Comparison of On-street Parking Management in Ermita-Malate and Makati Central Business District, Philippines

YRF13-001

Arian Aquino BULACTIAL[1], Federico Tan DIZON[2], Mark Wesley Chang GARCIA[3], Grace PadayhagGUETA[4], JudylynCaabayVALDEZ[5]

[1]Civil Engineering Department
De La Salle University
Telephone: (632) 524 4611
Email: arian_0000_18@yahoo.com

[2]Civil Engineering Department
De La Salle University
Telephone: (632) 524 4611
Email: dizonfederico3@gmail.com

[3]Civil Engineering Department
De La Salle University
Telephone: (632) 524 4611
Email: mwcg_539@yahoo.com

[4]Civil Engineering Department, Faculty of Engineering
De La Salle University
Telephone: (632) 524 4611
Email: padayhag.grace@yahoo.com

[5]Civil Engineering Department
De La Salle University
Telephone: (632) 524 4611
Email: judayvaldez@yahoo.com

Abstract

Ermita-Malate and Makati Central Business District (CBD) are the center of business and commerce in the Philippines. On-street parking is rampant in Ermita-Malate even in areas that do not allow it including national roads, public transportation and truck routes. In Makati CBD, on-street parking facilities are widely used for short-term businesses. Parking management is crucial for an efficient use of available parking resources. This paper aims to compare the on-street parking management between the two study areas. Survey was done and the current on-street parking conditions in Ermita-Malate were identified. Parking demand in Makati CBD was determined as well. From the data gathered, it was found out that Ermita-Malate has existing parking ordinances but are not properly implemented. Several recommendations were made including the three-hour parking rule from Makati CBD to maximize the use of the facilities. An on-street parking map was generated for Ermita-Malate area to serve as a guide to motorists.

Keywords: On-street parking, parking management, cost analysis, parking map

1. Introduction

Two of the busiest areas in Metro Manila are Ermita-Malate and Makati CBD. These areas have various business establishments, institutions, malls, and restaurants that people are making trips to for their transactions or to spend their leisure time.

Ermita houses different government institutions and offices including Supreme Court of the Philippines, Philippine General Hospital and Rizal Park which is the most prominent public park in the country. Educational institutions like University of the Philippines-Manila and Manila Science High School can also be found here.

Similarly, numerous institutions and universities are in Malate area like BangkoSentralngPilipinas (Philippine Central Bank) and De La Salle University. It can be easily accessed by Light Rail Transit-1 or with the main roads like Taft Avenue and Roxas Boulevard.

Figure 1 shows the total population by municipality in Manila. Ermita caters to more government and educational institutions and offices than Malate that is more on the residential side.

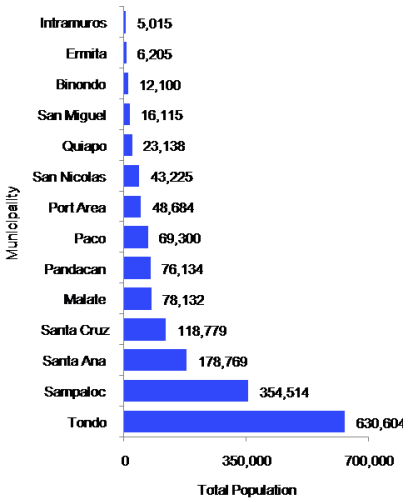

Fig. 1 Total population by municipality in Manila (2007)

Makati on the other hand is labeled as the financial capital of the country. Headquarters of various multinational companies can be found here. Makati CBD is vastly growing with the increasing number of offices and condominiums. Its daytime population is estimated to double from almost half a million on a working weekday due to the volume of people conducting business or shopping. High-end malls like Glorietta and Greenbelt are located here.

