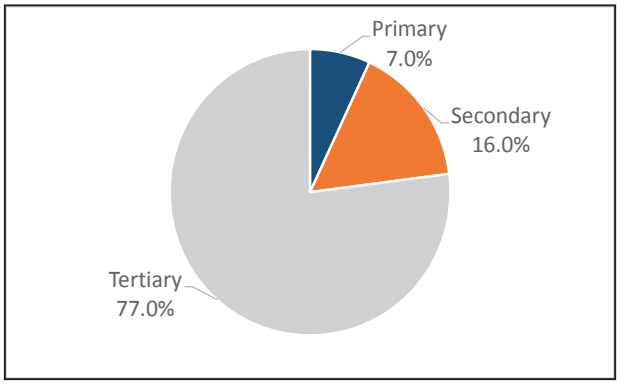
Table 3.5 shows that in the age group of 4 years and over, 61% of the male population are employed or working while the remaining are either students or unemployed. On the other hand, 37% of the female population is employed or working, while the remaining 63% are students, housewives, or unemployed. The employed rate is 50% based on the total population.

Table 3.6: Population by Zone and by Employment Status

City/ Municipality	Population (000)	Gainful Worker (000)	Student (000)	Housewife (000)	Jobless (000)
City of Manila	1,700.9	648.3	337.2	143.7	160.7
1st	665.1	247.0	143.4	60.9	57.9
2nd	186.4	78.0	34.7	12.9	17.4
3rd	400.6	152.1	76.2	33.0	37.4
4th	448.8	171.2	82.9	36.9	48.1
Pasay	398.2	114.2	85.4	50.9	24.9
Makati	518.5	148.9	113.8	70.6	24.6
Mandaluyong	359.0	87.7	64.1	40.8	19.0
San Juan	122.5	29.8	18.5	14.4	9.8
Quezon City	2,920.5	880.3	565.0	311.7	227.6
I	296.6	84.8	52.6	32.2	21.5
II	295.8	90.5	53.2	26.8	22.6
III	199.9	57.1	34.6	21.2	11.7
IV	2,128.3	648.0	424.6	231.5	171.8
Caloocan City	1,631.4	433.2	360.2	210.6	81.2
South	627.8	171.9	137.0	84.8	35.4
North	1,003.6	261.3	223.2	125.9	45.9
Valenzuela	599.7	145.7	117.6	76.3	27.1
Malabon	357.3	88.3	68.3	43.4	23.9
Navotas	260.5	51.3	42.6	29.4	16.1
Marikina	438.0	111.2	70.8	49.5	25.7
Pasig City	689.4	156.6	118.7	80.9	42.0
Pateros	68.1	23.0	13.9	8.6	3.3
Taguig	691.6	161.0	141.9	92.5	35.0
Parañaque	637.2	179.2	140.5	84.1	27.2
Muntinlupa	480.9	124.8	93.9	69.6	24.0
Las Piñas	587.5	162.7	122.4	77.6	29.0
Metro Manila Total	12,461.2	3,546.2	2,474.7	1,454.8	801.3
Bulacan	2,464.8	790.9	611.5	180.9	245.1
Cavite	3,048.8	1,202.5	524.7	215.3	253.2
Laguna	1,762.2	526.8	389.2	240.0	72.1
Rizal	2,740.4	804.5	617.0	261.6	226.5
Provinces Total	10,016.2	3,324.6	2,142.4	897.8	797.0
Survey Area Total	22,477.4	6,870.8	4,617.1	2,352.6	1,598.3

Source: JICA Project Team

Figure 3.4: Employment by Industrial Sector

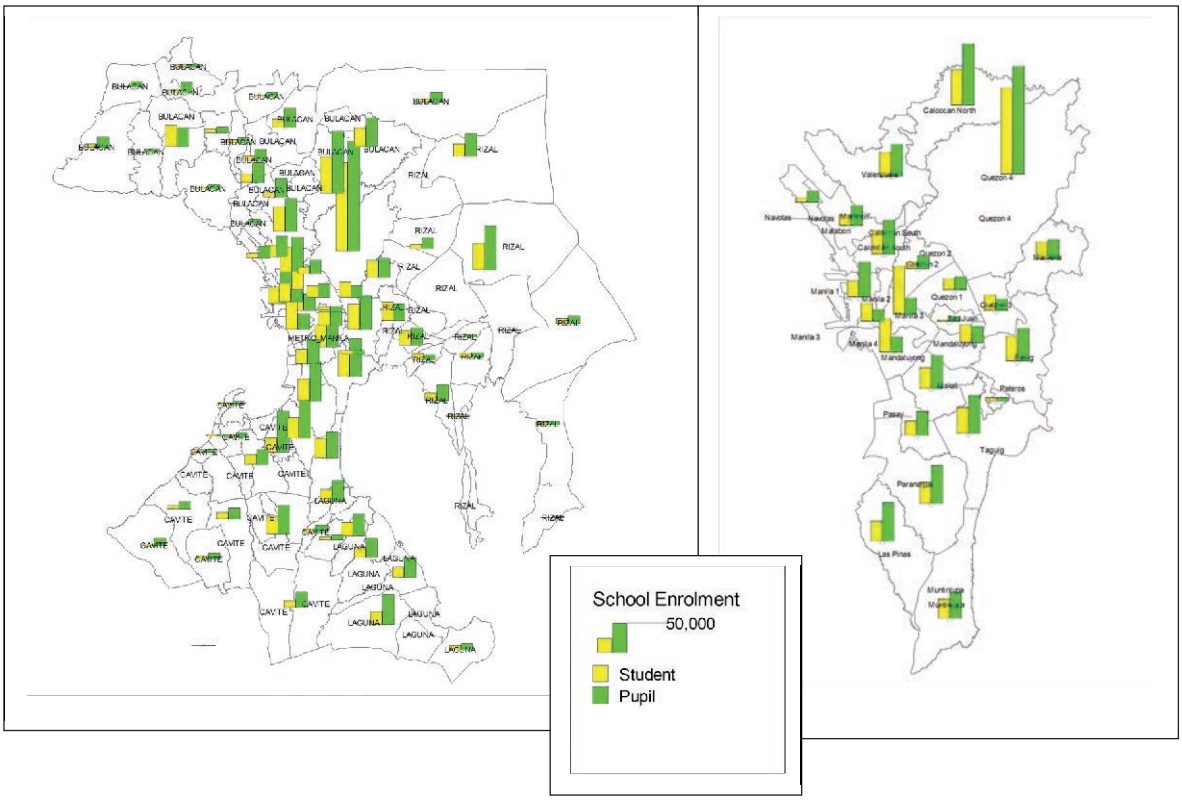


Source: JICA Project Team

3.5 School Enrollment

Figure 3.5 and Table 3.7 present the number of pupils and students by zone. Zones in Manila City where many higher education schools are located have more students than pupils although, overall, the number of students is lesser than with pupils.

Figure 3.5: Distribution of Students and Pupils in Schools



Source: JICA Project Team

3.6 Daytime and Nighttime Population

Nighttime population refers to the resident population in a given area generally present in the evening hours. Daytime population counts all present in a given area including workers and students. There are those who work and go to school at night, yet are not included in the nighttime population count.

Table 3.7: Number of Students by Zone

City/Municipality	Pupil		Student		Total	
	(000)	%	(000)	%	(000)	%
City of Manila	168.5	6.2	174.1	9.6	342.7	7.6
1st	74.2	2.7	36.1	2.0	110.2	2.4
2nd	24.7	0.9	40.3	2.2	65.0	1.4
3rd	35.3	1.3	104.1	5.8	139.4	3.1
4th	34.3	1.3	73.4	4.1	107.7	2.4
Pasay	51.7	1.9	31.6	1.7	83.3	1.8
Makati	68.1	2.5	46.5	2.6	114.6	2.5
Mandaluyong	36.1	1.3	38.9	2.2	75.0	1.7
San Juan	10.3	0.4	4.9	0.3	15.2	0.3
Quezon City	314.9	11.5	258.0	14.3	572.9	12.6
I	28.9	1.1	24.3	1.3	53.2	1.2
II	29.8	1.1	14.0	0.8	43.9	1.0
III	25.0	0.9	33.4	1.8	58.4	1.3
IV	231.2	8.5	186.3	10.3	417.4	9.2
Caloocan City	203.1	7.4	128.9	7.1	332.1	7.3
South	72.4	2.7	51.4	2.8	123.8	2.7
North	130.7	4.8	77.5	4.3	208.2	4.6
Valenzuela	68.7	2.5	52.3	2.9	120.9	2.7
Malabon	43.9	1.6	24.4	1.4	68.3	1.5
Navotas	24.9	0.9	11.0	0.6	35.9	0.8
Marikina	41.2	1.5	37.9	2.1	79.1	1.7
Pasig City	71.3	2.6	53.2	2.9	124.5	2.7
Pateros	7.4	0.3	8.2	0.5	15.6	0.3
Taguig	81.3	3.0	55.6	3.1	136.9	3.0
Parañaque	82.1	3.0	46.4	2.6	128.6	2.8
Muntinlupa	56.2	2.1	41.8	2.3	98.1	2.2
Las Piñas	83.6	3.1	44.3	2.5	127.9	2.8
Metro Manila Total	1,413.4	51.8	1,058.2	58.6	2,471.6	54.5
Bulacan	392.3	14.4	203.6	11.3	595.9	13.1
Cavite	338.2	12.4	174.5	9.7	512.6	11.3
Laguna	251.5	9.2	136.7	7.6	388.2	8.6
Rizal	335.3	12.3	233.8	12.9	569.1	12.5
Provinces Total	1,317.3	48.2	748.5	41.4	2,065.8	45.5
Survey Area Total	2,730.7	100.0	1,806.7	100.0	4,537.4	100.0

Note: Population is 5 years old and above.
Source: JICA Project Team

The nighttime population is obtained using the formula below.

(Daytime population of zone i) = (Night-time population of zone i)
+ (Attracted trips to work to zone i)
+ (Attracted trips to school to zone i)
- (Generated trips to work from zone i)
- (Generated trips to school from zone i)

Table 3.8 and Figure 3.6 show the daytime and nighttime population by zone. The discrepancy is due to the “unknown” samples of workers, students, and those traveling to beyond the study area.

Zones with central business districts, such as Makati, Manila, and Mandaluyong, have a daytime population larger than their nighttime population (refer to Figure 3.6). Figure 3.7 directly shows the ratio between daytime to nighttime populations. In the provinces of Cavite and Laguna, high ratios are observed in zones with industrial parks.

