

Analysis of Locational and Functional Characteristics of Terminal Areas in Metro Manila

Akira HOSOMI
Graduate Student,
School of Urban and Regional
Planning,
University of the Philippines
FAX: +81-929-0494

Yoji KAWAKAMI
Associate Professor,
Dept. of Architecture & Civil
Eng., Faculty of Eng.,
Fukui University, Japan
FAX: +63-776-27-8746

Hussein S. LIDASAN
Associate Professor,
School of Urban and Regional
Planning
University of the Philippines
FAX: +81-929-0494

ABSTRACT

In Metro Manila, among the contributing factors to transportation problems is the inefficiency of the transferring behaviors of passengers. Most of the urban core, that is, traffic generating areas have no facilities enhancing promote transferring behaviors of passengers even though the modal splits of public transport are quite high. In this regard, the authors tried to comprehend the situation of transferring points in Metro Manila by defining such area as 'terminal area'. There are 215 areas, considered as terminal, within Metro Manila that were identified and their characteristics regarding routes and land use were examined in this paper.

1. INTRODUCTION

One of the major traffic characteristics of Metro Manila is its high modal share of road based public transportation. About 71% of the total volume of passenger movements were accounted by such modes as buses, Jeepneys, tricycles and taxies in 1990 ¹⁾. It can be considered that the public transport modes are fully utilized in Metro Manila. In particular, the share of Jeepney of the total person trips was roughly 45%, so the role of Jeepney as an urban hauling mode is very significant.

This high modal share of Jeepney might be explained by two main factors: its flexibility and economic aspects. Especially, the flexibility seems to be effective to people's travel behavior. The route of Jeepneys spread like a spider's net within Metro Manila and it might correspond minutely with the travel demand of the habitants. And passengers can ride on and get off wherever they want. Its flexibility has offered high accessibility to the habitants but on the other hand, it also caused several problems. The congestion around its terminal, origin or destination of a route, is one of the immense problems.

In general, Jeepney terminals are located close to the traffic generating area in order to correspond to the demand of passengers, and the roads inside of these areas are crowded seriously because there is little space for loading and unloading. It is obvious that the local congestion at the terminal area has caused continuous congestion on a total road network in Metro Manila. These terminal areas are located spontaneously and as such there are so many bus and Jeepney terminals. It was observed that there were 270 Jeepney terminals and 122 bus terminals and turning points within Metro Manila in 1984 ²⁾.

In addition to this, there is the Light Rail Transit (LRT) running at the west part of Metro Manila, but most of the stations do not have the station plaza that might be able to make the passenger's transferring behavior smooth. Needless to say, these areas are highly demanded as a terminal area of Jeepney and bus and definitely causing congestion because of the lack of sufficient spaces for transferring. In Metro Manila, apart from the existing LRT line, six proposed rail-based transit lines (including the extension of LRT 1) are in place and one is presently being constructed¹⁾. When this rail-based transit systems are developed in the future, definitely we have to consider the transferring function at the station. To achieve this consequence, it seems to be significant to grasp the present situation of the transferring point in Metro Manila, that is, the terminal area of Jeepney and bus.

2. REVIEW, OBJECTIVES AND FLOW OF THIS STUDY

Considering this proposition, the authors had to recognize and reconsider the characteristics of present spontaneous terminal locations and their functions in Metro Manila. In his paper, Hokao ⁴⁾⁵⁾ mentioned the condition of terminal or transfer points in Metro Manila but these studies are limited to describe the outline of the present condition. Besides these, there is so far no study concerned with the terminal area in Metro Manila in spite of its importance. Regarding the characteristics of public transportation in Metro Manila, Kurokawa and Iwata ⁶⁾ described the characteristics of Jeepney in Metro Manila. Regider and Sigua evaluated the congestion around Jeepney stop by using simulation program ⁷⁾.

