

Parking Analysis and Contingency Valuation of Parking Facilities along Central Business District, Market and School Areas in Cagayan De Oro City

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Abstract: Pervasive demand for parking affect the overall built environment. This study investigates the parking environment of Cagayan de Oro City in the CBD, market and school zone area. The methodology include: parking survey, questionnaire survey and statistical analysis. Parking in the CBD and Market would mean parking access will be limited as compared to the school zone area. People’s activities/commerce usually peak in the early morning except in the market area where parking congestion start in the late afternoon consequently increasing “parking difficulty”. Parkers’ are willing-to-pay less than Php10.00 (for 12-hour) and willing-to-walk at least five minutes for pay-parking facility. Parkers’ highly recommend special parking allocation for the elderly, person-with-disability, and pregnant women. Finally, this study highly recommend that the City should set on-street parking restriction; create public parking awareness while promoting pay-parking garages; and advance the formulation and implementation of parking policies that will balance the need of the community.

Keywords: Parking Supply, Parking Demand, Parking Occupancy, Parking Adequacy, Contingency Valuation, Parking Perception

1. INTRODUCTION

Parking provision is a requirement in any urban landscape not only an appendage to a building requirement (Manville and Shoup, 2005). As population increases, mobility and motorization increases; thus, as growing cities’ urban landscape change overtime, pervasive demand for parking necessitates a balance of parking supply. Else, inevitable parking issues will affect the overall urban built environment.

Cagayan de Oro is a booming regional center of Northern Mindanao. Comprised of 80 barangays, it has a total land area of 488.86 km² that represents 13.9% of the Misamis Oriental Province. The geographic location of the city strategically permits greater mobility and

accessibility of goods, services and people that are central to its economy. As of 2013, the total volume of registered vehicles in the Land transportation Office (LTO) reached 246,880. The City's population also increased with a density of 945 people per km² (NSO, 2010). This urban sprawl extensively increased the establishments of residential subdivisions, schools and markets. Moreover, this prompted emerging business establishments to be well dispersed in the downtown and uptown residential areas and the City markets.

One undesirable reality that goes with rapid urban development for a small city like Cagayan de Oro is the increasing off- and on-street parking congestion. The combined on- and off-street parking congestion are primarily attributed to the increased demand for parking space that outbalanced the actual parking supply. The observed issues related to parking include: very limited off-street public parking spaces; very few provisions of public and private pay-parking garage; congestion of parking along narrow streets during peak and off-peak hours; improper on-street parking (e.g., curbs and road corners); mixed-parking utilization between vehicles, carts, and vendors along market streets; increasing parking hazard and safety issues: theft, vandals, and other crimes; parking violations and monopoly; misuse of the "hazard" parking rule (i.e. idling of vehicle on streets). Moreover, weak parking policy and lack of apprehension of parking violators also exacerbate the issue. This study assumes that the problem on parking is significant. Therefore, parking evaluation and management should be initiated.

This research will investigate the parking condition and environment of Cagayan de Oro City. More specifically, the baseline condition of parking in the central business district, market and school zone area; the trip and parking profile of the parkers in each area; and the parker's preference and views on pay-parking facility.

2. RELATED LITERATURES AND STUDIES

Increasing urbanization alongside the demand for mobility and motorization result to traffic congestion (Dayal Sharma, Jain, and Singh, 2011; Ali and Gazder, 2010). Specifically, traffic congestion is rooted in the local's trip generation characteristic of land uses which include trip making behavior as well as the modal choice of individual travelers (Regidor, 2004).

Parking demand is affected by vehicle ownership, trip rates (travel frequency and duration), mode split (use of a car, bus etc.), duration (parking time), geographic location (downtown, markets etc.), and quality of travel alternatives, type of trip (work, shopping, recreational etc.), and factors such as fuel and road pricing. Therefore, most parking studies begin with parking inventories of the available parking supply and the demand of the motorist for parking space. Parking Inventory of existing parking facilities includes: the location, condition, type, and number of parking spaces; parking rates if appropriate (these are often related to trip generation or other land use consideration); time limits, hours of availability and any other restrictions; layout of spaces: geometry and other features such as crosswalks and city services and the ownership of the off-street facilities (Kolhar, 2012; Felsburg Holt and Ullevig, 2010).

The purpose of a parking utilization study (Rowe, McCourt, Morse, and Haas, 2013; Islam and Chawdhury, 2014) is used to derive a comprehensive and detailed understanding of actual use dynamics and access characteristics associated with parking of an area. Important elements

include: development of a data template for all parking in the study area, denoting all parking bays, by time of stay type, for on and off-street facilities; a complete survey of parking use over two “typical days” (e.g. Thursday and Saturday); and the analysis of parking utilization and turnover. Also, in determining the total amount of parking to be provided, planners weigh the relative merits of convenience versus cost. Some of the factors to be considered are: the desire among users to have dedicated, convenient parking with direct access to facilities, the need to ensure the safety of all site users, the need to protect open space and the environment, community impacts, the availability of resources to build and operate parking facilities.

Analyzing preferences of the people are helpful for policy formulation. These preferences represent people’s true interest for a given service (Buckley, 2003; Kyle, Absher, and Graefe, 2003). The contingent valuation method is a tool for economic welfare analysis and policy formulation and has been a popularly used approach in measuring preferences or Willingness to Pay (WTP). Although, the process of acquiring a potential user’s WTP has often been a challenge for policy makers (Anastasiadou, 2009). WTP techniques are devised to elicit peoples’ monetary valuations of costs and benefits for goods or services. In the study of Moura et al. (2009), they carried out WTA on identifying WTP on underground car park by the following methods: (1) define the supply of parking spaces needed to satisfy the demand of users of the leisure area, accounting for spaces that would be eliminated on the surface by pedestrian-only area; (2) consider three choice possibilities for the user: street parking (SP), paid street parking and future underground car park (UP); and (3) determine WTP per hour of parking in the UP to reduce access time to the final destination from the car park.

