3.3 Socio-economic Characteristics

Some of the most important information derived from person-trip surveys are the socio-economic characteristics of the population. These information contain important trip determinants and indicators. Of the almost 15 million residents of the metropolitan region, 5.5 million (or 37%) are employed and each employed person is economically supporting about three persons. As expected in a highly urbanized area, more than 74% of the employed people are in the tertiary and 22% in the secondary sectors. Slightly less than 19% of households own cars, which means there are 54 cars for every 1,000 persons compared to about 27 in the entire Philippines. Average household income is ₱ 12,400 a month. About 8.7% of households are considered below the poverty line of ₱ 6,520 a month (refer to Table 3.3 and Figure 3.3).

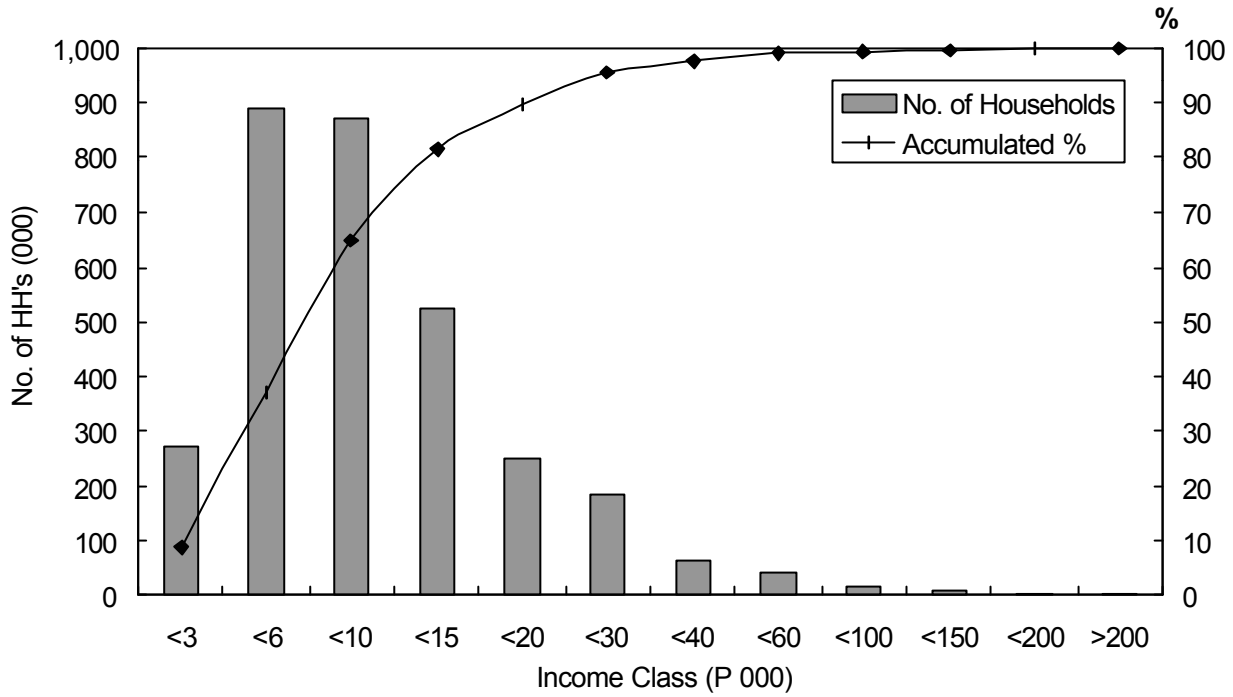
The socio-economic profile of Metro Manila is considerably different than that of adjoining areas. While the former provides more employment opportunities in the tertiary sector, the latter is more in the secondary sector. Metro Manila also has more enrolment in the higher educational level. Car ownership and average household income of Metro Manila residents are likewise higher roughly by 20% and 30%, respectively (refer to Figure 3.4 and 3.5).

Table 3.3
Socio-economic Profile, 1996

	Metro Manila	Adjoining Municipalities	MMUTIS Study Area
Population: 000	9,817	5,180	14,997
No. of Households: 000	2,045	1,057	3,102
Ave. Household Size	4.8	4.9	4.8
Employment: 000 (%)	3,729 (100.0)	1,806 (100.0)	5,535 (100.0)
- Primary	39 (1.0)	117 (6.5)	157 (2.8)
- Secondary	836 (22.4)	426 (23.6)	1,263 (22.8)
- Tertiary	2,854 (76.5)	1,263 (69.9)	4,117 (74.4)
School Attendance: 000 (%)	3,122 (100.0)	1,463 (100.0)	4,584 (100.0)
- Pupil (Primary)	2,173 (69.6)	1,215 (83.0)	3,387 (73.9)
- Student (Secondary above)	949 (30.4)	248 (17.0)	1,197 (26.1)
Car Ownership			
- No. of 4-wheel vehicles: 000	527	212	739
- Car-owning Households: %	19.7	16.9	18.7
- Ownership: no./000 pop.	59	45	54
Household Income			
- Average: Peso/month	13,122	10,850	12,356
- % HHs below Poverty Line	6.5	12.8	8.7

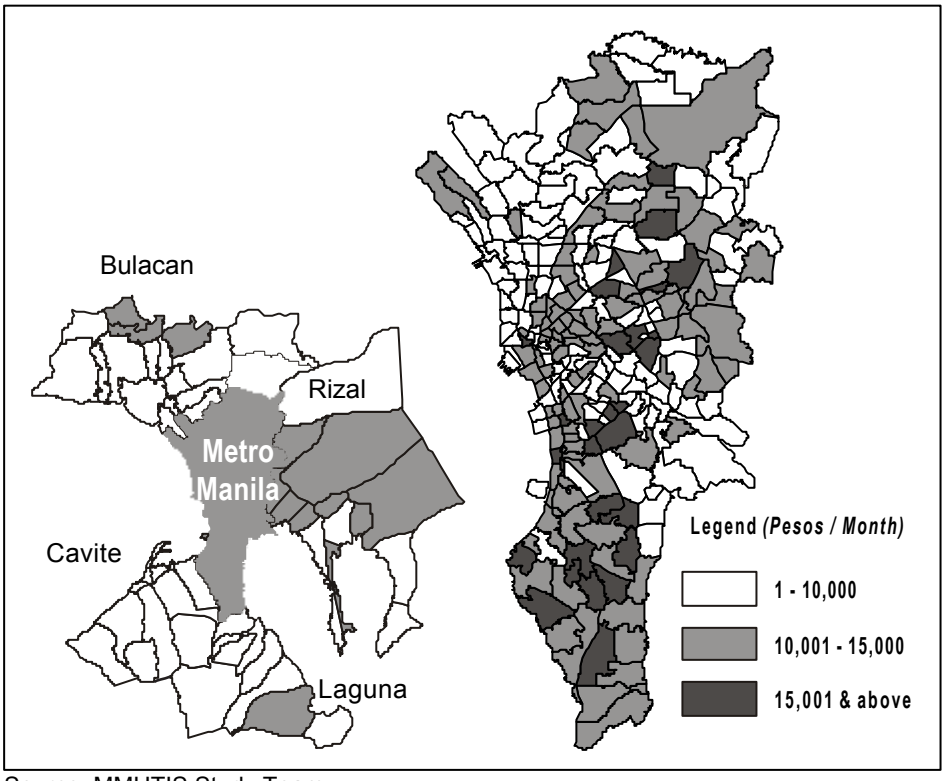
Source: MMUTIS Person-trip Survey and various official statistics.
Note: Employment and school attendance were taken at the workplace and in school, respectively.

