

URBAN TRANSPORT AND LOCAL GOVERNANCE IN ASIAN DEVELOPING COUNTRIES

– In Search of Transport Policies – (IATSS H493 Project Report)

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The rapid urbanization in Asia since the 1970s has caused many serious urban environmental problems, among which the degradation of the transport-related environment is most prominent. Overall assessment of the physical, socio-economic, and institutional factors affecting urban transport is a key to transport improvement in Asian metropolises. The purpose of this study is to understand the current situation of these factors in some selected metropolises, namely Bangkok and Metro Manila.

This paper comprises a) GIS-based land use analysis on the relationship between urbanization and transport infrastructure development, b) GPS-based travel behavior survey, and c) interview survey on residents' satisfaction with transport infrastructures and services. It was shown that the current land use patterns largely differ depending on the existence of agricultural infrastructure development in the pre-urbanized stage. It was also confirmed by a GPS-based travel survey that travel behavior patterns in scattered development areas are significantly different from those in orderly development areas. The former areas lack not only road space but also a structured hierarchy of networks, resulting in inefficient travel behaviors with low speed and detours. The GPS survey gave clearer pictures to grasp the relationship between travel patterns of residents and their demand for the improvement of local transport services. It was indicated that local governments who are responsible for these demands often fail to meet them due to financial and institutional limitations of the current system.

Key Words: Land use and transport, Urbanization, Travel behavior, Asian metropolises, Local governance, Decentralization

1. INTRODUCTION

Urbanization in Asia has been rapid in the past 30 years. This rapid development, with poor planning and decision-making has led to many serious urban environmental problems. In the process, people from the countryside would migrate and settle in the urban areas to work or to look for a better quality of life. This migration, on the one hand, has drastically increased the population in the urban areas and contributed significantly to their economic activities. On the other hand, large urban populations have caused serious urban related problems; one of which is transport.

In most developing Asian cities, road congestion is

attributed to inadequate transport infrastructures, planning and management. The level of self-discipline on the part of the traveling public could further aggravate this condition. This problem has in turn crucial economic and environmental impacts on society as a whole. For this reason, it is very important to study how to improve the quality of life in urban areas by addressing the issues related to transport.

A key to the solution of the problem is to have an in depth knowledge on the potentials and limitations of both the physical and non-physical components of urban transport. It is imperative then to account for infrastructure, social and institutional components of the system when looking for opportunities to improve the effectiveness of urban transport. Similarly, it is important to un-

derstand the interactions between the existing infrastructures together with their relationships with the socio-economic and institutional aspects^{1,2,3} (see Figure 1).

The purpose of this study is to understand the current situation of the issues stated above and to devise necessary plans in the future to improve urban transport. Special considerations are paid to the transport policies and local governance, since the decentralization of administration power and planning responsibility to local government has become a notable trend in Asian countries. Metro Manila, Bangkok, and Tokyo, which are different in their stage of decentralization, were selected for the comparative analysis. Metro Manila is highly decentralized in its administration power and planning responsibility to local government units, although Bangkok and Tokyo are still located in an early stage of decentralization.

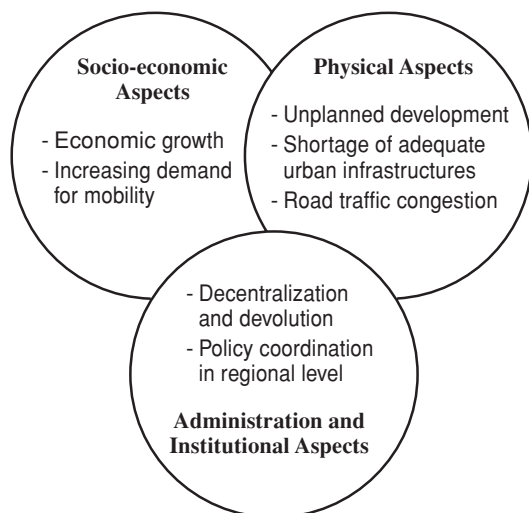


Fig. 1 Interaction between physical, socio-economic, and institutional aspects

2. SCOPE AND METHOD OF SURVEY

2.1 Scope of the study

This study tries to identify the causalities among: urban structures, people's travel behaviors, and the transport problems from the viewpoint of residents. Therefore, our study includes a) GIS-based land use analysis on the relationship between urbanization process and transport infrastructure development, b) activity-based trip survey to identify the impact of current transport infrastructure on daily travel behavior patterns, and c) interview survey on satisfaction of the existing transport infrastructures

and services.

2.2 Characteristics of the Asian transport systems

Many models of Asian transport systems are known, particularly those concerning passenger transport. Among them, well-known examples are the dense urban and interurban railway networks of Japan, Korea and Singapore's advanced systems of demand management, including road pricing. In some Asian countries, public transport systems can provide seamless, almost door-to-door service for large numbers of residents. In other countries, a variety of non-motorized transport systems provide essential services.

Public transport has been developed in close connection with urban development for a relatively long time since the early twentieth century. In Bangkok, Metro Manila, and Singapore, horse drawn tramways and streetcars were introduced not later than in the OECD countries. In Tokyo, railway construction had already begun in the late nineteenth century. These transport systems were formed, having competitive and complementary relationships with earlier modes of transport such as horse drawn carriages and rickshaws. They played a specific role in urban expansion and the formation of cities.

When motor vehicles were imported around the middle of the twentieth century, buses and taxis began operating. Although the transport systems continued to be developed and enhanced, traffic became congested in central areas and consequently the streetcars declined. Thereafter, motor vehicle-based public transport systems were developed along with the progress of motorization in the second half of the twentieth century. However, public transport has not been able to bridge the gaps between demand and supply. In each city, these systems continue to be developed according to the city's own particular characteristics.

Asian transport systems have the following features in common: a) high reliance on road public transport, b) well-developed public transport systems to provide almost a door-to-door service, c) mixed transport by diverse transport modes⁴.

a) High reliance on road public transport

Public transport services in Asian metropolises are more dependent on buses and intermediate public transport than on rail transit. This can be regarded as the first characteristic of transport in Asia. Most Asian cities, except Tokyo, show a much higher share of bus services in the total demand for public transport services than other cities.

b) A variety of public transport systems

In many cities, a hierarchy of public transport systems has been developed to meet a growing demand and preference for door-to-door service. An important role is played by intermediate public transport (IPT) that is suitable to unplanned urban structures and insufficient transport infrastructures. In general, more diversity is seen in Asian cities, primarily with regards to small and medium-volume ride-sharing public transport, including taxis and motorcycle taxis. Table 1 presents the categorization of typical transport modes in Asia.