The economic efficiency of an area is dependent on the road accessibility and the availability of parking (Roess et. al., 1998; Takyi, Kofi, and Anin Kwabena, 2013). Part of this is due to the fact that motorists do tend to travel at slower speeds when having difficulty in finding a parking space and thus contribute to traffic congestion due to delayed travel time (Shoup, 2007; Osoba, 2012). Another factor that worsens the degree of traffic congestion is attributed to unlawful parking practices which decrease the overall road capacity; and to motorists occupying more than the designated parking space provided which in turn makes other motorist perceive that the allotted parking space is fully occupied (Añana et. al. 2015). Such circumstances would then call for a parking study to provide the appropriate solution. However, a parking study requires starting with assessing the need or the demand for parking facilities (Litman, 2007). Moreover, if parking problems (TDM, 2011) is an issue this would usually mean that motorist considers parking as inexistent, inadequate, inconvenient or expensive. The study of Alfaro et al (2015) stressed that in the perspective of parking problems related to inadequate supply and expensive parking rates, a supply-oriented parking evaluation is necessary; supply more parking space and increase in the minimum parking standards or regulate on-street parking. If the issue is inadequate parking user information and misuse of parking space, an information-oriented parking approach is needed where parking information thru various media would help direct parkers’ to the location, the availability, and price of a parking facility. If the issue is excessive automobile usage of the community (e.g. urban motorization), a demand-oriented parking study is necessary which entails improved public transport vehicles and facilities, encouraged use of mass transit, and reduced use of private vehicles. And if the problem on parking is more on inadequate parking causing problems in other locations (parking violations etc.), a spillover impact evaluation is needed where management strategies are created to address spillover problems and improve enforcement of parking regulations.

3. METHODOLOGY

The selected site of the study is along the Central Business District (CBD) of Divisoria Plaza, the main market area in Cogon Market and the school zone area along Corrales Street. Evaluation of on-street parking supply and demand were collected as primary data. Secondary data were also collected from the Department of Public works and Highway (road records), Regional Traffic Authority (traffic records) and City Planning Development Office (parking policy records) to provide a profile of the study areas. Similarly, to elicit information related to parking contingency valuation, a parking survey questionnaire was crafted and sampling was employed in order to obtain the target parking respondents in the three selected areas of the City.

The data collection of the study employed two survey methods, namely: parking survey and parking questionnaire survey. The engineering aspect of this study include the evaluation of the following parking surveys, namely: parking space inventory (by block and by area), hourly parking occupancy (30-minute monitoring during daytime, a total of 9-hour survey), and parking supply and demand in the CBD, market and school zone area. Descriptive analysis was also incorporated based on parking survey profile and parkers' parking preference. A survey questionnaire was also employed to generate information on respondents' profile, the mode of transport and parking profile, the contingency valuation (i.e. willingness to pay and willing to walk) and respondents parking preference and perception.

The data analysis included the evaluation of the following parameters, namely: parking occupancy, supply, demand and adequacy. In this case statistical analysis was employed to compare parking results in each surveyed area. On the other hand, when using the questionnaire data, descriptive analysis was employed in order to assess the following items, namely: location of parking, time spent searching for parking space, rate of difficulty in searching for parking space, assessment of parking availability, perception on parking situation and policy, willingness-to-pay for pay-parking garage, time spent walking to parking space, willingness-to-walk, and overall parking recommendation of parkers.

4. RESULTS AND DISCUSSION

4.1 parking profile of the three study areas

The study conducted two days (i.e. Monday and Wednesday) of parking survey and data collection in the CBD, market and school areas. Since Cagayan de Oro City is defined by street blocks, the on-street parking survey considered the surrounding perimeter of the block. As per parking supply inventory, the on-street parking in the CBD area and school zone area consists of 12 and 8 parking blocks respectively. Whereas, the market area is considered only as one parking block. For parking supply and demand (Appendix Table 15), the CBD and school zone area survey were based on the dedicated on-street parking (i.e. white-painted) boxes in each block. However, in the market area, since there are no dedicated parking space, the survey only considered parking demand (of each surrounding blocks). In terms of parking usage, parking by vehicle classification was initiated to understand the prevailing profile of parking (Figure 1 to Figure 6) by area during a typical Monday (Day 1) and Wednesday (Day 2) setting. Results revealed that parking in the CBD area for Monday and Wednesday (Figure 1 and Figure 2) is dominated by motorcycle (43%), cars (22%) and Sports

Utility Vehicle (21%), respectively. In school zone area (Figure 3 and Figure 4), the vehicle types varies vary according to Monday and Wednesday parking i.e. private motorcycles (31%) and motorela (38%), car (27%) and Jeepneys (23%), and SUVs (19%) and service van (17%), respectively. In the market area, (Appendix, Figure 5 and Figure 6), the vehicle types varies according to Monday and Wednesday parking i.e. private motorcycles (36% and 24%), multi-cabs or Asian Utility Vehicle (16% and 11%) and van (10%) and large truck (10%), respectively.

We assume that weekday traffic volume on Mondays as the start of the working day creates influx of traffic and this volume will normalize during the middle of the week which is on Wednesdays. Correspondingly, the parking demand will have the same attribute. Statistical evaluation of the parking hourly occupancy, parking demand and adequacy for these days were investigated using independent sample t-test with unequal variance (at 5% significance level). This part of the analysis attempted to check if occupancy, demand and adequacy of for these days for of each area are not equal.

The results in Table 1 summarized the Monday and Wednesday hourly parking occupancy of each area. The results revealed that the mean hourly parking occupancy of Monday and Wednesday are significant in the CBD and market area which means that the hourly parking occupancy are not equal. This could further imply that hourly parking occupancy varies considerably; possibly related to diverse clients/parkers, different activities available, varied trip attractors and trip purpose in the area. The hourly parking occupancy in the school zone area revealed that the means are equal. This result could mean that regardless of the day and hour, the parkers are deemed regular users of the parking space possibly due to the clientele being regular (e.g. student, school personnel) parkers.

Table 1. Hourly parking occupancy per area

Parking Location	Total Blocks	Parking Statistics				
		Mean Day 1	Mean Day 2	T-value	P-Value	Remarks
CBD Area	12	188.44	176.64	2.0845	0.0447	**
Market Area	12	241.278	209.78	3.7062	0.0009	**
School Zone	8	264.67	249.66	1.8065	0.0799	n.s

Note: ** significant for P-value at 5% level; n.s. - not significant

The results in Table 2 summarized the parking adequacy and demand of each surveyed area. The results revealed that the mean parking demand of Monday and Wednesday are not significant which would imply that regardless of what day, the parking demand remains the same. Likewise, the parking adequacy (in percent) for both days are not significant, implying that there is inadequate parking (negative % value) regardless of day.