Figure 3.3
Distribution of Households by Income Level



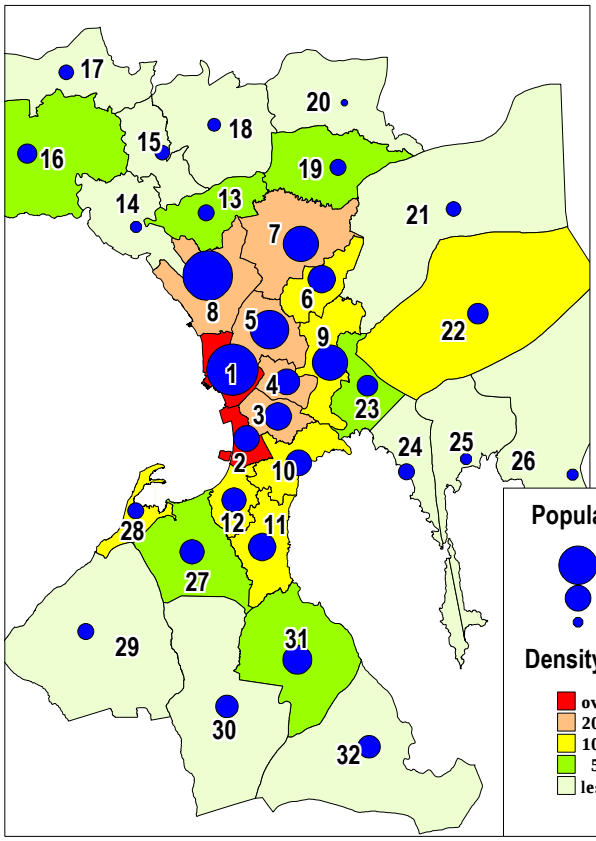
Source: MMUTIS Person-Trip Survey

Figure 3.4
Average Household Income Distribution

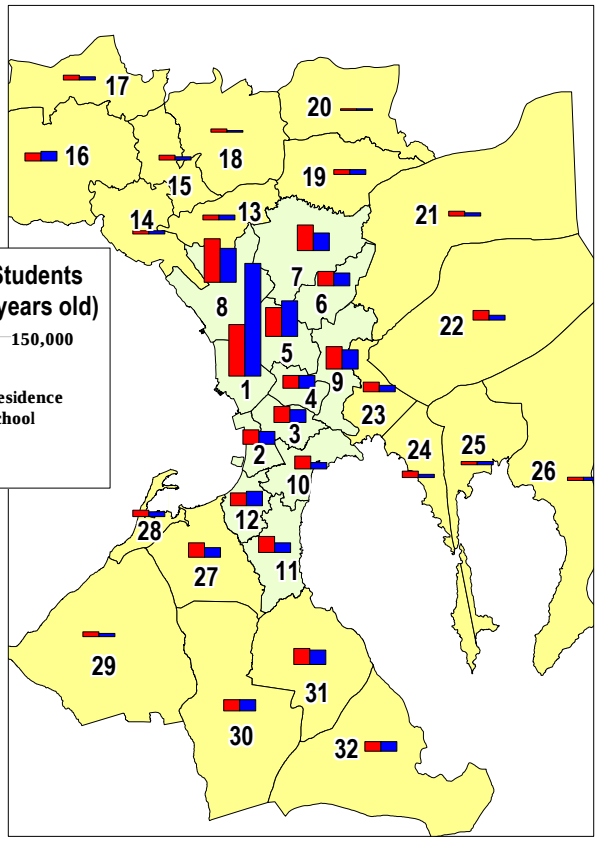


Source: MMUTIS Study Team

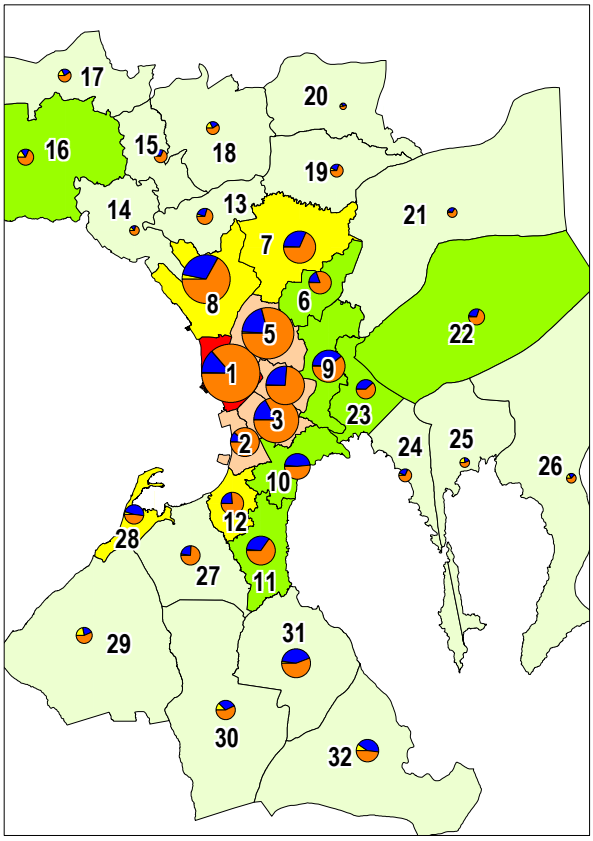
Figure 3.5
Distribution of Population, Students and Workforce, 1996



Source: Population Census



Source: MMUTIS HIS



Source: MMUTIS HIS

Planning Zones:

1 Manila
2 Pasay / Parañaque
3 Makati / Pateros
4 Mandaluyong / Pasig
5 Quezon (EDSA)
6 Quezon (Northeast)
7 Quezon (North)
8 Kaloocan / Malabon
9 Marikina / Pasig
10 Taguig
11 Muntinlupa / Las Piñas
12 Las Piñas / Parañaque
13 Marilao / Meycauayan
14 Obando / Bulacan
15 Bocaue / Balagtas
16 Malolos / Paombong
17 Plaridel / Pulilan
18 Sta. Maria / Pandi
19 San Jose del Monte
20 Norzagaray
21 San Mateo / Rodriguez
22 Antipolo
23 Taytay / Cainta
24 Angono / Binangonan
25 Cardona / Morong
26 Tanay / Pililia
27 Bacoor / Imus
28 Cavite City / Kawit
29 Gen. Trias / Tanza
30 Dasmariñas / Silang
31 Carmona / Gen. Alvarez
32 Cabuyao / Calamba

Note: area in calculating population/employment density is the one including uninhabitable area such as water, roads, etc.

3.4 Motorization

Motorization has increased rapidly. During the period 1980-1995, the number of registered vehicles, both private and for hire, has increased at an average rate of about 6% a year. The increase in private utility vehicle, private trailer and for-hire motorcycles (termed tricycles) was especially high. More than 40% of all vehicles registered in the Philippines are concentrated in Metro Manila (refer to Table 3.4).

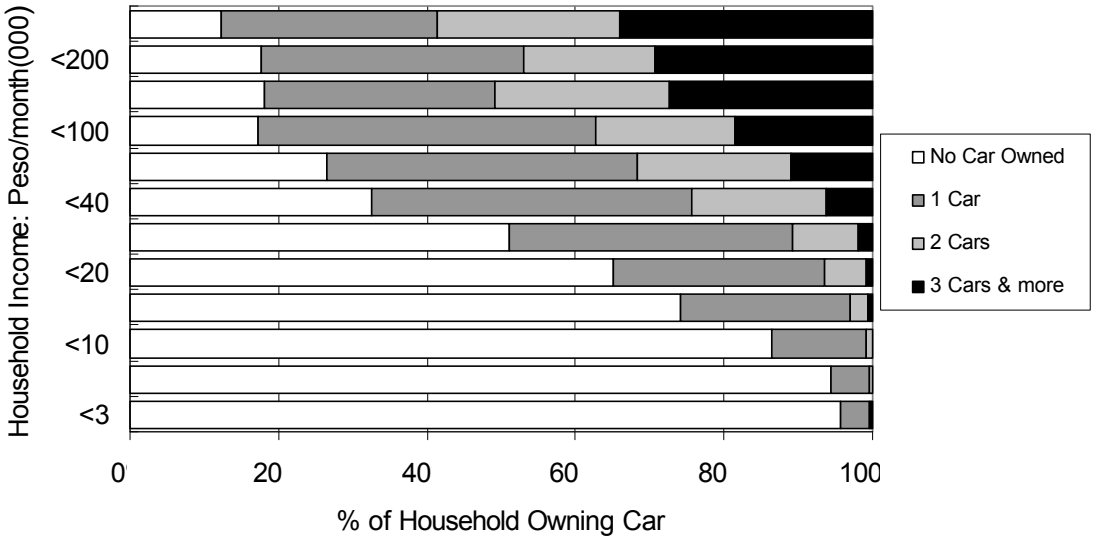
Table 3.4
Number of Registered Vehicles in Metro Manila