Table 1 A variety of transport modes in Asia

Category			Transport mode
Infra-structure	Public/Private	Transport Volume	Asian Cities
Rail		Mass Transit	Subway, Light Rail Transit
			Airconditioned Bus Non-airconditioned Bus
Road	Public	Middle-size Transit	Mini bus Jeepney, Remodeled Bus
			Individual Transport
	Private	Non-motorized mode (rickshaw, carriage)	
		Passenger Car Motorcycle Bicycle	

c) Mixed traffic by diverse transport modes

The third characteristic of transport in Asia is the mixture of diverse modes of transport. For instance, in Bangkok, the streets are shared by a variety of transport modes that differ in travel behavior, including buses, minibuses, taxis, tuktuks, songtaews and motorcycle taxis. While the category of road-based ride-sharing transport is limited to buses in developed countries, in Asian developing countries there is a great deal of small and medium-volume ride-sharing transport.

This exists in a rich variety of forms, including trucks that have been converted into songthaews and jeeps that have been converted into jeepneys. In Bangkok, tuktuks, songtaews, and motorcycle taxis account for 14% of public transport. In Manila, jeepneys and tricycles account also for a significant share in public transport.

2.3 Study areas

The study areas were selected from typical urban fringe areas both in the Bangkok Metropolitan Region

and in Metro Manila. As urban fringe areas, we chose the Sai Mai District in Bangkok, Thailand and Marikina and Pateros in Metro Manila, the Philippines (see Figure 2).

Sai Mai District is geographically located in north-east of Bangkok proper and spans an area of 36.7 km² with a total population of 154,916. For this study, two study areas were selected in this district: the north (in Sai Mai Tambon) and the south (in Khlong Thanon). The north is characterized by having soi networks in good condition; the area has also more exclusive village, a subdivision type. The south has more complex and narrow soi networks. The population is higher than that of the north.

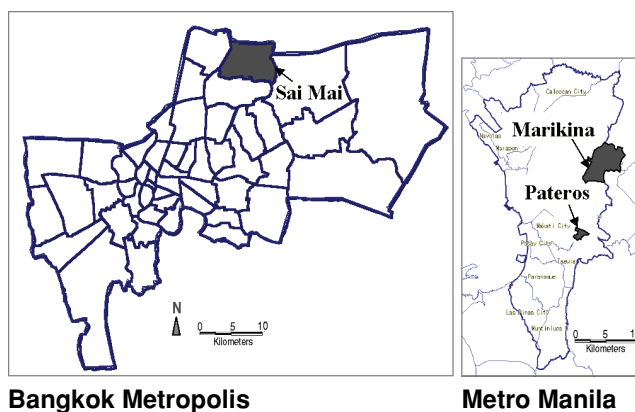


Fig. 2 Study areas

Marikina city is located in the east suburb of Manila and spans an area of 21.5 km² with a total population of 430,000. The city area was originally agricultural area on the back marsh of Marikina River, but has been converted into a residential area in the last two decades^{5,6}. While residential land use predominates in the city, commercial land uses are catching up over the last five years. Marikina city has developed a hierarchical road network and its development and provision of utilities have given rise to a number of new commercial areas.

Pateros is the smallest municipality in the entire Metro Manila. It has a total land area of 1.8 km² and is located in the near-suburb which used to be an agricultural area on a natural levee along the Marikina River^{5,6}. In Pateros, there has been an increase of the built-up areas with corresponding decrease of the agricultural areas. This is seen to be largely due to the municipality's role as a buffer between the rapidly urbanizing cities. Pateros absorbed the waves of population spills originating from the expanding Metropolitan core. Recent urbanization and increasing traffic have a gap with poor road networks that are provided only along the former river course.

2.4 Survey methods

Three kinds of surveys were conducted in our study. The first one is a GIS-based land use analysis to grasp the relationship between land-use change and transport infrastructure development from the long-term viewpoint. The second one is an activity-based trip survey to identify the impacts of current urban structure and current transport infrastructure on daily travel behavior patterns. The third one is an interview survey on a) residents’ satisfaction with the existing transport system, the responsibility of local government in transport policies and practices and also b) demands for future transport improvement.

a) GIS-based land use analysis

Current transport problems are not independent of the historical path of urban development. Many Asian cities are located in the areas used to be agricultural fields affected by natural conditions. It is a key issue how to overcome these conditions in the pre-urbanized stage or in the earlier stage of urbanization as the urbanization speed has been too high to provide urban infrastructure matching rapidly increasing demand.

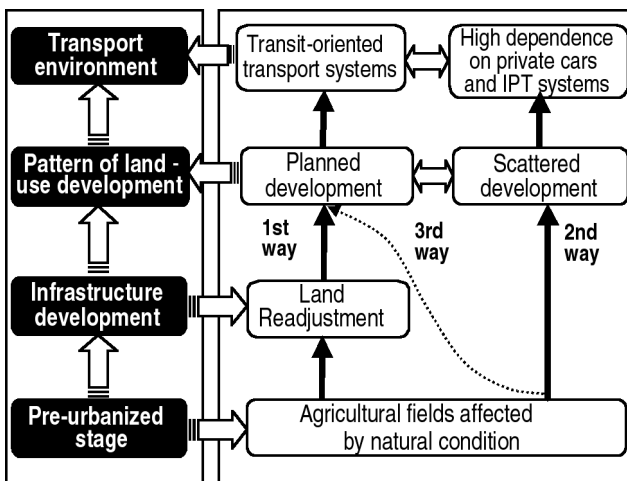


Fig. 3 Urbanization process and transport systems

As shown in Figure 3, some Asian cities have achieved planned-development in areas vulnerable to natural hazards such as floods by the introduction of agricultural land readjustment, and then promoted transit-oriented transport systems (1st way). On the other hand, cities without timely infrastructure development in the pre-urbanized stage often experience scattered land-use development that results in high dependence on private cars and intermediate public transport systems (2nd way)⁴.

In this study, GIS-based land use analysis is applied to identify the difference between the two ways. We put a special focus on the land use change in the urban fringe areas or “urban front”, where the speed of development is very rapid, the gap between demand and supply on transport infrastructure is significant, and where proper planning is highly expected.

b) Travel survey and interview survey

A questionnaire survey was undertaken to gather information on the socio-economic profile of residents, their daily activities and time allocated to these activities, and their daily trips. Furthermore, the selected residents were requested to carry with them a GPS (Global Positioning System) to gather information on their travel patterns in a day.

To substantiate further the collected information, GPS units were distributed to the respondents. The respondents were requested to use the GPS during one-weekday to trace their travel patterns during the day. At the same time, they were asked to note down their trip purpose, the time of the day they started and finished the trip, the destination and the mode of transport used. These data were used to compliment the information recorded from the GPS. The unit generally records the speed, instantaneous time, and geographical position.

In addition, an interview survey was conducted to grasp their satisfaction level of the present transport facilities in the area and their demands for transport improvements, and their expectation of the responsibility and roles of local government in transport policies and practices.