There are some reports and studies regarding the terminal area in Metro Manila, for example, JUMSUT ²⁾ and MMUTSRAP ⁸⁾ tried to grasp the present terminal condition and they discussed the future development plan of the terminal facilities at specific highly congested areas like Cubao, Monumento and so on.

In this regard, this study is being considered that the basis for the further study about terminal area by first explaining the present situations regarding terminal areas in Metro Manila. As such, the objectives are as follow:

- to comprehend present characteristics of Jeepney/bus terminal areas in Metro Manila;
- to analyze the locational and functional characteristics of Jeepney/bus terminal areas; and
- to consider present advantages and disadvantages of locations and functions of terminal areas based on the result of comprehension.

The flow of this study is the following: Firstly, qualitative discussion was described in order to address the crucial points of this study; And survey method and simple results were mentioned; Sectional study regarding characteristics of terminal areas were examined at chapter IV; Finally, conclusion and further studies were addressed at chapter V.

3. CHARACTERISTICS OF TERMINAL AREA IN METRO MANILA

3.1 Discussion about Present Terminal Areas

As it was mentioned in Chapter I, the following are the perceived main problems related to terminal development:

- (1) Inconvenience for transferring behaviors of passengers:

There is no definite transferring facilities for passengers and loading points are distributed widely so that it is hard to grasp the locations and inefficient for passengers.

- (2) Local intense congestion at the terminal area:

If there is designed terminal facilities to promote transferring behavior smooth with consideration of the passing through traffic, it is obvious that it will contribute to reduce the local congestion.

The local congestion might cause the several further problems like whole congestion, obstacle to a reliable economic activities and so on.

And regarding the reasons why we are lacking terminal developments, it seems that there are main three reasons: land use aspect; financial aspect; and customary aspect.

Land use aspect:

The urban development in the Philippines is private-oriented, therefore it is hard to contemplate urban facilities development plan with the consideration of transport situation.

Financial aspect:

Same as other infrastructure development, there is a financial constrain to develop such facilities. Moreover, most crucial areas are located at high land price area and there is no sufficient place to develop it.

Customary aspect:

There are little consciousness about 'terminal facilities' as a transferring points among people because basically they can ride and get off Jeepneys and buses anywhere they want. Long distance bus companies have their own terminals but they are distributed widely and there is no consideration for the other modes.

Regarding this discussion, Figure 3.1 shows hypothetically causes and effects regarding the lacking of terminal developments in Metro Manila. The relationship between these phenomena is explained just by the description. Therefore, we had to recognize the present situation regarding terminal area by quantitative data.

