

# Modelling the Response to Chargeable Off-street Parking Policy for Two-wheelers & Four Wheeler on Selected Urban Street of Busy CBD Area

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## ABSTRACT

The aim of the project is to assess the parking performance at the area surrounding the central business districts where the parking spills over should also be included in the survey of city of Vadodara. In this context, we carried out a questionnaire-based survey with three days in a walled city area of Vadodara. We extracted the information and their importance and vision towards parking from the data & know how much vehicle park in weekend & weekdays and how much hour they stayed on that location? From this survey we analysed that, parking safety is very essential than parking charges for four wheeler owner, but the two wheeler owner having conservative approach towards parking charges. This survey is very helpful for making different policies of parking. Lastly, I have attempt to create a model using SPSS SOFTWARE .The BINARY LOGIT MODEL assessment showed that parking cost has, as expected, the most important impact on the choice of parking alternatives. In my paper, I had developed the analysis of parking turnover, parking accumulation and the various attractors for parking like number of bays, etc.

**Keywords:** Parking Facility, Parking Charges, behavior of respondent, CBD area, off-street parking

## I. INTRODUCTION

Parking especially ‘Off-street Parking’ is the most concerning problem in urban cities, which is created by the increasing traffic and growth of motorized vehicles. Every vehicle trips requires parking at its Destination, so parking facilities are an integrated component of the roadway system.

Road side parking: Unregulated road side parking is being resorted to by vehicle users as the owners and visitors prefer to park the vehicle close to the work place for easy access and safety of the vehicle. Parking of this type must be prohibited. To overcome, parking policy is one of the most powerful means for urban planners and policy makers who use it to manage travel demand and traffic in city centers. In many countries, governments are increasingly using parking policies as a means of reducing urban road traffic. Many researchers believe that parking measures are effective means of reducing congestion. Since urban access is considered crucial to the economic success of a downtown area, certain constituencies, such as business and retail, have

historically been opposing to any parking restriction policies.

In order to address these concerns and create appropriate parking policies, it is important to understand how visitors to the city center are likely to respond to new policies.

## II. METHODS AND MATERIAL

### A. Types of Off-Street Parking

The types of off-street facilities commonly considered are:

1. Surface car parks.
2. Multi-storey car parks.
3. Roof parks.
4. Mechanical car parks.
5. Underground car parks.

#### 1. Surface car parks

Surface car parks, properly located and developed on a piece of vacant land or surrounding an office complex or

super market, are very popular with the motorists. Great care is needed in their design and operation. The overall aesthetics of the area should receive due attention. A stall size of 2.5 m x 5 m is probably adequate for Indian conditions predominated by Small-size cars. If the surface park is to be operated with a fee-charging system, there should be arrangement for collecting the money. This can be done either manually by stationing an attendant in a kiosk at the entrance who sells the parking tickets or by installing an automatic vending machine which can be designed to raise a barrier rail upon insertion of a coin.

## 2. Multi-storey Car Parks

Surface parks consume too much of the precious land in the heart of the city and are not, therefore, always feasible. One of the alternatives when land is costly is to provide multi-storey car parks.

Multi-storey car parks are designed for a capacity of about 400 to 500 cars. Larger capacity tends to increase the time for unparking a car. About five floors is also the upper limit for the same reason. The car parking floors, the ramps, the entrance and the exits should be well lighted. If the garage is without external walls, as is often the case, there is no need for artificial means for ventilation.

## 3. Roof Parks

A very popular method of solving the parking problems adopted in many cities is to park the vehicles on roof tops. Access ramps or mechanical lifts provide the necessary access to the roofs. To economize, many roofs may be linked together served by a single access ramp. In addition to the ramps, extra cost is involved in designing the roof tops and the structural elements for the parking load.

## 4. Mechanical Car Parks

Mechanical car parks provide for lifting of the cars from floor to floor by means of a lift and transfer of cars to and from the parking stall by means of wheeling or mechanically operated transfer dollies or cradles. Since the ramps and aisles are eliminated in this system, it is more economical in space as compared to the ramped system, multi-storey garages. The disadvantages are the

higher maintenance costs and the possibility of breakdown due to mechanical or power failure.