Type		1980	1990	1995	1995/80	%/Yr. (1980-1995)
PRIVATE	Motorcycles	36,854	50,159	73,014	2.0	4.7
	Cars	218,964	297,094	410,814	1.9	4.3
	Utility Veh.[1/]	36,770	223,976	368,002	10.0	16.6
	Buses	-	918	491	-	-
	Trucks/Trailers	97,590	51,351	76,060	0.8	-1.6
	Sub-total	391,178	623,498	928,381	2.4	5.9
FOR HIRE	Motorcycles	4,801	16,418	34,478	7.2	14.0
	Taxis	10,125	1,715	21,702	2.1	5.2
	Cars	1,461	8,150	5,601	3.8	9.4
	Utility Veh.[1/]	27,202	27,659	53,362	2.0	4.6
	Buses	3,578	4,329	7,824	2.2	5.4
	Trucks/Trailers	8,797	3,009	4,344	0.9	-12.5
	Sub-total	55,964	61,280	127,331	2.3	5.6
Total		446,142	684,778	1,055,692	2.4	5.9

Source: Land Transportation Office

1/ A utility vehicle is a small van-type vehicle commonly used for either delivery of commodities or as passenger shuttle (e.g., school bus, company bus, jeepney, etc.).

Figure 3.6
Car Ownership by Income Level



Source: MMUTIS Person-trip Survey

Although the percentage of car-owning households in Metro Manila has jumped from 10% in 1980 to 20% in 1996, it is slightly lower in adjoining provinces. Moreover, there is a parallel increase in household income and car ownership: The higher the household income, the higher the car-owning rate becomes.

Table 3.5
Car Ownership Structure

Item	Metro Manila		Adjoining Areas
	1980	1996	1996
% of car-owning households	9.5	19.7	16.9
- 1 car	n.a.	14.9	n.a.
- 2 cars	n.a.	2.7	n.a.
- 3 cars and more	n.a.	1.1	n.a.
Ave. no. of cars per car-owning household	1.4	1.3	1.2
% of multiple car-owning households [1/]	19.0	20.1	13.3

Source: MMUTIS Person-trip Survey
[1/] % to total car owning households

Compared to other Asian cities, Metro Manila's car ownership level is still low. It is interesting to note that the motorcycle has never been a popular transport mode in Metro Manila (refer to Table 3.6).

Table 3.6
Car Ownership in Selected Asian Cities

Item		Metro Manila	Bangkok	Jakarta	Kuala Lumpur	Singapore	Tokyo
		(1995)	(1993)	(1994)	(1995)	(1993)	(1995)
No. of Vehicles (000)	- Motorcycle	73	1,105	1,084	480	120	451
	- Car	806	1,147	681	624	322	3,004
	- Other 4-wheel vehicles	142	291	487	186	142	1,169
No. per 000 Population	- Motorcycle	8	136	118	357	41	38
	- Car	85	141	74	464	110	255
	- Other 4-wheel vehicles	15	36	53	138	48	99
Population (000)		9,454	8,126	9,175	1,344	2,930	11,772

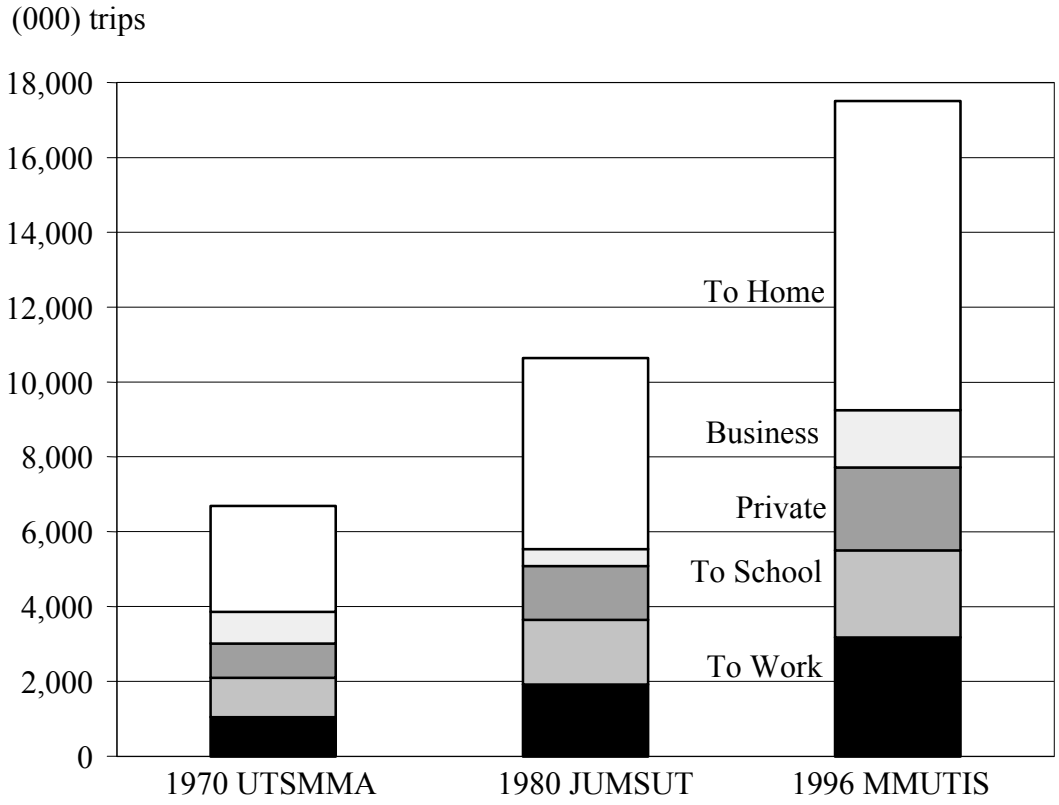
Source: Various reports and publications

The number of cars in the metropolitan region is expected to increase sharply in the future due to an increase in income level as well as population. The MMUTIS estimated the number of cars in the Study Area in year 2015 at 2.1 million, 2.9 times higher than the present level. The future increase in car ownership in the adjoining areas is also significant.

3.5 Transportation Demand

Transport demand generally increases with population and economic growth. Surveys conducted in 1996 revealed a total of 30.3 million person trips a day within the greater metropolitan region. This is broken down into 24.6 million motorized trips and 6.3 million pedestrian trips. Within Metro Manila, the growth in travel demand since 1970 is quite dramatic – from less than seven million motorized trips a day to 10.6 million in 1980 and 17.5 million in 1996 (refer to Figure 3.7).

Figure 3.7
Total Travel Demand in Metro Manila
(Number of Person Trips excluding Pedestrian)



Source: UTSMMA, JUMSUT and MMUTIS

About 79% of Metro Manila residents make daily trips. The average number of daily trips by a person above four years old is 2.3. People with different socio-economic backgrounds differ in their trip requirements. Males make more trips (2.6 a day on the average) than females (2.0). Those who belong to car-owning households make 2.6 trips compared to 2.2 of noncar-owning households. Those with higher income also make more trips: Persons who belong to households earning more than ₱ 200,000 monthly make 3.1 trips compared to 1.8 for those earning less than ₱ 3,000 a month.