3. RESULTS

3.1 GIS-based land use analysis

Here, we highlight the land use change in Sai Mai district in the northern suburbs of Bangkok. Figure 4 shows land use pattern in 1952 and that in 1998. Before urbanization (in 1952), large-lot rice fields predominated in the north part of this district, and small-lot rice fields in the south part. Agricultural land readjustment was implemented only in the north part.

It is seen that most land areas in both parts of Sai Mai have been converted to residential land (town houses) and abandoned cultivated-land from the 1950s to 1998. The north part consists of large residential blocks, where as the south part includes many scattered developments.

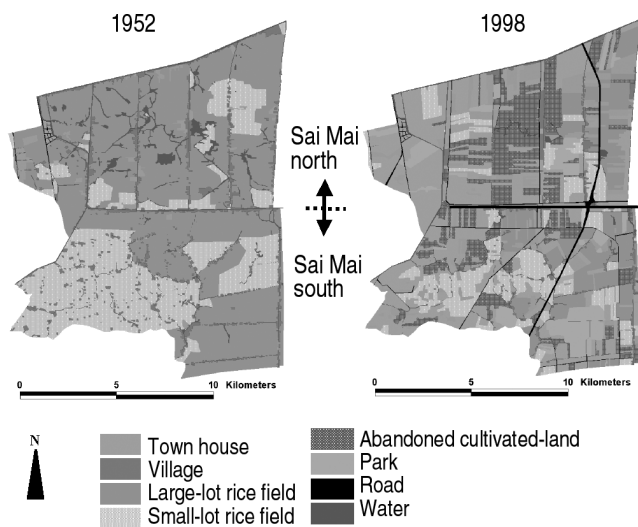


Fig. 4 Land use patterns before- and after-urbanization⁷

The difference in land use change between the north and south clearly reflects the situation in the pre-urbanized stage, that is, existence of agricultural land readjustment⁸.

Time-series data on land use change in Figure 5 show a closer comparison between the north and south. In the north part of Sai Mai, grid-like roads were constructed on the readjusted land areas and pushed orderly residential development in a large block unit. On the other hand, the south part has been provided with poor road networks that were converted from canals. This area has suffered sprawl development along small roads during the 1980s.

3.2 Travel survey

The GPS survey was conducted to understand the travel behavior patterns of the residents in the study area and its implications to the existing transport system. The travel behavior patterns of the respondents can be used to identify the characteristics and quality of the road facilities existing in the area. This survey was done on January 16 and 17, 2003 simultaneously with an interview survey.

Some physical data were collected by the GPS (Sony Navin' You5 2001 Edition PCQ-NYM55) including travel speed, distance and location. The GPS data collected from the respondents were basically in the form of comma-delimited format (*csv*). In our survey, MapInfo Professional was used in the mapping and geographical analyses. To generate a coverage of GPS routes in Mapinfo, a PCQ_MapInfo_Converter software was employed to convert *csv* files into MapInfo interchange format (*mif*), a standard interoperability file format used

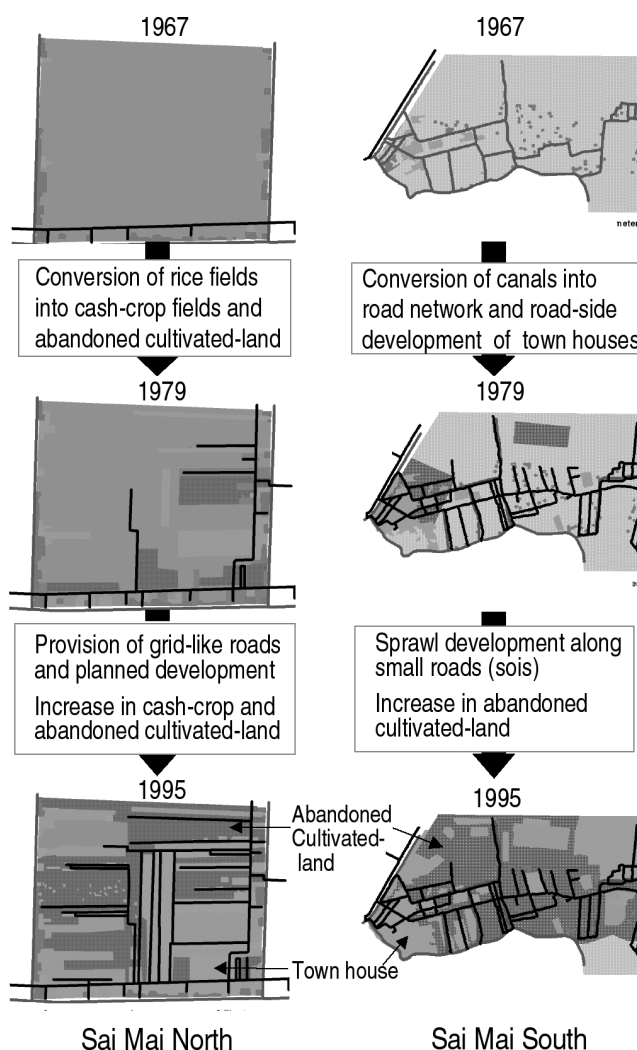


Fig. 5 Land use change in respective parts of Sai Mai⁷

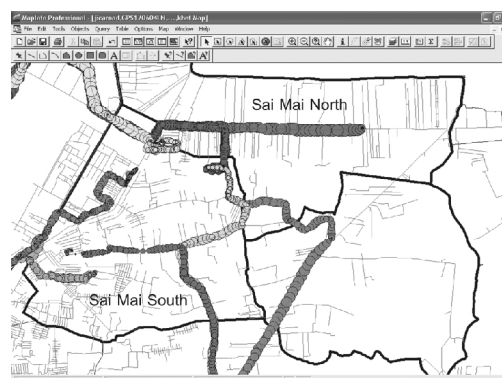


Fig. 6 Travel speed profile in the study area

in the GIS software.

Figure 6 shows examples of travel speed profile in the morning peak-hour. The size of each circle on the

travel route illustrates the trip of each respondent in discrete distance (every 1 km) and travel time (s km⁻¹). It refers to how fast the vehicles travel along the road networks. The figure clearly shows that the north zone has better road infrastructures than in the south. Respondents in the north traveled at faster speeds while in the south they traveled at slower speeds. It takes around 300-400 seconds to traverse 1 km distance in the south, whereas less than 200 seconds in the north.

