

# Parking Policy for Vadodara City, Gujarat, India

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## Abstract

Rapid growth in vehicles population has put an enormous strain on all cities. Due to high vehicle ownership and poor public transport facilities especially in the cities where the population between 1 to 2 million. This study concerned with Vadodara city. The main objective of this study is to identify the problems in the existing parking area. This study can help to find an innovative solution to the current problems such as increasing vehicle density, the capacity of the parking area and poor parking facility etc. finding the problems with current parking planning, discusses the costs of parking facilities and potential savings from improved management, describes specific parking management strategies suitable for Vadodara city and from case study how they can be implemented, discusses planning and evaluation issues, and describes how to develop optimal parking management in a particular situation of Vadodara.

**Keywords-** Parking Policy, Paradigm Shift, Cost-Effective Parking, on/off-Street Parking, Vadodara City

## I. INTRODUCTION

According to a 2006 study by the Central Road Research Institute in New Delhi estimated a typical vehicle stays parked 95% of the time while in 4% steering time in the year. Each car needs/ occupies an average of three different parking locations in the city every day. Each car effectively consumes 69 sq. mt. of land every day, most of which is public land. (Delhi Development Authority, October 2010)

- 1) Increase in car holders.
- 2) Increase in traffic every year by 18-20%
- 3) An increase in the rate of growth of vehicles and their usage in urban areas has resulted in parking space demand. (average 1 to 1.2 lakh vehicle increase in Vadodara city)
- 4) The New trend of use of buildings having a higher concentration of people of like shopping malls, multiplexes adopted the provisions for commercial use of a building and their parking requirements.
- 5) Parking requirements since the last three decades are not changes in statutory GDCR. (GDCR1994 and 2006)
- 6) The adverse impact of regularization of the unauthorized development act.
- 7) Insufficient mass transportation facilities increase more vehicles on road.

## II. FLOW CHART OF METHODOLOGY

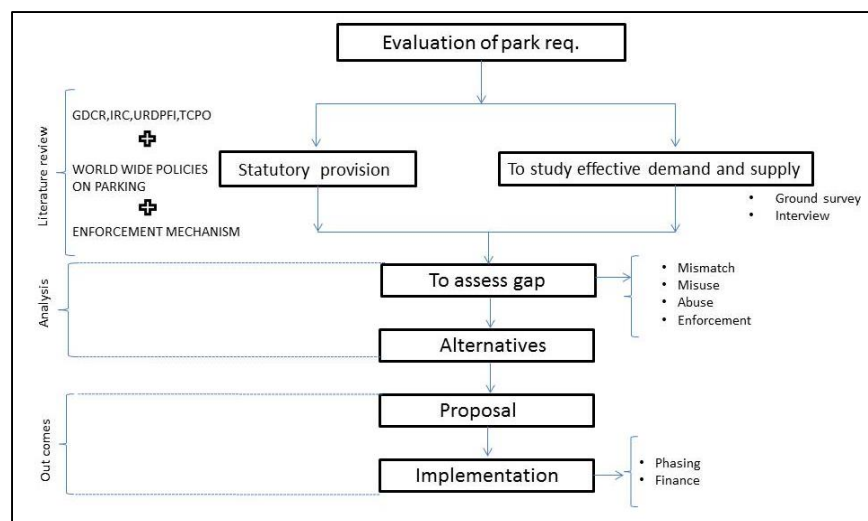


Fig. 1: Flow chart of the Methodology

### A. Vadodara City Profile

Vadodara is also known as Baroda formerly, It is the administrative headquarters of Vadodara District and is located on the banks of the Vishwamitri River, Both the railway line and national highway connecting Delhi and Mumbai pass through Vadodara. Vadodara is an important industrial, cultural and educational hub of western India, the city houses several institutions of national and regional importance while its major industries include petrochemicals, engineering, chemicals, pharmaceuticals, plastics, IT etc. The corporation limits have changed and outgrowths have emerged as areas comprising of all the facilities around the corporation limits; forming an urban agglomeration. The growth of the corporation can be seen in the following table.

Table 1: Corporation population trend and growth rate

Census Year	status	Pop	Area (sq.km)	Density (person/sq.mt)
1961	M	295,144	34.42	8669
1971	MC	466,669	78.13	5973
1981	MC	734,473	108.22	6787
1991	MC	1,031,346	108.22	9530
2001	MC	1,306,035	108.22	12068
2011	MC	1,670,806	159.3	10488
1961	M	295,144	34.42	8669

As of 2011, Vadodara had a population of almost 2 million people and is on the list of the top ten fastest developing cities of India. The city is home to the Lakshmi Vilas Palace, once owned by the royal Gaekwad dynasty of the Marathas. It is also the home of the Maharaja Sayajirao University of Baroda (Vadodara), the largest university in Gujarat.