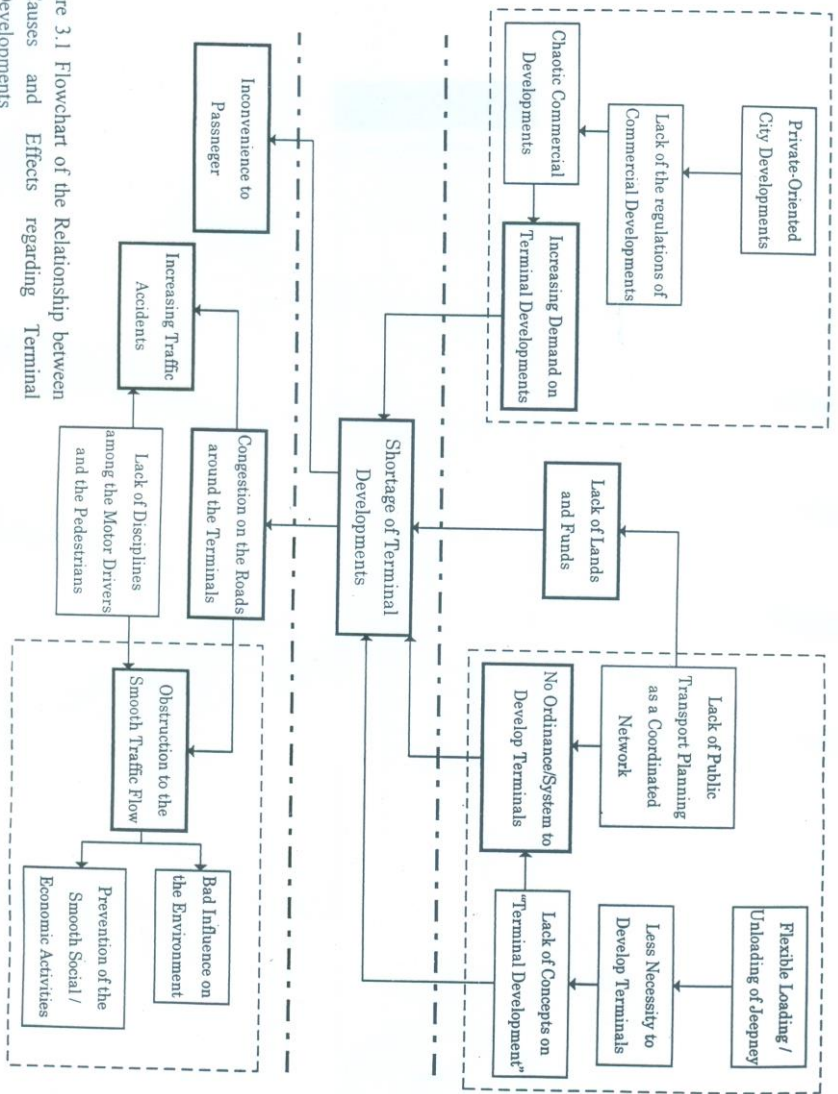


Figure 3.1 Flowchart of the Relationship between Causes and Effects regarding Terminal Developments

3.2 Definition of Terms

Terminal Area: is a area which is origin or destination of the routes of Jeepneys or buses. In Metro Manila, all of the Jeepneys and buses have their panel route names so that it is easy to recognize the terminal area if we can identify all routes in Metro Manila. However, if one of the loading/unloading point locates above 500m far from the nearest loading/unloading point, that points will not include as one terminal area.

Loading/Unloading Point: Within terminal area, many passengers are making queuing line spontaneously to ride on their Jeepney and bus at certain points. We call such points as "loading/unloading points". Basically, each route supports to have one loading/unloading point within a terminal area. Passengers may be able to use several Jeepney/bus routes at one loading/unloading points.

Based on these definitions, the authors tried to comprehend the present situation of terminal area by the survey.

3.3 Survey methods

This study is based on a survey conducted by Department of Transportation and Communications (DOTC) of the Philippines and Japan International Cooperation Agency (JICA) though Metro Manila Urban Transportation Integration Study or MMUTIS.

The terminal survey was conducted from Nov., 1996 to Feb., 1997 by the 2 steps:

- (1) Identification of terminal area; and
- (2) Grasp on characteristics of terminal area.

(1) Identification of terminal area

Regarding the definition of terminal area at 3.2, we had to grasp all Jeepney and Bus routes in Metro Manila. The route of public transport is managed by Land Transportation Franchise Regulation Board (LTFRB) under DOTC but there are irregular Jeepneys (colorum Jeepney) which is not registered but operating. Therefore, we had to recognize the Jeepney and bus routes anew to identify the terminal area.

From the survey, we figured out the following items:

- all Jeepney and bus (including air-con bus, non air-con bus and mini bus) routes within Metro Manila and from Metro Manila to the other area
- passing links of all Jeepney and bus routes
- frequency from AM 6:00 to PM10:00 of all Jeepney and bus routes

Table 3.1 shows the number of routes of Jeepney and bus.