Table 3.8: Nighttime and Daytime Population

City/Municipality	Population (000)		Day/Night Ratio (B/A)
	Nighttime (A)	Daytime (B)	
City of Manila	1,367.5	1,472.1	1.1
1st	534.7	449.6	0.8
2nd	149.8	248.0	1.7
3rd	322.1	359.7	1.1
4th	360.8	414.9	1.2
Pasay	320.2	346.4	1.1
Makati	416.9	567.1	1.4
Mandaluyong	280.8	374.8	1.3
San Juan	96.8	97.9	1.0
Quezon City	2,335.3	2,463.5	1.1
I	234.5	268.7	1.1
II	237.8	257.6	1.1
III	151.9	265.2	1.7
IV	1,711.2	1,672.0	1.0
Caloocan City	1,311.6	1,146.8	0.9
South	504.8	463.5	0.9
North	806.9	683.3	0.8
Valenzuela	482.2	484.4	1.0
Malabon	287.2	270.2	0.9
Navotas	209.4	194.4	0.9
Marikina	352.1	366.8	1.0
Pasig City	554.2	622.2	1.1
Pateros	54.7	52.0	1.0
Taguig	556.0	569.2	1.0
Parañaque	512.3	524.2	1.0
Muntinlupa	386.7	418.3	1.1
Las Piñas	472.3	447.7	0.9
Metro Manila Total	9,996.3	10,418.0	1.0
Bulacan	1,981.7	1,890.1	1.0
Cavite	2,451.2	2,355.8	1.0
Laguna	1,416.8	1,407.9	1.0
Rizal	2,203.2	1,977.3	0.9
Provinces Total	8,052.9	7,631.2	0.9
Survey Area Total	18,049.2	18,049.2	1.0

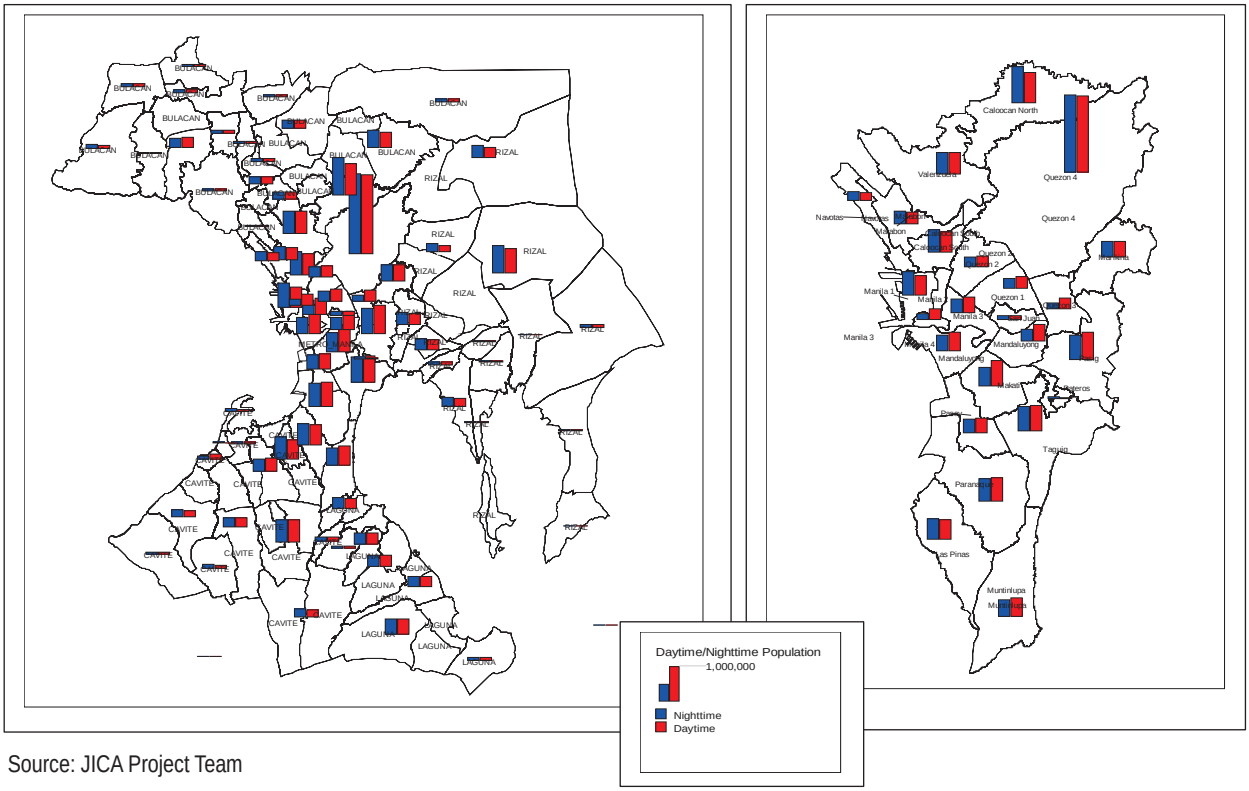
Note: Population is 5 years old and above.
Source: JICA Project Team

3.7 Household Incomes

Table 3.9 shows the distribution of household income in the study area. From the total number of households, 530 (10.4%) and 1,175 (23.0%) belong to the income bracket of PHP1,000-5,000 per month and PHP5,000-10,000 per month, respectively.

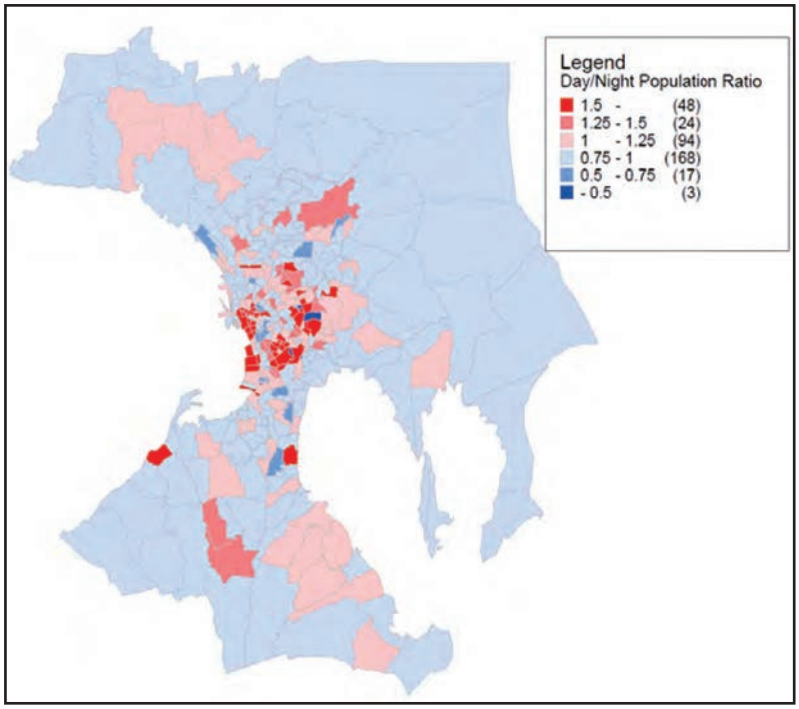
Average household incomes are illustrated by zone in Figure 3.8. Zones along and inside EDSA show relatively higher income especially in Forbes Park and Ayala Alabang.

Figure 3.6: Daytime and Nighttime Population



Source: JICA Project Team

Figure 3.7: Daytime and Nighttime Population Ratio



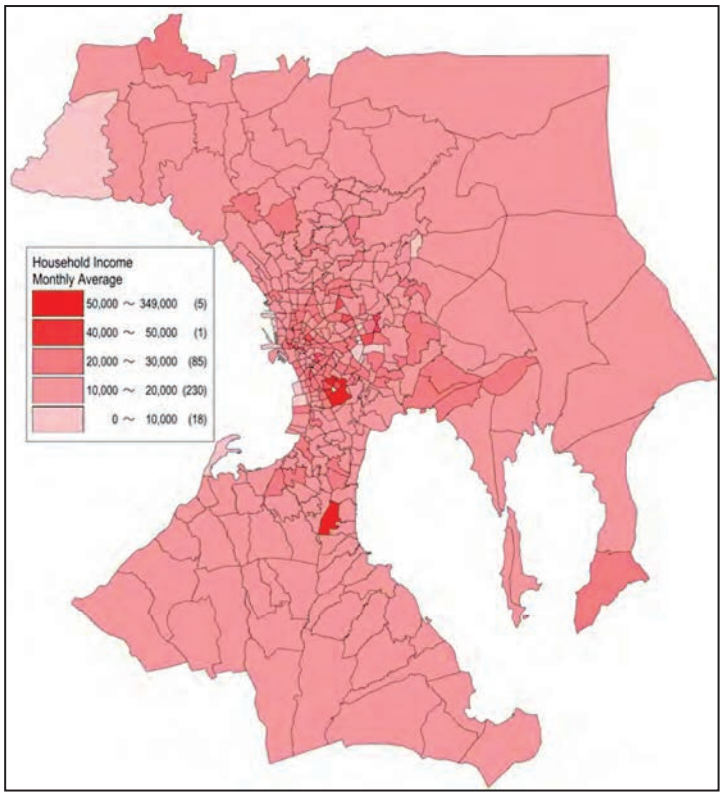
Source: JICA Project Team

Table 3.9: Personal and Household Income Distribution

Household Income (PHP)	No. and Share of Households		No. and Share of Population	
	(000)	(%)	(000)	(%)
No Income	149	2.9	356	2.0
<5,000	530	10.4	1,671	9.3
<10,000	1,175	23.1	3,967	22.0
<15,000	1,080	21.2	3,808	21.1
<20,000	716	14.0	2,610	14.5
<25,000	459	9.0	1,716	9.5
<30,000	310	6.1	1,178	6.5
<35,000	201	3.9	796	4.4
<40,000	140	2.7	567	3.1
<50,000	146	2.9	588	3.3
<60,000	81	1.6	336	1.9
<80,000	58	1.1	245	1.4
<100,000	21	0.4	84	0.5
<150,000	18	0.3	75	0.4
<200,000	6	0.1	21	0.1
<300,000	2	0.0	9	0.1
<500,000	1	0.0	5	0.0
500,000 & over	1	0.0	6	0.0
Unknown	3	0.1	10	0.1
Total	5,098	100.0	18,049	100.0
Average	17,414		4,918	
2014/1996	156.8 %		190.4 %	

Source: JICA Project Team

Figure 3.8: Average Household Incomes by Zone



Source: JICA Project Team

3.8 Car Ownership

Out of the total number of households, 11.5% are household car owners, as shown in Table 3.10. Tables 3.11 and 3.13 show household car ownership breakdown. Among the car-owning households, 10% own more than one car. The total number of owned cars in the study area is 666.9 thousand, or 13.1 cars per 100 households. The average number of owned cars per household is 1.1.

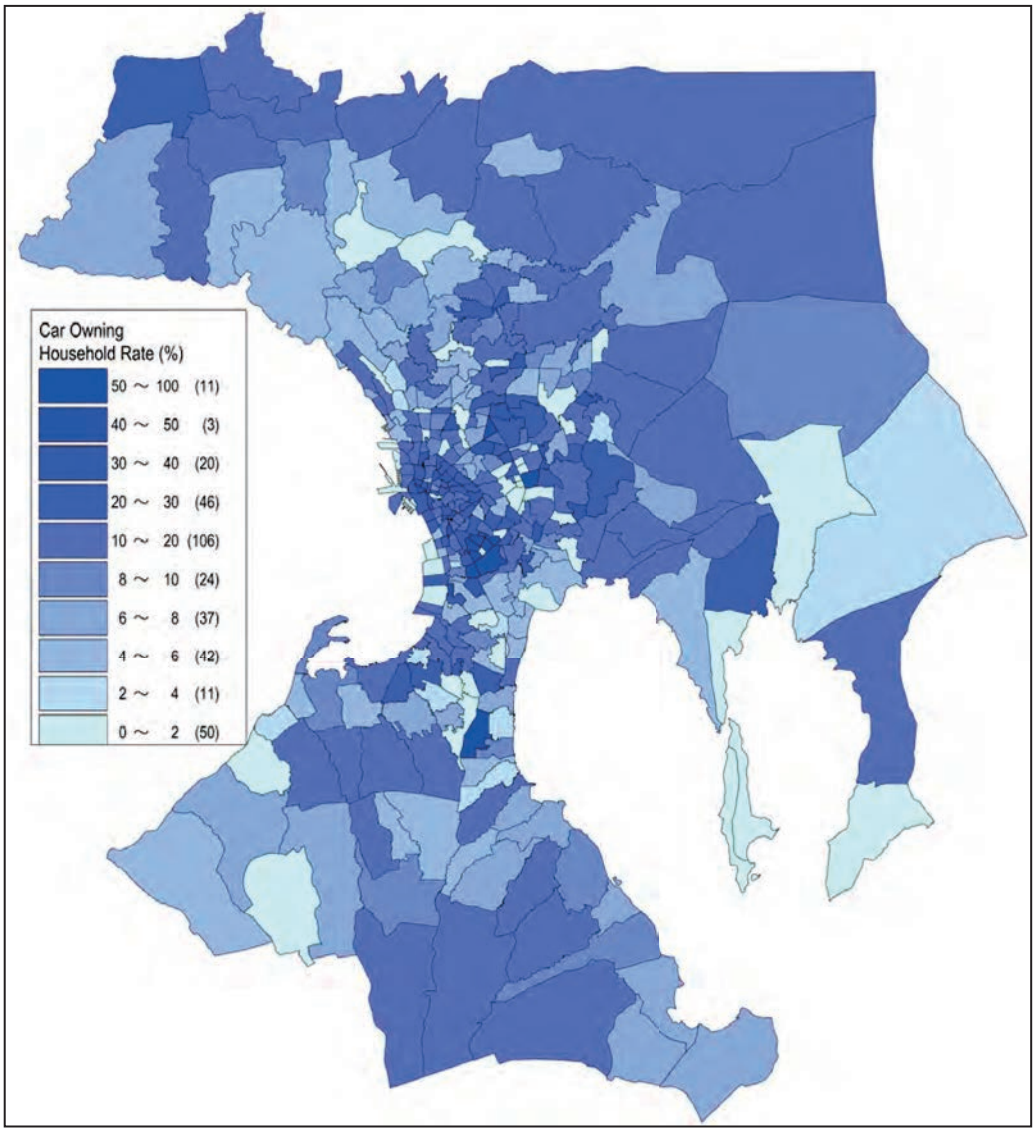
Generally, car ownership is determined by income level. In Table 3.13 that shows the distribution of income levels by car ownership, it is clear that income level goes up as car ownership level rises. Car ownership by zone is illustrated in Figure 3.9 and Table 3.14.