Table 2: City profile

No	Sector	Till 2015
1	VUDA limits	714.56 sq.km
2	VMC limits	160 sq.km
3	Population 2011	1,725,371
4	Sex-ratio	920m
5	Literacy rate	81.44%
6	Work force	33.87%
7	No of house hold	393887
8	Average density	11,021/ sq.km
9	Total wards	13
10	Total road length	Pucca- 84305 km Kutchha-172.718km

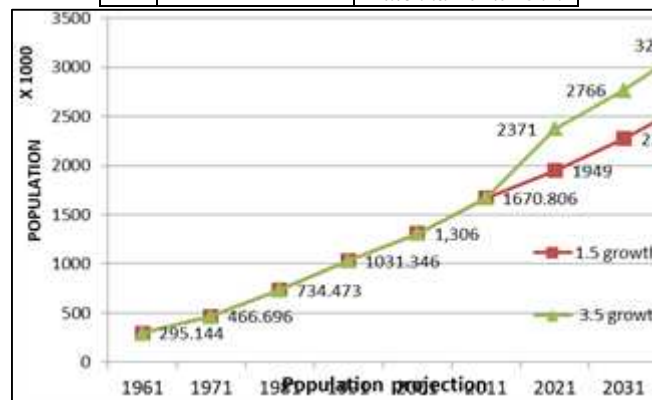


Fig. 2: VMC limit (VUDA, VMC Limit)

As per the Census records, the population trends show that the continuously increasing population can be seen along with the fact that the rate of growth in each decade is decreasing. The maximum growth rate was achieved from the years 1971 to 1981. This can be connected with the fact that there had been sudden industrial establishments. The establishment of large industrial units in a region automatically brings into existence some smaller enterprises. Recently the trends show a decreasing rate of growth with 24.17 % as calculated for the decade from 2001 to 2011.

#### 1) Vehicle Data

Vadodara city is well connected by an expressway, national and state highways, the broad-gauge and meter-gauge railways and an airport. The city transportation system is predominantly dependent on roadway systems. Vehicular growth has been increased at the rate of 8.5%. The road network is experiencing heavy congestion. Consequently, air pollution has become severe.



Fig. 3: Vehicle projection in VMC limit

As per the RTO record Within the VMC limit in 2010 total vehicle was 1,100,037. In 2011, 2012, 2013, 2014 and 2015 vehicle incising by 1301156, 1409526, 1538259 and 1673882 with respected year. So in 2021 total vehicle will be incising 2,493,282 by the average growth rate of 8.5%. The below table shows the growth pattern of various segments of the vehicle in Vadodara in the last four years. Bellow table shows the per year type of vehicles increasing.

Table 3: Per year increasing Vehicles

Year	2-W	3-W	4-W	Passenger	Goods	Others
2011	912650	36602	189073	9240	50717	1119
2012	991166	39794	204915	10218	54872	1179
2013	1074039	42465	221880	11210	59635	1285
2014	1169017	46328	243058	12661	66706	1477
2015	1263773	50262	270537	14124	74396	1778

## 2) Case study of Munich, Germany

- Population: 1,356,594
- Population Density: 4,370 /km<sup>2</sup> (11,318 /sq.mt)
- Car Ownership: 516 vehicles per 1,000 inhabitants
- Policy Goals: Congestion Mitigation, Public Space Reclamation, Alternative Mode

## B. Promotion

Special regulations are set according to the times of highest demand for each group. The city was divided into zones of manageable size, which were gradually incorporated into the parking program according to their characteristics and needs. The general Pay and display regulations and restrictions are described below. Munich also has arranged alternating or mixed rules according to the time of day. Visitors must purchase a parking voucher at a pay-and-display vending machine, which allows for parking up to an entire day. The parking fee is €1 per hour or €6 for the entire day in most areas of the city, and €2.50 in the historic city centre, which has a two-hour maximum time limit. In general, priority is given to residents, who generate the greatest parking pressure, followed by shoppers and visitors. Special regulations are set according to the times of highest demand for each group. The general P&D regulations and restrictions are described below.