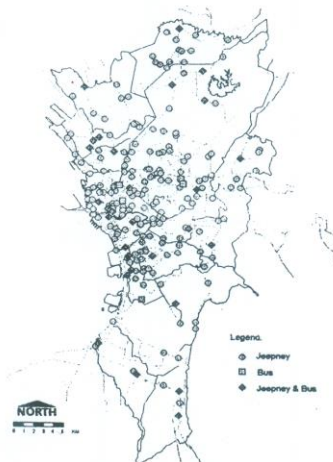
Table 3.1 Public Transportation Routes in Metro Manila

	Metro Manila ↔ Metro Manila	Metro Manila ↔ Other Area
Jeepney	399 Routes	90 Routes
Bus	53 Routes	171 Routes

Based on this results, 215 terminal area were identified based on our definition. (See Table 3.2 and Figure 3.2)

Table 3.2 Terminal Area in Metro Manila

	No. of Area
1) Jeepney Terminal Area	181
2) Bus Terminal Area	5
3) Jeepney and Bus Terminal Area	29
Total	215

**Figure 3.2 Plot of Terminal Area in Metro Manila**

The Jeepney terminal area is the origin or destination of the routes of Jeepney so that it may not necessarily mean that passenger can not use buses or other travel modes at the Jeepney area. The same consideration for bus. Hence, Jeepney and bus terminal area is the origin or destination of the routes of both modes.

(2) Grasp on characteristics of terminal are

The survey about their locations of loading/unloading points was conduct. First, we had to recognize the "loading/unloading points" to identify the boundary of terminal area. Basically, we identified the place where there is queuing line of passengers. If there are two or more queuing lines for one route, we chose the longest line as a loading/unloading point of the route. The place of loading/unloading points are plotted to a map.

There are many case that the panel route name is the same but the loading/unloading points are quite different. For example, when they are using the name of street as origin or destination of routes, the loading/unloading point is often far from the others. In this case, even panel route name is the same, we identified as a different terminal area based on the definition of 3.2.

3.4 Preliminary Results of the Survey

The number of routes at terminal areas are shown at Figure 3.3(a)(b) and the relationship between number of routes and condition of their distribution is shown at Figure 3.4.

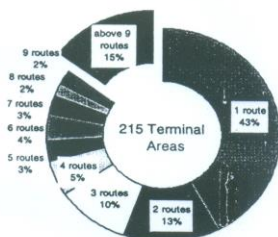


Figure 3.3(a) No. of Jeepney & Bus Routes
at Terminal Areas

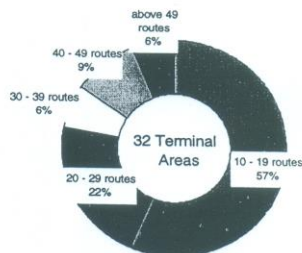


Figure 3.3(b) No. of Jeepney & Bus Routes
at Terminal Areas
- above 9 routes -

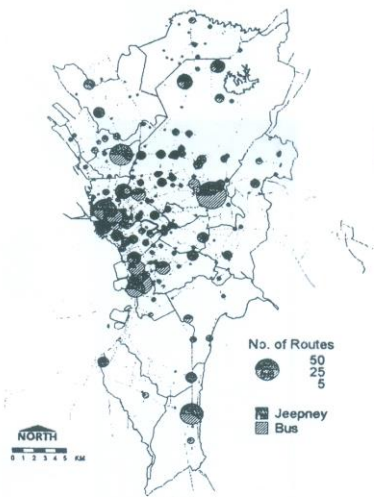


Figure 3.4 No. of Jeepney & Bus Routes and Distribution of Terminal Areas

From the results of the frequency survey, we can see the average no. of arriving/leaving Jeepneys and buses per hour and route at Table 3.4.

Table 3.4 Average No. of Arriving/Leaving Jeepneys and Buses per Hour and Route (AM 6:00-PM 2:00)

	vehicle/route hour
Jeepney	24.8
Bus	6.7

4. ANALYSIS ON TERMINAL CHARACTERISTICS

4.1 Routes Characteristics at Terminal Areas

First of all, the characteristics of routes at terminal areas are analyzed in order to figure out the relationship between the distribution within the city and their traffic functions. Figure 4.1 and 4.2 show the number of route and direction (within Metro Manila or outside of Metro Manila) at terminal areas. According to Figure 4.1, which exhibits Jeepney routes, most Jeepney terminal areas located within C-4 (EDSA) has few routes for outside of Metro Manila while major terminal area located outside of C-4 has many routes for outside of Metro Manila. Small terminal areas located outside of C-4, however, has few routes for outside of Metro Manila because we can guess that there is a hierarchical relationship among major and small terminal areas so that the small terminal

areas do not need to have routes for outside. On the other hand, from Figure 4.2, we can see that most of routes going to outside of Metro Manila are generated from the center part of Metro Manila.

