

A Study on Parking Occupancy of Residential Condominiums in Metro Manila

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Abstract: Parking is a vital component of residential condominium developments and is an aspect of the entire transportation system. In the light of changing transportation trends, the study believes that a review and comparison of existing policies with actual parking allocation practices and with parking occupancy is high time. It aims to investigate supply factors, or variables affecting parking supply, and present the parking situation in Metro Manila. The investigation is in the form of a parking occupancy survey, obtaining information on parking occupancy (number of slots that are bought or rented), parking supply, and supply variables. These variables are analyzed as to their contribution to parking supply using multiple regression analysis. Parking ratios, expressed in slots-per-unit or slots-per-floor area, are computed and compared with existing parking policies and guidelines. Results show that the supply of parking is indeed an inter-play of several variables. There also exists a wide disparity between the minimum parking requirements of the National Building Code with the CBD-specific parking guidelines. The findings are vital in understanding the parking situation in residential condominiums. Recommendations are concerned with parking policies and factors to be included in future parking evaluation.

1. INTRODUCTION

Parking facilities serve as the transport system's facility for storage that should complement with the system's facilities for movement such as road networks and infrastructures. In the Philippines, the requirement is based on the minimum standards set by the National Building Code and on the parking guidelines prescribed by zoning ordinances, in the form of minimum requirements also, based on the desired and allowed development density of the area.

The amount of parking supplied for every land use varies depending on several factors. Foreign studies suggest using the number of dwelling units, building floor area, and number of bedrooms as qualitative measures.

Several issues confront parking for residential condominiums. First, parking over- and undersupply create transportation, economic, and environmental problems. Oversupply means having unutilized spaces and this translates to inefficient transport system and economic loss. On the other hand, undersupply may encourage on-street parking, worsen traffic congestion, and limit socio-economic activities in the area. Second, the stipulations of the Code may no

longer apply to current transport needs and development trends. Third, there have been proposals to revise current parking requirements for residential condominiums. The decision of HLURB to let market forces dictate the requirements may aggravate problems such as traffic congestion and may result to more expensive housing units. Fourth, condominium developments will continue to shape our urban environment. Residential condominiums are still considered a niche market (FPD Savills, 1999). Consequently, appropriate parking provision for this kind of development becomes crucial.

The study seeks to investigate parking occupancy in the context of condominium characteristics in order to provide a picture of the parking scenario. A parking supply ratio will be developed to relate these characteristics, or supply variables, with existing parking policies and parking occupancy. Specific objectives are:

- a) Determine the various factors affecting the supply of parking facilities of residential condominiums;
- b) Evaluate these supply variables as to how they influence the supply of parking by

- developing a mathematical model describing actual parking supply; and,
- c) Compare actual parking occupancy with parking supply and with the policies using parking ratios.

2. RESEARCH FRAMEWORK

Parking occupancy refers to the number of slots that are either bought or rented by condominium tenants. Because occupancy is limited by the capacity of the facility, or parking supply, factors affecting such supply are examined. From Figure 1, the occupancy of parking slots results from the interaction of demand and the supply. Demand stems from market characteristics such as socio-economics, trip patterns, car ownership and population distribution. Supply refers to the factors affecting the provision of the facilities which are controlled by the developers, namely: development size, density, and mix; requirements and guidelines of transport and urban policies; location; and, cost.

The premise of this study is that parking supply can affect the characteristics of its target users.

Thus, demand factors are not covered in this study. Instead, factors affecting the supply of these facilities and their relationship to occupancy is concentrated on.

Measurements of the relationships of these variables to parking supply is done through

correlation and modeling analyses. Because it would be difficult to compare actual parking occupancy and supply, parking factors shall be computed. A parking factor is expressed as the number of slots per unit of supply variable.