## 5. Underground Car Parks

The great advantage of underground car parks is the least intrusion they cause to the aesthetics of a place. These parks can be built in the basement of any multi storeyed building or below open spaces. Since the work involves large quantities of excavation, construction of retaining walls, ventilation and lighting, such car parks tend to be very costly.

### B. Need of Study

Parking is one of the major problems that is created by the increasing road traffic. It is an impact of transport development. The availability of less space in urban areas has increased the demand for parking space especially in areas like Central business district. This affects the mode choice also. This has a great economic impact. Hence there is a need to work out the effective parking policy measures to meet demand of existing parking facilities. Use of private vehicles on CBD areas , parking problems which needs to be focus for managing the parking demand. Preference in choosing a parking location in the Central Business District area, especially for commuting, business and shopping trips, create a high demand for on street & off street parking which needs to attend by framing parking policy measures.

### C. Objectives

1. To calculate the parking load, accumulation, turnover, Average parking duration to understand parking trend of the study area.
2. To study the parking volume on the busy street in CBD area.
3. The formulation of the scenario of chargeable off-street parking policies.
4. To develop a model of 2 wheeler & 4 wheeler vehicles users for various formulated parking Polices in CBD area.
5. To estimate the revenue generated on account of chargeable parking policy.

## D. Literature Study

“Off-Street Parking Choice Sensitivity” (BY John Golias, GeorgeYannis & MichelHarvatis, Transportation Planning and Technology , Volume 25, Issue 4, January 2002) deals with the determinants of choice between on-and off-street parking. In this context, a questionnaire-based survey was conducted and the stated preference method was used to develop an explanatory model. The model assessment showed that parking cost has, as expected, the most important impact on the choice of parking alternatives.

2) “Comparison of On-Street Parking Management in Ermita-Malate Manila and Makati Central Business District” (By -Associate Prof. De La Salle University-Manila Proceedings of the Eastern Asia Society for Transportation Studies, Vol.9, 2013) In this paper, The on-street parking facilities in Ermita-Malate area needs improvement since most of the on-street parkers stay for a very long period and they park in areas where parking is not allowed. The laws and ordinances are not implemented properly, thus, the motorists tend to ignore these. And Recommendations are (1) the area of Ermita-Malate should impose better parking rules and regulations and these should be strictly implemented. (2) More parking facilities should also be constructed so that the demand will be met by the supply of parking spaces. (3) Off-street parking facilities are increase since some areas are residential areas so off-street parking facilities should be increased instead.

## E. Study Area

The study was conducted in Mangalbazar of Vadodara city in state of Gujarat. Mangalbazar is the shopping hub for Vadodara.Of the total number of vehicles parked in the lots considered, 93% were two wheelers, 7% were four wheelers in mangalbazar.. CBD areas are greatly affected by parking hence, areas under the influence of CBD activities are considered for the study. The methodology adopted, to achieve the objectives of the above-mentioned study, is discussed in the following paragraphs.

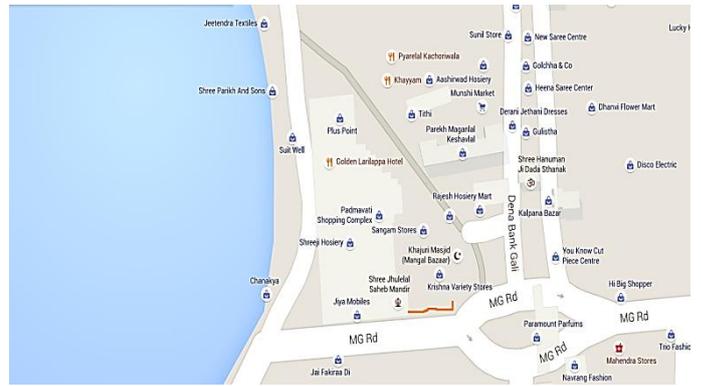


Figure 1. Location of Study area profile

## F. Methodology

- (1) **Review of available plans and survey data:** Study of available plans, survey data and statistics related to mangalbazar were identified, compiled and reviewed. The parking codes and practices were studied. In addition, the relevant agencies and government departments were contacted for collection of secondary sources of information.
- (2) **Selection of off – street parking lots:** The central business district is usually the area where parking survey is needed.
- (3) **Methods of survey conducted:** License Plate Method of Survey, Questionnaire Type Parking Usage Survey were the parking surveys conducted.