Table 2. Parking adequacy and demand per area

Parking Location	Total Blocks	Parking Statistics				
		Mean Day 1	Mean Day 2	T-value	P-Value	Remarks
CBD Area	12	188.44	176.64	2.0845	0.0447	**
Market Area	12	241.278	209.78	3.7062	0.0009	**
School Zone	8	264.67	249.66	1.8065	0.0799	n.s

Note: n.s. - not significant for P-value at 5% level

4.2 Profile of the respondents

The study conducted parking surveys to represent the central business district, the main market and the school zone area of the city. These representations include: Divisoria Plaza (sample size, N=450), Cogon Market (N=450) and Corrales Street (N=193), respectively. The profile in Table 3 represented a total of 1,093 samples from interviewed respondents.

In the CBD area, results revealed that most of the respondents along Divisoria plaza are employee (48%) and client (49%) of the nearby establishments. In terms of gender, most of the respondents were males (86%). The age range in the CBD area showed that 40% are younger than 30 years old, 33% are 30 to 39 years old and the remaining 27% are above 40 years old. The respondents profile also revealed that 58% attained college level (i.e. college students and college graduates). The respondents profile on average monthly income revealed that 67% earn less than Php 10,000; 28% earned between Php 10,000 to Php 20,000 and only 5% have income higher than Php 20,000.

Table 3. Parking survey respondents' profile

Profile	Categories	CBD		Market		School		TOTAL
		(N=450)	%	(N=450)	%	(N=450)	%	(N=1093)
Type of Respondents	Employee	216	48%	43	10%	28	15%	287
	Employer	11	2%	13	2%	112	58%	136
	Client	218	49%	264	59%	53	27%	535
	Supplier	5	1%	130	29%	0	0%	135
Gender	Female	53	12%	19	4%	25	13%	97
	Males	397	88%	431	96%	168	87%	996
Age Range	Younger than 30	179	40%	83	18%	149	77%	411
	30 - 39	147	33%	175	39%	23	12%	345
	40 - 49	97	21%	117	26%	17	9%	231
	above 49	27	6%	75	17%	4	2%	106
Educational Attainment	High School Graduate	124	28%	189	42%	5	3%	318
	College Level	261	58%	91	20%	164	85%	516
	Graduate School	65	14%	170	38%	24	12%	259
Average Monthly Income	Less than Php 10,000	302	67%	384	85%	101	52%	787
	Php 10,000 - Php 20,000	128	28%	52	12%	37	19%	217
	more than Php 20,000	20	5%	14	3%	55	29%	89

Note: Php10,000 (\$ 200.34)

In the market area, particularly along the four-corner streets of Cogon Market, results showed that most of respondents interviewed are clients (59%) and suppliers (29%) of the market establishments. Similarly, for the result in the CBD area, most of the respondents were males (96%). The age profile showed that most of the respondents are 30 to 39 years old (39%) and 40 to 49 years old (26%). In terms of educational attainment and average monthly income, most respondents are high school graduates (42%) and most of them have income less than Php 10,000 (85%).

In the school zone area, mainly along the length of Corrales street, most of the respondents are employers (58%) and clients (27%) of the different business establishments. By gender, most

of the respondents were males (87%). The age range showed that 77% are younger than 30 years old, 12% are along the range of 30 to 39 years old and the remaining 11% are above 40 years old. The respondents profile also revealed that 85% attained college level (i.e. college students and college graduates). Moreover, their average monthly income revealed that 52% earn less than Php10, 000; 29% have income higher than Php20, 000 and only 19% earned between Php10, 000 to Php20, 000.

It is observed that the type and age of the respondents are associated with the predominant human and economic activities in the area. For instance, social activities and gatherings are common near Divisoria and Corrales Street thus restaurants, shops, hotels, banks, and convenience stores are common sights. In contrast, retail business establishments' are predominant in Cogon market selling various products (i.e. dry and wet goods). These establishments are owned and/or operated by private individuals, various cooperatives and the city government. Moreover, since this market utilizes the public space of the community; the existence of street vendors and small stores are also predominant. On the other side, upon soliciting parking queries most respondents are generally drivers. Thus, more feedback from male driver respondents were solicited since there are fewer female drivers in the area.

4.3 Trip and Parking Profile of the Respondents

4.3.1 Frequently used transport mode

The four (4) most frequently used vehicle for transportation to and from work in descending order, include: personal/private motorbike (37%), Public Utility Jeepney or Jeepney (22%), personal/private car (18%); and local tricycle or motorela (11%). These results (Table 4) do not reflect the same order of arrangement in each area. Results also revealed that most respondents travel to the Divisoria plaza (CBD area) using their motorcycle, to Cogon market using the public utility jeepney and to Corrales street (school zone area) using their personal car. As observed, motorized public transport such as motorelas (for hire motorcycles with 6 to 8 passenger capacity) and jeepneys are highly patronized by the general public. The motorela is the cheapest mode of transport for short distance trips in the CBD and School zone area due to its route flexibility and availability. Moreover, its regular fare is regulated at Php6.00 (\$0.12) while special fare of Php5.00 (\$0.10) is also given to senior citizens, person with disabilities (PWD) and students. For long distance trips, outside the CBD and school zone area, the public utility jeepney is the cheapest mode of transport where the minimum regular fare is Php7.00 (\$0.14) for every first four kilometers distance and an additional Php1.50 (\$0.03) for the succeeding kilometers. Again, lower fare was also given to senior citizens, person with disabilities and students. Competitively, private transport like private motorcycles (not for hire) and private cars (i.e. regular car, SUVs, AUVs, pickups and small vans) are patronized by the middle class and upper class. Private vehicle ownership is based on personal choice of mobility and affordability; moreover, the latter is influenced by the family's take home income.