Travel demand also exhibits different patterns during the day. Trips tend to concentrate in the morning between 6 to 9 and in the afternoon between 4 to 7. A third peak period occurs during lunchtime. During the morning peak period, the number of to-school trips is significant between 6 and 7, while to-work trips dominate between 7 and 9 (refer to Figure 3.8).

Since people usually start and end their trip from/to their homes, the most significant traffic generation/attraction source is the residence (47% of the total traffic demand), followed by educational facilities (18 to 19%) and office/commercial/trade facilities (see Table 3.7).

Figure 3.8
Hourly Distribution of Trip by Purpose, 1996

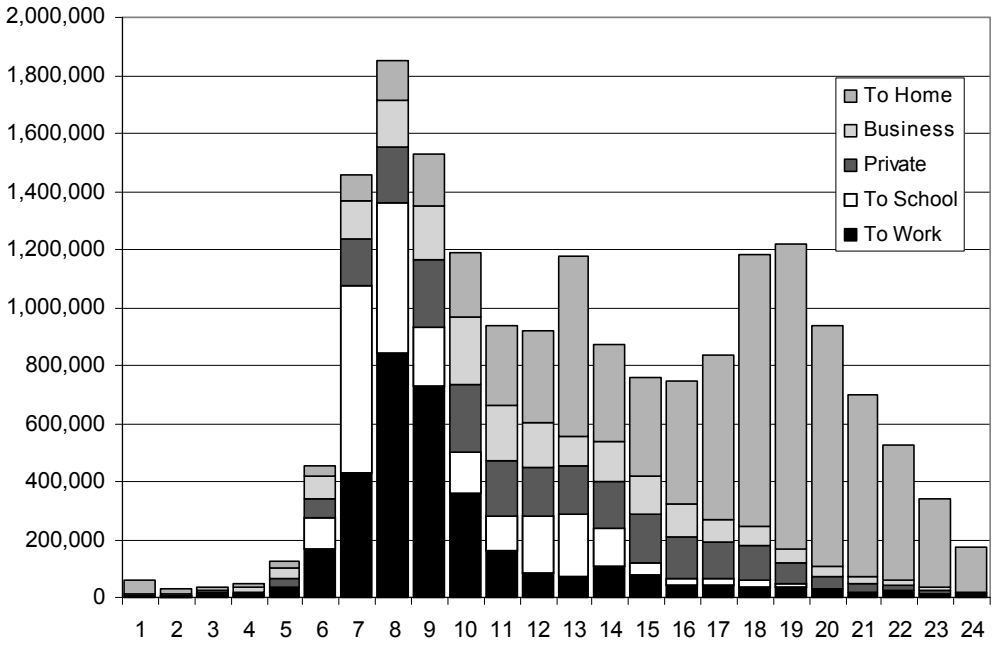


Table 3.7
Trip Generation/Attraction by Type of Facility, 1996 [1/]

Type of Facility	Generation		Attraction	
	000 Trips/Day	%	000 Trips/Day	%
Residential	14,223	46.6	14,238	46.7
Commercial	651	2.1	642	2.1
Office	2,289	7.5	2,260	7.4
Factory	1,239	4.1	1,231	4.0
Educational	5,612	18.4	5,670	18.6
Recreational	112	0.4	112	0.4
Medical	320	1.1	314	1.0
Social	406	1.3	408	1.3
Wholesale	2,660	8.7	2,655	8.7
Restaurant	527	1.7	513	1.7
Others	2,453	8.0	2,447	8.0
Total	30,491	100.0	30,491	100.0

Source: MMUTIS Person-trip Survey
[1/] Entire Study Area and includes pedestrian trips.

Mode of Transportation

Approximately 98% of the total travel demand in Metro Manila are met by road transport, while public transportation usage is still high at 78% of all trips (public and semi-public).

The jeepney is the most popular mode of transport regardless of trip purpose: 34% of to-work trips, 46% of to-school trips, 42% of private trips, and 21% of business trips. The bus is relatively well used for to-work (24%) and private (13%) trips. The tricycle is popularly used for to-school (21%), business (13%) and private (12%) trips. The taxi is mainly used for business trips (14%) (see Figure 3.9).

The travel demand share of private car has risen from 16% in 1980 to 19% in 1996, and that of the taxi from 2% in 1980 to 6% in 1996 in terms of person trips (see Table 3.8). The car is the preferred mode for business (25%), to-work (20%) and private trips (21%). It is significant to note that 10% of to-school trips are made by car.

The share of rail transit is still minor. Although it only handles 3% of to-work and to-school trips, this is still high since it represents the share of only one Light Rail Transit (LRT) corridor. The share of the Philippine National Railways (PNR) is negligible.

Compared to Jakarta and Bangkok, the modal share of public transportation in Metro Manila and Tokyo is remarkably high, which means less traffic congestion, and such a situation is desirable to maintain (refer to Table 3.9).

Table 3.8
Traffic Demand by Mode of Transportation in Metro Manila, 1996

Mode		Person Trips		Average	Vehicle Trips		
		No. (000)	%	Occupancy	No. (000)	% vehicle	% PCU[2/]
Private	Motorcycle	125	0.7	1.1	114	3.2	1.6
	Car/Jeep+UV[1/]	3,289	18.5	2.5	1,316	37.0	37.2
	Truck	422	2.4	2.1	201	5.7	11.4
	Subtotal	3,836	21.6	-	1,630	45.8	50.2
Semi Public	Taxi	862	4.9	2.2	392	11.0	11.1
	HOV Taxi	226	1.3	4.7	48	1.4	1.4
	Private Bus	440	2.5	22.3	20	0.6	1.1
	Subtotal	1,528	8.6	-	460	12.9	13.6
Public	Tricycle	2,373	13.4	2.5	949	26.7	13.4
	Jeepney	6,952	39.1	15.1	460	12.9	19.5
	Bus	2,653	14.9	46.5	57	1.6	3.2
	LRT	409	2.3	-	-	-	-
	PNR	6	0.0	-	-	-	-
	Subtotal	12,394	69.8	-	1,466	41.2	36.2
TOTAL		17,758	100.0	-	3,556	100.0	100.0

Source: MMUTIS Person-trip Survey
1/ UV – Utility Vehicle
2/ PCU – Passenger Car Unit: conversion of different sizes of vehicles in terms of car size for comparison.