Table 3.10: Car Ownership by Household (000)

Car Ownership	No. of HH	%
Non Car Owning	4,512,000	88.5
Car Owning	582,500	11.5
Total	5,094,500	100.0

Source: JICA Project Team

Figure 3.9: Car-Owning Household Rates by Zone



Source: JICA Project Team

Table 3.11: Distribution of Car Ownership

Car/Jeep Ownership	Households		No. of Cars
	No.	%	
Non owning	4,514,506	88.6	0
1 car	524,823	10.3	524,823
2 cars	46,432	0.9	92,864
3 cars	7,681	0.2	23,044
4 cars	2,555	0.1	10,220
5 cars	905	0.0	4,527
6 cars	199	0.0	1,193
7 cars	282	0.0	1,977
8 cars	0	0.0	0
9 cars	0	0.0	0
10 cars	0	0.0	0
11 cars	0	0.0	0
12 cars	279	0.0	3,342
13 cars	0	0.0	0
14 cars	0	0.0	0
15 cars	325	0.0	4,873
Total	5,097,987	100.0	666,863
Average No. of Cars Owning per 100 HHs			13.1
Average No. of Cars Owning per Own HHs			1.1

Motorized Vehicle Ownership	Households	No. of Cars	
	No.	%	
Non owning	3,435,282	67.4	0
1 car	1,310,435	25.7	1,310,435
2 cars	262,754	5.2	525,507
3 cars	58,150	1.1	174,450
4 cars	17,184	0.3	68,735
5 cars	6,316	0.1	31,580
6 cars	2,528	0.0	15,169
7 cars	1,102	0.0	7,713
8 cars	331	0.0	2,645
9 cars	0	0.0	0
10 cars	297	0.0	2,966
11 cars	3,228	0.1	35,503
12 cars	0	0.0	0
13 cars	470	0.0	6,113
14 cars	0	0.0	0
15 cars	0	0.0	0
16 car	325	0.0	5,198
17 cars	0	0.0	0
18 cars	0	0.0	0
19 cars	0	0.0	0
20 cars	0	0.0	0
21 cars	0	0.0	0
22 cars	95	0.0	2,089
23 cars	0	0.0	0
24 cars	0	0.0	0
25 cars	0	0.0	0
26 cars	0	0.0	0
27 cars	0	0.0	0
28 cars	0	0.0	0
29 cars	0	0.0	0
30 cars	0	0.0	0
31 cars	0	0.0	0
32 cars	0	0.0	0
33 cars	0	0.0	0
34 cars	0	0.0	0
35 cars	0	0.0	0
36 cars	0	0.0	0
37 cars	0	0.0	0
38 cars	0	0.0	0
39 cars	96	0.0	3,758
Total	5,098,591	100.0	2,191,861
Average No. of Cars Owned per 100 HHs			43.0
Average No. of Cars Owned per Own HHs			1.3

Source: JICA Project Team

Table 3.12: Car Ownership by Occupation

Occupation	Population			
	Non-car-owning		Car-owning	
	No. (000)	%	No. (000)	%
Official, Manager	399.5	4.4	151.8	10.3
Professional	275.1	3.0	179.1	12.1
Technician	248.2	2.7	89.0	6.0
Clerical Worker	323.1	3.5	87.1	5.9
Service Worker	2,293.7	25.1	282.1	19.1
Farmer	142.9	1.6	16.4	1.1
Trade	867.1	9.5	161.7	11.0
Operator	345.8	3.8	45.1	3.1
Laborer	2,498.2	27.4	154.6	10.5
Jobless & others	1,729.0	19.0	307.7	20.9
Total	9,122.6	100.0	1,474.6	100.0

Note: "Jobless & others" includes students from elementary, high school & university; housewife/husband; unemployed; and, others

Car owning means owning car/jeep only.

Source: JICA Project Team

Table 3.13: Car Ownership by Income Level

Household Income (PHP)	Non-car-owning	No. of Cars Owned			Total
		1 Car	2 Cars	3 Cars or More	
No Income	137.5	11.1	0.2	0.3	356.1
<5,000	517.7	12.1	0.2	0.2	530.2
<10,000	1,138.9	35.1	0.9	0.3	1,175.2
<15,000	1,013.7	64.3	1.3	0.4	1,079.7
<20,000	640.9	70.8	2.8	1.1	715.5
<25,000	382.6	70.4	4.2	1.5	458.6
<30,000	252.9	53.7	2.9	0.7	310.2
<35,000	150.9	45.5	4.3	0.6	201.3
<40,000	100.2	36.9	2.7	0.3	140.0
<50,000	91.2	47.6	5.5	1.9	146.2
<60,000	39.6	34.1	6.5	0.6	80.7
<80,000	28.6	22.9	4.8	1.6	57.9
<100,000	8.2	8.8	3.3	1.1	21.4
<150,000	5.3	9.1	3.1	0.4	17.8
<200,000	1.8	1.4	1.9	0.6	5.6
<300,000	0.9	0.0	1.3	0.3	2.4
<500,000	0.6	0.0	0.3	0.2	1.2
500,000 & over	0.7	0.2	0.2	0.3	1.4
Unknown	0.0	0.0	0.0	0.0	0.0
Total	4,512.0	523.9	46.4	12.2	5,301.5
	178.0%	108.1%	57.9%	47.4%	169.6%

Note: Car/Jeep-owning only
Source: JICA Project Team

Table 3.14: Number of Cars Owned by Zone

City/Municipality	Number of Cars by Vehicle Type				Total
	Car/Jeep + UV	Bicycle & Motorcycle	Others	Trucks	
City of Manila	103,245	151,191	38,361	2,524	295,321
1st	28,857	56,337	15,904	404	101,502
2nd	12,224	16660.82	5,102	1764.2	35,751
3rd	37,844	36,869	8,032	0	82,745
4th	24,320	41324.48	9,323	355.29	75,323
Pasay	13,054	32,704	11,275	74.66	57,108
Makati	34,470	36,011	12,173	832.82	83,487
Mandaluyong	13,730	23471.74	5,219	0	42,421
San Juan	3,742	7799.51	1,246	0	12,787
Quezon City	106,501	124,333	41,237	1,667	273,737
I	10,420	13875.9	3,838	258.85	28,393
II	10,440	13,250	4,066	0	27,756
III	8,433	8807.38	2,909	0	20,149
IV	77,208	88399.73	30,425	1,408	197,440
Caloocan City	44,601	114,406	38,745	1,247	198,998
South	16,044	41,979	16,788	85.38	74,897
North	28,557	72426.63	21,956	1161.5	124,101
Valenzuela	18,953	46,989	12,416	99.58	78,457
Malabon	4,973	26200.77	6,833	0	38,007
Navotas	5,938	19692.31	6,035	0	31,665
Marikina	15,625	30,844	4,300	0	50,770
Pasig City	21,533	46,856	12,761	173.81	81,324
Pateros	981	4659.11	2,805	0	8,446
Taguig	7,885	40,548	7,722	327.83	56,482
Parañaque	19,127	52,864	13,262	332.73	85,586
Muntinlupa	16,010	31,586	12,575	650.1	60,821
Las Piñas	11,309	46,519	9,387	477.35	67,692
Metro Manila Total	441,678	836,674	236,352	8,406	1,523,110
Bulacan	61,224	265,467	58,340	2,865	387,895
Cavite	71,109	231,382	45,661	475.38	348,627
Laguna	43,169	142,515	63,047	0	248,731
Rizal	76,757	259,689	42,622	561	379,629
Provinces Total	252,258	899,053	209,670	3,901	1,364,882
Survey Area Total	693,936	1,735,726	446,022	12,307	2,887,992

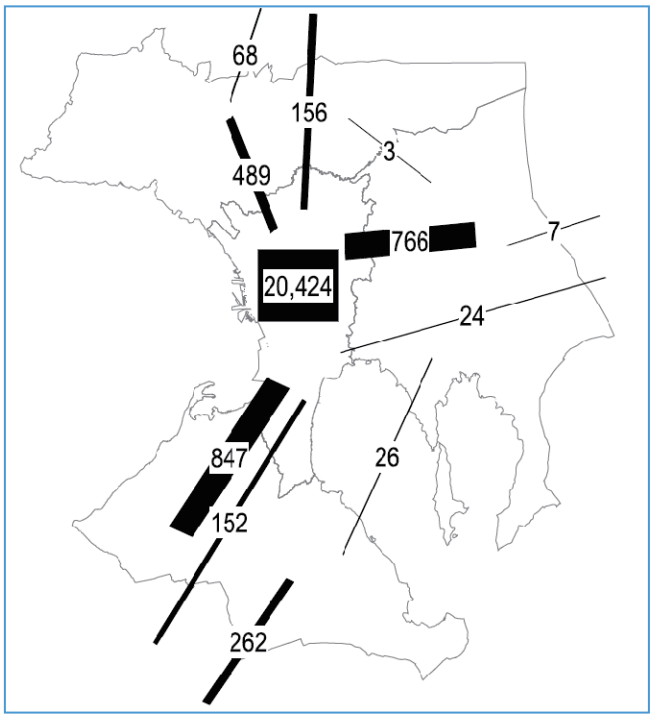
Source: JICA Project Team

4 TRIP CHARACTERISTICS

4.1 Number of Trips

The total number of trips a day made within the study area is 46,818 thousand, more than 99% of which were made by study area residents. About 23% of the total are walking trips (see Table 4.1). Looking at the trip pattern in Figure 4.1, 43% of the trips are within Metro Manila. Cavite and Laguna provinces have the largest share of trips to and from Metro Manila, followed by Rizal and then Bulacan.

Figure 4.1: Total Number of Trips



Source: JICA Project Team

Table 4.1: Number of Trips In/From/To the Study Area

Study	Location	No. of Trips (000)		
		Walking	Trips Using Vehicle	Total
MMUTIS (2006)	Metro Manila	4,471	17,676	22,147
	Province	2,039	6,304	8,343
	Survey Area Total	6,510	23,980	30,490
	Outside		551	551
	Study Area Total	6,510	24,531	31,041
MUCEP (2014)	Metro Manila	6081	21585	27,667
	Province	4829	13976	18,805
	Survey Area Total	10910	35561	46,471
	Outside		346	346
	Study Area Total	10910	35908	46,818

Source: JICA Project Team

4.2 Trips by Purpose

Table 4.2 shows the composition of trips between MMUTIS and MUCEP. Both compositions show similar patterns except that the shares of “to school” and “business” trips slightly decreased, while “private” trips increased. The youngest HIS respondents for MMUTIS were four-year-olds, while those for MUCEP were five-year-olds.

Table 4.2 shows a drop in "to school" kids under MUCEP. One reason could be that during MMUTIS, four-year-old kids were already attending kindergarten, but by the time MUCEP was implemented, the required age for kindergartners was five years old. The Philippine Government's "K to 12 Program," a new educational system which also adds two more years or levels to the secondary school curriculum (refer to Table 4.3), was enforced in 2012 and the transition period is from 2012 to 2016. If the new system is strictly enforced, the share of "to school" trips would become larger. This must be noted when forecasting modal shares.

Table 4.2: Comparison of Trip Purposes between MMUTIS and MUCEP

Purpose	MMUTIS (1995)		MUCEP (2014)	
	Trips/day	Share (%)	Trips/day	Share (%)
To Work	4921	16.1	5922	16.7
To School	4991	16.4	5204	14.7
Business	2702	8.9	1823	5.1
Private	3859	12.7	5073	14.3
To Home	14017	46.0	17481	49.2
Total	30490	100.0	35503	100.0

Source: MMUTIS & MUCEP JICA Project Team.