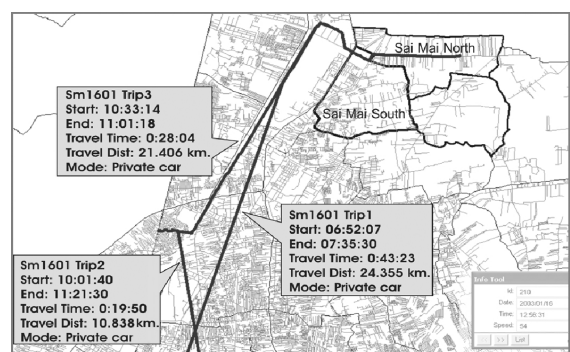
Figure 7 illustrates some examples of travel patterns made by respondents. Each figure includes the following information: trip origin and destination, start and end time, travel time and distance, and travel mode of each trip. It is shown that an orderly and hierarchical road network ensure a smooth travel from the north. On the other hand, travel starting from the south looks less smooth, which is attributed to the complex road network in the area and poor quality of the roads. In addition, the third figure c) illustrates inefficient mobility in the wider area of the district, where the traveler is forced to make detours due to the existence of missing links. Comparing travel speed of the first trip as labeled by “Trip 1” in the three figures, the first one shows the highest speed 33.7 km/hr, followed by the second (30.0 km/hr), and the third one (24.1 km/hr). Although these three trips bound for the city center used private cars and traveled almost same distance, their travel speeds differed significantly depending on the road network condition.

The major purposes of trips made by respondents are to work and go back home. Of those who used two modes of transport in a trip, 50% went to the office in the south and 50% went to shopping in the north. With three or more modes of transport being used, the majority of respondents from both the north and south zones went to the office. When using a single mode of transport in a trip, 100% of respondents in the north used private cars compared to only 46.7% in the south. The rest of the respondents in the south used a taxi, motorcycle and preferred walking if the distance was short from their point of origin. When using 2 modes of transport, respondents in the north go by car pool, taxi or motorbike taxi, while respondents in the south go either by public bus or motorbike taxi. If three or more transport modes are used, meaning their trip might be long and discrete, the respondents in the north preferred to use a minibus, public bus, motorbike taxi and walking. In the south, the respondents used a combination of BTS (Bangkok Mass Transit System), Public bus, mini bus, motorcycle, motorbike taxi and walking.

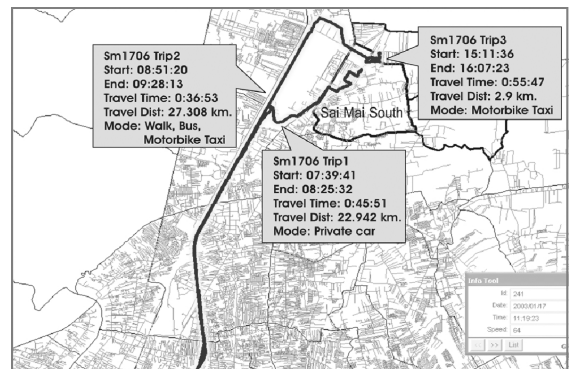
3.3 Interview survey

a) Socio-economic status of respondents in Sai Mai

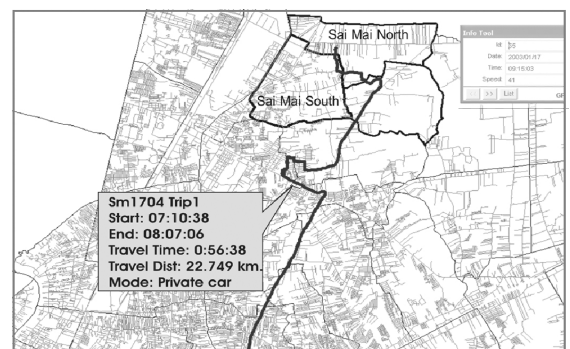
Twenty households were randomly selected for interviews from each zone. They were asked to make assessments of the present transport systems in the area and its vicinity. The majority of respondents in the north zone were government officers (49%), and 12% occupied managerial positions. Around 26% were professionals and business officers and the rest do some clerical jobs. In the south, 40% of the respondents were business and



a) Travel pattern starting from the north



b) Travel pattern starting from the south



c) Travel pattern from north to south

Fig. 7 Travel behavior patterns detected by GPS

government officers, and another 40 % indicated that they have other job categories. The rest also do clerical work in the office.

The income distributions among the respondents are well represented by the profile of occupations presented above. The respondents in the north are economically better off than in the south. The majority in the north received incomes between ThB 30,000-39,000 compared to ThB 20,000-29,000 in the south.

As for vehicle ownership, people in the north own more cars than in the south. Around 30% of the respondents in the south own motorcycles, which is double the figure in the north. Motorcycles in the south could be more convenient to use for their type of work they do in their everyday lives. The respondents in the south own a number of vans, none in the north. Further, the respondents in both areas also own pick-up trucks.

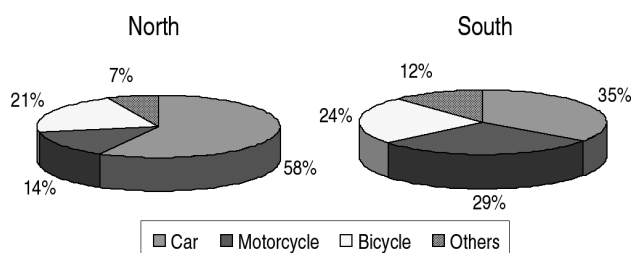


Fig. 8 Vehicles owned by households



Fig. 9 Satisfaction level with road facilities

b) Satisfaction level

The respondents were also requested to rate their levels of satisfaction to the type of transport services they used for their daily activities. The collected information comprised of their satisfactions towards the existing (i) road facilities and infrastructures, (ii) district transport, (iii) city/municipality transport and (iv) metropolitan transport.

(i) Road facilities and infrastructures

Among the road facilities and infrastructures that the respondents were asked to give ratings were: sidewalk, soi, streetlight, major road, and bridge.

It is shown at the first category in Figure 9 that more than half of the people in the north were satisfied with the conditions of the sidewalks and “don't matter” follows it. This result coincided with the observations during the household visits where the sidewalks in the north are adequately spacious for pedestrians. The situation in the south is opposite. A majority (70%) of the respondents were dissatisfied, of which 20% indicated that they were very dissatisfied. Thirty percent of the respondents from the south do not care at all.

Only few respondents expressed satisfaction on the conditions of the sois in both the north (11%) and south zones (20%). In the south, where the sois are more complex, 40% of respondents expressed their dissatisfaction, 10% of which indicated that they are really very dissatisfied. Correspondingly, 33% indicated their dissatisfaction in the north.

In general, people in the north (56%) and south (50%) have almost the same satisfaction with the condition of the main road. However, 22% of the respondents in the north indicated that they were actually very satisfied compared to nearly 0% in the south.

(ii) District/neighborhood transport

The respondents were also asked to give their assessments on the types of transport they used in their district/neighborhood. Four categories were evaluated; these were walking, bicycle, motorbike taxi, and mini bus.

Figure 10a shows that a majority of the respondents in the south were dissatisfied with walking because of the conditions of the sidewalks. There is a similarity of how the respondents in the south rated the motorbike taxi and mini-bus. Around 30% indicated that they were dissatisfied with these services, of which 10% showed very dissatisfied. Nevertheless, they still prefer to use a motorbike taxi and mini-bus to go and roam around their district.