Transportation Modes in the Study Area

LRT Line 1

MRT Line 3

Bus

Minibus

PNR

Jeepney

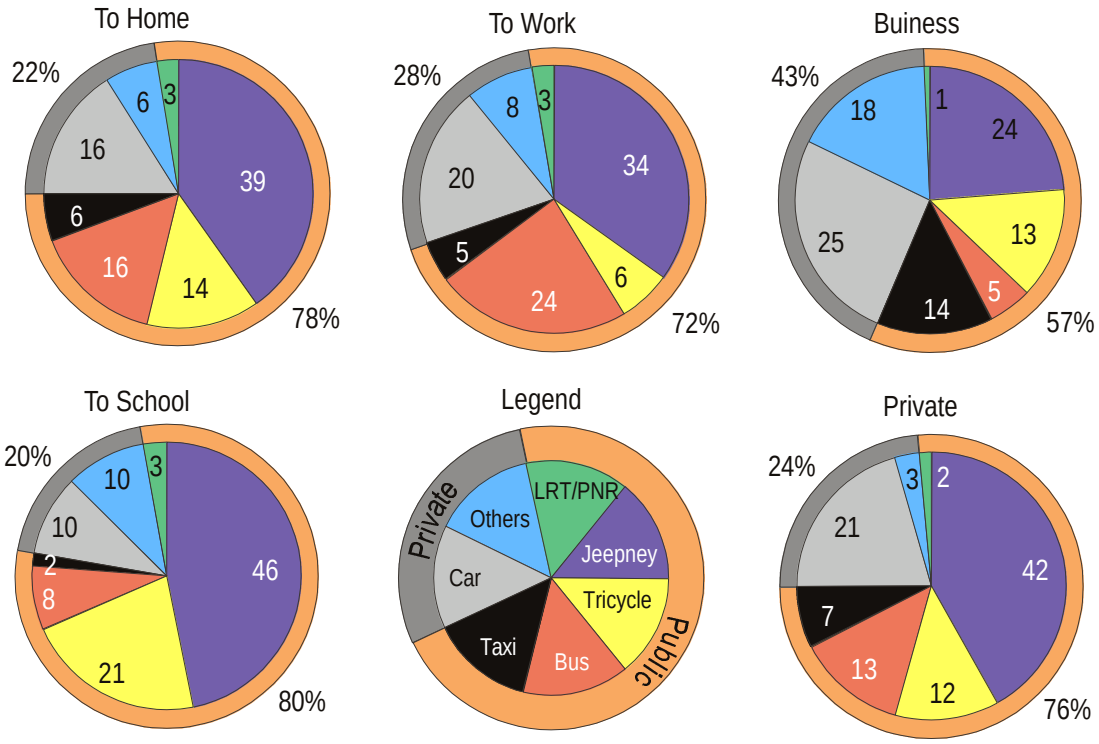
FX Tamaraw

Taxi

Tricycle

Pedicab

Figure 3.9
Modal Share by Trip Purpose



Source: MMUTIS

Table 3.9
Modal Share in Selected Asian Cities

%

Mode	M. Manila (1996)	Bangkok (1989)	Jakarta (1993)	Singapore[1/] (1990)	Tokyo (1988)
Private	22	51	46	34	33
- Car	19	33	34	19	33
- Motorcycle	1	19	12	6	-
- Others	2	-	-	9	-
Public	78	49	54	66	67
- Bus	17	39	-	42	5
- Taxi	6	10	-	-	-
- Railway	2	-	-	12	62
- Others	53	-	-	13	-

Source: Culled from various reports
[1/] To-work trips only

Distribution of Demand

All the trips captured in the person-trip survey have been translated to directional patterns to reflect desired lines for travel. Figure 3.10 shows the 1980 and 1996 desired lines of all modes of private and public transportation. It is clear that volume has intensified in all directions since 1980. The most notable is the increase in trips to the south, north and east. In 1980, the trips were largely confined within the area cordoned by EDSA. Today, this area is only the inner core of the metropolis. As development took place along the fringes of EDSA, trips started to gravitate toward this area. What used to be the suburb has become urbanized. The number of trips

generated has also increased at an outstanding rate. As a result, both travel distance and travel time have lengthened throughout the Study Area.

Generally, people prefer to travel shorter distances and to seek employment near their residences. However, this has not always been possible and there are evidences of growing cross-town trips. For example, there are residents in the northern part of Quezon City that commute to workplaces in the south (see Figure 3.11) and vice versa.

Commercial and business centers in various parts of the Study Area also vary in their trip attractions. The cities of Manila and Makati attract traffic from all over the greater metropolitan region, while the EDSA area in Quezon City attracts more from the northern half of Metro Manila. This and similar traffic characteristics provide useful information in formulating traffic and urban plans of localities.

3.6 Urban Road Development

Realization of Past Road Development Proposals

Metro Manila has a long history of arterial road network planning. The Major Thoroughfares Plan, prepared by the Planning Commission in 1945, gave birth to what is now known as the radial-circumferential network comprising 10 radial and six circumferential roads.

In 1970, the JICA-assisted UTSMMA adopted this topology and prepared a transport network plan based on the results of what is perhaps the first person-trip survey in the country. This was followed in 1975 by the IBRD-assisted MMETROPLAN, which consolidated various transport studies and projects at that time. It also highlighted the linkage between transport and land uses. Its road proposals did not depart from the radial-circumferential model. In fact, it was recommended that priority be accorded to the construction of the missing R-4, R-10 and segments of C-3. For the area outside EDSA, the MMETROPLAN endorsed the construction of what is now the equivalent of the C-6 alignment.

Another major transportation planning study was initiated in 1985 titled Metro Manila Urban Transportation Strategy Planning Project (MMUSTRAP). In the study's Part B2, investment packages for primary and secondary road projects in Metro Manila were prepared to strengthen the road network. Analyses were done on 18 arterial road projects and 95 secondary road projects, and the evaluation of the former identified the following top five priority projects:

1) C-3 Mandaluyong Roads
2) C-3 Araneta, Sgt. Rivera Road Section
3) Mindanao Avenue
4) Sucat-Parañaque Road
5) R-10

The study also proposed to modify the location of the outer circumferential road proposed by MMETROPLAN from the Sucat-Parañaque route to the present location of C-5 to ease the traffic on EDSA and provide a better access to the airport.

Figure 3.10
Distribution of Transport Demand (No. of Person Trips/Day)