## III. RESULTS AND DISCUSSION

### A) Data Collection and Analysis Using License Plate Survey Method:

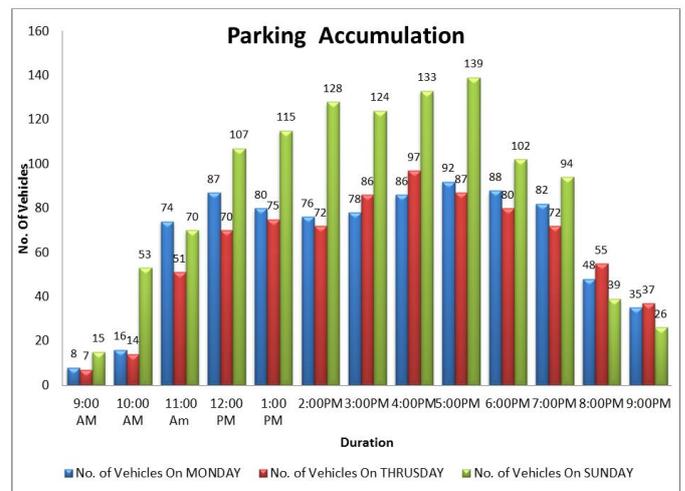


Figure 2. Graph of Parking Accumulation

Table 1. Data

	Monday	Thursday	Sunday
Parking Duration	2hour 40 min	2hour	3 hour 30 min
Parking load (veh/hr)	52.21	42.46	27.86
Parking index (veh/hr)	52.21	42.46	27.86
parking turnover (%)	3.85	3.84	5.47

**B) Data Collection and Analysis Using**

Questionnaire Type Parking Usage Survey Method:

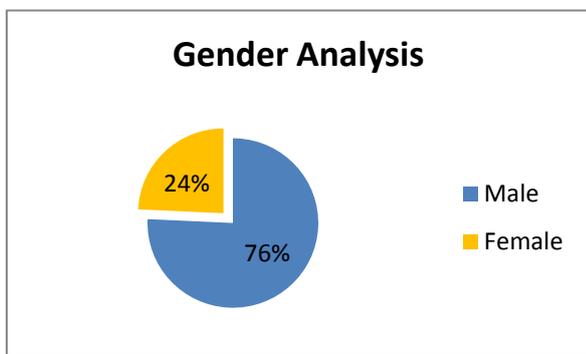


Figure 3. Graph of Gender analysis

The result evaluated that 76% of male & 24% of female are parking vehicles on CBD area.

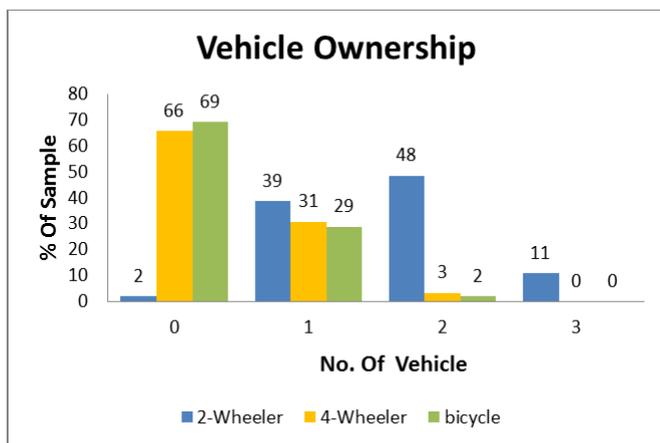


Figure 4. Graph of vehicle ownership

This graph evaluated that 2% of people having 0 nos. -2 wheeler, 66% of people having 0 nos. -4 Wheeler, 69% of people having 0 nos. bicycle. 39% of people having 1 nos. -2 wheeler, 31% of people having 1 nos. -4 Wheeler, 29% of people having 1 nos. bicycle.