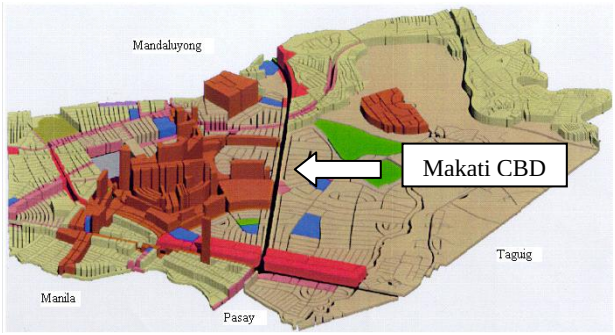

Fig. 2 Makati City 2020 building projection

On-street parking is extensive in these areas. On-street parking facilities in Makati CBD are properly managed and maintained by Makati Parking Authority (MaPA). Sufficient parking slots for vehicles, motorcycles, and food trailers, among others are provided in Makati CBD. However, on-street parking in Ermita-Malate is not efficiently used. People in Ermita-Malate tend to park anywhere possible. The lack of off-street parking facilities leads the drivers to park on-street that is prohibited in some areas. Parking management is essential so that congestion problems can be minimized, if not totally avoided. Parking rules and laws should be followed to ensure safety among the drivers and passengers inside the vehicle.

The objective of the study is to compare the parking management of Ermita-Malate and Makati CBD. In particular, it aims to determine the similar characteristics of on-street parking demand in Makati CBD and Ermita-Malate areas. It also aims to identify the good parking management practices in Makati and assess these practices that can be applied in Ermita-Malate. To aid the current situation of on-street parking in Ermita-Malate, it also aims to generate an on-street parking map in this area. This study intends to identify the financial aspect in improving the on-street parking of Ermita-Malate as well.

The study is limited to Ermita-Malate and Makati CBD. The parking demand is considered to determine if there are significant differences between the two study areas. The study is concerned on the parking management of the two study areas. It also focuses on the financial implication of the improvement of on-street parking facilities. For the generated on-street parking map, the parking spaces considered are no parking, residential, driveways and illegal parking. The study covers the regulations/policies of on-street parking implemented in Makati and the actual situation in Ermita-Malate. Through this study, the congestion of vehicles due to improper parking can be reduced and the quality of on-street parking in Ermita-Malate can be improved. With the on-street parking map, it can also assist the drivers in determining the areas where they can park legally.

2. Literature Review

2.1 Supply and Demand

It is known that on-street parking is seen as a problem of crisis proportions in some cities in the study. These observations are not necessarily in conflict. Even a small number of vehicles, when

parked in ways that are especially disruptive, and if they park for a long period such as the whole working day, can cause heavy traffic. In the study conducted by the Asia Development Bank (2011) about the parking policy in Asian cities, street parking crises are often localized in high-profile commercial areas or streets. While parking itself is widely seen in these cities as hindering traffic flow, there was surprisingly little concern about the impact on congestion of motorists searching for parking. Lack of awareness of the parking search externality does not prove that it is not important.

This study tackles about the importance of on-street parking although on-street parking is one of the main causes of traffic problem in an area. Even if a state provides abundant supply of off-street parking, there will always be on-street parking that can be seen. This is because people choose their parking areas where it is near to their destination, and they choose their parking places based on their accessibility and convenience. The study also suggests that there is a need to give consideration on the time consumed by motorists in searching for their parking slot on street since this may also cause traffic.

2.2 Parking Scheme

In the study of Oyon-oyonet. al (2008) on the on-street parking scheme for Ermita and Malate Districts, City of Manila, due to the fact that the area is surrounded by many establishments, there is an insufficient supply of parking facilities to accommodate the vehicles, thus, ending up cars parked along the narrow roads of Ermita and Malate Districts. In order to solve the problem, they proposed a new parking scheme to improve the traffic flow wherein vehicles are prohibited to park along main roads, narrow roads, and driveways, and at the same time, revenue will increase due to the fact that other areas will be utilized for on-street parking. They concluded that there is excess in demand even after improving the design of the parking facility. The real problem lies not only in designing a perfect parking scheme, but also to the over-demand of parking facilities given that the number of people going to Ermita and Malate is rapidly increasing.

From a study of MaPA (2008), they stated that the constant heavy traffic along the streets of the Makati CBD brought about by traffic congestion caused by illegal on street parking which had been adversely affecting the interest of the general public, could best be resolved if the government would exercise its police power to control traffic conditions in the said district and to legalize on-street parking, thus, several ordinances imposing reasonable parking regulations and traffic schemes, some of which were recommended by MAPA, were immediately enacted and put into effect. The map of Makati CBD on-street parking facility can be accessed through the website of the MaPA. It is indicated in the map, through the use of color-coding, the parking slots for cars, motorcycles, reserved parking for private establishments, and also the loading and unloading zones for public and private vehicles. This map has been a very helpful tool to commuters and motorists that drive to this area. It also shows the management of on and off-street parking in Makati CBD. Figure 3 shows the on-street parking map in Makati CBD.