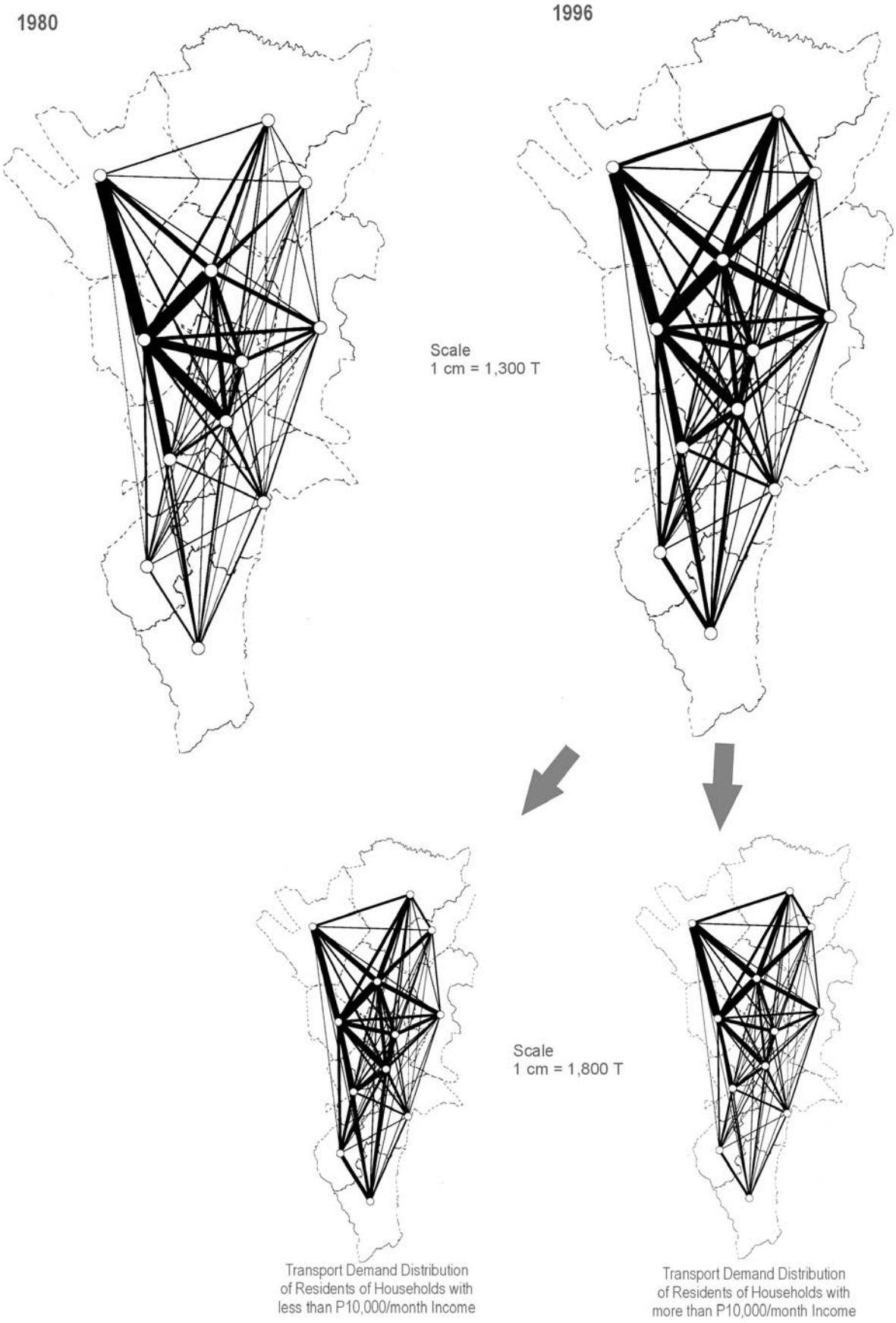
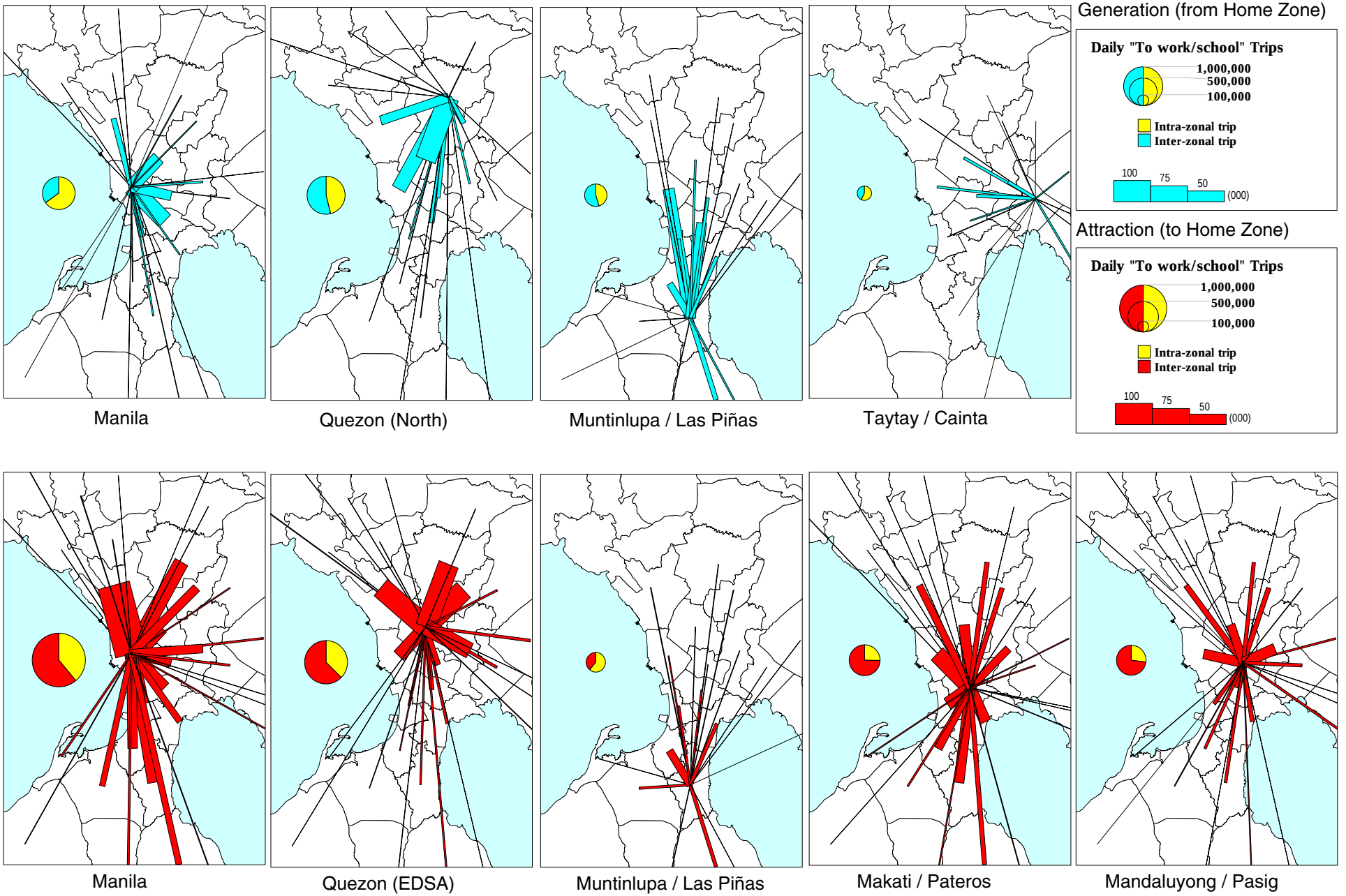


Figure 3.11
Demand Distribution of Residents



.Of the high-priority projects identified by the foregoing studies, the C-3 Mandaluyong Road was never completed because of the insurmountable problem of ROW acquisition in built-up areas. Another section of C-3, between R-10 and A. Bonifacio, also remained unbuilt. The noncompletion of C-3 has overloaded EDSA and constricted traffic in Metro Manila for more than 20 years now.

Road Developments, circa 1985-1995

Investments in road construction during the past 11 years aggregated to about ₱ 5.4 billion, mainly for major bridges and interchanges, new roads and rehabilitation and widening of existing road sections. These figures do not necessarily mean that the original budgetary allocation was met; there were in fact big disparities in annual expenditures on this subsector that created backlogs of uncompleted projects.

Key Issues on Urban Road Development

Network Improvement: Effective road management requires not only knowledge of the design element and criteria, but also the recognition of the roles and functions of each segment of the road network. Road classification by function groups based on their service characteristics is an important method for comprehensive transportation planning. Though several efforts have been made to reclassify the existing road network, the present road hierarchy in Metro Manila still does not fully reflect the function of these links.

Moreover, there is a shortage of secondary arterial and collector roads, which is one of the causes of inefficient traffic flows to/from major arteries. Development of residential subdivisions has also resulted in insufficient secondary arterial and collector network. Hence, opening some of the subdivision roads is important for a smoother traffic flow.

In the major arterial network system, the delay in constructing missing links is one of the major causes limiting alternative routes for vehicles. The missing links of C-3 corridor have been particularly much of a burden on EDSA. Further, the increasing traffic volume on the completed sections of C-5 is compounding the necessity of constructing the missing links of C-5 itself. Without the completion of these links, the fundamental improvement of the traffic situation in Metro Manila cannot be achieved.

The priority of grade separation in intersections should also be discussed from the arterial network viewpoint. The policy on prioritization should not only be based on current traffic volume but also on its function in the network. As such, higher priority should be given to intersections where major arterial roads intersect.

The absolute lack of bridges over major rivers also causes the concentration of traffic flows in these areas. The congestion on every bridge over the Pasig River for instance shows that the bridges' capacity is absolutely insufficient. The few existing radial arteries crossing over Marikina River are also traffic bottlenecks.

ROW Acquisition: Though the government's prerogative still remains in force, the general tendency is to change the methods of acquiring ROW for road development. In the South Luzon Expressway Extension Project, for example, the DPWH hired an

independent appraiser to establish more appropriate valuation of the affected properties. Such flexibility in land acquisition methods should be applied to other projects so that a more efficient land acquisition can be done and projects would be finished on schedule.

To cope with the present ROW problems, it is necessary to prepare parceled plans for such items as basic design, aerial photo, supplementary ground survey, and map, prior to the commencement of the detailed road design. The fund for these plans should be separate from the project loan so that these can be performed independently.