Persons qualified to provide the required information are either the building administrator/property manager, or any representative of the developer. The condominiums targeted for sampling must be:

1. A residential condominium with or without office and/or commercial spaces;
2. Not a condotel (a residential condominium that functions as a hotel)
3. Located within or near the CBD;
4. High-rise (more than nine storeys); and
5. Must have at least 1 floor as an off-street parking facility, either under- or aboveground.

Table 1 lists down each supply variable and their corresponding units of analysis.

3. DATA ANALYSIS

A parking occupancy survey was conducted to gather information on parking occupancy and supply and on the various supply variables. Multiple regression analysis is employed to develop a mathematical model to represent parking supply ratio as an attempt to explain parking supply.

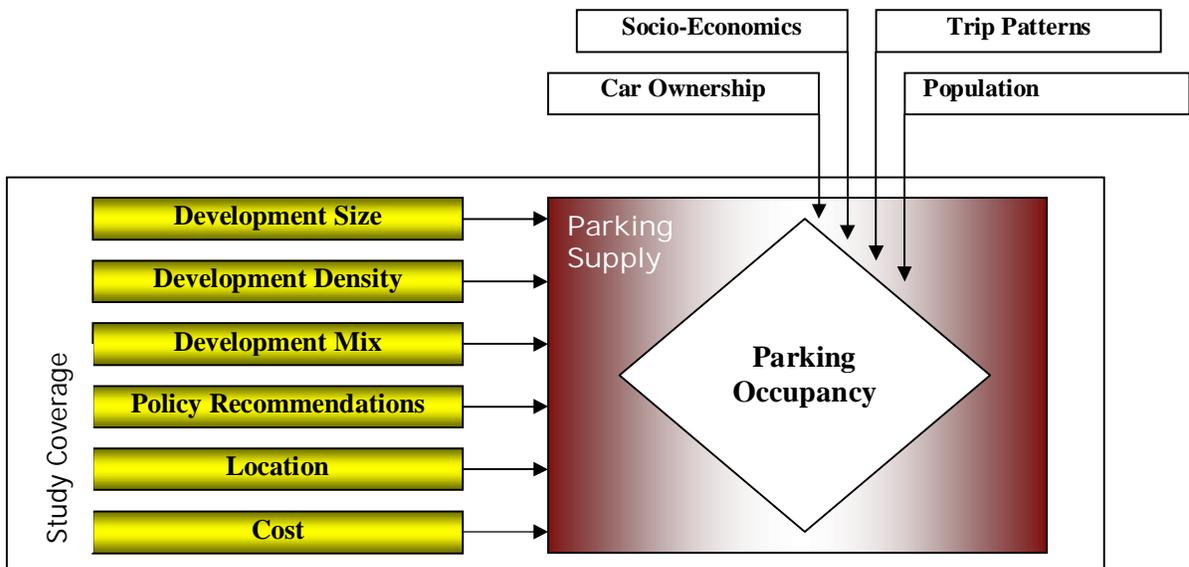


Figure 1. Conceptual Framework

Table 1. Study Variable, Indicators and Unit of Analysis

Indicators	Unit of Analysis
VARIABLE 1: Building Size	
Gross Floor Area (RGFA)	GFA excludes commercial and/or office spaces for rent of for sale within the building. Total number of residential units (occupied and supplied)
Gross Saleable Area (RGSA)	
Number of Units	
VARIABLE 2: Development Density	
Land area	RFAR = (RGFA) / (LA)
Gross floor area (RGFA)	Number of units per 1,000 sq.m. of RGFA
Gross saleable area (RGSA)	Number of units per 1,000 sq.m. of RGSA
Floor area ratio	
Number of units	
VARIABLE 3: Development Mix	
Percentage of type of units of residential units to total units provided	Number of unit types Percentage of Studio units to total number of units Percentage of 1-BR units to total number of units Percentage of 2-BR units to total number of units Percentage of 3-BR units to total number of units
Number of units per unit type	
Total number of units	
VARIABLE 4: Policy Requirements	
Number of units	Number of slots required per National Building Code (NBC)
Size of Units	Number of slots required per Development Guidelines (MACEA and OCA)
VARIABLE 5: Location	
Distance from the public transport stop	Walking distance in meters
Distance from the heart of the CBD	Radius from the nearest major commercial center
VARIABLE 6: Cost	
Parking slot cost	Cost of parking slot

Parking factors are computed to compare parking supply with parking occupancy. Out of the 85 distributed survey forms, only 31 were returned representing 36% return percentage. Due to incomplete or missing data entries, only 29 samples were considered in the analysis.