Based on observation, most of the respondents whose vehicles fall under personal car, pooled car (i.e. shared car), personal motorcycle, pooled motorcycle (i.e. shared motorcycle) and bicycle are considered parking lot users. In contrast, moving vehicles such as jeepney, motorela, taxi, and truck (i.e. service /delivery vehicle) only park to unload/unload goods and commuters along dedicated loading and unloading areas (i.e. yellow-marked parking box areas) but only for very short allowable period. The Traffic Code of Cagayan de Oro City under City Ordinance No. 10551-

2007, already established that on-street parkers should only use the dedicated parking with white-marked parking box areas. Violation of this provision are penalized and charged with Php1, 500.00 (\$ 30.11) for violating plus additional unlocking fee of Php500 (\$10.04) for the wheel clamp. As observed, the school zone area along Corrales street, has several yellow-marked boxes for public on-street parking space aside from the schools having its own parking space.

Table 4. Frequently used vehicle for transportation to/from work

Vehicle Type	CBD		Market		School		Total	
	(N=450)	%	(N=450)	%	(N=193)	%	(N=1093)	%
On foot (Walk)	0	0	2	0	2	1	4	0
Bicycle	0	0	2	0	1	1	3	0
Motorela	2	0	118	26	4	2	124	11
Personal Motorcycle	306	68	66	15	28	15	400	37
Pooled Motorcycle	14	3	18	4	11	6	43	4
Personal Car	65	14	23	5	110	57	198	18
Pooled Car	19	4	15	3	7	4	41	4
Jeepney	36	8	188	42	16	8	240	22
Taxi	4	1	16	4	4	2	24	2
Truck	4	1	2	0	10	5	16	2

4.3.2 Typical parking locations

The results in Table 5 established the typical or usual parking locations chosen by the respondents in the three (3) study area. Results revealed that parking along CBD (97%) and Market (91%) area is usually located two blocks from the establishment or destination of the parker while in the school zone area (46%) will be along the street of the destination or establishment. Overall, parkers' response (N= 615) yield that 79% of the parkers would park at least two blocks from the establishment or destination. And, based on survey observation, parking of smaller sized vehicles (i.e. bicycle, motorcycle and smaller car) are predominant along the street of the establishments or destination.

Table 5. Location of the parking lot

Location of parking lot	CBD %	Market %	School %	Total	
	(N=375)	(N=93)	(N=147)	(N=615)	%
Lot of establishment	0	0	6	9	2
Lot along the street of the establishment	1	1	46	73	12
Lot located two blocks from the establishment	97	91	28	488	79
Lot located more than two blocks from the establishment	2	8	19	43	7
Lot on a private Pay-Parking-Space	0	0	1	2	0

Note: Parking only on weekdays, Mondays to Fridays

4.3.3 Time spent searching for parking space

The time consumed in searching for vacant parking space translate to engine fuel cost and opportunity lost. The respondents' time spent in searching for a vacant parking slot or space is summarized in Table 6, Table 7 and Table 8. These results revealed that the time spent scouting for parking space increases as the day progresses. Except for Cogon market, parking space users in Divisoria plaza and Corrales street are at the highest between 9AM to 12NN. These correspond

to customary trading hours of the establishments, offices and school classes in the morning. Parking space users appear to expend extend beyond 10minutes searching for vacant parking space after midday. In the afternoon, parking spaces are already filled up since business hours commence earlier in the day and clienteles usually complete business transactions before the day ends. Overall, the scenario is an indicator of parking shortage possibly due to unmitigated parking monopoly (i.e. parking space are not regulated with parking meters) throughout the day and possibly a consequence of the increasing motorization.

Table 6. Time spent scouting for parking space in the CBD area

Minutes Spent Looking for Parking Space	Time of the Day (Monday to Friday)					
	6AM-8AM % n=46	8AM-9AM % n=156	9AM-12NN % n=128	12NN-3PM % n=14	3PM-6PM % n=25	After 6PM % n=7
Less than 5 mins.	95.7	75.6	36.7	7.1	16.0	
5 mins. to 10 mins	4.3	24.4	61.7	85.8	64.0	
10 mins. to 20 mins.			1.6	7.1	20	100.0

Table 7. Time spent scouting for parking space in the market area

Minutes Spent Looking for Parking Space	Time of the Day (Monday to Friday)					
	6AM-8AM % n=29	8AM-9AM % n=21	9AM-12NN % n=30	12NN-3PM % n=4	3PM-6PM % n=9	After 6PM % n=1
Less than 5 mins.	72.4	52.3	36.7		22.2	
5 mins. to 10 mins	20.7	42.9	53.3	50.0	44.5	
10 mins. to 20 mins.	6.9		10.0	50.0	33.3	
More than 20 mins.		4.8				100.0

Table 8. Time spent scouting for parking space in the school area

Minutes Spent Looking for Parking Space	Time of the Day (Monday to Friday)					
	6AM-8AM % n=49	8AM-9AM % n=77	9AM-12NN % n=22	12NN-3PM % n=10	3PM-6PM % n=8	After 6PM % n=14
Less than 5 mins.	56.0	20.8	4.5	30.0	37.5	28.6
5 mins. to 10 mins	16.0	48.0	77.3	20.0	12.5	42.8
10 mins. to 20 mins.	18.0	24.7	9.1	30.0	37.5	28.6
More than 20 mins.	10.0	6.5	9.1	20.0	12.5	

4.3.4 Parking difficulty rating

Parking space users of the study were requested to assess the level of difficulty in searching for available parking space. The assessment is rated at a scale of 1 to 5, wherein the progression of the number indicates the increasing level or rate of difficulty of finding parking space. More specifically, 1- not difficult, 2- rarely difficult, 3- sometimes difficult, 4- frequently difficult, and 5- constantly difficult. As listed in Table 9, approximately 69.3% of the parking users in Divisoria Plaza and 45.2% of the parking users in Cogon Market rated their speed in searching for a vacant parking space in their respective area is at “2”, while about 33.8% of the parking users in the school zone area rated their speed in looking for vacant parking space in the areas is at “3”. In totality, 51.2% of the respondents rated “2” meaning “rarely difficult” as speed rate in looking for vacant parking space.

Table 9. Rate of difficulty in finding a parking space

Difficulty Rating	CBD		Market		School		Total	
	N=375	%	N=93	%	N=147	%	N=615	%
1	7	2	4	4	10	7	21	3.4
2	260	69	42	45	13	9	315	51.2
3	101	27	37	40	50	34	188	30.6
4	7	2	9	10	49	33	65	10.6
5	0	0	1	1	25	17	26	4.2

4.3.5 Parking space assessment and contingency valuation for paid parking space

The next succeeding section discuss the respondent's or parker's observation on parking space availability, situation and rules, parker's willingness to pay and willingness to walk if there are existing and proposed pay-parking garages. Most of the elicited assessment were gauge with respect to respondents who are regular parkers in the CBD and school area.