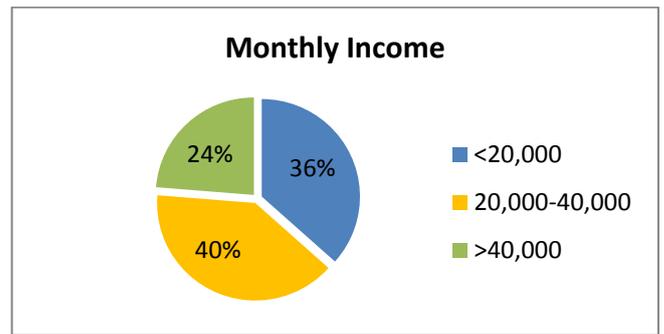


Figure 5. Graph of monthly income

The result of monthly income of respondent evaluated that 36% of people have monthly income is <20,000 , 40% of people have monthly income is 20,000-40,000 & 24% of people have monthly income is >40,000.

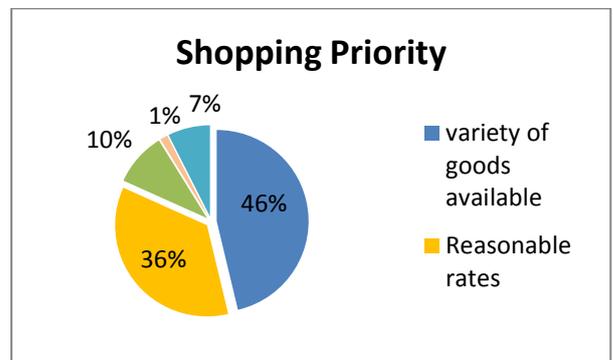


Figure 6. Graph of shopping priority

The result of shopping priority of respondent evaluated that 46% of people have choosing option 1.variety of goods available, 36% of people have choosing option 2.Reasonable rates, 10% of people have choosing option 3.Bargaining is easy, 1% of people have choosing option 4. Free parking,7% of people have choosing option 5.other

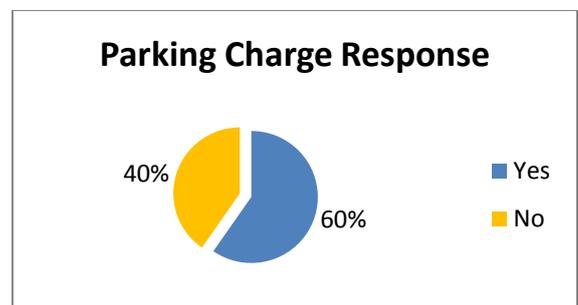
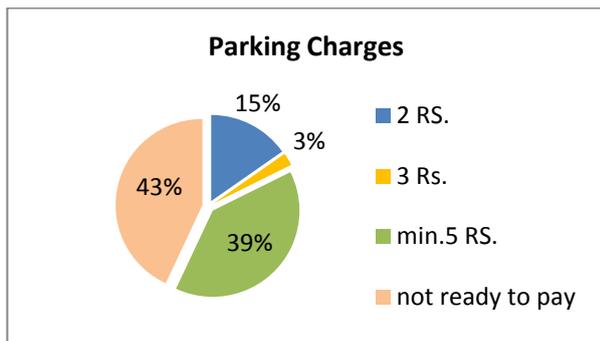


Figure 6. Graph of parking charge response

The result of parking charge response evaluated that 60% of people are ready to park on off street parking study area, if parking charge are introduced. & 40 % of people are not ready to park on off street parking study area, if parking charge is introduced.



**Figure 6.** Graph of Parking Charges

The result evaluated that 15% of people are ready to pay 2 RS. For parking, 3% of people are ready to pay 3 RS. For parking, 39% of people are ready to pay min 5 RS. For parking & 43% of people are not ready to pay.

#### IV. CONCLUSION

1. People have given positive response to charge introduced with regard Time Restriction and hence it can be stated that it can be an effective tool for management of parking demand.
2. This policy may be effective for the Vadodara city and it is also effective for the city having a same population growth rate.
3. Government can generate revenue from this policy.
4. Their capacity and some are about to cross the capacity.
5. Parking licence plate method analysis suggests that majority of parking lots has already crossed.
6. Travel parameters like trip length, frequency of visiting, shopping priority ,shopping duration ,fuel expenditure, vehicle ownership and walking time from parking to destination have identical significant for response to chargeable for off-street parking policy at study area.
7. Prohibition of parking in peak hours is to be varied based on the variation in the peak accumulation in their respective parking lots.
8. The high demand for parking spaces in the horizon years could be effectively met by the development of automated parking system.

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