Table 4.3: K to 12 Basic Educational Program

Level of Education			Age Range	Years in School
Before 2012	Pre-School		3-6	3
	Primary		6-11/12	6
	Secondary		11/12-15/16	4
	Tertiary		16-	4-5
Since 2012	Kindergarten		5	1
	Primary		6-11	6
	Secondary	Junior High School	12-15	4
		Senior High School	16-17	2
	Tertiary		18-	4-5

Note: Since 2012, the K to 12 Program has been enforced.
Source: Internet "http://www.gov.ph/k-12"

Figure 4.2 and Table 4.4 present respectively the share and number of trips of residents in the study area by purpose. They show no significant difference between trips with and without "walk" trips.

With the exception of "to home" under excluding "walk" trips in Table 4.4, the trips of "to work" and "to school" account for 30.8% and 30.5%, respectively. Only 10% percent are shared by "business" trips and 26.3% by "private" trips.

Among the private trip purposes, more than half are for shopping, followed by "to send/pick up," "social," and "worship."

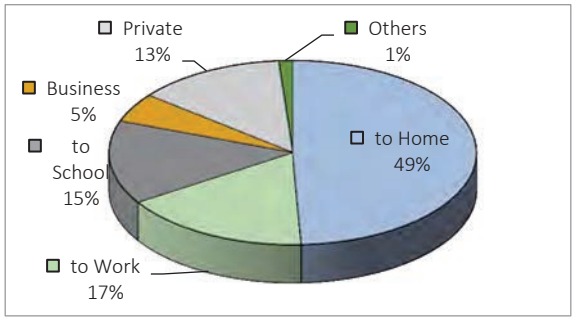
4.3 Trips by Mode

Table 4.5 shows the modal composition of trips made by residents, which is termed "linked trips." In case of a trip using more than one transportation mode, the trip is classified under the highest-ranking mode used. All modes are ranked according to hierarchy as specified in Chapter 2. In principle, public transportation modes are given higher ranking than private modes. Modes that serve longer trips also have higher ranks. The hierarchy adopted by MUCEP is:

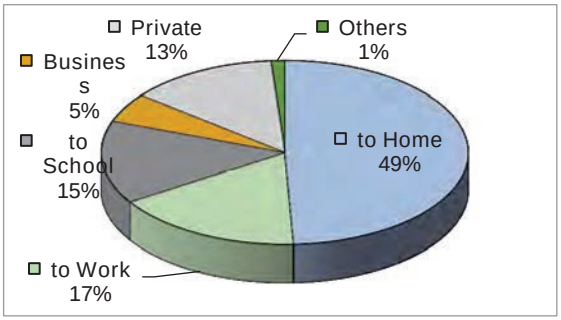
Railway > Truck > UV/ HOV > Bus > Jeepney > Taxi > Passenger Car > Motorcycle

Figure 4.2: Compositions of Trip Purposes of Residents in the Study Area

(1) Including "Walk" Trips



(2) Excluding "Walk" Trips



Source: JICA Project Team

Table 4.4: Purposes of Trips made by Residents in the Study Area

Trip Purpose	Including Walk Trips			Excluding Walk Trips		
	(000)	%	%	(000)	%	%
To Home	17,481	49.2		16,029	49.3	
To Work	5,922	16.7	32.9	5,078	15.6	30.8
To School	5,204	14.7	28.9	5,026	15.5	30.5
Business	1,823	5.1	10.1	1,652	5.1	10.0
Private Business	1,678	4.7	9.3	1,519	4.7	9.2
Employer's Business	146	0.4	0.8	133	0.4	0.8
Private	4,634	13.1	25.7	4,332	13.3	26.3
Medical	137	0.4	0.8	134	0.4	0.8
Social	291	0.8	1.6	273	0.8	1.7
Eating	89	0.3	0.5	83	0.3	0.5
Shopping	2,665	7.5	14.8	2,537	7.8	15.4
Worship	253	0.7	1.4	242	0.7	1.5
Recreation	151	0.4	0.8	142	0.4	0.9
To Send/Pick up	1,047	2.9	5.8	922	2.8	5.6
Others	439	1.2	2.4	410	1.3	2.5
Total	34,365	100.0		31,581	100.0	

Source: JICA Project Team
Note: Trips are by residents inside study area only. Excluding Walk is excluding walking mode as representative mode.

Table 4.5: Trip Composition by Mode

Mode	No. of Trips (000)	% of Public or Private	% to Total
Public Mode	17,337	100.0	48.8
Train	1,485	8.6	4.2
Bus	2,352	13.6	6.6
Jeepney	6,763	39.0	19.1
Tricycle	5,687	32.8	16.0
UV/HOV	261	1.5	0.7
Pedicab	631	3.6	1.8
Others	156	0.9	0.4
Private Mode	7,263	100.0	20.4
Motorcycle	2,948	40.6	8.3
Car	2,894	39.9	8.2
Taxi	315	4.3	0.9
Truck	270	3.7	0.8
Others	826	11.4	2.3
Walking	10,913	-	30.7
Total	35,503	-	100.0

Source: JICA Project Team
Note: Trips are by residents inside study area only.

Table 4.6: Number of Trips by Mode and Car Ownership

Mode	Non-Car Owner		Car Owner		Total	
	No. (000)	%	No. (000)	%	No. (000)	%
Public Mode	14,667	48.2	1,603	31.7	16,270	45.9
Train	1,290	4.2	193	3.8	1,483	4.2
Bus	2,011	6.6	337	6.7	2,348	6.6
Jeepney	6,140	20.2	614	12.1	6,754	19.0
Tricycle	5,226	17.2	458	9.1	5,684	16.0
Private Mode	5,541	18.2	2,748	54.3	8,288	23.4
Car	716	2.4	2,174	43.0	2,891	8.2
Taxi	254	0.8	60	1.2	314	0.9
Truck	239	0.8	31	0.6	270	0.8
Others	4,332	14.2	482	9.5	4,814	13.6
Walking	10,201	33.5	709	14.0	10,910	30.8
Total	30,408	100.0	5,060	100.0	35,468	100.0

Source: JICA Project Team

Walking is ranked lowest. Walking trips in Table 4.5 refer to trips done solely by walking. The ratio of public mode to private mode to walking is 49.20:31. If walking is excluded, the public to private ratio is 70:30.

Modal composition by car ownership shows a clear difference between car and non-car-owning households (see Table 4.6). This suggests that the modal split model should be built according to car ownership because the share of car-owning households would undoubtedly become higher in the future.

Figure 4.3 illustrates the modal split between public and private modes. The private modes show a naturally high share in the zones with high car ownership. On the other hand, public modes have a high share along the main corridors running radially from Metro Manila.

Among public modes, jeepneys make up for 19% and tricycles at 16%. The share of buses and railways are low at 6.6% and 4.2%, respectively. Among private modes, motorcycles have a slightly higher share of 8.3% than passenger cars, which have 8.2%.

4.4 Trip Generation and Attraction

1) Trip Generation and Attraction by Travel Mode and by Zone

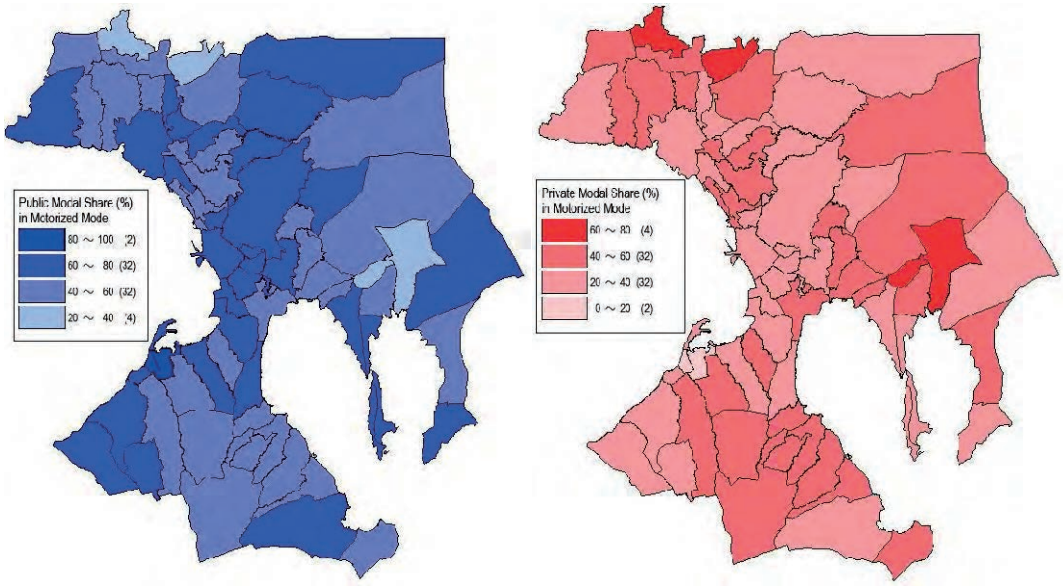
Trip generation and attraction by travel mode and zone are listed in Table 4.7. Their compositions or shares are shown in Table 4.8. The trips are daily and the generated trips are almost balanced with attracted trips in every zone.

The compositions in Metro Manila show that Quezon City has the largest share in every mode. Next are Manila and Caloocan City. Makati City has actually the highest car share compared to the overall mode total. In contrast, each adjacent province has a lower car share than the overall at about 10%.

2) Trip Generation and Attraction Rate by Zone in Peak Hour

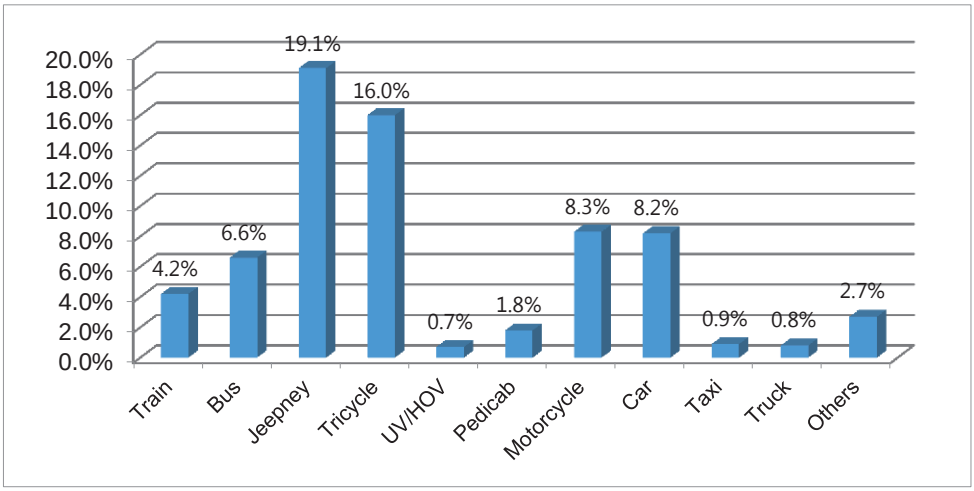
The abovementioned observations with the trip generation and attraction by travel mode and zone are more visible at the morning peak hour between 7:00 a.m. to 8:00 a.m. This is shown in Figure 4.5. The rate of buses and jeepneys are higher in the provinces, while HOV trips cover a seemingly short distance.

Figure 4.3: Modal Shares of Private and Public Transportation by Zone



Source: JICA Project Team

Figure 4.4: Shares of Private and Public Transportation by Mode



Source: JICA Project Team

3) Trip Generation and Attraction by Purpose and Zone

Generated and attracted trips are shown by travel purpose and zone in Table 4.9 and their composition percentage is in Table 4.10. Trip generation is almost proportional to the nighttime population. On the other hand, attraction shares by “to work” trips are remarkably high in cities with business centers such as Makati, Pasig, and Taguig. The attraction shares by “to school” trips are high in Manila and Quezon Cities where many schools are located.