Observation on parking space availability of the respondents are shown in Table 10. Result indicates that the respondents in CBD area witnessed enough parking space (82.9%) as well as enough parking space for employees. In contrast, shortage of parking space are revealed in both market area and school zone area. The non-uniformity of their responses reflects the observed parking space situation in each respective area. In the CBD area, parking space is evidently painted yellow-marked box on designated areas in Divisoria plaza while in the school zone area parking space are only few and the limited number of yellow-marked parking is designed only for motorcycles and motorbikes. However, in Cogon market the parking space not indicated in any of the parking perimeter of the market block nor are there any yellow-marked boxes for parking.

Table 10. Observation on availability of parking space by area*

Observe adequacy of parking areas	CBD (%)		Market (%)		School (%)	
	Space User (N=375)	Non User (N=75)	Space User (N=93)	Non User (N=357)	Space User (N=147)	Non User (N=46)
There is enough parking space in the areas.	82.9	81.3	29.0	47.6	10.2	13.0
There is enough parking space for employees in areas.	84.8	85.3	33.3	58.3	23.8	34.8

Note: *Percentage of those respondents who affirmed on the following observations.

The respondents also evaluated the parking situation and the implementation of a specific parking policy in the City. This evaluation is rated at a scale of 1 to 5, wherein the progression of the number indicates disagreement on a particular parking situation and/or parking rule. More specifically, 1- not disagree, 2- rarely disagree, 3- sometimes disagree, 4- frequently disagree, and 5- constantly disagree. The results are then summarized as mean score of the respondent's rate presented in Table 11. Respondents in CBD area observed that parking rules are rigidly and fairly enforced in the Divisoria plaza. However, the response in the school zone area particularly, along Corrales street agreed less on this observation. Conversely, all respondents have unanimous observation on the parking situation of the City.

Currently, pay-parking garage or space is not yet viewed as a revenue generating business opportunity in the City. A consequence of a weak or non-existent policy on on-street parking. For

one, on-street parking restriction is not implemented in most areas in the City which gives parking space users the opportunity to lodge their vehicle to any vacant space. Nonetheless, there are few parking entrepreneurs who now caters to this untapped market. The parking fee is usually cheap ranging from Php10.00 (\$0.20) to Php12.00 (\$0.24) for a 12-hour parking. This are often off-street, unpaved and open pay-parking garage with security personnel. The only drawback of these garages is its non-strategic location from the City centers or main hubs. In the CBD and market areas, business establishments, shops and offices do provide off-street parking garage for its clientele and employers, but these parking slots are limited only for transient or short duration parking. In school zone areas, in-campus parking are also available however the parking access are usually charged (e.g. Php300.00 which is about \$6.02 for one year) and the slots are very limited to school personnel and selected students.

The respondents were probed if they are willing to pay for parking charges. The respondent's willingness-to-pay for pay-parking garages or space are summarized in Table 12. Results revealed that most parkers in the CBD (99.1%) and the market (83.9%) area are willing to pay less than Php10.00 (\$ 0.20) for pay-parking space. In the school zone area 39% are willing to pay Php10.00, 49% will pay between Php10.00 to Php20.00 and only 12% are willing to pay higher than Php20.00 parking fee. Based on interview, respondents are willing to pay more than Php10.00 provided that there are amenities and special services inside the pay-parking facility (e.g security personnel, illumination, access aisle and paved area)

Table 11. Assessment on the parking situation and parking rules by areas*

Specific Parking Situation/Rules	CBD (Mean)		Market (Mean)		School (Mean)	
	Space User (n=375)	Non User (n=75)	Space User (n=93)	Non User (n=357)	Space User (n=147)	Non User (n=46)
Satisfied with the current parking situation	2.4	2.4	2.4	2.5	3.6	3.6
Spent too much time searching for parking	2.6	2.7	2.6	2.9	2.6	2.7
Parking rules are rigidly enforced	1.9	1.9	2.3	3.0	2.1	2.3
Parking rules are enforced fairly	1.9	1.9	2.1	2.3	2.6	2.8

Note: Results are the average level that respondent agree on the parking situation/rule based on each area

Table 12. Willingness-to-pay for pay-parking garages

Pay-Parking Cost	CBD % (N= 106)	Market % (N= 31)	School % (N= 117)
Less than Php10.00	99.1	83.9	38.5
Php10.00 but less than Php20.00	0.9	12.9	49.6
Php20.00 but less than Php30.00		3.2	6.0
Php30.00 but less than Php40.00			4.3
Php40.00 but less than Php50.00			1.7

Note: Php10.00 (\$ 0.20)

The study assume that the distance of the private parking garage to and from the parker's destination maybe a disadvantage to pay-parking garages. Moreover, time spent on walking may also be an issue. Thus, the respondents were also probed if they are willing to walk. Results in Table 13 revealed that about 72% in the CBD area, 33% in the market area and about 80% in the school zone area are willing to walk towards pay-parking garages. Furthermore, these observations also revealed that current conditions already made parkers spend five (5) minutes walking from parking space to destination i.e. CBD at 85%, market 63% and school zone at 56%. However, with

pay-parking garage, respondent's expectation to walk reduced (i.e. CBD at 54%, market at 61% and school zone at 56%); walking shall be less than the customary. However, these parkers will tolerate walking but at a maximum of 10 minutes.

Table 13. Time spent walking to pay-parking space by area

Minutes Spent Walking	CBD N=375 (71.7%)*		Market Zone N=93 (33.3%)*		School Zone N=147 (79.6%)*	
	%	%	%	%	%	%
	walking from parking area to establishment	willingness - to-walk to Parking	walking from parking area to establishment	willingness- to-walk to Parking	walking from parking area to establishment	willingness - to-walk to Parking
Less than 1.0min		45.9	1.1	24.7	7.5	28.4
1.0 min. to 5.0mins.	85.1	53.6	63.4	61.3	62.6	56.1
5.0mins. to 10.0 mins.	14.5	0.5	24.7	14.0	19.7	14.9
More than 10 minutes			10.8		10.2	

*Percentage of respondents who are willing to walk

4.4 Parking recommendation of parkers

Parking perceptions of the respondents were also solicited and summarized in Table 14. This revealed that respondents agreed for a designated parking space in front of the establishments for senior citizens, pregnant women and women with small children, more parking spaces for persons with disability, installation of on-street pay-parking meters, and designated parking space for employees and clients. Also, unanimously disagree on paid parking lot for employees and clients.