It seems that the hierarchy of routes is one of most interesting aspects of functional characteristics of the terminal areas. For example, we will see Figure 4.3 which exhibits destination of Jeepney routes going from Divisoria and Quiapo, both of them are quite big terminal in terms of number of passengers and they locate close. It seems that routes from Divisoria takes north and south part while ones from Quiapo does north-west part of bound. As it was mentioned before, Jeepney routes are spontaneous so that it is quite interesting that they are doing their share spontaneously.

Next, focused on Jeepney routes, 'dependent terminal area' was identified to see the hierarchy among terminal areas. The methods to select as 'dependent terminal area' are the following:

1. The terminal area which has only one route, except the area that both ends of route are 'only one route' terminal area.
2. The terminal area which has two routes and one of the route is connected to 'one or two routes' terminal area.
3. The terminal area which has above two routes and all routes except one route are connected to 'dependent' terminal areas.

And we call the area which is connected to 'dependent' terminal areas and is not 'dependent' terminal area as 'core' terminal area. Figure 4.4 shows the distribution of 'core' terminal area, which has above four 'dependent' terminal areas, and 'dependent' terminal area.

It is obvious that most of 'dependent' terminal areas are located close to the 'core' terminal area. Novaliches has 12 'dependent' terminal areas, therefore we can easily imagine that Novaliches has a significant function as a transferring points between the north part and the center part.

It was supported that Cubao would be a big 'core' terminal area because it has many routes and is seemed the gateway to the east part of Metro Manila. However, only one 'dependent' terminal area was selected for Cubao based on this method. That is because most terminal area located the east part of Metro Manila have routes going to inside of C-4 so that Cubao does not play a role as their 'core' terminal area.

It is obvious that there are hierarchical relationship spontaneously among terminal areas but at the same time, it is not definite that the system is complete and efficient.