Table 4.7: Trip Generation and Attraction by Mode and Zone

	Car		Jeepney		Bus		Truck		Others		Total	
Municipality	Gen.	Att.	Gen.	Att	Gen.	Att.	Gen.	Att	Gen.	Att.	Gen.	Att.
City of Manila	309,694	311,653	726,775	728,385	175,613	172,016	31,064	31,722	1,722,469	1,718,279	2,965,615	2,962,055
Manila (1)	68,059	71,853	183,823	182,993	20,459	18,707	9,254	8,916	593,172	588,763	874,767	871,232
Manila (2)	66,359	63,454	181,821	186,106	34,563	34,044	4,703	4,712	340,408	336,382	627,854	624,698
Manila (3)	82,504	84,542	191,275	190,974	49,256	48,884	4,077	4,584	344,775	339,611	671,887	668,595
Manila (4)	92,772	91,804	169,856	168,312	71,335	70,381	13,030	13,510	444,114	453,523	791,107	797,530
Pasay	64,840	64,845	150,868	151,198	66,691	68,480	4,501	4,248	506,242	514,801	793,142	803,572
Makati	202,736	203,387	137,596	135,405	136,088	134,723	3,599	3,152	688,476	705,980	1,168,495	1,182,647
Mandaluyong	81,342	83,530	150,675	151,444	100,644	100,061	3,797	3,950	454,544	456,070	791,002	795,055
San Juan	24,577	26,507	45,328	44,910	22,461	25,132	277	277	114,205	113,580	206,848	210,406
Quezon City	605,448	603,609	1,121,014	1,114,781	570,544	590,538	34,676	33,826	2,763,589	2,750,286	5,095,271	5,093,040
Quezon (1)	62,728	64,437	102,367	98,633	55,255	58,064	4,966	4,927	315,041	318,336	540,357	544,397
Quezon (II)	81,411	80,488	82,092	81,099	66,199	70,170	5,256	4,803	269,983	262,904	504,941	499,464
Quezon (III)	73,081	71,379	120,442	121,374	72,562	71,275	7,032	7,032	281,366	279,614	554,483	550,674
Quezon (IV)	388,228	387,305	816,113	813,675	376,528	391,029	17,422	17,064	1,897,199	1,889,432	3,495,490	3,498,505
Kaloocan	118,863	118,996	456,969	457,686	125,956	121,433	14,477	14,888	1,606,981	1,606,068	2,323,246	2,319,071
Kaloocan (S)	49,641	50,482	216,225	215,503	50,141	46,763	3,908	4,412	651,337	652,590	971,252	969,750
Kaloocan (N)	69,222	68,514	240,744	242,183	75,815	74,670	10,569	10,476	955,644	953,478	1,351,994	1,349,321
Valenzuela	53,360	53,996	151,523	152,520	52,632	48,799	2,653	2,653	687,826	690,184	947,994	948,152
Malabon	24,620	24,740	108,027	107,388	21,700	22,390	3,555	4,605	393,532	391,219	551,434	550,342
Navotas	12,213	11,736	60,771	60,551	9,995	11,115	3,070	3,605	278,379	277,253	364,428	364,260
Marikina	61,082	61,065	211,046	209,118	27,196	27,520	8,205	8,286	446,339	450,537	753,868	756,526
Pasig City	91,411	90,268	217,512	219,344	77,036	73,766	7,563	7,425	786,065	791,114	1,179,587	1,181,917
Pateros	3,427	3,957	14,951	14,530	1,559	1,418	1,186	1,186	78,866	78,772	99,989	99,863
Taguig	65,791	67,296	167,133	169,469	61,997	56,826	3,035	3,035	764,012	765,699	1,061,968	1,062,325
Parañaque	105,235	102,608	312,284	310,425	92,261	92,418	3,120	3,120	808,410	810,148	1,321,310	1,318,719
Muntinlupa	61,684	61,538	216,721	214,660	59,593	63,447	5,089	4,942	554,595	555,306	897,682	899,893
Las Piñas	47,359	46,870	200,139	202,198	46,725	48,820	4,686	4,686	643,217	637,412	942,126	939,986
Metro Manila Total	1,933,682	1,936,601	4,449,332	4,444,012	1,648,691	1,658,902	134,553	135,606	13,297,747	13,312,708	21,464,005	21,487,829
Bulacan	213,879	214,165	608,457	610,082	143,764	140,005	45,639	46,776	2,691,387	2,681,103	3,703,126	3,692,131
Cavite	271,119	271,534	631,871	634,974	292,287	289,426	19,572	19,445	2,565,665	2,570,785	3,780,514	3,786,164
Laguna	217,771	217,945	476,453	475,868	112,971	114,298	13,163	13,163	2,074,152	2,074,776	2,894,510	2,896,050
Rizal	203,817	200,060	580,293	581,971	116,649	113,617	38,668	37,695	2,558,629	2,547,056	3,498,056	3,480,399
Province Total	906,586	903,704	2,297,074	2,302,895	665,671	657,346	117,042	117,079	9,889,833	9,873,720	13,876,206	13,854,744
Study Area Total	2,840,268	2,840,305	6,746,406	6,746,907	2,314,362	2,316,248	251,595	252,685	23,187,580	23,186,428	35,340,211	35,342,573
Outside	53,583	53,546	16,909	16,408	37,932	36,046	18,431	17,341	35,762	36,914	162,617	160,255
Ground Total	2,893,851	2,893,851	6,763,315	6,763,315	2,352,294	2,352,294	270,026	270,026	23,223,342	23,223,342	35,502,828	35,502,828

Source: JICA Project Team

Table 4.8: Share of Trip Generation and Attraction by Mode and Zone

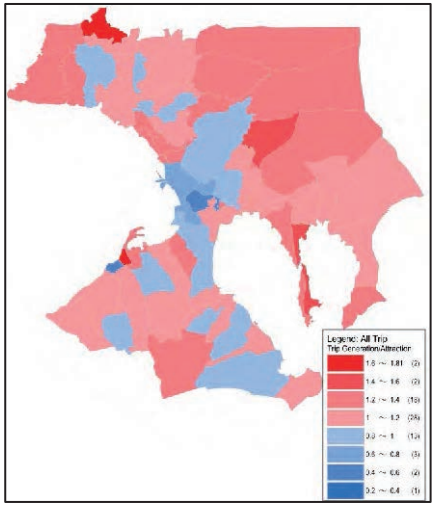
(Unit: %)

Municipality	Car		Jeepney		Bus		Truck		Others		Total	
	Gen.	Att.	Gen.	Att	Gen.	Att.	Gen.	Att	Gen.	Att.	Gen.	Att.
City of Manila	10.9	11.0	10.8	10.8	7.6	7.4	12.3	12.6	7.4	7.4	8.4	8.4
Manila (1)	2.4	2.5	2.7	2.7	0.9	0.8	3.7	3.5	2.6	2.5	2.5	2.5
Manila (2)	2.3	2.2	2.7	2.8	1.5	1.5	1.9	1.9	1.5	1.5	1.8	1.8
Manila (3)	2.9	3.0	2.8	2.8	2.1	2.1	1.6	1.8	1.5	1.5	1.9	1.9
Manila (4)	3.3	3.2	2.5	2.5	3.1	3.0	5.2	5.3	1.9	2.0	2.2	2.3
Pasay	2.3	2.3	2.2	2.2	2.9	3.0	1.8	1.7	2.2	2.2	2.2	2.3
Makati	7.1	7.2	2.0	2.0	5.9	5.8	1.4	1.2	3.0	3.0	3.3	3.3
Mandaluyong	2.9	2.9	2.2	2.2	4.3	4.3	1.5	1.6	2.0	2.0	2.2	2.2
San Juan	0.9	0.9	0.7	0.7	1.0	1.1	0.1	0.1	0.5	0.5	0.6	0.6
Quezon City	21.3	21.3	16.6	16.5	24.7	25.5	13.8	13.4	11.9	11.9	14.4	14.4
Quezon (1)	2.2	2.3	1.5	1.5	2.4	2.5	2.0	1.9	1.4	1.4	1.5	1.5
Quezon (II)	2.9	2.8	1.2	1.2	2.9	3.0	2.1	1.9	1.2	1.1	1.4	1.4
Quezon (III)	2.6	2.5	1.8	1.8	3.1	3.1	2.8	2.8	1.2	1.2	1.6	1.6
Quezon (IV)	13.7	13.6	12.1	12.1	16.3	16.9	6.9	6.8	8.2	8.1	9.9	9.9
Kaloocan	4.2	4.2	6.8	6.8	5.4	5.2	5.8	5.9	6.9	6.9	6.6	6.6
Kaloocan (S)	1.7	1.8	3.2	3.2	2.2	2.0	1.6	1.7	2.8	2.8	2.7	2.7
Kaloocan (N)	2.4	2.4	3.6	3.6	3.3	3.2	4.2	4.1	4.1	4.1	3.8	3.8
Valenzuela	1.9	1.9	2.2	2.3	2.3	2.1	1.1	1.0	3.0	3.0	2.7	2.7
Malabon	0.9	0.9	1.6	1.6	0.9	1.0	1.4	1.8	1.7	1.7	1.6	1.6
Navotas	0.4	0.4	0.9	0.9	0.4	0.5	1.2	1.4	1.2	1.2	1.0	1.0
Marikina	2.2	2.1	3.1	3.1	1.2	1.2	3.3	3.3	1.9	1.9	2.1	2.1
Pasig City	3.2	3.2	3.2	3.3	3.3	3.2	3.0	2.9	3.4	3.4	3.3	3.3
Pateros	0.1	0.1	0.2	0.2	0.1	0.1	0.5	0.5	0.3	0.3	0.3	0.3
Taguig	2.3	2.4	2.5	2.5	2.7	2.5	1.2	1.2	3.3	3.3	3.0	3.0
Parañaque	3.7	3.6	4.6	4.6	4.0	4.0	1.2	1.2	3.5	3.5	3.7	3.7
Muntinlupa	2.2	2.2	3.2	3.2	2.6	2.7	2.0	2.0	2.4	2.4	2.5	2.5
Las Piñas	1.7	1.7	3.0	3.0	2.0	2.1	1.9	1.9	2.8	2.7	2.7	2.7
Metro Manila Total	68.1	68.2	66.0	65.9	71.2	71.6	53.5	53.7	57.3	57.4	60.7	60.8
Bulacan	7.5	7.5	9.0	9.0	6.2	6.0	18.1	18.5	11.6	11.6	10.5	10.4
Cavite	9.5	9.6	9.4	9.4	12.6	12.5	7.8	7.7	11.1	11.1	10.7	10.7
Laguna	7.7	7.7	7.1	7.1	4.9	4.9	5.2	5.2	8.9	8.9	8.2	8.2
Rizal	7.2	7.0	8.6	8.6	5.0	4.9	15.4	14.9	11.0	11.0	9.9	9.8
Province Total	31.9	31.8	34.0	34.1	28.8	28.4	46.5	46.3	42.7	42.6	39.3	39.2
Study Area Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Outside												
Ground Total												

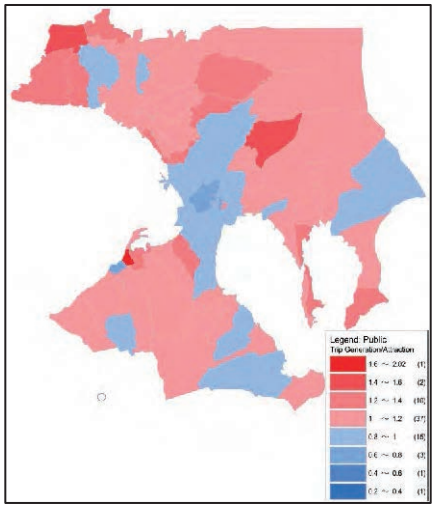
Source: JICA Project Team

Figure 4.5: Trip Generation and Attraction Rates by Zone at Peak Hour (7:00-8:00) in 2014