On the other hand, respondents suggested that to alleviate shortage of parking in the downtown business district, designated parking lot for employees shall be constructed in nearby private and/or municipal parking lot while parking lot for clients shall be built near/in front of their destination and/or establishment.

Table 14. Recommendations for parking according to respondents and specific conditions

Specific Situations	Divisoria (%)		Market (%)		School (%)	
	Space User (N=375)	Non User (N=75)	Space User (N=93)	Non User (N=357)	Space User (N=147)	Non User (N=46)
(1) There should be designated parking space for senior citizens in front of the establishments.	100.0	100.0	100.0	98.0	83.7	84.8
(2) There should be designated parking for expected mothers and mothers with small children in front of the establishment.	100.0	100.0	100.0	99.2	75.5	69.6
(3) There should be more parking space for persons with disability.	100.0	100.0	98.9	99.4	83.0	82.6
(4) There should be pay-parking meters downtown.	100.0	100.0	100.0	99.2	72.1	63.0
(5) There should be designated employee parking.	100.0	100.0	100.0	99.2	94.6	82.6
(6) There should be designated client parking.	100.0	100.0	100.0	99.7	68.0	58.7
(7) There should be fee for designated parking for employees.	1.1	5.3	8.6	13.4		
(8) Employees should pay for their own designated parking.	2.1	4.0	8.6	7.0		
(9) There should be fee for designated parking for clients.	27.2	25.3	15.1	45.9		

5. CONCLUSION AND RECOMMENDATION

In conclusion, parker's parking utilization and perception in the CBD, market and school area varies according to its environment. Peoples movement and mode of transportation revealed that private motorcycles are predominantly used in Divisoria plaza (CBD area), Public Utility Jeepneys in Cogon market and private cars in Corrales Street (school zone area). Parking access and requirement also vary. Drivers' parking in the CBD and Market would mean parking access will be at least two blocks away from the destination whereas in the school zone area the parking access will be located just adjacent to the destination. Parking demand usually peak in the early morning except in the late afternoon when activities in the market area create parking congestion. The difficulty of finding parking space would require about 10minutes (maximum) of scouting for space yet difficulty increases as more time will be needed during peak parking congestion state. Consequently, in terms of pay-parking preference, parkers are willing to pay less than Php10.00 (for 12-hour parking) and willing to walk at least five minutes for pay-parking facility. Parkers' pay-parking preference and willingness (to pay- and to walk-) would depend on the location, amenities and special services inside the pay-parking facility. Moreover, in terms of parking accessibility and preference, parkers' recommend that there should be allocation for special parking for the elderly, person with disability, and pregnant women. Finally, this study highly recommend that the City should set on-street parking restriction as the demand for motorization increases; create public parking awareness while promoting off-street parking supply through pay-parking garages; and advance the formulation and implementation of parking polices that will balance the need of the community.

APPENDICES

Table 15. Parking Supply and Demand

Parking Block	Parking Supply	Demand Per Day		Parking Block	Demand Per Day		Parking Block	Parking Supply	Demand Per Day	
		Day 1	Day 2		Day 1	Day 2			Day 1	Day 2
Central Business District (space-hour)				Market Area (space-hour)			School Zone Area (space-hour)			
5	105	136	138	1	317	351	13	269	407	362
6	86	113	94	2	276	284	14	194	197	208
9	113	100	103	3	447	406	15	220	185	195
10	120	136	139	4	207	126	25	157	193	184
16	208	261	257	5	547	397	26	290	272	188
17	139	168	155	6	217	133	35	569	491	387
18	70	88	92	7	431	532	36	224	295	614
19	72	132	116	8	500	539	37	290	446	376
20	104	73	94	9	346	262				
21	135	128	135	10	275	99				
22	89	102	92	11	604	317				
23	155	171	175	12	406	333				

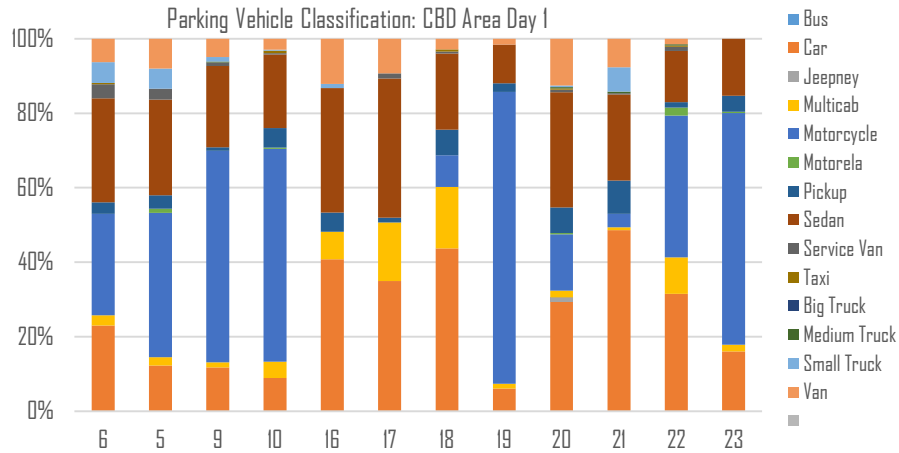


Figure 1 Parking classification in CBD area (Day 1)