Table 2. Parking Supply Model: List of Independent Variables

Variable Code	Remarks/Units
DEVELOPMENT SIZE	
1 RUNITS	Total number of residential units supplied (units)
2 RGFA	Gross floor area of the unit per 1000sq.m.
3 RGSA	Gross saleable area of the unit per 1000 sq.m.
DEVELOPMENT DENSITY	
4 RFAR	Floor area ratio
5 UNIGFA	No. of supplied units per 1000 sq.m. GFA (units)
6 UNIGSA	No. of supplied units per 1000 sq.m. GSA (units)
DEVELOPMENT MIX	
7 DEVMIX	No. of unit types
8 STU%	Percentage of supplied studio units to total units supplied
9 ONEBR%	Percentage of supplied 1-bedroom units to total units supplied
10 TWOBR%	Percentage of supplied 2-bedroom units to total units supplied
11 THRBR%	Percentage of supplied 3-bedroom units to total units supplied
LOCATION	
12 DISTOP	Distance from the nearest public transport stop (meters)
13 DISTCBD	Distance from the nearest commercial center (meters)
PARKING POLICY	
14 NBC	Number of slots required by the National Building Code
15 MACEA	Number of slots required
16 OCA	Number of slots required
DUMMY VARIABLES	
17 RENT	Type of slot ownership
18 OWN	Type of slot ownership
19 LOPAY	Type of slot ownership

Survey period was from November 2000 to February 2001. About 79% of the samples are located in Makati while the rest are in Ortigas Center. A total of 19 variables listed in Table 2 above are investigated as to their contribution to parking supply. They pertain to the identified supply variables and are mostly continuous data.

Three dummy variables that characterize the parking facilities sampled are included. All 19 variables are tested for each dependent variable.

Association) suggests slot-per-100 m² RGFA). To compare them, values of the other variables must be known first.

The complete modeling procedure including the criteria for model selection is illustrated in Figure 2. Having identified the Y and X variables, correlation analysis is conducted for each data set followed by the regression analysis.

Results of the comparison indicate that a wide disparity in parking requirements between NBC

4. CONCLUSIONS

Parking supply is largely determined by developers and parking policies. Supply of parking is an inter-play of several variables that include building size, development density, development mix, location, cost, and policy requirements. Because of this inter-relation among variables, it is difficult to establish parking trends on a slot-per-single-variable relationship. Such difficulty is illustrated in the conflict between National Building Code (NBC) requirements and that of how development mix is defined by the developers. The value of NBC's slot-per-unit ratio is categorized according to unit floor area (e.g. 0.125 slot per unit for units measuring less than 50 m², 0.250 slot per unit for units measuring 50-100 m², and 1 slot per unit for units measuring more than 100 m²). On the other hand, unit category is not based on unit size but rather on the number of bedrooms or unit type (e.g. studio, 1-BR, etc.). Each unit type has a wide range of floor area values that often overlap with each other. Such conflict already concerns several variables, namely: parking requirements, development mix, building size, and development density. Furthermore, there is difficulty in comparing some indicators of a single variable due to the varying units of analyses used (e.g. NBC requirement uses slot-per-unit ratio while MACEA (Makati Commercial Estates