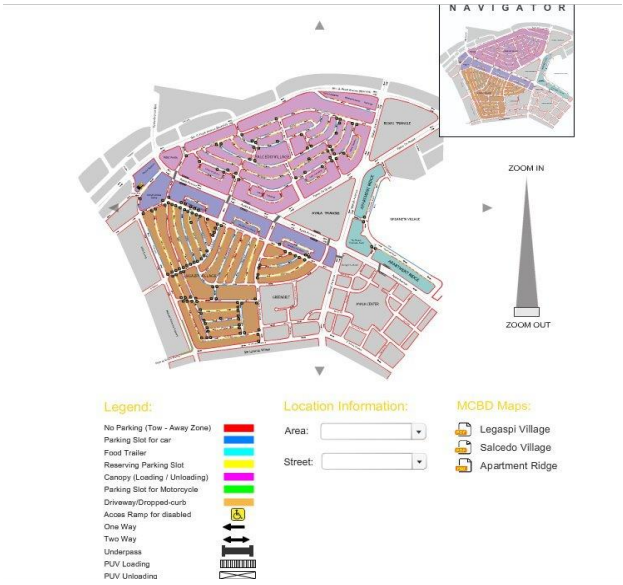

Fig. 3 Makati CBD's on-street parking map

Fig. 4 Zoomed-in image of on-street Parking Map

This study is related to the research since it suggests techniques on how to properly regulate the on-street parking along an area. The demand of vehicles entering a place is uncontrollable. The off-street parking facilities are mostly full. Through the use of enforcers to control parking and traffic conditions like implementing a limit on parking duration for on-street parkers, others can get their chances on that certain parking slot.

2.3 Recommended Parking Regulations and Parking Management

The parking cost also affects the decision of the motorist where to park their cars. There are places in which parking is relatively cheap,therefore, vehicles parked on that area tend to stay longer. Meanwhile, in places with higher cost of parking fee, people sometimes look for a cheaper parking space or just limit their stay. In the study of Cerreño (2002), it provides a comprehensive review of on-street policy, planning, management, and operations, all of which supply a foundation upon which to base further discussion and assessment about on-street parking. The purpose of this report is to determine the impact that on-street parking has on transportation, development, and land-use; and to identify and review comprehensively "on-street" parking policies and management practices in large cities. It was proposed that the congestion or value pricing in which a vehicle can only stay a maximum of 3-hour parked on the streetcan be made. Another is the use of the meter technologies like the smart cards, in-vehicle meters, and free flow parking since its beneficial in maintaining revenues and maximizing the number of spaces on a given street.

The study by Cerreño found some practices suitable to address the problem like limiting the number of hours a vehicle can park, or increasing the parking fee of on-street parking for the successive hours. These practices, if applied to the parking management in Makati and Ermita-Malate, it can improve the condition of parking supply and demand in the area.

3. Methodology

This study involves four major phases in the collection and analysis of data.

First phase is the comparison of the two study areas. The demographics were determined, particularly the government institutions, schools, hospitals, hotels, restaurants, recreational facilities and malls. These institutions are the major trip generators in both areas. The next aspect considered was the parking demand. For the parking demand data collection, the vehicles' time in and time out were identified as the raw data. The data that was taken from MaPa was on October 19, 2012 which was a Friday this was the day within the week which had the highest on-street parking demand. The parking data was limited to the working hours of MaPA, which starts at seven am and end at five pm. The data that were gathered included the plate number of the cars, their time-in and time-out. The on-street parking data was graphed to know how many cars go in the area every 30 minutes. Duration, turnover rate, minimum and maximum duration, standard deviation and variance were computed for the parking demand. The study from Go (2010) determined these values for Ermita-Malate and similar values were also computed for Makati CBD. The following equations were used:

$$TR = \frac{N_t}{S * T_s} \qquad (1)$$

where,

TR : turnover rate
N_t : total number of vehicles observed
S : number of parking slots
T_s : time of study in hours

$$D = \frac{\Sigma(N_x * X * Y)}{N_t} \qquad (2)$$

where,

D : average parking duration
N_x : number of vehicles parked
X : number of intervals parked
Y : length of intervals
N_t : total number of vehicles parked

The second phase is on the on-street parking map. Parked cars, driveways, no parking signage, residential places and vacant spots were considered in creating the on-street parking map. Ermita was divided into three areas while Malate was divided into four areas. It was assumed that the slot where the cars parked will be there or cars will take that same spot throughout the day. The colors that were used in the on-street parking map are: red, blue, black, pink and green. Red indicates that there is no car parked in that spot and there is a no parking signage in that place. Blue indicates that the vehicle parked in that area is for residences.