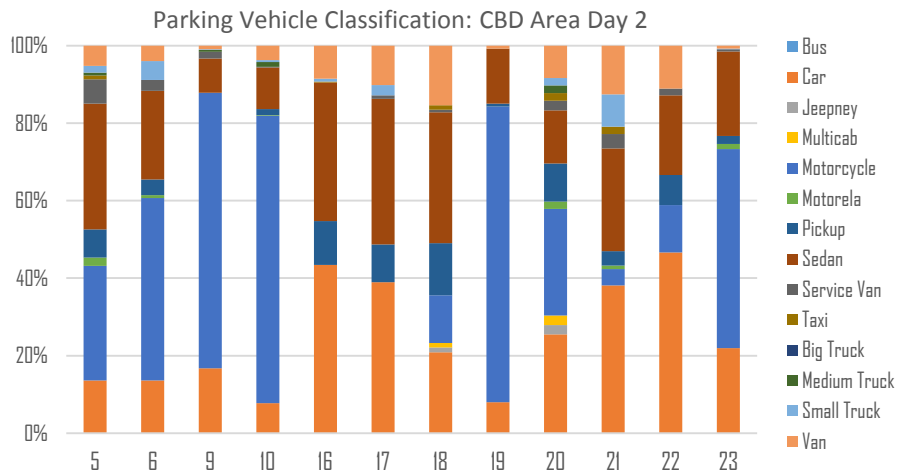


Figure 2 Parking classification in CBD area (Day 2)

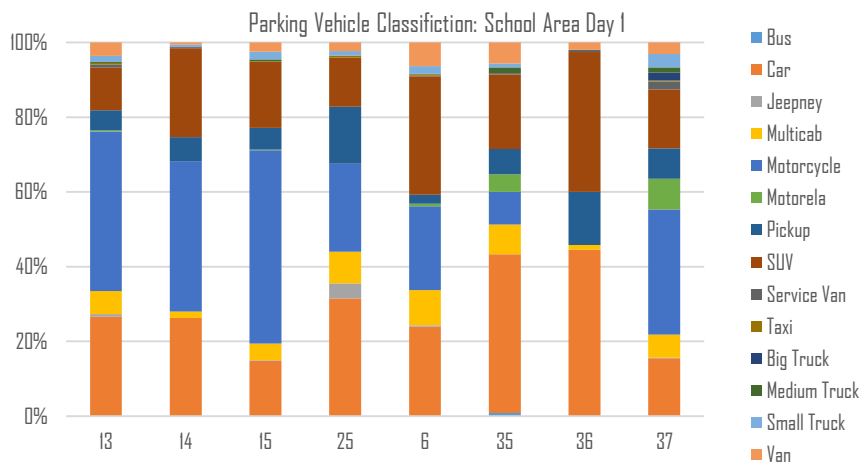


Figure 3 Parking classification in school area (Day 1)

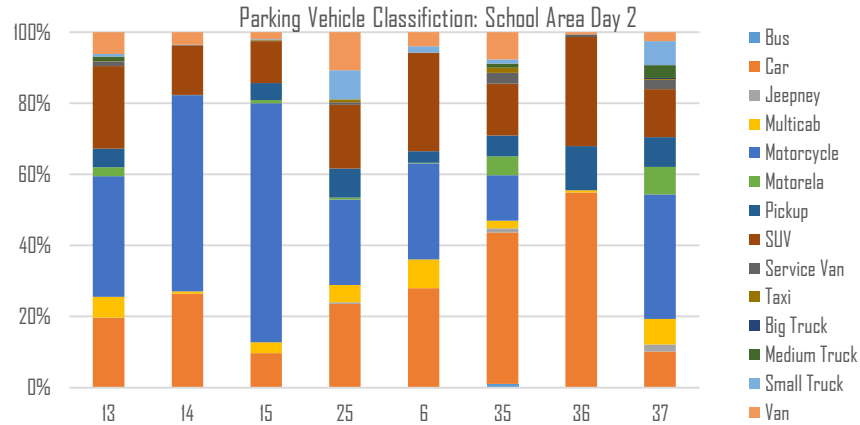


Figure 4 Parking classification in school area (Day 2)

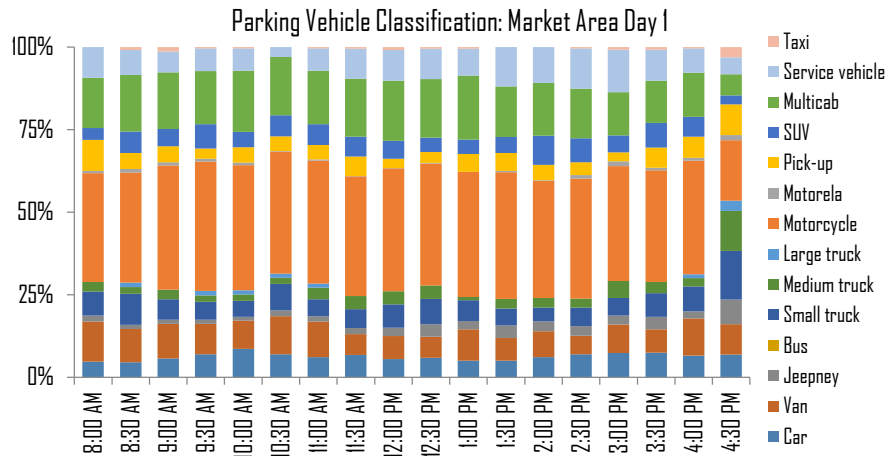


Figure 5 Parking classification in market area (Day 1)

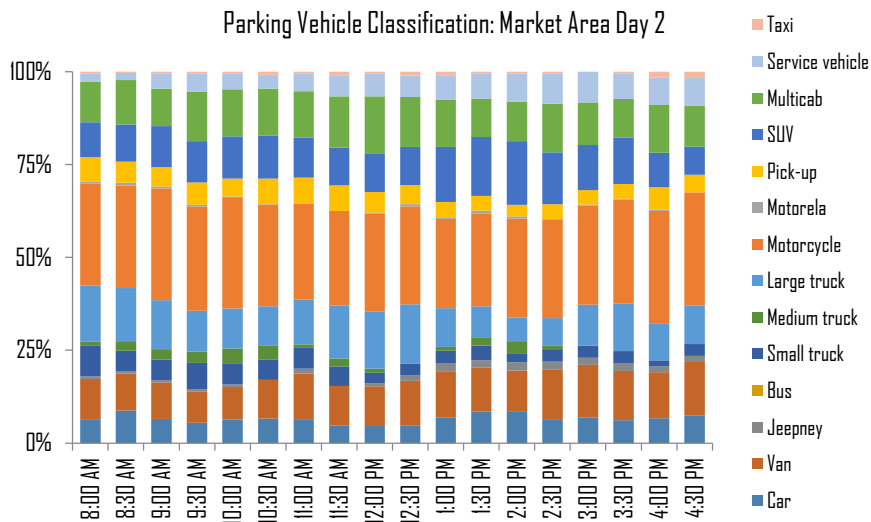


Figure 6 Parking classification in market area (Day 2)