(iii) City/municipality transport

Among the types of transport that the respondents were asked to assess in their city/municipality were motor-bike taxi, tricycles (tuktuks), mini-bus, and taxi. For motorbike taxi, around 40% in the south indicated satisfaction with the use of motorbike taxi, compared to 25% in the north. In the north, the share of “satisfied” including “very satisfied” in the city level is higher than that in district level.

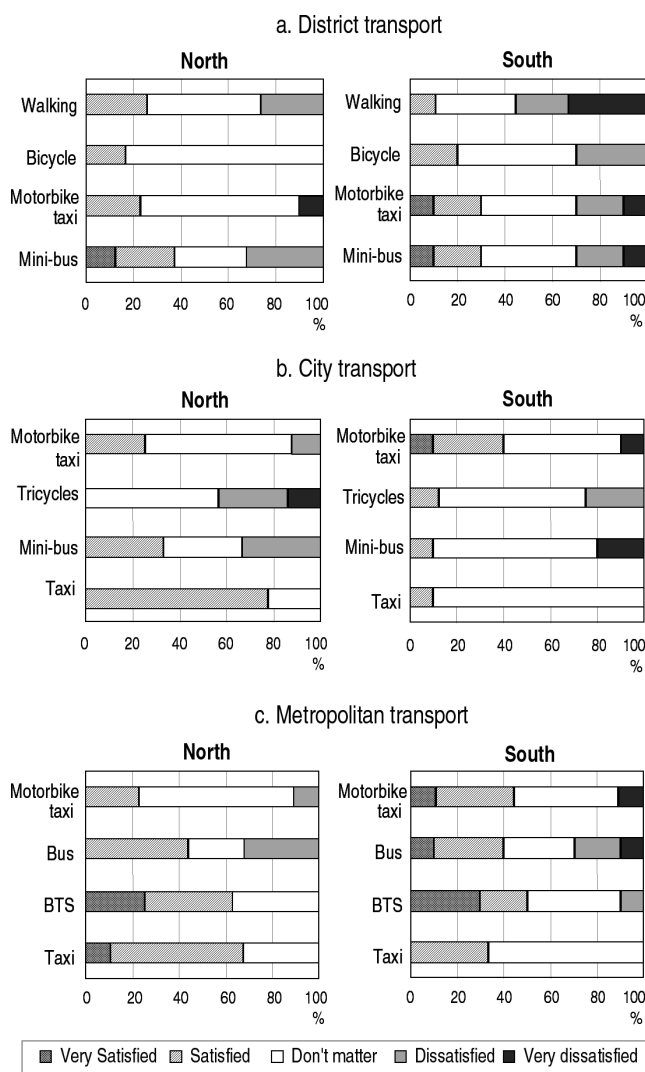


Fig. 10 Satisfaction level with transport services

Tricycle is not also favored much in the north, where 43% of the respondents indicated dissatisfactions. In the south, only 25% expressed dissatisfaction with the use of tricycle, 10% indicated that they were satisfied, and the rest (63%) rated the use of tricycle does not matter. Regarding the use of mini-bus, 33% of the respondents in the north indicated that they were satisfied compared to only 10% in the south.

There was a contrasting view regarding the use of taxi as a mode of transport in the city/municipality. The majority (78%) of the respondents in the north were satisfied with the service, while only 10% were satisfied in the south. The majority of the respondents in the south were not interested at all.

(iv) Metropolitan transport

The respondents in Sai Mai also evaluated the metropolitan (intercity) transport. The people in the north used more taxis, BTS and buses while in the south they used more BTS, motorbike taxis and buses.

Despite their significant satisfaction with the said services, still, some people in the south were not satisfied with buses, motorbike taxis and the BTS. Notice that the number of respondents dissatisfied with buses was higher compared to other transport modes. This was attributed to the inconvenience caused by the apparent overcrowding in buses especially during peak hours. Although BTS is a convenient mode of transport, standing and overcrowding as well as its higher fare might have caused the dissatisfaction to some of the respondents.

3.4 Some results of the survey in Metro Manila

a) Contrasting situations of Markina and Pateros

The same surveys were conducted simultaneously in two municipalities, Marikina and Pateros, in Metro Manila, the Philippines. The characteristics of Marikina and Pateros, namely natural conditions in the pre-urbanized stage, infrastructure development, and pattern of land-use development, corresponds to those of Sai Mai north and Sai Mai south respectively. Figure 11 shows examples of travel patterns detected by GPS in Marikina and Pateros. Travel behavior pattern in Marikina with a structured hierarchy of road networks seems smoother than that in Pateros. Due to the limited links and nodes, Pateros has suffered serious congestion as shown by extremely low travel speeds.

In order to quantitatively compare the network performance in the two areas, we conducted an assessment of road network by using a microscopic traffic simulator. Table 2 shows the comparison of mean speeds and total stopped delays of all vehicles of the road networks of Marikina and Pateros for 3 levels of traffic demand inputs on the networks of same road length. These results are aggregated values of 1 hour of simulation run of the Paramics microscopic traffic simulation software. The simulation ran for 2 hours and output data were obtained after 1 hour of simulation in order to allow the network to stabilize as vehicles fill up the road network. As the traffic demand increases, there is a significant decrease in the average speed of the network even in Marikina. For the 3 levels of traffic demand, the mean speed of the Pateros network is significantly lower than that of the Marikina network. Also, the results of total stopped delay show that the Pateros road network had consistently greater delays for all the traffic demand levels.