Black indicates that cars parked in that spot even though there are "no parking signage" parks illegally. Pink indicates that there is a driveway in that spot. Green indicates that there are cars that are parked in that spot.

The third phase of the study was determining the efficiency of the parking facilities in Ermita-Malate through surveys questionnaires that were distributed to the motorists around the area. Questions that were asked included: family's average monthly income, the number of cars owned by the family, the frequency of their visit in Ermita-Malate and their purpose, length of time they usually park, amount they usually pay for parking, amount that they are willing to pay for an hour of parking and some suggestions regarding the parking facilities in Ermita-Malate.

The survey data was analyzed using the Statistical Package for Social Science (SPSS) progrom to come up with Ordered Probit Analysis, which scrutinizes the variables used to obtain the correlation between these variables. The advantage of using the Ordered Probit Analysis is that it generates the t-values of the multiple variables. Through this, the correlation between these variables in different survey data and the behavior of these samples can be efficiently analyzed. Using the data collected, the equation that was formed was:

$$y_i = x_i\beta + \varepsilon_i \quad (3)$$

where,

y_i: frequency of visit to Ermita-Malate
x_i: independent variables (such as age, number of cars per household, family income, parking duration, frequency of visit with vehicle, purpose of trip, parking place, household size, amount paid for parking, limited parking spaces)
β : unknown coefficient
ε_i : random error

This formula was formed as multiple regression and the t-values were compared in identifying the significance of the factors.

The last phase of the study involves determining the parking management practices in Ermita-Malate and Makati CBD. Interviewswere conducted to the staff from the parking management division of Manila City Hall and MaPA. Financial aspects on how they maintain the on-street parking were also asked. The information and data gathered here were also used as basis for the cost analysis.

4. Results

4.1 Comparison of Ermita-Malate and Makati CBD

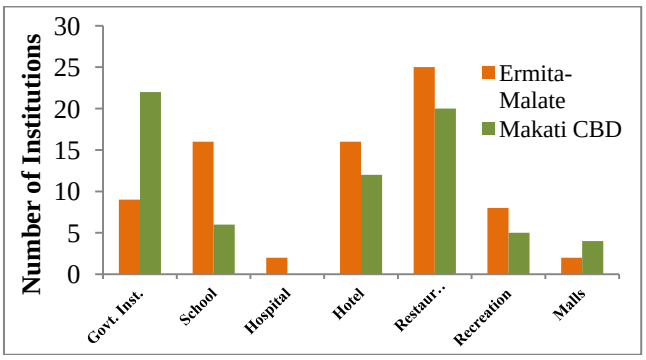

Fig. 5 Demographics of Ermita-Malate and Makati CBD

Shown in figure 5 are the demographics of the two study areas. Makati houses more government institutions including most of the embassies and consulates of other countries to the Philippines. Ermita-Malate has more schools located in it as well as hospitals, hotels, restaurants and recreation facilities than Makati CBD. There are no big public and private hospitals in Makati CBD but there are various clinics in different buildings within the area that accommodate its patients. From this, it can be observed that most of the trip-generating factors in Makati CBD are government institutions and malls. Schools, hospitals, hotels, restaurants and recreation facilities are more substantial in Ermita-Malate.