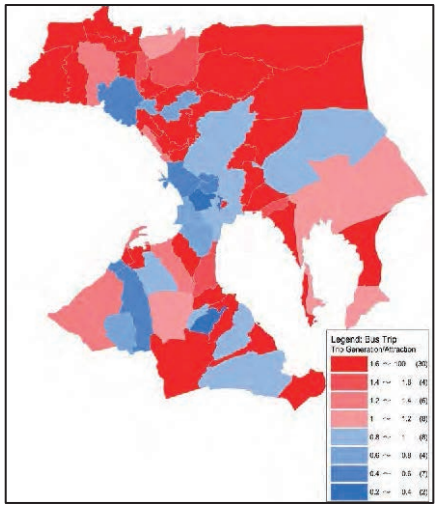
(a) All Mode



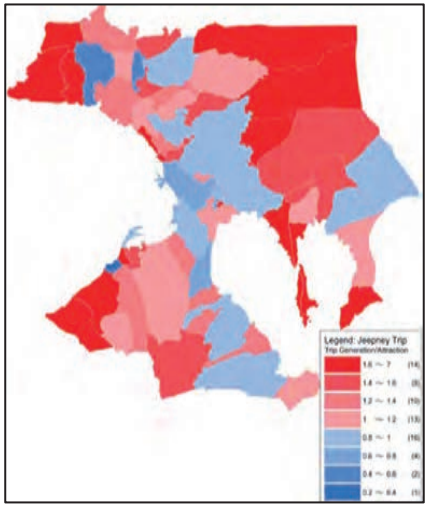
(2) Para Transit



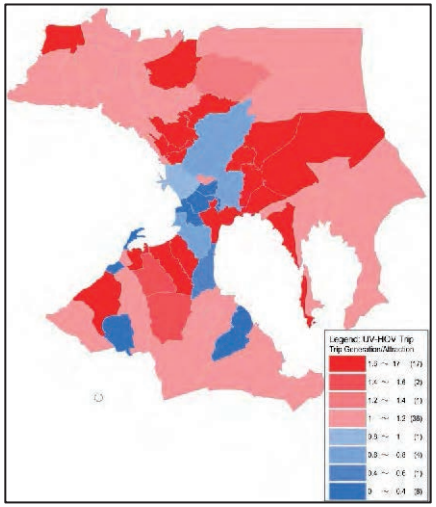
(3) Bus



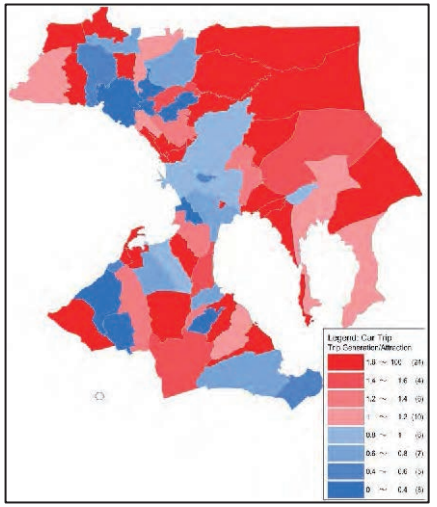
(4) Jeepney



(4) UV/HOV



(5) Car



Source: JICA Project Team

Table 4.9: Trip Generation and Attraction by Purpose and Zone

Municipality	To Home		To Work		To School		Business		Private		Total	
	Gen.	Att.	Gen.	Att	Gen.	Att.	Gen.	Att	Gen.	Att.	Gen.	Att.
City of Manila	1,593,196	1,286,230	347,656	412,505	331,392	494,153	240,319	242,943	453,052	526,224	2,965,615	2,962,055
Manila (1)	351,007	503,196	135,645	82,765	143,035	108,648	79,323	49,886	165,757	126,737	874,767	871,232
Manila (2)	465,483	139,330	37,944	113,825	34,085	71,685	30,290	74,572	60,052	225,286	627,854	624,698
Manila (3)	329,802	321,312	84,430	62,920	75,969	178,818	61,599	41,666	120,087	63,879	671,887	668,595
Manila (4)	446,904	322,392	89,637	152,995	78,303	135,002	69,107	76,819	107,156	110,322	791,107	797,530
Pasay	425,777	362,380	119,461	179,995	93,117	93,469	30,449	33,548	124,338	134,180	793,142	803,572
Makati	704,251	445,655	139,955	415,879	123,262	125,725	52,787	54,365	148,240	141,023	1,168,495	1,182,647
Mandaluyong	466,390	303,760	113,010	230,777	82,881	97,182	24,793	43,240	103,928	120,096	791,002	795,055
San Juan	98,262	105,359	40,719	42,280	24,761	19,587	10,622	16,525	32,484	26,655	206,848	210,406
Quezon City	2,629,749	2,408,371	798,067	901,099	637,463	633,861	315,805	335,181	714,187	814,528	5,095,271	5,093,040
Quezon (1)	281,031	253,942	85,801	121,508	61,438	58,355	32,483	34,511	79,604	76,081	540,357	544,397
Quezon (II)	269,587	220,674	77,702	96,473	61,924	52,412	25,627	39,104	70,101	90,801	504,941	499,464
Quezon (III)	379,470	164,071	56,845	162,674	43,133	70,883	21,246	48,625	53,789	104,421	554,483	550,674
Quezon (IV)	1,699,661	1,769,684	577,719	520,444	470,968	452,211	236,449	212,941	510,693	543,225	3,495,490	3,498,505
Kaloocan	966,681	1,339,517	421,503	235,712	417,024	378,488	101,796	69,206	416,242	296,148	2,323,246	2,319,071
Kaloocan (S)	443,657	522,109	166,577	122,954	155,467	136,687	32,996	40,732	172,555	147,268	971,252	969,750
Kaloocan (N)	523,024	817,408	254,926	112,758	261,557	241,801	68,800	28,474	243,687	148,880	1,351,994	1,349,321
Valenzuela	441,310	496,655	163,015	142,364	152,534	152,879	39,873	30,442	151,262	125,812	947,994	948,152
Malabon	246,912	299,220	91,804	57,904	85,222	82,387	30,437	20,747	97,059	90,084	551,434	550,342
Navotas	150,399	210,671	75,075	50,643	62,595	53,064	17,852	16,343	58,507	33,539	364,428	364,260
Marikina	366,166	382,894	132,717	101,096	103,285	102,989	39,355	36,736	112,345	132,811	753,868	756,526
Pasig City	605,276	565,311	188,477	233,755	161,267	156,204	45,357	51,995	179,210	174,652	1,179,587	1,181,917
Pateros	45,435	52,930	18,946	15,205	13,526	13,348	5,981	5,871	16,101	12,509	99,989	99,863
Taguig	535,568	524,898	168,045	202,064	167,358	165,126	33,925	28,568	157,072	141,669	1,061,968	1,062,325
Parañaque	686,348	624,944	225,126	259,662	188,934	162,926	43,902	43,443	177,000	227,744	1,321,310	1,318,719
Muntinlupa	454,856	433,597	160,265	170,624	120,683	122,806	39,103	48,547	122,775	124,319	897,682	899,893
Las Piñas	413,372	528,481	188,662	120,138	156,902	153,131	39,446	23,736	143,744	114,500	942,126	939,986
Metro Manila Total	10,829,948	10,370,873	3,392,503	3,771,702	2,922,206	3,007,325	1,111,802	1,101,436	3,207,546	3,236,493	21,464,005	21,487,829
Bulacan	1,675,703	1,812,616	537,156	446,251	730,875	708,981	286,554	265,567	472,838	458,716	3,703,126	3,692,131
Cavite	1,822,977	1,955,013	916,438	803,622	502,219	482,259	160,214	165,619	378,666	379,651	3,780,514	3,786,164
Laguna	1,418,285	1,467,520	500,810	468,118	428,270	421,839	128,383	118,596	418,762	419,977	2,894,510	2,896,050
Rizal	1,589,670	1,874,764	571,463	393,087	620,346	573,934	133,784	123,006	582,793	515,608	3,498,056	3,480,399
Province Total	6,506,635	7,109,913	2,525,867	2,111,078	2,281,710	2,187,013	708,935	672,788	1,853,059	1,773,952	13,876,206	13,854,744
Study Area Total	17,336,583	17,480,786	5,918,370	5,882,780	5,203,916	5,194,338	1,820,737	1,774,224	5,060,605	5,010,445	35,340,211	35,342,573
Outside	144,203	0	3,924	39,514	0	9,578	2,489	49,002	12,001	62,161	162,617	160,255
Ground Total	17,480,786	17,480,786	5,922,294	5,922,294	5,203,916	5,203,916	1,823,226	1,823,226	5,072,606	5,072,606	35,502,828	35,502,828

Source: JICA Project Team

Table 4.10: Share of Trip Generation and Attraction by Purpose and Zone

(Unit: %)

Municipality	To Home		To Work		To School		Business		Private		Total	
	Gen.	Att.	Gen.	Att	Gen.	Att.	Gen.	Att	Gen.	Att.	Gen.	Att.
City of Manila	9.2	7.4	5.9	7.0	6.4	9.5	13.2	13.7	9.0	10.5	8.4	8.4
Manila (1)	2.0	2.9	2.3	1.4	2.7	2.1	4.4	2.8	3.3	2.5	2.5	2.5
Manila (2)	2.7	0.8	0.6	1.9	0.7	1.4	1.7	4.2	1.2	4.5	1.8	1.8
Manila (3)	1.9	1.8	1.4	1.1	1.5	3.4	3.4	2.3	2.4	1.3	1.9	1.9
Manila (4)	2.6	1.8	1.5	2.6	1.5	2.6	3.8	4.3	2.1	2.2	2.2	2.3
Pasay	2.5	2.1	2.0	3.1	1.8	1.8	1.7	1.9	2.5	2.7	2.2	2.3
Makati	4.1	2.5	2.4	7.1	2.4	2.4	2.9	3.1	2.9	2.8	3.3	3.3
Mandaluyong	2.7	1.7	1.9	3.9	1.6	1.9	1.4	2.4	2.1	2.4	2.2	2.2
San Juan	0.6	0.6	0.7	0.7	0.5	0.4	0.6	0.9	0.6	0.5	0.6	0.6
Quezon City	15.2	13.8	13.5	15.3	12.2	12.2	17.3	18.9	14.1	16.3	14.4	14.4
Quezon (1)	1.6	1.5	1.4	2.1	1.2	1.1	1.8	1.9	1.6	1.5	1.5	1.5
Quezon (II)	1.6	1.3	1.3	1.6	1.2	1.0	1.4	2.2	1.4	1.8	1.4	1.4
Quezon (III)	2.2	0.9	1.0	2.8	0.8	1.4	1.2	2.7	1.1	2.1	1.6	1.6
Quezon (IV)	9.8	10.1	9.8	8.8	9.1	8.7	13.0	12.0	10.1	10.8	9.9	9.9
Kaloocan	5.6	7.7	7.1	4.0	8.0	7.3	5.6	3.9	8.2	5.9	6.6	6.6
Kaloocan (S)	2.6	3.0	2.8	2.1	3.0	2.6	1.8	2.3	3.4	2.9	2.7	2.7
Kaloocan (N)	3.0	4.7	4.3	1.9	5.0	4.7	3.8	1.6	4.8	3.0	3.8	3.8
Valenzuela	2.5	2.8	2.8	2.4	2.9	2.9	2.2	1.7	3.0	2.5	2.7	2.7
Malabon	1.4	1.7	1.6	1.0	1.6	1.6	1.7	1.2	1.9	1.8	1.6	1.6
Navotas	0.9	1.2	1.3	0.9	1.2	1.0	1.0	0.9	1.2	0.7	1.0	1.0
Marikina	2.1	2.2	2.2	1.7	2.0	2.0	2.2	2.1	2.2	2.7	2.1	2.1
Pasig City	3.5	3.2	3.2	4.0	3.1	3.0	2.5	2.9	3.5	3.5	3.3	3.3
Pateros	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3
Taguig	3.1	3.0	2.8	3.4	3.2	3.2	1.9	1.6	3.1	2.8	3.0	3.0
Parañaque	4.0	3.6	3.8	4.4	3.6	3.1	2.4	2.4	3.5	4.5	3.7	3.7
Muntinlupa	2.6	2.5	2.7	2.9	2.3	2.4	2.1	2.7	2.4	2.5	2.5	2.5
Las Piñas	2.4	3.0	3.2	2.0	3.0	2.9	2.2	1.3	2.8	2.3	2.7	2.7
Metro Manila Total	62.5	59.3	57.3	4.1	56.2	57.9	61.1	62.1	63.4	64.6	60.7	60.8
Bulacan	9.7	10.4	9.1	.6	14.0	13.6	15.7	15.0	9.3	9.2	10.5	10.4
Cavite	10.5	11.2	15.5	13.7	9.7	9.3	8.8	9.3	7.5	7.6	10.7	10.7
Laguna	8.2	8.4	8.5	8.0	8.2	8.1	7.1	6.7	8.3	8.4	8.2	8.2
Rizal	9.2	10.7	9.7	6.7	11.9	11.0	7.3	6.9	11.5	10.3	9.9	9.8
Province Total	37.5	40.7	42.7	35.9	43.8	42.1	38.9	37.9	36.6	35.4	39.3	39.2
Study Area Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Outside												
Ground Total												