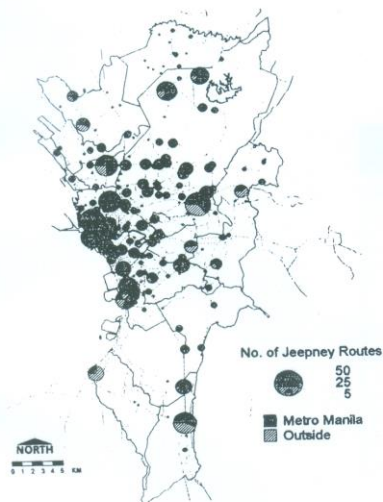


Figure 4.1 No. of Jeepney Routes
- Direction of the Routes -

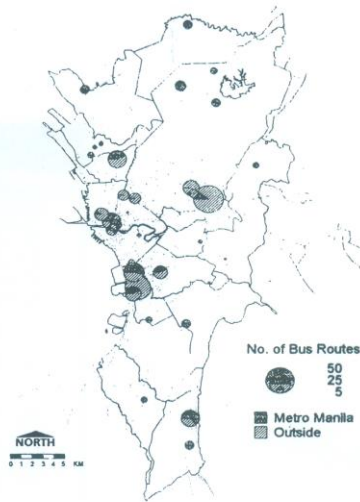


Figure 4.2 No. of Bus Routes
- Direction of the Routes -

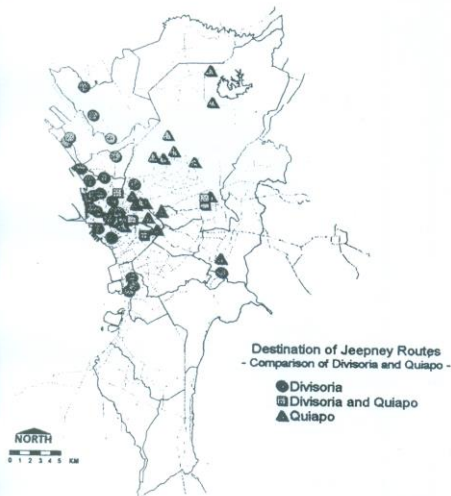


Figure 4.3 Destination of Jeepney Routes
- Divisoria and Quiapo -

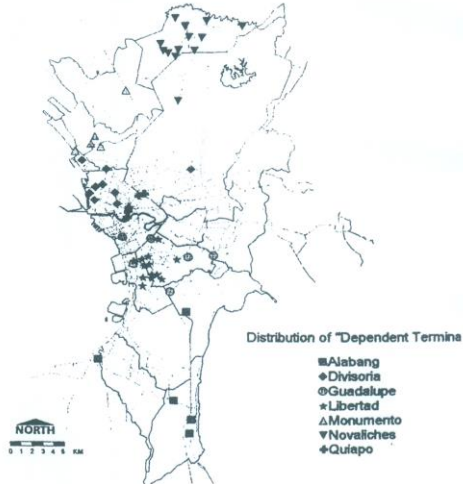


Figure 4.4 Distribution of "Dependent Terminal"

4.2 Arriving / Leaving Vehicles at Terminal Areas

The relationship between number of the routes and frequency of arriving/leaving Jeepneys and buses are shown at Figure 4.5. Even the correlation between them is 0.89, it seems that the relationship between them is not complete liner. It is obvious that there is a difference in the frequency by their locations. To see the locational relationship of this difference, Figure 4.6 is exhibited. This Figure shows the average number of arriving/leaving Jeepneys per route. According to this figure, the terminal areas which located in the north part of City of Manila have high frequency routes while the ones which located in outskirts area have less frequency routes comparatively.

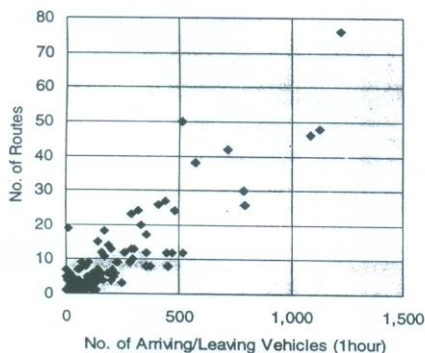


Figure 4.5 No. of Routes and Arriving / Leaving Vehicles at Terminal Area

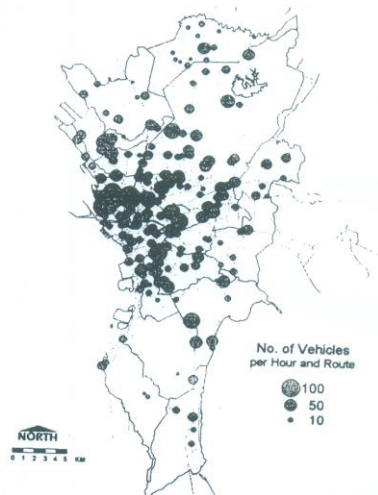


Figure 4.6 Average No. of Arriving / Leaving Jeepneys per Route

4.3 Land Use around Terminal Area

Main land use around terminal areas is grasped in order to identify the locational characteristics of terminal area. The results are Figures 4.7 and 4.8. Figure 4.7 is about the ratio of land use around terminal areas and Figure 4.8 shows the distribution of them. Above half of the terminal areas located close to commercial facilities and they are distributed widely within Metro Manila. Commercial facilities have variations in terms of their scales. It is definite that most of the areas which have large shopping department store(s) became to terminal areas like Cubao, Quiapo, Ayala Center, Monumento, SM North EDSA, Crossing and so on. Such major market places as Divisoria, Baclaran, Blumentritt, Balintawak are also terminal areas. However, most of the 'commercial' terminal areas do not have such large commercial facilities. They just have fast-food shops and some stores. It easily can be imagined that such small shops and shores are developed because of passenger's transferring behaviors at terminal areas. In Metro Manila, it seems it is one of most interesting locational characteristics of them. That is why 'commercial' terminal area has large portion among other land use.