Delays in Implementation Procedure: The Implementing Rules and Regulations (IRR) was set forth to implement the provisions of Presidential Decree (P.D.) 1594 entitled "Prescribing Policies, Guidelines, Rules and Regulations for Government Infrastructure Contracts". The latest IRR amendment was enacted in 1992 to apply the "Simplified Public Bidding" procedure for high-priority projects. In principle, the amendment allows the use of alternative measures to expedite the implementation of major infrastructure projects.

According to the procedure specified in the IRR, it should take only three months from bid opening to issuance of the Notice to Proceed (NTP) even for a ₱ 100 million project. In fact, it is possible to procure a responsible contractor and commence construction works within six months as the APEC road projects have demonstrated. Several road projects in Metro Manila, however, spend more than one year to finish due procedures, when there is actually no justification to spend even more than three months from contract signing to NTP issuance.

Quality Control: It is widely observed that road conditions in the Philippines are unsatisfactory and deteriorating. In the design phase, the following technical shortcomings can be pointed out:

a) insufficient and erroneous topographic survey
b) inadequate selection of map scale
c) lack of intensive application of aerial photo and CAD
d) inaccurate geological survey
e) disregard for axial weight survey
f) disregard for keeping survey records
g) insufficient survey expenses and remuneration

The above-mentioned shortcomings are so fundamental that no appropriate construction work could be expected. Although gradual improvements are observed, it should still be noted that insufficient and erroneous surveys cause construction defects more seriously than design defects.

Road Maintenance: Road maintenance is the major component of infrastructure maintenance that the DPWH's Bureau of Maintenance (BOM) undertakes. About 68.3% of its total budget is allocated to maintain national roads all over the country.

Each DPWH regional office makes road maintenance programs and carries out their work in accordance with the Maintenance Management Manual prepared in 1993 under the 4th IBRD Highway Loan. The manual was made to improve maintenance

management by establishing a uniform level of maintenance work programs and evaluation and correction to the work performance.

The budgetary system for road maintenance is based on the equivalent maintenance kilometer (EMK) system, which was developed to incorporate road maintenance factors, such as traffic volume, pavement type and thickness and roadway width by a regulated computation. P.D. No.17, under which the EMK system was mandated, stipulates that the National Highway Maintenance Fund will be based on the sum of the total EMK multiplied by the basic maintenance cost per kilometer of a standard EMK at the current price. The fund shall be allocated to all districts and cities in the Philippines accordingly.

Recently, the government has begun to give higher priority on proper road maintenance to preserve huge investments, prolong the road's economic lives, minimize transport operating cost, and lessen public inconvenience. Low-cost measures are also being given higher priority over new construction.

Though the basic cost per EMK has increased substantially and maintenance efforts are being done more intensively, arterial roads in Metro Manila are still suffering from interrupted damages caused by overloaded vehicles, such as trucks, trailers, and buses, which are even increasing in volume and axle load. Hence, there must also be comprehensive axle load control measures to maximize the effort of road maintenance.

Planning/Engineering: The BOM is the basic source of official road inventory data. Sometimes, however, they are inconsistent with other data from the DPWH itself. As the Philippine Road Classification Study (PRCS) prepared in 1994 with ADB technical assistance has revealed, there are still major discrepancies in the inventory data especially of lower-class roads, such as provincial, city and barangay roads. This has not been fundamentally improved on as the needs for inventories are different among the divisions in the DPWH, and the necessity of sharing a common data for all purposes is not yet recognized. Among local governments, the discrepancies are more glaring, since there have been no major road developments for a long time, and the motivation to solve the problem is even lower.

The ambiguity and unreliability of the existing inventory data therefore make the road development planning process an ad hoc approach rather than systematic and strategic. One example is the absence of nationally established design standards based on the functional classification of the road network, causing illogical and inefficient road planning and evaluation process. These have sometimes resulted in a geometric feature of roads with similar functions but different at each jurisdictional boundary, depending on the preference or policy of each jurisdiction.

Road Administration: Since investments in road construction and maintenance yield high economic return, there is definitely a pressing need to invest more to maintain and improve the road network, including rehabilitating and improving the pavement as motorization increases. However, the government still lacks fund to fully accelerate the necessary programs, particularly in the lower hierarchy of the road network.

The imbalance between the rapidly increasing number of vehicles and the insufficient development and maintenance of road network can be attributed to the inappropriate allocation of government budget. Even though road user charges and fuel taxes are absorbed by the government's general fund, the annual funding allocation to road maintenance as well as road safety programs have not been prioritized. A more strategic allocation of road user charges to road development and maintenance should be implemented including the possibility of earmarking a road fund system.

The absolute shortage of capital investment for new major road developments, especially urban expressways, is being covered by the recent emergence of the build-operate-transfer (BOT) scheme wherein the private sector provides financial and institutional assistance to government projects. However, the private sector develops only the most feasible urban freeway routes, leaving the less feasible ones undeveloped. As a result, a concentrated or disproportionate traffic flow is created. Hence, the public sector's role still remains crucial in planning and evaluating the overall picture of the future urban expressway network, including access road systems.

Skyway

C-5

Flyover (Ayala – EDSA)

South Luzon Expressway

3.7 Traffic Management

Necessity of Traffic Management

Traffic management refers to a wide range of actions and measures, including regulatory, traffic engineering and operational, needed to improve traffic flow and enhance traffic environment without substantial capital investment or ROW acquisition.

A fundamental problem in Metro Manila is the imbalance between traffic demand and supply which results in heavy and chronic congestion throughout the day. Some primary roads are too narrow to accommodate their assigned demand. The problem is aggravated by the unsystematic loading/unloading of jeepneys along these primary roads. J.P. Rizal in Makati and Quirino Highway in Quezon City are examples. A good indicator of the severity of traffic congestion is the average travel speed. For jeepneys it is 9 kph within Metro Manila, while for buses it is 12 kph. On EDSA, the average speed of private vehicles is 10 kph.

However, the oversaturation of the road network is only a component of the problems that plague the Metro Manila roadway system. Problems range in complexity, from specific engineering challenges that relate to traffic control and management to institutional issues that are beyond simple engineering solutions.

Previous and Ongoing Attempts

Over the years, a number of different traffic management and engineering measures have been undertaken, as shown in Table 3.10. Most have spared motorists, until the adoption of the odd-even scheme in December 1995 which banned vehicles from major streets during morning and evening peak hours depending on the last digit of their plate number. In June 1996, the scheme was modified into the Unified Vehicle Volume Reduction Program (UVVRP), which prohibited vehicles on all streets one day a week from 7:00 a.m. to 7:00 p.m.

Between 1977 and 1995, the Traffic Engineering and Management Project (TEAM) implemented an Area Traffic Control system in the main urban area of Metro Manila in three phases. After 12 years of operation, the existing computer system has been overtaken by new technologies in terms of hardware and software. The government has taken steps to upgrade the system under the TEAM IV project using Australian ODA (official development assistance). This will upgrade the software to a demand-responsive (SCAT) system and is being undertaken in two stages:

- Stage 1: Rehabilitation and upgrading of 182 intersections within C-2 and along other thoroughfares. Contract period is 27 months.

- Stage 2: Rehabilitation and upgrading of 267 intersections, including the TEC building. Contract period is 48 months.

Traffic Management Constraints

The degree of freedom in implementing traffic demand management solutions is constrained by the imbalance between demand and supply. While traffic demand exceeds network capacity in many locations causing heavy congestion, driver misbehavior aggravates the problem and makes the tasks of enforcers more difficult. Traffic control and management problems are summarized in Table 3.11.