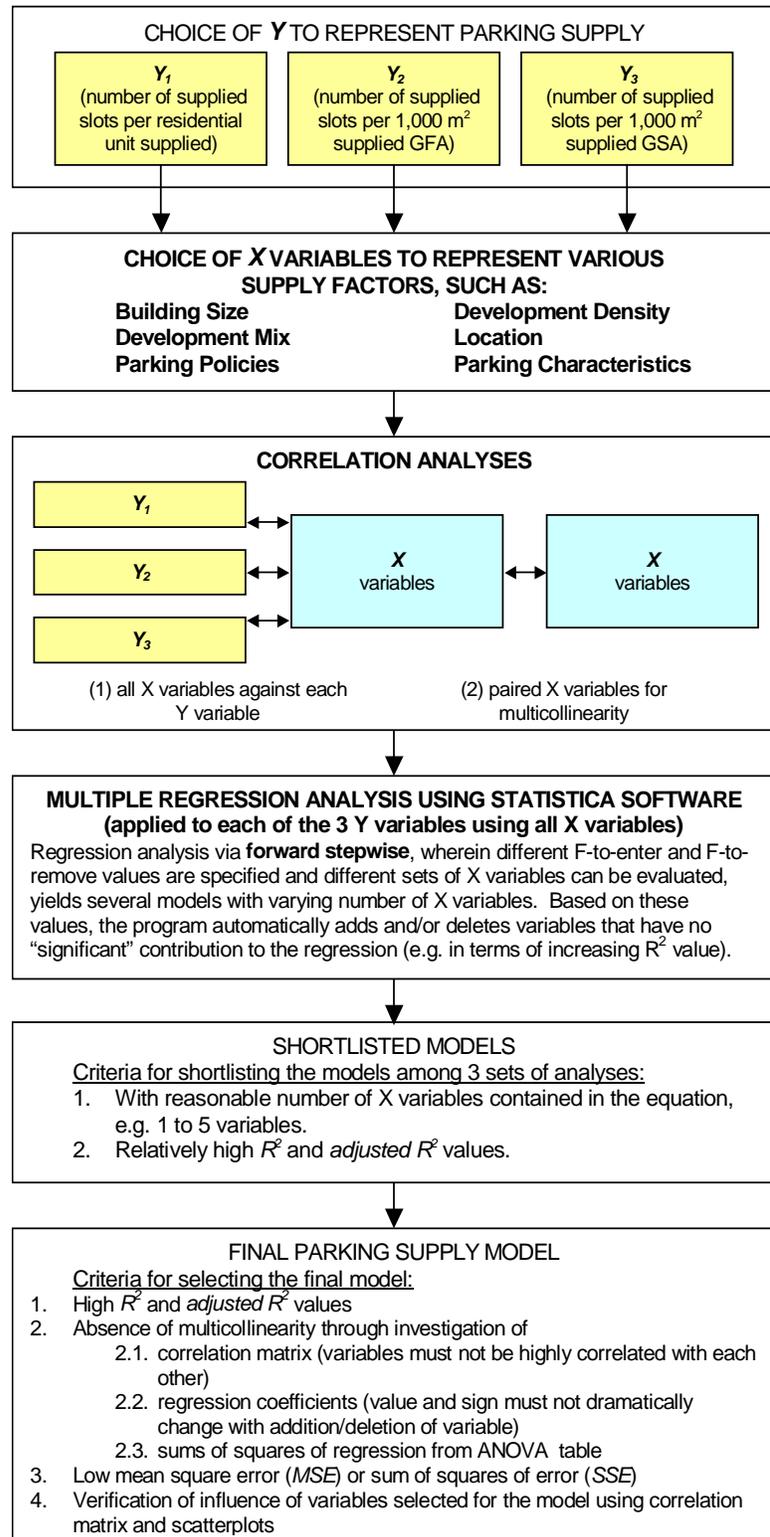


Figure 2. Complete Procedure for the Model Development

and that of MACEA and OCA (Ortigas Commercial Association) guidelines exists, with NBC requiring the lowest amount of parking. Actual parking supply and occupancy are midway between NBC and MACEA and/or OCA. Such disparity suggests that a review, and possibly a revision of NBC, is high time.