4.2 Parking Demand

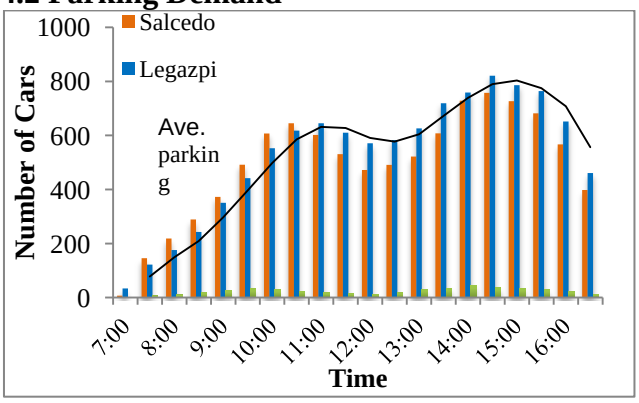

Fig. 6 Makati CBD parking accumulation

Figure 6 shows the total parking accumulation for the Makati CBD. It can be observed that there are more vehicles that occupy the parking slots in the afternoon, in which its peak is during the 2:30 pm interval. One reason why there are more trips done in the afternoon is because of the banks located in the area. Most banks have banking hours only until four or five in the afternoon so there are those who have their transactions just hours before the closing to somehow make it one time. Another reason could be due to restaurants and malls in the area. People tend to visit such establishments in the afternoon including those who come from work or school.

Legazpi Village has relatively greater parking accumulation than the other two study areas in the CBD. Legazpi is composed mainly of banks, several schools and offices. Because of this, there are more people who park their cars mostly just for a short-term visit. On the other hand, Salcedo Village houses numerous office buildings, condominiums and some restaurants. Parts of Apartment Ridge have the least on-street parking since it is just a small part of the study area.

Table 1 General comparison of Ermita-Malate and Makati CBD

	Ermita-Malate	Makati CBD
Population and Demographics	84, 337	30, 966
Parking Management	Manila Traffic Parking Bureau (MTPB), private (residents)	Makati Parking Authority (MaPA)
Total number of cars that park in the study area	2476	7683
Parking Fee	P30-40 (with ticket) P20-30 (without ticket)	P30 (first 2 hours) P35 (additional hour)
Parking Limit	No limit	Three hours
Revenue (per day)	P99, 040	P242, 890

The table above shows the general comparison between the two study areas. MTPB covers certain areas only unlike MaPA which handles the on-street parking in the whole CBD.

Table 2 Parking demand data of Ermita-Malate

Area	Duration (hour)	Turnover Rate (veh/sp-hr)	Standard Dev.	Variance
1	4.027	0.099	2.495	6.223
2	6.564	0.233	1.137	1.293
3	2.877	0.170	2.193	4.809

In determining the on-street parking demand in Makati CBD, turnover rate, average parking duration, standard deviation and variance were computed. Table 2 shows the parking demand data of Ermita-Malate from the study of Go et. al (2010). It was found out that the average parking duration in Makati CBD is 1.164 hr/vehicle. This is lower than the average parking duration in the three study areas in Ermita-Malate since in Makati, the parking time is being limited to three hours to maximize the use of the on-street parking facilities. Also, since there are a lot of offices and business establishments in the area, most of the transactions are short-term only so it is expected that the parking duration is lower in Makati CBD. For the turnover rate, the value obtained for Makati CBD was 0.367 veh/space-hour. Comparing it with the turnover rate of Ermita-Malate, it has bigger value which implies that more vehicles get to use a parking slot more often. The obtained small value for the standard deviation is also affected by the three-hour parking rule since the time of parking allowed for cars are being limited. Small values for the standard deviation and variance suggest that the values are close to each other, generating a smaller range for the data.

Table 3 Parking demand data of Makati CBD

Village	Duration (hour)	Turnover Rate (veh/sp-hr)	Standard Dev.	Variance
Salcedo	0.931	0.409	0.030	0.00088
Legazpi	0.953	0.396	0.033	0.00110
Apartment Ridge	0.762	0.095	0.032	0.00100
Makati CBD	**1.164**	**0.367**	**0.0000013**	**0.001**

4.3 On-street Parking Map

Ermita-Malate area was surveyed to determine the existing on-street parking condition in the area. In order to simply show the data gathered, an on-street parking map for the current parking situation in the area was generated. Since Ermita and Malate have a lot of minor and major arteries, Ermita and Malate were divided into three and four parts, respectively.

Ermita-Malate was observed to determine the places where cars were parked then created an on-street parking map. The parameters that were considered were illegal parking, residence, driveway, no parking and parking of cars. Illegal parking is defined as places or slots were cars were parked although a signage prohibiting parking has been placed and it was designated with color black. Residence is defined as places where cars are parked in front of houses or residence and was designated with color blue. Driveway is defined as a short road leading from a public road or street to an establishment or a house. This was designated with color pink. No parking is defined as places where no cars were parked or there are signages prohibiting parking. It was designated with color red. Parking is defined as places where cars are parked and was designated with color green. Some streets or parts of the map were not highlighted with any color since the area was not surveyed because it is a private road. The cars that were observed are not only private cars but also public utility vehicles, specifically jeepneys, pedicabs and buses.