Second largest portion (30%) is residential area and large parts of them locates outskirts area. Most of such 'residential' terminal area are located to the gateway of subdivision. As it was discussed at 4.1, such terminal areas connected to major terminal areas and it looks like hierarchy.

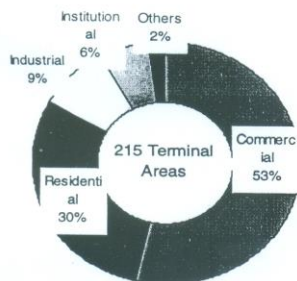


Figure 4.7 Ratio of Land Use around Terminal area

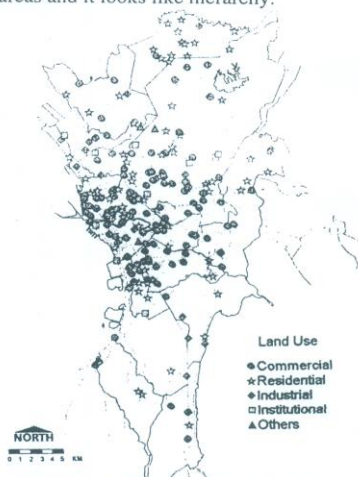


Figure 4.8 Distribution of Land Use

5. CONCLUSION

In this paper, the authors tried to comprehend the terminal area, that is, main transferring point in Metro Manila in order to address the present problems regarding them. Outline of the present situation of main transferring points in Metro Manila was discussed and the method to identify 'terminal area' was figured out. Based on the definition of terminal area in this study, 215 areas were identified. The salient findings of this study are:

- The scales of terminal areas are varied and they are distributed widely within Metro Manila.
- Major terminal areas locate along LRT and EDSA and some of them are in the suburb center.
- There might be a hierarchy among terminal area spontaneously but it is vague and not complete because there is no coordinated consideration.
- Above half of the terminal areas are located in commercial area and the scale of them are varied.

As further studies, there are such topics to be examined.

- analytical examination as to the hierarchy among terminal areas
- discussion about scale of commercial facilities and terminal area
- detailed consideration regarding loading/unloading points:
 - analysis on distribution of loading/unloading points within Terminal area
 - grasp for loading/unloading behavior to Jeepney and bus

The authors would like to extend their gratitude to the MMUTIS study team for the usage of the data on the Public Transport Terminal Survey.

REFERENCES

- 1) JICA(1995), "Finipino Way (Transportation in the Philippines)"
- 2) JICA(1984), "The Metro Manila Transportation Planning Study (JUMSUT)"
- 3) Hokao(1990), "A Study on the Formation of the Terminal Areas in Metro Manila", Proc. of Infrastructure Planning No.13 pp. 703-710
- 4) Hokao(1991), "A Study on the Formation of the Terminal Areas around the LRT Station in Metro Manila", Proc. of City Planning No. 26, pp. 247-252
- 5) Kurokawa T. et al(1984), "Characteristics of Jeepney Operation and Demand in Metro Manila, the Philippines", Proc. of JSCE No.347/- 1 pp. 157-184
- 6) Regin R. et al(1995), "Development of a Simulation Program for the Evaluation of Jeepney Stop Configuration with Focus on Single Lane Roadways", 1st Conference of the Eastern Asia Society for Transportation Studies
- 7) Pak-Poy & Kneebone Pty Ltd.(1983), "Metro Manila Urban Transportation Strategy Planing Project(MMUSTRAP)"