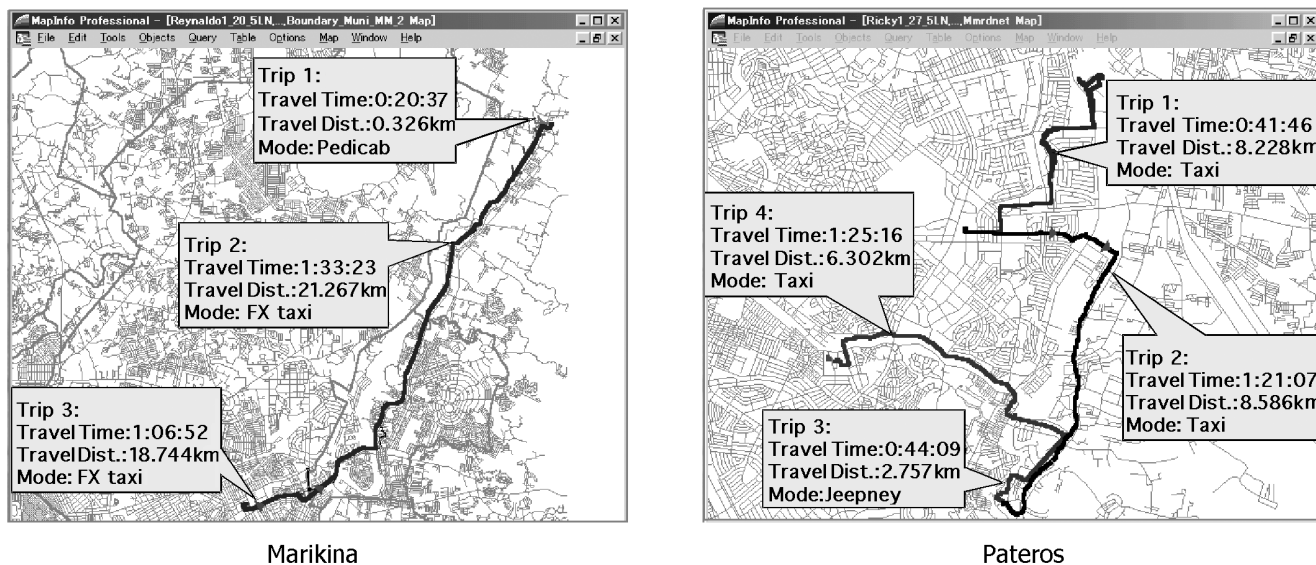


Fig. 11 Travel behavior patterns in two municipalities in Metro Manila

Table 2 Comparison of network traffic characteristics between Marikina and Pateros (Results of one-hour traffic simulation)

Traffic Demand	3,000 veh/hour		5,000 veh/hour		7,000 veh/hour	
Area	Marikina	Peteros	Marikina	Peteros	Marikina	Peteros
Mean Speed (km/hour)	15.26	1.40	8.83	1.04	7.12	0.95
Std. Deviation (km/hour)	1.4	0.3	0.9	0.3	0.7	0.3
Total Stopped Delay (minutes)	28.7	157.0	59.8	185.3	72.5	188.6

Simulation runs revealed the advantages of having a structured road network (i.e., the case of Marikina) in contrast with an unstructured network (i.e., Pateros). Pateros with its limited road infrastructure will not be able to cope with additional demand for road space. Additional roads will help ease this predicament and only if these roads will follow a hierarchy similar to that of Marikina.

Figure 12 illustrates that Pateros has developed a rather dense tricycle network which seems suitable to its narrow roads. Residents' mobility here is largely supported by small-size public transport. Under the current situation of road infrastructure, the opportunity for middle-size public transport such as jeepney is quite limited as shown in Figure 12b. Solutions for better mobility may be widening roads to increase capacity but this could not be accomplished because of possible issues concerning the acquisition of right-of-way.

Figure 13 shows the outline of residents' demands for transport improvement by standardized score between (0,1). It is seen that the demands for foot-tight improvements such as installation of street lights, road pavements, and sidewalks are higher than those for large-scale im-

provements, such as the construction of jeepney terminal, new road construction, transfer facilities between tricycles and jeepneys. In this point, it seems that municipal government should be more responsible for transport improvement in the local level even though it has the poorest in financial resources.

b) Success in Marikina by institutionalization

Until the end of the 1980s, Marikina was the most problematic city as well as Pateros. However, it made a drastic improvement in the 1990s by the strong leadership of the mayor. Nowadays, Marikina is known as a showcase or the most successful case in Metro Manila from the viewpoint of transport policies as well as environmental policies⁹.

Since Mayor Bayani Fernando was elected in 1992, the city government has enacted a number of "landmark legislation" on crucial local issues. These include ordinances :

- (i) proclaiming the proper uses of sidewalks and prohibiting their occupancy and use for other purposes;
- (ii) stopping the issuance of permits to sidewalk hawkers

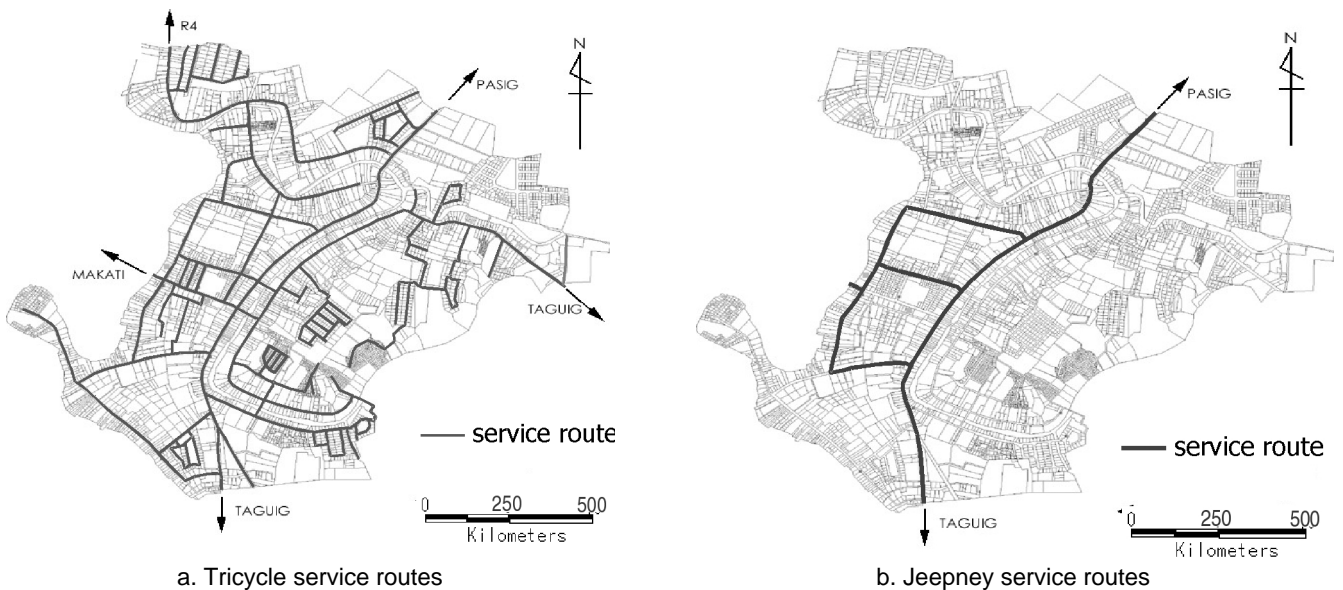


Fig. 12 Pubic transport services in Pateros

and vendors and prohibiting the purchase of any good from sidewalk vendors;

- (iii) amending the "Revised Traffic Code of Marikina" to authorize the police to tow stalled or illegally parked vehicles, confiscate violator-drivers' licenses and license plates, and impose towing and impounding fees.