REFERENCES

- Alfaro, D. J., Camomot, F. V., Escalante, A. C., Bair, H., Abuzo, A., (2015). On-street Parking Evaluation Divisoria, Cagayan de Oro City. *Journal of the Eastern Asia Society for Transportation Studies*. Vol. 11, pp. 1710-1725.
- Ali, M., and Gazder, U., (2010). Urban Transportation Policy Framework for Karachi. Proceedings of Third International Symposium on Infrastructure Engineering in Developing Countries and First International Conference on Sustainable Transportation and Traffic Management Larachi, Pakistan. 1 – 3 July, 2010.
- Añana, J. A., Calma, K., Flores, C., Tantoy, D., Abuzo, A., and Vallente, J. Jr., (2015). A Traffic Congestion Study of Unsignalized Intersections along Yacapin-Capt. Vicente Roa, Yacapin-Osmeña, J.R. Borja-Capt. Vicente Roa and J.R. Borja-Osmeña Streets in Cagayan de Oro City. *Journal of the Eastern Asia Society for Transportation Studies*. Vol. 11, pp. 1899 – 1918.
- Dayal Sharma, R., Jain S., and Singh, K. (2011). Growth rate of Motor Vehicles in India – Impact of Demographic and Economic Development. *Journal of Economic and Social Studies*. Vol. 1, pp.137-153.
- Department of City Planning, 2011, Manhattan Core: Public Parking Survey, NYC Transportation Division, Accessed: November 12, 2012
- Felsburg and Ullevig, 2010, Highlands Neighborhood Study Area Parking Analysis. Denver: City and County of Denver.
- Kolhar, P., 2012, Off-street Parking Management Plan for Dharwad City, Karnataka, India. *Journal of Engineering Research Studies*, 5.
- Land Transportation Office, 2013, Annual Statistical Data. <http://www.lto.gov.ph/component/jdownloads/send/7-statistical-reports/191-annual-report-2013>
- Litman, T., 2007, Parking Management: Strategies, Evaluation and Planning, Victoria Transport Policy Institute, Transportation Research Board, 07-1581, Accessed: Nov. 12, 2012, www.trb.org and www.vtpi.org/park_man.pdf
- Litman, T., 2010, Camosun College: Transportation and Parking Management Plan, Victoria Transport Policy Institute, Accessed: Nov. 12, 2012, www.Camosun.ca/transportation
- Litman, T., 2011, Planning Principles and Practices, Victoria Transport Policy Institute, Accessed: Nov. 12, 2012
- Manville, M. and Shoup, D., 2005, Parking, People and Cities, *Journal of Urban Planning and Development* pp 233-245 accessed date Jan 10, 2017
[http://ascelibrary.org/doi/abs/10.1061/\(ASCE\)0733-9488\(2005\)131%3A4\(233\)](http://ascelibrary.org/doi/abs/10.1061/(ASCE)0733-9488(2005)131%3A4(233))
- Parking Inventory. Accessed: Nov. 12, 2012 http://www.downtownspokane.org/uploads/documents/parking/appendix%20a%20%20parking%20inventory%20_new%20graphs_%2012-2-04.pdf
- Parking Study, Joint Use Site Planning and Facility Design Committee Accessed: Nov. 12, 2012 www.ecsd.net/jua/pdf/parking_report.pdf
- Philippine Statistics Office. 2015. First Semester Per Capita Thresholds and Incidences: 2013 and 2014. Available at <<http://www.nscb.gov.ph/poverty/dataCharts.asp>>
- Pioneer Valley Planning Commission (PVCP), 2009, Chicopee Center Parking Study, Accessed: Nov. 12, 2012
- Regidor, J. R. F., (2004), Public participation in Traffic Impact Assessment Process. Proceedings of the Symposium of the Joint Seminar on Sustainable Urban Transport System. Japan

- Society of Civil Engineers, Philippine Institute of Civil Engineers and the U.P. National Center for transportation Studies, Philippines, 65-69, November 2004.
- Reimer, B., Mehler, B., and Coughlin, J., 2010, An Evaluation of Driver Reactions to New Vehicle Parking Assist Technologies Developed to Reduce Driver Stress, Massachusetts Institute of Technology AgeLab (MIT-AGELAB), Accessed: Nov. 12, 2012, www.agelab.mit.edu
- Roess, R., 1998, Traffic Engineering (4th Ed.). Pearson Higher Education Inc.
- Seattle Department of Transportation (SDOT), 2011, Citywide Paid Parking Study, Technical Report, Accessed: Nov. 12, 2012,
- Shoup, 2007, Cruising for Parking. Accessed: January 26, 2015, <http://shoup.bol.ucla.edu/CruisingFroParkingAccess.pdf>
- Sport England, 1999, Car Park and Landscape Design. Sport England Publications, Belmont Press, London, U.K., ISBN 1-86078-101-2
- Thanet District Council, Thanet Local Development Framework: Clifton Parking Survey Report, Accessed: Nov. 12, 2012,
- The Clean Air Partnership, 2009, Bike Lanes, On-Street Parking and Business: A Study of Bloor Street in Toronto's Annex Neighborhood, Accessed: Nov. 12, 2012
www.cleanairpartnership.org
- Takyi, H., Kofi, P. Anin Kwabena, E., (2013). An Assessment of Traffic Congestion and Its Effect on Productivity in Urban Ghana. *International Journal of Business and Social Science*. Vol. 4, pp.225-234
- Trakolis, D., 2001, Perceptions, Preferences, and Reactions of Local Inhabitants in Vikos-Aoos National Park, rtation Direece, *Journal of Environmental Management*. Vol. 25, pp. 665-676
- Transportation Demand Management (TDM) Victoria Transport Policy Institute, 2011, Parking Evaluation: Evaluating Parking Problems, Solutions, Costs and Benefits, Accessed: Nov. 12, 2012, <http://www.vtpi.org/tdm/tdm73.htm> and www.vtpi.org/planning.pdf