Fig. 7 Existing on-street parking in Ermita

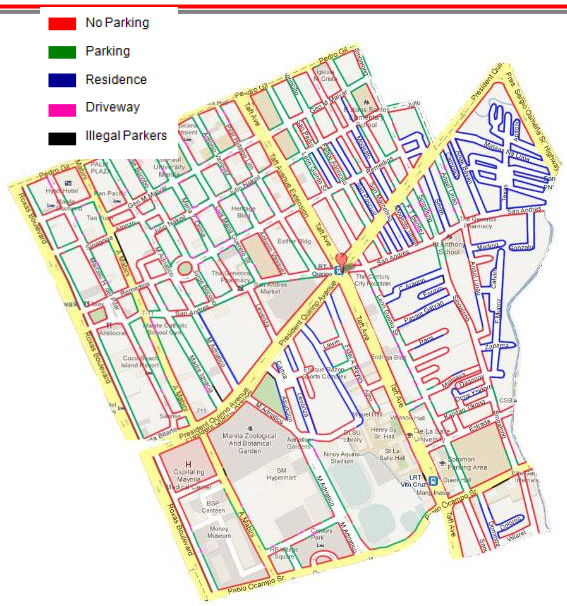

Fig. 8 Existing on-street parking in Malate

Figures 7 and 8 show the existing parking conditions in Ermita and Malate. Upon surveying of the roads and streets and the consultation of the Republic Act 4136 section 46, the recommended map was generated. The routes of public vehicles, particularly the jeepneys and buses, national roads and trucks were also taken into consideration.

Figure 9 shows the number of parked cars per part in the area of Malate. It also shows the total number of cars for the existing and recommended on-street parking. Part 1 has a lot of parking spaces since there are a lot of establishments that can be found here. The estimated numbers of cars parked for the existing and recommended are 1355 and 1213 cars, respectively. There was a difference of 142 parked cars and with the recommended on-street parking, it is expected that there would a 10.48% decrease in on-street parking.

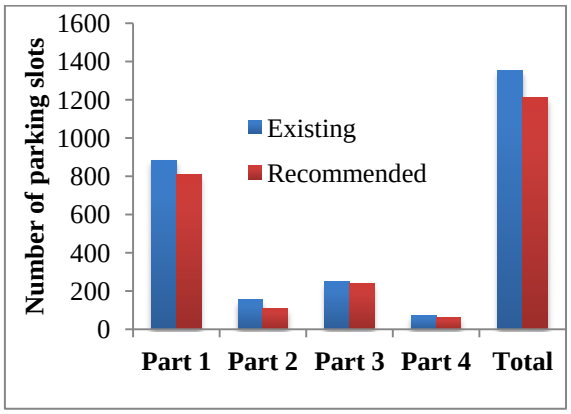

Fig. 9 Parked cars in Malate

Figure 10 shows the number of parking slots per part in the area of Ermita. It also shows the total number of cars for the existing and recommended on-street parking. It can be observed that part 3 has a lot of parking space since there are a lot of establishments that can be found in here. The estimated numbers of cars parked for the existing and recommended are 1121 and 1023 cars respectively. There is a difference of 98 parked cars and an 8.08% decrease to the number of cars that park on-street is expected.

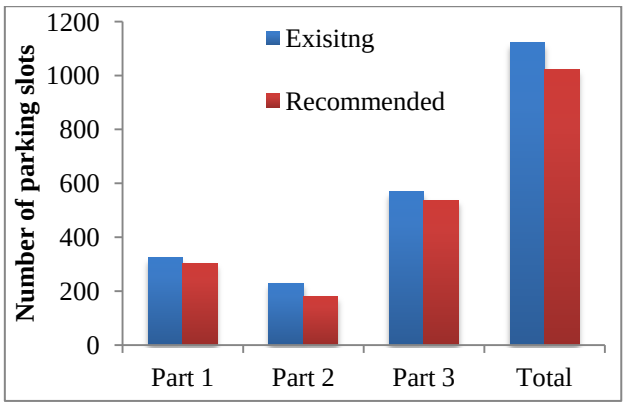

Fig. 10 Parked cars in Ermita

The estimated numbers of parked cars for the existing and recommended on-street parking are 2476 and 2236 cars respectively. There was a difference of 240 parked cars and a percentage of 9.69% for the decrease. The difference was small since the parameters that were considered were few.