Table 3.10
Management Measures introduced in Metro Manila

Year	Engineering and Management Measures	Related Events
1976		Traffic Control Center was established. Transport Training Center was established.
1977	Start of TEAM Project Phase I (up to 1982)	Toll Regulatory Board was created.
1980	Implementation of TEAM Phase I Geometric improvement of intersections Pavement markings Bus waiting shed	
1982	TEAM Project Phase II (up to 1987)	
1983	Yellow Box	
1985	Implementation of TEAM Phase II Pedestrian barrier	
1986	One-way System in Makati	MMC was reorganized.
1989	TEAM Phase III (up to 1995) Pedestrian overpass Bus stop separator	TCC was renamed TEC. TEC was transferred to DOTC. MMLTCC was created.
1990	Pook Batayan EDSA Bus Lane Bicutan Traffic Discipline Project Toll-free hours on the Expressway	MMA was created. DOTC Action Center was created.
1991	Reversible Lane	Local Government Code was enacted.
1992	Implementation of TEAM Phase III Battery Back-up for Signals Provincial Bus Ban	
1993	Domestic Road One-way System Bus Stop Segregation Scheme	TEC was transferred to DPWH. TTC was reorganized into NCTS. MMLTCC was reaffirmed.
1994	Tulong Daan 2000 New Truck Ban	MMLTCC was rationalized.
1995	Odd-Even Number Scheme TEAM Phase IV implementation signed	MMDA was created. MMLTCC was abolished. Signal Ticketing System was introduced.
1996	Color Coding Scheme (UVVRP)	
1997	TEAM Phase IV implementation Underpass and elevated walkway	Signal System was transferred to MMDA. TRAFIMM was organized.

Source: MMUTIS Study Team

Table 3.11
Summary of Traffic Control/Management Problems

Area	Road	Feature of Road and Traffic	Traffic Control/Management	Issues/Problems
CBD	Binondo/Quiapo	• Commercial area (commercial vehicles) • Narrow streets and irregular road network • Very limited parking space • No sidewalk except on few streets	– One-way streets – No Parking	• Illegal parking due to lack of parking facility • Narrow/no sidewalk
	Ermita/Malate	• Comml/entertainment/govt office area • Grid road network • Narrow sidewalk • Major jeepney route (Mabini, Del Pilar)	– One-way streets (Mabini and Del Pilar)	• Narrow sidewalk.
	Makati	• Growing business district mixed with residential buildings • Surrounded by low-density village • Relatively high percentage of passenger car • Private roads	– One-way system – Alternate one-way system (Pasay Road) – Traffic enforcer (yellow shirt) – Parking building – On-street parking – Pedestrian underpass w/ escalator – Skywalk	• High dependence on private cars for commuting. • Limited number of access in/out of the area • Insufficient parking space • Growing demands
Major Corridors	EDSA	• Largest daily volume at Guadalupe • 12 lanes divided with wide median • Large number of buses • LRT under construction	– Flyover on SSH, Ortigas, Santolan, and Kamias-East – Vehicle underpass on Shaw, P. Tuazon, and Cubao – Two bus lanes – Segregated bus stop – Turning bay – Jeepney ban	• Bottleneck on Taft, Aurora (Tramo), Pasay, Ayala, Shaw, Cubao, North Balintawak, and Monumento
	Roxas Blvd.	• Artery along shore line connecting south of Manila to the city center • 6-lane divided road • Connected to Coastal Road	– Flyover on Buendia and EDSA	• Loading/unloading in Baclaran • Bottleneck on MIA road and President Quirino in Baclaran
	Quezon Ave.	• 6-lane divided road • High volume of jeepneys	– Pedestrian barrier – Turning restriction – Turning bay at some intersections	• Bottleneck at Governor Forbes, Welcome Rotonda Araneta, Roosevelt, and West-South Ave.
LRT Corridors	Taft Ave.	• 4-lane divided road. • LRT columns at center • Bus terminals near Sen. Puyat • University/college/school	– Pedestrian barrier installed under the LRT – Turning restriction	• Loading/unloading at LRT stn • On-street market on Libertad • In/out of bus terminal • Bottleneck on EDSA, Libertad, Sen. Puyat, Pres. Quirino, UN Ave.
	Magsaysay/ Aurora Blvd.	• 6-lane divided road (Magsaysay) • 6-lane divided road (Aurora) • 4-lane divided road (Aurora between San Juan River to Cubao) • Major jeepney route • Major commercial area in Cubao	– Flyover on Nagtahan and Katipunan – Bus bay at SM Center Point – Pedestrian barrier at median	• Loading/unloading on de la Fuente, SM Centerpoint, Cubao • Bottleneck on de la Fuente, V. Mapa, Araneta, Cubao, and 20th Ave.
Secondary Roads	E. Rodriguez	• 4-lane undivided road • Residential area, hospital and school • Jeepney route • Narrow sidewalk	– Vehicle underpass in Cubao	• Loading/unloading by jeepneys • Bottleneck on Araneta, Cubao, Welcome Rotonda
	Chino Roses Ave. (Pasong Tamo)	• 4-lane undivided road • Commercial complex (Makati Cinema Square) • Narrow sidewalk • Major jeepney route	– One-way circulation between Arnaiz and Don Bosco – No left turn on Sen. Puyat	• On-street jeepney terminals • Bottleneck on Arnaiz, Cinema Square, Sen. Puyat, Kamagong, Vito Cruz, Kalayaan
Suburban Areas	Commonwealth Ave.	• 6-lane divided road • Arterial road connecting residential areas northeast of Metro Manila to Manila	– Flyover on Tandang Sora – Pedestrian overpass – Reversible lane between Don Antonio and University Ave.	• Loading/unloading by jeepneys/buses • Market along the road • No sidewalk • Bottleneck on T. Sora, Don Antonio, south/north Batasan
	Alabang-Zapote Road	• 4-lane undivided road • Increasing comml bldgs along the road • Connecting subdivisions to major corridor (SSH and Coastal Road)	– Jeepney terminal at Alabang Town Center and SM Southmall – Pedestrian overpass	• Bottleneck on SSH, Alabang Town Center, SM South, Marcos Alvarez Ave., J. Aguilar Ave., Zapote
Expressway	South Superhighway	• One of two toll roads in Metro Manila • Connects southern municipalities and provinces (Batangas and Laguna) to Manila • 6-lane divided road with narrow median • 4-lane divided road with wide median • Skyway Project under construction	– Emergency telephone (not operating)	• Dilapidated pavement • No facilities of toll road surveillance and control system except emergency telephone • Interchange directly connected to local street • Bottleneck on Magallanes, Bicutan, Sucat, Alabang

Source: MMUTIS Study Team

Traffic Management Issues

The most cost-effective and noncapital-intensive traffic demand management solutions are difficult to sustain under a 'soft State' regime. It depends too much on the capabilities of government agencies, which unfortunately is the weakest part of the public sector. Consider the following issues:

1) The MMDA has been designated to take a leading and active role in planning and implementing traffic management measures in Metro Manila. However, its capability needs to be strengthened.

2) It is acknowledged that the MMDA lacks staff in traffic engineering and management. Training is being done among the rank and file with mixed results, and the corollary measure to professionalize the managerial and technical levels need to be further pursued.

3) Schemes get implemented but measurements of relevant traffic indicators before and after the project intervention should be enhanced.

4) Upgrading the hardware and software requirements of the computerized traffic signal is underway. However, a sophisticated system would prove less effective with the habit of traffic enforcers overriding the controls and switching to manual patterns.

5) The Traffic Engineering Center regularly conducts intersection turning movement surveys. However, the data do not seem to trigger immediate remedial steps or feedback into the signaling system.

6) The basic traffic rules are stipulated in Republic Act 4136 (which was enacted in 1964). Its provisions are already outdated, compounded by the utter lack of awareness by drivers and traffic enforcers of the regulations in effect.

7) Licensing of drivers is so porous that anybody can get behind the steering wheel. Many traffic snarls are caused by drivers who block intersection, make unauthorized counter flow, or suddenly and forcibly change lanes.

8) Although new construction and road maintenance require prior approval of the MMDA, this is sometimes not followed. Execution of countermeasures on the other hand are weakened due to:

    a) the contractors, who disregard or are unable to deal with the problems they cause, and whose priority is to complete their tasks, and

    b) the disregard of traffic mitigation schemes.