The integration of existing ordinances into codes is a notable feature of local legislation. These codes reflect local efforts to rationalize previous measures and amendments into a coherent whole, and to assert municipality initiatives and authority even in areas well covered by national laws or codes. Marikina City has enacted at least four such codes, namely, one each on local transport, public markets, sanitation, and on the regulation of excavations and other civil works of utility companies. The mayor started with a limited road network, including narrow thoroughfares, and faced a number of difficult regulatory as well as infrastructure problems that are still observable in other parts of the metropolis. Among these were unruly motorists, pedestrians, and mis-users of the city's sidewalks. Residents and establishments that improperly disposed of their wastes also posed a serious environmental concern.

Lack of such facilities as proper parking spaces exacerbated bad driving behavior, especially on the part of jeepney, tricycle, and bus drivers. But a whole culture and socio-political structure seemed to underpin such misbehavior as jeepney stopping to pick up or unload passengers in the middle of the street, vending on sidewalks,

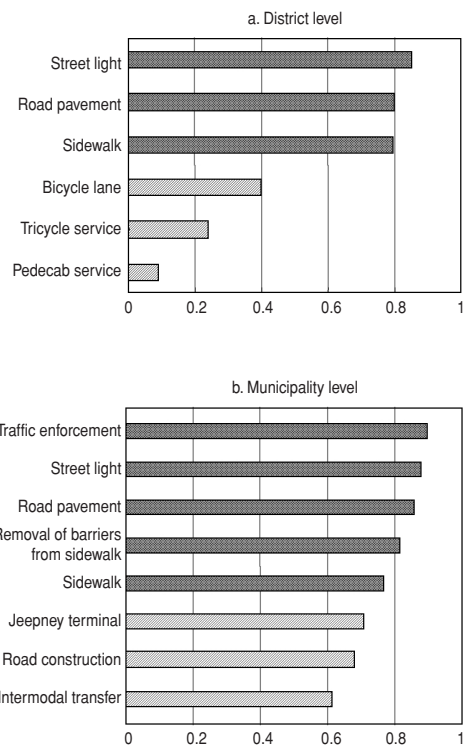


Fig. 13 Demands for transport improvement

and other forms of illegal occupancy and pollution of public spaces.

Unlike neoliberals, the mayor believes in discipline, law and order and in strong government. He often explores and exploits the legal as well as the technical resources of government in asserting responsibilities. This

has been illustrated by admittedly draconian measures in enforcing measures that are likely to provoke strong resistance, such as the clearing of sidewalks and squatter areas, in which the city government substituted physical force for fiscal or other incentives.

The mayor said that government should show its supremacy at all times in undertaking such projects. It is well known that, unlike other political leaders today who would at least pay lip-service to the value of partnership with civil society, he did not encourage the participation of NGOs and other such organizations in the city government. Even where local associations could be useful to the local government, their actual participation is restricted by certain rules. He preferred to undertake government projects “by administration” or on an in-house basis rather than by contracting out to private entrepreneurs, partly to ensure that the projects are designed and implemented economically and efficiently, and partly to provide local employment with the savings obtained from the foregone profits of private contractors.

The mayor was also keen on showing the independence of the city government from higher authorities. This has been shown by the enactment of local codes even when corresponding national codes exist. As mayor, he had Marikina exempted from the color-coding scheme (car use restriction by designated number of vehicular plate as a TDM measure) of the MMDA because he reasoned that the transport and traffic improvements he had introduced made the volume-reduction scheme unnecessary.

4. ROLE OF GOVERNANCE

4.1 Current status of governance in Bangkok, Metro Manila, and Tokyo

In general, both local and regional governments are responsible for transport policies and they share the roles. This section overviews the current status of transport-related governance in three Metropolises including Tokyo.

In Bangkok, the BMA (Bangkok Metropolitan Administration) has relatively a great power in wide-ranging fields such as social order keeping, city planning, road construction, transportation, environment protection, public works, and public health. The 50 local governments (Kehts) in metropolitan region are placed as branch offices of the BMA and their authority is limited. The governor is chosen through election, and the headpersons of Kehts are appointed from the BMA officers. This appointment needs congressional approval because the budget for

each Keht is a part of BMA's. As to transport problems, each Keht grasps the needs of residents and submits its improvement plan to the BMA, then, implements a relatively small project in its own area.

Tokyo metropolitan region is under the TMG (Tokyo Metropolitan Government) as a regional government and 23 Special Wards as local government units. The Special Wards were defined as “the internal organizations of the TMG”, and its power and financial autonomy were restricted once. As a result of the amendment of the Local Autonomy Law in 2000, the Tokyo Special Wards were authorized as “basic administration bodies” which function in the same way as general municipalities. As to transport problems, Special Wards take leadership in comparatively small projects in their jurisdiction areas even if they have legal and financial limitations. For the programs related to setting and management of roads, parks, green spaces, open spaces, and redevelopment projects of an urban area, and land readjustment, role assignment between the metropolitan governments TMG and local government Special Wards is defined clearly. For example, arterial roads authorized in city plans are managed by the TMG, other roads are managed by Special Wards.

Metro Manila is a special administrative region which consists of 17 local governments. In the 1990s, the Local Government Code has promoted devolution of powers, resources, and responsibilities to all local governments. This legislation has enhanced the initiatives of local governments, but sometimes brought a serious disparity among local government units. The MMDA (Metro Manila Development Authority), the branch office of the national government has a role of metropolitan (regional) government. However, the metropolitan government MMDA has a very limited power due to lack of resources. The MMDA is financed mainly by contribution from central government, partly by the 17 municipalities, and revenue from waste disposal charges and flood prevention charges, and established mainly for transport management in jurisdiction areas.

Figure 14 summarizes the current status of local governance in the three Asian metropolises, illustrating the administration power in comparison with that of the metropolitan government and the compositions.

4.2 Desirable directions of local governance

a) Case of Bangkok

In Bangkok, large-scale transport infrastructures have been rapidly developed by the BMA as well as central government. However, traffic congestion especially

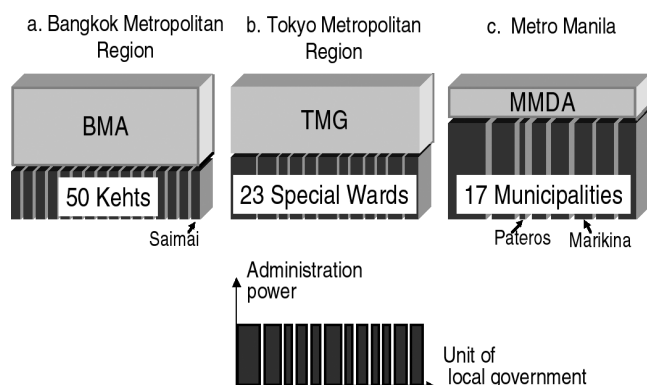


Fig. 14 Current status of local governance

in suburban areas has not been significantly alleviated due to the lack of sub-arterial roads. In areas with increasing residents, informal settlers, and limited financial resource, expectation on land readjustment project is growing. The land readjustment projects are to improve infrastructure such as sub-arterial roads with preserving land ownership in project area, not by land purchasing as usual public work system. This method has an advantage in simultaneous development of infrastructure in a wide-area, on the other hand, cooperation and agreement of landowners are indispensable. The way of introducing a participatory system is the next challenge as Bangkok lacks the experience of public involvement in any stage of policy, plan, program, and project (PPPP).