The survey data was analyzed using the Ordered Probit Analysis. When the t - statistical values of the variables reaches the value of positive or negative one, it has a greater effect on the assigned independent variable. The positive and negative signs indicate that there is an increase and decrease in the demand of the variables with respect to the independent variable. The independent variable was assigned as the frequency of people visiting or taking their trips to Ermita - Malate. The McFadden's R^2 values resulted to a value of 0.272. It was rather small compared to other applications like Cox and Snell, and Negelkerke, which have R-values of 0.434 and 0.496 respectively. For this reason, the discussion that follows focused on explaining the variables that exhibit significant t-values of the variables included.

Table 4 shows that there is a high volume of trips along the roads of Ermita-Malate, but among the establishments present, the most frequently visited are the malls and schools that are situated in the area. The reason is that most of the respondents of the survey conducted were students and university workers. Since students who regularly bring their vehicles are increasing, the capacity of parking facilities both on and off street easily gets filled up, thus, some cars cannot be accommodated anymore. Also, from the result of the survey, it shows that people who often visit the area say that there are limited on-street parking spaces and facilities in the area.

Table 4 Parameter Estimate

		Estimate	T-Values
Threshold	[freqa = 1.00]	-1.302	-1.177
	[freqa = 2.00]	.522	0.473
Location	age1 (20 and below)	-.235	-1.209
	age3 (26 and above)	-.330	-0.667
	car1 (2 and below)	-.535	-2.026
	car2 (3-4)	.039	0.150
	car3 (5 and above)	0	-0.150
	freq1 (everyday)	-2.299	-6.588
	freq2 (4-5 times a week)	-1.174	-4.124
	freq3 (2-3 times a week)	-.940	-3.395
	freq4 (once a week)	-.530	-1.830
	freq5 (seldom)	0	1.830
	pur1 (school)	-.508	-0.831
	pur3 (malls)	.585	0.904
	pur4 (Others)	.204	0.312
	plac1 (Name of School)	.421	1.903
	plac2(Name of Building)	-.126	-0.548
	plac4 (Others)	-.157	-0.406
	Hh (Household Size)	-.019	-0.287
	Limitpark (Limited Parking Spaces)	.623	1.978

Other than places that offer off-street parking facilities, people prefer roaming around the area without their bringing their own vehicles. They seldom bring their cars when taking their trips to Ermita-Malate because of limited on-street parking spaces. Commuting has become the better option so as to avoid the inconvenience of having to look for parking spaces.

4.4 Parking Management and Cost Analysis

The following are the recommended ordinances for Ermita-Malate based on Makati City Ordinance No. 97-175:

- Three hour parking rule in Makati CBD
- Placing of parking markings to clearly indicate a parking slot only for four wheel vehicles
- Parking is prohibited along major roads, and on narrow roads especially in areas with high density on/off peak.
- Parking is prohibited along private properties without the consent of the owner. The person in lawful possession of any private property has the right to have the cars removed if it is parked within their property line and/or driveway.
- Ordinance shall take effect after the MAPa have conducted information campaigns to update the public on this newly released ordinance, and also after posting appropriate street signs informing the motorists two weeks before the day of implementation.

Before implementing the ordinances in Makati to the Ermita-Malate area, certain costs will be incurred. The costs that will be included are the road markings, renting of ticketing machines, and the salary and benefits of the hired parking attendants. These costs will be taken into account in the cost analysis of the project to be applied in Ermita-Malate.

Not all streets generate income for the parking management. Some streets generate a large amount of income while others will only end up in losses. Before application, the streets where parking management is to be applied must be studied first to ensure that there will be income for the implementation of the parking management scheme.

Figure 11 shows the cost for an estimate of 12 months. The total number of estimated parkers was based from the recommended map. Breakeven point can be reached within less than a year.