To understand the inter-play among these variables, a parking supply model was developed using multiple regression analysis. The model is represented by the equation:

$$Y = 1.9267 - 0.0476 X_1 + 0.0168 X_2 - 0.0279 X_3 - 0.0051 X_4 \quad (1)$$

where:

Y = number of supplied slots per residential unit supplied

X_1 = number of supplied units per 1,000 m² GSA supplied (UNIGSA)

X_2 = supplied RGFA in 1,000 m² (RGFA);

X_3 = floor area ratio based on supplied RGFA in m² (RFAR); and

X_4 = percentage of 2-BR units supplied to total supplied units (TWOB%)

The parking supply ratio model confirms that a more dense development yields a low slot-per-unit ratio. A smaller development also yields a low ratio. But an increase in percentage of bigger units (average area of 127 m²) does not cause an increase in the ratio. The exclusion of the other supply variables from the model does not imply that these variables do not influence parking. The study merely states that only these 4 variables are linearly related to parking supply. About 62% of the variation in parking supply ratio is accounted for by changes in all the enumerated variables.

Comparing parking occupancy with parking supply and existing policies is limited by the ways the various ratios are expressed. For instance, slot-per-unit ratio of parking occupancy can only be compared with parking supply and with NBC requirements. To compare it with MACEA or OCA guidelines, the equivalent slot-per-GSA-ratio must be used. In general, there exists a wide disparity between parking occupancy ratio and NBC requirements. However, in terms of slot-per-GSA, parking occupancy ratio has only a minimal difference with MACEA or OCA guidelines.

Full unit occupancy does not necessarily lead to full parking occupancy and vice versa; hence, the information is not enough to make conclusions as to adequacy, under-supply, or over-supply of parking. This is because

oversupply–undersupply is a complex issue and can only be better understood by considering both demand and supply factors. This study focuses on supply factors only. Due to insufficiency in demand data, no significant conclusion regarding parking occupancy ratio can be drawn.

5. RECOMMENDATIONS

In order to address several issues confronting residential condominium parking identified earlier, the following are recommended:

§ In the light of the findings pertaining to disparity between various parking policies and parking ratios, a review of the minimum requirements of the NBC is high time.

§ Building code provision for condominiums may consider using number of bedrooms to categorize parking specifications by unit type (e.g. studio, 1-BR, 2-BR, and so on) instead of NBC's current categorization by unit size (e.g. 0.125 slot per unit for units measuring less than 50 m², 0.250 slot per unit for units measuring 50-100 m², or 1 slot per unit for units measuring greater than 100 m²). Each unit type by number of bedrooms must also be defined by a range of floor areas to avoid overlapping floor area sizes among various unit types.

As a pioneer investigation on residential condominium parking, the study has several limitations. Basic to this is the limited number of samples. Also, in the course of the analysis, certain findings point out to other aspects or issues that would need exploration of a more comprehensive parking scenario. This study then recommends these further studies:

§ An extensive parking study covering both parking supply and demand factors to assess the applicability of current requirements and parking supply ratios. Among the demand factors that should be looked into are user-tenant characteristics which include: car ownership, level of income, trip-making characteristics, and parking preferences from which a mathematical model may develop;

§ Replication of the parking occupancy study in other locations (e.g. low to medium-rise, low- to medium-costs, non-CBD condominiums) in order to check if the study findings are site-specific.

§ Assessment of the implications of various parking allocation practices (e.g. manner of slot assignment and payment, types of slot ownership, etc.) on parking occupancy and on the overall parking system which entails

interview with slot owners-renters and developers in order to establish supply-and-demand relationships;

- § An investigation on parking under- and over-supply by incorporating demand factors in a comprehensive parking occupancy study. Vital in such investigation is finding out how over- under-supply cases are being addressed by developers, building administrators, and users to shed light on issues such as economic livability, traffic congestion, and on-street parking.

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