Source: JICA Project Team

4.5 Trip Distribution

1) Trip Distribution by Purpose

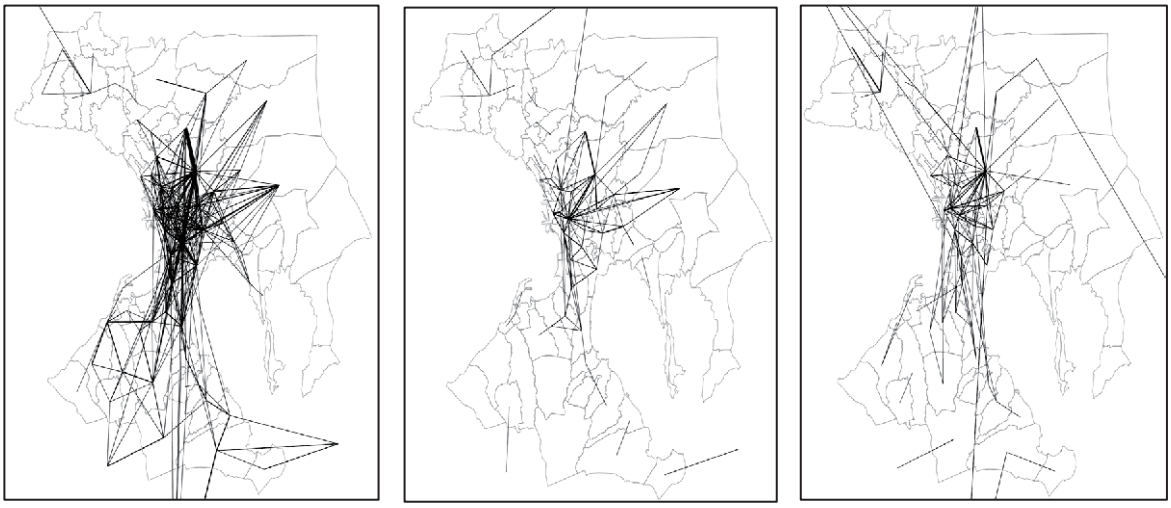
Makati, Pasig, and Quezon Cities have large agglomerations of business centers and attract a lot of “to work” and “business” trips. Manila and Quezon Cities attract “to school” trips. The concentration, however, is only a small scale because the majority of pupils move within the same zone as generated.

2) Trip Distribution by Travel Mode

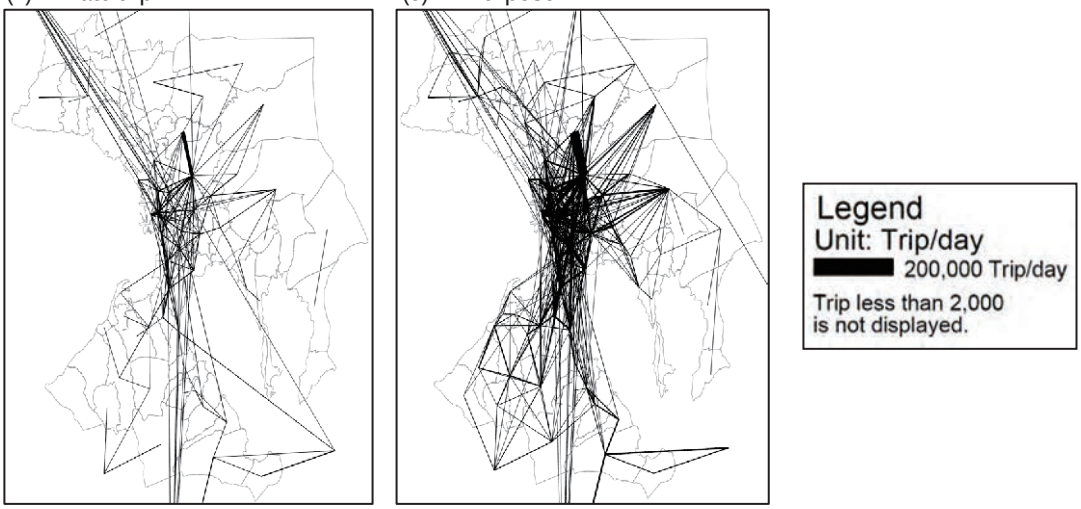
Car trips show a similar pattern to that of “to work” trips. Jeepney and motorcycle trips are rather shorter than car trips while bus trips are generally long.

Figure 4.6: Desire Line Charts by Trip Purpose

(1) “To Work” Trip (2) “To School” Trip (3) Business Trip



(4) Private trip (5) All Purpose

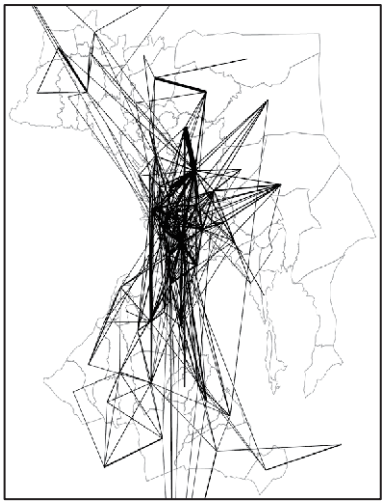


Source: JICA Project Team

Figure 4.7: Desire Line Charts by Travel Mode

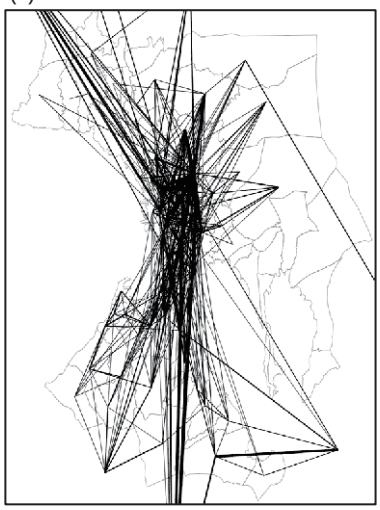
(1) Motorcycle

(2) Car



(3) Jeepney

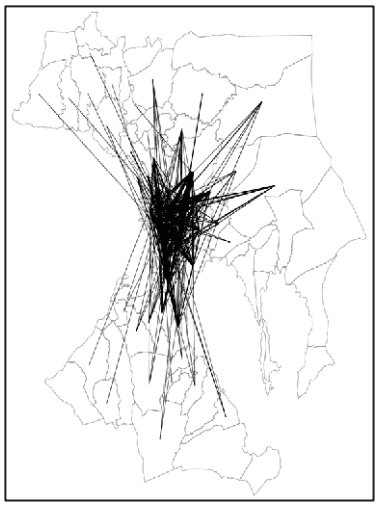
(4) Bus

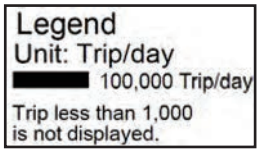


(5) UV/HOV

(6) Truck

(7) Railway





Source: JICA Project Team

5 TRIP PRODUCTION RATES

The trip production rate (or, simply, trip rate that is the number of trips made by one person per day) is analyzed in this chapter, in relation to the characteristics of trip makers. Findings in the analysis will be useful in making a future trip demand forecast.

5.1 Trip Production Rates by Trip Makers' Attributes

1) Trip Rates by Gender and Age Group

Trip maker is a person who makes at least one trip per day. The rate of the trip makers to the total population 5 years old and above is called the trip maker rate. Table 5.1 shows the trip maker rates by gender and age group.

Table 5.1: Trip Maker Rates by Gender and Age Group (%)

Age Group	Male	Female	Total
5 - 9	92.8	93.9	93.3
10 - 14	94.8	95.2	95.0
15 - 19	88.9	89.4	89.1
20 - 24	85.7	83.3	84.5
25 - 29	89.0	84.3	86.7
30 - 34	90.0	84.8	87.5
35 - 39	90.5	84.5	87.6
40 - 44	90.2	84.9	87.7
45 - 49	89.8	85.3	87.7
50 - 54	88.8	85.6	87.3
55 - 59	87.3	86.7	87.0
60 - 64	83.4	82.1	82.8
65 - 69	80.0	78.3	79.2
70 - 74	69.4	71.6	70.5
75 & Over	60.5	57.1	58.6
Total	89.3	86.7	88.1

Source: JICA Project Team

There is a tendency that trip maker rate becomes lower as a person grows older. Both male and female children are active at the basic school age younger than 15 years. At the productive age over 14 years old, males are more active than females.

Table 5.2 shows the trip production rates by gender and age group. The number of trips divided by the number of trip makers (excluding non-trip makers) is called the "net" trip rate, which is used to distinguish the gross trip rate that is total number of trips divided by population. According to definitions, the gross trip rate is equal to the net trip rate multiplied by trip maker rate. In Table 5.2, there was no significant difference among the net trip rates by gender and age group.

Table 5.2: Trip Production Rates by Gender and Age Group

Age Group	Number of Trips (1000/day)			Trip Production Rate		
	Male	Female	Total	Male	Female	Total
5 - 9	1,927	1,806	3,733	2.11	2.14	2.13
10 - 14	1,920	1,718	3,639	2.13	2.10	2.12
15 - 19	1,594	1,472	3,067	2.11	2.10	2.10
20 - 24	1,589	1,482	3,071	2.23	2.24	2.23
25 - 29	1,663	1,597	3,260	2.31	2.31	2.31
30 - 34	1,717	1,517	3,235	2.40	2.30	2.35
35 - 39	1,718	1,483	3,202	2.37	2.27	2.32
40 - 44	1,608	1,248	2,856	2.41	2.13	2.28
45 - 49	1,450	1,146	2,597	2.44	2.16	2.31
50 - 54	1,234	966	2,201	2.36	2.13	2.26
55 - 59	833	734	1,567	2.31	2.12	2.22
60 - 64	590	497	1,088	2.27	2.19	2.23
65 - 69	257	239	497	2.20	2.15	2.18
70 - 74	97	108	206	2.28	2.10	2.18
75 & Over	67	72	139	2.27	2.16	2.21
Total	18,271	16,093	34,365	2.28	2.18	2.23

Source: JICA Project Team

2) Trip Rates by Car Ownership

It is well known in the Philippines that trip rates differ by car ownership. There is no big difference in net trip rates between car owner and non-car owner as seen in Table 5.4. However, trip maker rate of car owner is higher than that of non-car owner in most occupations (see Table 5.3). The gross trip rate of a car owner is higher than that of a non-car owner by an average of 16%.

White-collar workers such as officials, managers, professionals, and technicians show high trip rates, followed by operators and workers in trade.

Table 5.3: Trip Maker Rates by Occupation and Car Ownership (%)

Occupation	Non-Car Owner	Car Owner	Total
Official, Manager	94.4	96.1	94.8
Professional	93.5	92.6	93.2
Technician	93.4	94.8	93.8
Clerical Worker	75.9	75.0	75.7
Service Worker	93.7	93.1	93.7
Farmer	93.1	93.1	93.1
Trade	91.0	93.8	91.4
Operator	92.7	90.9	92.5
Laborer	93.7	92.0	93.6
Pupil	95.5	97.4	95.6
Student	95.5	96.1	95.6
Housewife	79.6	82.5	79.9
Jobless	56.4	61.9	57.1
Others	69.5	79.0	72.1
Total	88.0	88.9	88.1

Source: JICA Project Team

Table 5.4: Trip Production Rates by Occupation and Car Ownership

Occupation	Net Trip Rate			Gross Trip Rate		
	Non-Car Owner	Car Owner	Total	Non-Car Owner	Car Owner	Total
Official, Manager	2.22	2.82	2.39	2.10	2.71	2.27
Professional	2.39	2.97	2.62	2.23	2.75	2.44
Technician	2.55	2.90	2.64	2.38	2.75	2.48
Clerical Worker	2.42	2.73	2.48	1.84	2.05	1.88
Service Worker	2.22	2.66	2.27	2.08	2.48	2.13
Farmer	2.19	2.64	2.24	2.04	2.46	2.09
Trade	2.13	2.36	2.17	1.94	2.21	1.98
Operator	2.31	2.23	2.30	2.14	2.03	2.13
Laborer	2.25	2.64	2.27	2.11	2.43	2.12
Pupil	2.12	2.35	2.14	2.02	2.29	2.05
Student	2.06	2.30	2.09	1.97	2.21	2.00
Housewife	2.21	2.36	2.23	1.76	1.95	1.78
Jobless	2.09	2.38	2.13	1.18	1.47	1.22
Others	2.17	2.52	2.27	1.51	1.99	1.64
Total	2.19	2.54	2.23	1.93	2.26	1.96

Source: JICA Project Team

By trip purpose, car owners show higher trip rates in “to home,” “to work,” “business,” and “private” trip purposes than non-car owners. Non-car owners, however, have a higher rate in “to school” trips than car owners.