In Bangkok, urban land uses are highly segmented and there is no clear border between them. Moreover real landowners are hardly identified and ownerships (titles) are tangled. Project costs cannot always be restored by capital gains due to the increase in land price even if land readjustment is implemented. In addition, land acquisition by taking is not institutionalized sufficiently. Consequently, projects will be delayed longer as citizen participation is promoted more, then, targeted areas have to be reduced. In this case, the advantage of the land readjustment project may be offset. This fact could be taken as a limitation of a participatory system in wide-area.

A successful participatory system requires not only peoples' initiatives but also strong commitments of local governments (Kehts). Without government's commitment, a participatory system cannot work well.

b) Case of Metro Manila

Since the enactment of the Local Government Code, administrative power of the local government has been fostered. Along with this trend, municipalities such as Marikina have achieved a marked success in traffic man-

agement. On the other hand, the basic role of metropolitan government MMDA is a coordination with national polices and municipal ones. It is more limited in comparison with that of central government and local governments. However, recently the MMDA has come to play a certain role in environmental issues such as waste disposal management. Furthermore, there is an increasing demand for upgrading metropolitan governance especially in areas of traffic management, transport infrastructure provision, and flood control. The administrative power of the MMDA is to be reinforced according to this growing demand.

c) Desirable directions

The "subsidiarity principle" is a key issue for examining appropriate role assignment between local government and metropolitan government. In this principle, basic government bodies should be prioritized firstly, then, regional government follows on the occasion of intergovernmental projects. National government leads the projects which regional governments are not capable of. This system has globally spread as a principle of local governance. This is also adopted in Japan's reform on decentralization. The devolution process being implemented recently in Tokyo seems necessary also in Bangkok.

However, decentralization is not always desirable. In some cases, it may be necessary to be more centralized in administrative power. For example, in Metro Manila, a counter power shift from local government to metropolitan government seems necessary in order to rectify the current imbalance and instability brought by excessive devolution.

5. CONCLUDING REMARKS

The transport policy will be more effective if the impact of land use, urban activities, and administrative systems are taken into account, rather than a narrow focus on transport alone. This study tried to examine the relationship between these factors and urban transport in selected Asian Metropolises.

Based on the GIS-based land use analysis, it was shown that the current land use patterns differ largely depending on initial infrastructure development in the pre-urbanized stage. In Bangkok, the north and the south of Sai Mai exhibit contrasting situations although they have similar geographical and natural conditions. In the north, grid-like roads were constructed in the pre-urbanized

stage on the agricultural readjustment area and pushed orderly residential development in a large block unit. On the other hand, the south without land readjustment has been provided with poor road networks that were converted from canals. This area has suffered sprawl development along small roads. This contrast is also observed between two municipalities, Marikina and Pateros, in Metro Manila.

By the GPS-based travel survey, it was confirmed that travel behavior patterns in scattered development areas (Saimai south and Pateros) are significantly different from those in orderly development areas (Saimai North and Marikina). The former area lacks not only road space but also a structured hierarchy of network, resulting in inefficient travel behaviors with low speed and detours. Differences of network performance in two areas were also examined by using the microscopic traffic simulator. The survey gave clearer pictures to grasp the relationship between travel behavior patterns of residents and their dissatisfaction with local transport services. In the area with the scattered development and limited supply of infrastructures, residents show higher demand for the improvement of existing road facilities, walking conditions, and transport services of motorbike taxis and minibuses operating on narrow thoroughfares. Although local governments are mainly responsible for these demands, they often fail to meet them due to financial and institutional limitations.

To come up with solutions, Marikina's successful case seems to indicate one of the desirable directions of local governance. Marikina used to be the most problematic city in Metro Manila. Nevertheless it has made a drastic change in the last decade by fostering its administrative power. The mayor has continuously explored and exploited the legal and technical resources of government in asserting responsibilities. In addition, he was keen on showing independence of the city government from higher authorities, namely central and metropolitan government. Thus, starting with a limited road network and narrow thoroughfares, Marikina has developed a structured network including sidewalks, bikeways, and also rail transit system¹⁰.

Due to the diversity in level of development and socioeconomic backgrounds, the results obtained in our study cannot be directly applied to other countries and regions. However, it is hoped that this study contributes to provide a basic framework of overall assessment of the physical, socio-economic, and institutional factors affecting urban transport in Asian metropolises.

REFERENCES

1. Kii, M. and Doi, K., Forecasting the interaction system between urban expansion and motorization, In Ohmachi, T. and Roman, E.R. (Eds.) Metro Manila in search of a sustainable future. University of the Philippines Press. 112-129. (2002).
2. Doi, K. and Kurokawa, T. Integrated design of LUCC policies and environmental simulation in Metro Manila. Invited paper for International Symposium on LUCC Contribution to Asian Environmental Problems. Science Council of Japan. (2001).
3. Doi, K. Land-use, transportation and environmental simulation for integrated design of environmental policies. Invited paper for International Symposium on Environmental Conservation in the Asian Region: Its Results and Perspective in a 'Research for Future Program'. Japan Society for the Promotion of Science, 31-38. (2002).
4. Hayashi, Y., Doi, K., Yagishita, M., and Kuwata, M. Asian trend, problems and policy practices. *European Journal of Transport and Infrastructure Research*. (2004).
5. Moriwake, N., Palijon, A., Takeuchi, K., Murakami, A., and Tsunekawa, A. Distribution and structure of urban green spaces in Metro Manila. *Proceedings of International Symposium on City Planning*. Kobe. 214-223. (2001).
6. Murakami, A., Moriwake, N., Takeuchi, K., and Tsunekawa, A. Trends in spatial extension and land use mixture in Metro Manila. *The Proceedings of International Symposium on City Planning*, II-C-3. Tainan. 1-10. (1999).
7. Hara, Y., Yokota, S., and Takeuchi, K. Land use changes and its factors in the suburbs of Bangkok. *Proceedings of the General Meeting of the Association of Japanese Geographers*. 62. 166. (in Japanese). (2002).
8. Takeuchi, K., Tsunekawa, A., and Murakami, A. Studies on changes due to suburbanization in the rural landscape environment of Bangkok. *The University of Tokyo, AGS Report*. (2002).
9. National Center for Transportation Studies, Metro Manila traffic administration capability survey. *Final Report*. (2000).
10. Okada, H., Doi, K., Gaabucayan, S., and Hosomi, A. Quantification of passengers' preference for improvement of railway stations considering human latent traits. *Journal of the Eastern Asia Society for Transportation Studies*. (2003).

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