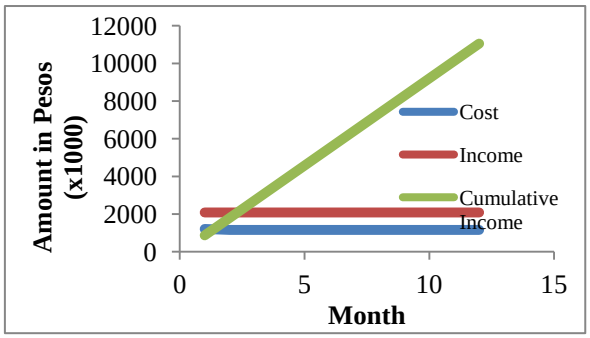

Fig. 11 Cost for recommendations in 12 months

5. Conclusion

Ermita-Malate and Makati CBD both attract a huge number of motorists in the area everyday. From the data gathered, it was deduced that Makati CBD accommodates more on-street parkers than Ermita-Malate due to its parking management. With this, it was concluded that the management of on-street parking facilities in Ermita-Malate area needs improvement since the parking slots are not utilized well. A lot of the on-street parkers stay for a very long period and there are some who park in the illegal parking areas. Although there are laws and ordinances regarding proper on-street parking, these are not being implemented properly and needs improvements in order to be more effective. Some streets have no proper markings and there are few signages placed along the streets. It is not clear as to where it is allowed to park and there are no enforcers that collect the parking fees and enforce the rules and regulations. Makati CBD's on-street parking management is better compared to that of Ermita-Malate. Makati CBD accommodates more on-street parkers because of its systematic way of handling them. Generation of the on-street parking map in Ermita-Malate can help reduce the number of on-street parkers by almost 10%.

The area of Ermita-Malate should impose better parking rules and regulations and these should be strictly implemented. Parking signages should be visible in areas where parking is prohibited so that motorists will have an idea where parking is allowed so that they will not be caught for illegal parking, which means the number of illegal parkers, will also be reduced. The existing

on-street parking map can be used by officials or traffic enforcers for them to determine where motorists usually park.

Fig. 12 Recommended Ermita On-street Parking Map

Fig. 13 Recommended Malate On-street Parking Map

6. Acknowledgement

The authors would like to thank the staff from MaPA and Manila City Hall for their time and information needed in this paper. The authors would also like to express their gratitude to their family, fellow Transportation major students and CE faculty of DLSU for their help in finishing this dissertation.

References

[1] Allison L. C. de Cerreño, Ph.D. (December 2002). *The Dynamics of On-Street Parking in Large Central Cities*. Retrieved from http://www.michaelwalker.ca/files/rudin.pdf.

[2] Anagnostopoulos, K.P.,Dimitriou, D.,Stephanis, B. &Vavatsikos, A. (2002).Evaluation of a Transportation Project with the Analytic Hierarchy Process: Best Parking Angle Selection. *Urban Transport VIII*, *2*, 161-168.

[3] Amusan L.M (n.d.) Study of Factors Affecting Construction Cost Performance in Nigerian Construction Sites. Retrieved from Covenant University.

[4] Asia Development Bank (2011). Parking Policy in Asian Cities. Retrieved from http://cistup.iisc.ernet.in/Urban%20Mobility%208th%20March%202012/parking-policy-asia.pdf.

[5] Benitez, F., Brebbia, C. A. &Sucharov, L. J (2002).*Urban Transport VIII*. Southampton, UK: WIT Press.

[6] Chance, B. (2009). Parking Problems- Potential Solutions[powerpoint slides]. Retrieved fromhttp://www.chancemanagement.com/downloads/presentations/CMA_MEPS2009_OnStreet.pdf

[7] Gresham Smith and Partners (June 2002). On-Street Parking. Retrieved from http://www.bgky.org/publicworks/planningdesign/transportation/pdf/On-Street_Parking.pdf

[8] Makati Parking Authority (2008). Locate on-street parking. Retrieved from http://www.makatiparking.com.ph/map/makati.html

[9] Mark Henric T. Go, Myron Julius O. Manguera (September 2010). Assessing Parking Demand and Supply of Establishments in Ermita-Malate Area City of Manila. Retrieved from De La Salle University

[10] Oyon-oyon, G., Sudaria, G., Yang, P.J.,(2008) On-street Parking Scheme for Ermita and Malate Districts, City of Manila. Retrieved from De La Salle University.

[11] PBIC (n.d).On-Street Parking Enhancements. Retrieved from http://www.walkinginfo.org/engineering/parking.cfm

[12] Republic Act No. 4136 from Lawphil Project (2000).Retrievedfromhttp://www.lawphil.net/statutes/repacts/ra1964/ra_4136_1964.html