Table 5.5: Trip Production Rates by Car Ownership and Purpose

Car Ownership	Trip Production Rate by Trip Purpose						Total
	To Home	To Work	To School	Business	Private	Others	
Non-Car Owner	1.08	0.37	0.33	0.10	0.28	0.03	2.19
Car Owner	1.23	0.41	0.30	0.19	0.39	0.03	2.54
Total	1.10	0.37	0.33	0.11	0.29	0.03	2.23

Source: JICA Project Team

3) Trip Rates by Purpose

Table 5.6 shows the trip rate by Gender and trip purpose. The male trip rates in “business,” “private,” and “others” trip purposes are slightly higher than with females.

Table 5.6: Trip Production Rates by Gender and Purpose

Gender	Trip Production Rate by Trip Purpose						Total
	To Home	To Work	To School	Business	Private	Others	
Male	1.12	1.17	1.06	1.11	1.24	1.18	2.29
Female	1.08	1.15	1.06	1.01	1.11	1.07	2.18
Total	1.10	1.16	1.06	1.07	1.15	1.11	2.24

Source: JICA Project Team

About half of the total trip production rate by trip purpose in each age category is “to home.” Naturally, the “to school” trip production rate of age group of 5 to 14 years is also nearly half the total, while the “to work” rate of the productive age groups range from 0.4 to 0.6 It must noted that “business” and “private” trips may possibly increase as people get older.

Table 5.7: Trip Production Rates by Age Group and Purpose

Gender	Net Trip Production Rate by Trip Purpose						Total
	To Home	To Work	To School	Business	Private	Others	
4 years old							
5 - 9	1.07	0.01	1.02	0.00	0.01	0.01	2.13
10 - 14	1.06	0.02	1.02	0.00	0.01	0.00	2.12
15 - 19	1.04	0.11	0.83	0.03	0.08	0.01	2.10
20 – 24	1.10	0.56	0.19	0.10	0.25	0.03	2.23
25 – 29	1.14	0.64	0.04	0.11	0.36	0.03	2.31
30 – 34	1.15	0.59	0.02	0.12	0.43	0.04	2.35
35 – 39	1.13	0.55	0.01	0.16	0.42	0.04	2.32
40 – 44	1.12	0.53	0.01	0.20	0.42	0.04	2.31
45 – 49	1.12	0.53	0.01	0.20	0.42	0.04	2.26
50 – 54	1.10	0.46	0.01	0.22	0.43	0.04	2.26
55 – 59	1.09	0.41	0.01	0.20	0.47	0.04	2.22
60 – 64	1.09	0.28	0.00	0.23	0.57	0.05	2.23
65 – 69	1.07	0.19	0.00	0.22	0.64	0.05	2.18
70 – 74	1.07	0.11	0.01	0.23	0.69	0.07	2.18
74 over	1.09	0.09	0.02	0.23	0.73	0.05	2.21
Total	1.10	0.37	0.33	0.11	0.29	0.03	2.23

Source: JICA Project Team

Table 5.8 shows the trip maker rates by occupation and trip purpose. Although rates vary by occupation, no big differences by car ownership have been observed.

Table 5.8: Trip Makers' Rates by Occupation

Population	Number of Trips per Day			Trip Markers Ration (%)		
	Non-Car Owner	Car Owner	Total	Non-Car Owner	Car Owner	Total
Official Manager	394,425	152,896	547,320	94.3	96.2	94.8
Professional	275,838	179,963	455,801	93.5	92.6	93.1
Technician	250,381	88,563	338,944	93.4	94.6	93.7
Clerical Worker	323,883	86,410	410,293	75.6	74.1	75.3
Service Worker	2,252,184	270,882	2,523,066	93.6	93.3	93.6
Farmer	128,620	16,074	144,694	92.6	93.3	92.7
Trade	834,369	154,170	988,539	90.9	93.5	91.3
Operator	339,085	43,278	382,363	92.4	90.3	92.2
Laborers	2,499,665	158,858	2,658,250	93.6	91.9	93.5
Pupil	2,755,781	237,642	2,993423	95.5	97.3	95.7
Student	1,824,131	281,553	2,105,684	95.6	96.0	95.6
Housewife	2,148,741	249,260	2,398,001	79.7	82.8	80.1
Jobless	1,413,966	189,575	1,603,541	56.3	62.3	57.0
Others	334,548	125,820	460,368	68.6	79.4	71.5
Total	15,775,617	2,234,670	18,010,287	87.9	88.8	88.0

Source: JICA Project Team

Table 5.9 shows the trip production rates by occupation and trip purpose. Mainly officials, professionals, technicians, clerical workers, and operators make "to work" trips. Trips made by housewives fall under "private" purpose trips.

Table 5.9: Trip Production Rates by Occupation and Purpose

Occupation	Trip Production Rate by Trip Purpose						Total
	To Home	To Work	To School	Business	Private	Others	
Official	1.16	0.68	0.12	0.17	0.22	0.03	2.39
Professional	1.29	1.08	0.03	0.11	0.09	0.01	2.62
Technician	1.29	1.11	0.02	0.12	0.09	0.02	2.62
Clerical	1.23	1.13	0.02	0.04	0.05	0.01	2.48
Service	1.10	0.68	0.01	0.17	0.23	0.03	2.27
Farmer	1.09	0.74	0.02	0.28	0.11	0.01	2.24
Trade	1.07	0.35	0.01	0.24	0.47	0.03	2.17
Operator	1.12	0.89	0.01	0.12	0.13	0.04	2.30
Laborer	1.11	0.75	0.01	0.14	0.23	0.02	2.27
Pupil	1.07	0.01	1.04	0.00	0.01	0.00	2.14
Student	1.04	0.02	1.00	0.01	0.02	0.01	2.09
Housewife	1.11	0.01	0.02	0.12	0.91	0.07	2.23
Jobless	1.05	0.00	0.02	0.23	0.74	0.09	2.13
Others	1.10	0.06	0.01	0.29	0.74	0.07	2.27
Total	1.10	0.37	0.33	0.11	0.29	0.03	2.23

Source: JICA Project Team

4) Trip Production Rates by Income

As seen in Table 5.10, the trip rate rises as household income increases especially at the category level of 50,000 Philippine Pesos per month per household. This is closely related to car ownership.

Table 5.10: Trip Production Rates by Household Income and Purpose

Household Income (PHP)	Trip Production Rate by Trip Purpose						Total
	To Home	To Work	To School	Business	Private	Others	
No Income	1.09	0.14	0.44	0.13	0.37	0.04	2.21
<5,000	1.07	0.24	0.39	0.14	0.32	0.03	2.19
<10,000	1.07	0.29	0.37	0.11	0.30	0.03	2.16
<15,000	1.09	0.34	0.35	0.10	0.30	0.03	2.20
<20,000	1.09	0.39	0.32	0.10	0.28	0.03	2.20
<25,000	1.11	0.43	0.29	0.11	0.29	0.03	2.27
<30,000	1.11	0.49	0.27	0.11	0.23	0.03	2.24
<35,000	1.11	0.49	0.27	0.11	0.23	0.03	2.24
<40,000	1.12	0.54	0.21	0.15	0.25	0.03	2.28
<50,000	1.18	0.55	0.23	0.13	0.26	0.03	2.38
<60,000	1.25	0.59	0.22	0.15	0.33	0.02	2.56
<80,000	1.21	0.56	0.22	0.20	0.35	0.02	2.55
<100,000	1.27	0.60	0.23	0.13	0.36	0.01	2.60
<150,000	1.28	0.43	0.26	0.28	0.36	0.03	2.65
<200,000	1.30	0.64	0.33	0.07	0.30	0.00	2.64
<300,000	1.71	0.74	0.20	0.08	0.69	0.00	3.42
<500,000	1.25	0.57	0.03	0.35	0.29	0.00	2.50
500,000 & over	1.09	0.82	0.40	1.15	0.34	0.02	3.83
Unknown	1.19	0.26	0.22	0.29	0.36	0.06	2.38
Total	1.10	0.37	0.33	0.11	0.29	0.03	2.23

Source: JICA Project Team

5.2 Trip Production by Zone

Trip production rates do not vary much by zone. In Metro Manila, Taguig City has the lowest rate at 2.05 trips per day. Next is Pateros City at 2.06. Among the provinces, Rizal is the lowest at 1.94. As for the highest rate, Parañaque City is at 2.65 then followed by Pasay City at 2.46 and Mandaluyong City at 2.41.

Trip production rates vary more widely by trip purpose. For example, the zone with the highest "to work" rate is Cavite (0.48 trips) and the lowest is Manila City II (0.24 trips).

Table 5.11: Trip Production Rates by Zone and Purpose

Zone	Trip Purpose					
	To Home	To Work	To School	Business	Private	Total
City of Manila	1.07	0.29	0.28	0.20	0.38	2.21
Manila (1)	1.06	0.28	0.30	0.17	0.35	2.15
Manila (2)	1.06	0.29	0.26	0.23	0.46	2.30
Manila (3)	1.13	0.30	0.27	0.22	0.42	2.34
Manila (4)	1.04	0.29	0.25	0.22	0.34	2.14
Pasay	1.22	0.40	0.31	0.10	0.42	2.46
Makati	1.16	0.36	0.32	0.14	0.39	2.37
Mandaluyong	1.16	0.43	0.32	0.10	0.40	2.41
San Juan	1.20	0.46	0.28	0.12	0.37	2.43
Quezon City	1.15	0.38	0.31	0.15	0.34	2.33
Quezon (I)	1.18	0.40	0.29	0.15	0.37	2.39
Quezon (II)	1.02	0.36	0.29	0.12	0.32	2.11
Quezon (III)	1.18	0.41	0.31	0.15	0.39	2.43
Quezon (IV)	1.17	0.38	0.31	0.16	0.34	2.35
Caloocan City	1.11	0.35	0.35	0.08	0.35	2.24
Caloocan (S)	1.13	0.36	0.34	0.07	0.37	2.27
Caloocan (N)	1.10	0.34	0.35	0.09	0.33	2.22
Valenzuela	1.11	0.36	0.34	0.09	0.34	2.24
Malabon	1.13	0.35	0.32	0.11	0.37	2.27
Navotas	1.08	0.39	0.32	0.09	0.30	2.19
Marikina	1.17	0.41	0.32	0.12	0.34	2.35
Pasig City	1.10	0.37	0.31	0.09	0.35	2.22
Pateros	1.02	0.36	0.26	0.11	0.31	2.06
Taguig	1.02	0.33	0.33	0.07	0.31	2.05
Parañaque	1.31	0.47	0.40	0.09	0.37	2.65
Muntinlupa	1.21	0.45	0.34	0.11	0.34	2.44
Las Piñas	1.21	0.43	0.36	0.09	0.33	2.42
Metro Manila Total	1.14	0.37	0.32	0.12	0.35	2.31
Bulacan	1.12	0.33	0.45	0.18	0.29	2.38
Cavite	1.03	0.48	0.26	0.08	0.20	2.06
Laguna	1.12	0.38	0.33	0.10	0.32	2.24
Rizal	0.96	0.29	0.32	0.07	0.30	1.94
Province Total	1.05	0.37	0.34	0.10	0.27	2.13
Total	1.10	0.37	0.33	0.11	0.32	2.23

Source: JICA Project Team