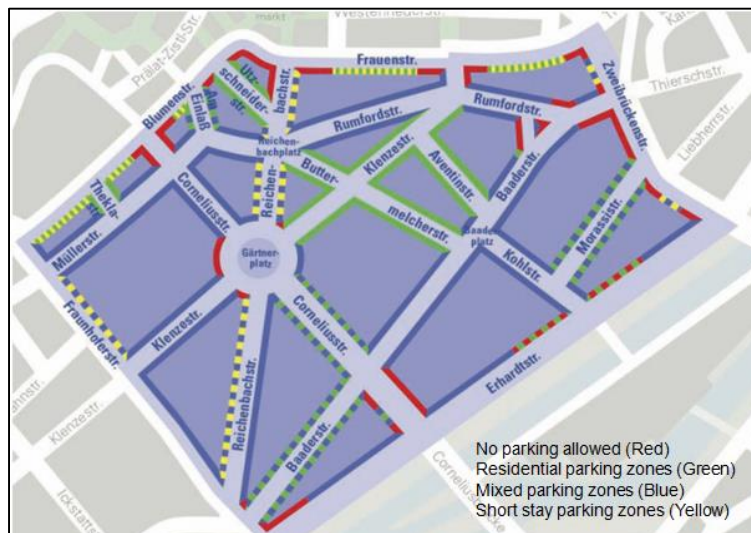


Fig. 4: Plan of Munich

### C. Strategies Introduce

- 1) Attractive public transport
- 2) Demand-orientated parking guidance systems
- 3) Parking pricing throughout the city
- 4) Parking zones with different characteristics
- 5) Stringent parking regulation throughout the city
- 6) Maximum parking standards for new buildings

### D. Result Achieve

- 1) Car trips:-14%,Bicycle: +75%,Walking: +61%
  - 2) Reduction of overnight parking by 25%
  - 3) Reduction of all-day parkers by 40%.
- So, Paradigm shifts from old to new.

Table 4: Old and new parking paradigm

Old Parking Paradigm	New Parking Paradigm
<i>"Parking problem" means inadequate parking supply.</i>	<i>There can be many types of parking problems, including inadequate or excessive supply, too low or high prices, inadequate user information, and inefficient management.</i>
<i>Abundant parking supply is always desirable.</i>	<i>Too much supply is as harmful as too little.</i>
<i>Parking should generally be provided free, funded indirectly, through rents and taxes.</i>	<i>As much as possible, users should pay directly for parking facilities.</i>
<i>Parking should be available on a first-come basis.</i>	<i>Parking should be regulated to favour higher priority uses and encourage efficiency.</i>
<i>Parking requirements should be applied rigidly, without exception or variation.</i>	<i>Parking requirements should reflect each particular situation and should be applied flexibly.</i>
<i>Innovation faces a high burden of proof and should only be applied if proven and widely accepted.</i>	<i>Innovations should be encouraged since even unsuccessful experiments often provide useful information.</i>
<i>Parking management is a last resort, to be applied only if increasing supply is infeasible.</i>	<i>Parking management programs should be widely applied to prevent parking problems.</i>

## III. CONCLUSION

- 1) Parking demand is not matching with statutory GDCR.
- 2) The provision of GDCR is one time depends on the total built-up area irrespective of actual demand.
- 3) The changing character of commercial activities of individual buildings/premises has not been studied by the regulatory authority.
- 4) Development control regulations are limited to % of parking requirements but are rigid and not changing demand/development. It is also limited to the premises to be developed.
- 5) The authority has no adequate mechanisms to control unauthorized vehicles parking, misuse of parking space, encroachments on parking space.
- 6) Regulations of unauthorized construction have added road parking.
- 7) The hardships created by statutory requirements. Few streets in an inner city having 4 to 5 feet (1 to 1.5mts) heights of the plinth. Narrow streets having no accessibility for four-wheelers.
- 8) For example, In the inner-city If 4mt wide and 6mt deep commercial properties abutting on the main road with two floors is rebuilt so require 21.6 sq. mt parking area where parking is not possible either in the basement or on upper floors because of no availability of gradient.
- 9) The parking spaces provided in the buildings are not utilized because of inconvenience like poor gradients of access for basement parking; level difference of flooring, hoardings and kiosks, hawkers and chattels acquires parking space, air condition duct and solid waste containers, Misuse of parking space while people's choice is mostly for front parking.
- 10) The authority is not providing parking lots in a commercial area, Downtown area with compare to increasing vehicles in the city.
- 11) The absence of mass transportation facilities make citizens to the compulsory use of Personalize transportation.

### A. Recommendation

#### 1) For Short Term

- 12) The parking layout mast is prepaid with a passing drawing.
- 13) Parking standards should be based on efficiency-based. For new development, parking requirement should be decided by the owner rather than the authority. If the building owner or builder fails to provide parking space then he is responsible for the penalty.

- 14) On-street, parking pricing will introduce on the roads where heavy congestion, and has potential travel demand corridors.
- 15) Given priority to short term parker and Parking on roads should be charged. Provision of parking meters is desirable. Parking lots and on-street lots are (with meters) to display total and real-time available parking spaces.
- 16) Revenue should be used to improve enforcement, security, maintenance and mobility management program that encourage the use of alternative modes and public transport.
- 17) Space for parking lots should be reserve in the master plan.

## 2) For Long Term

- 18) Revenue will be used to develop new parking lots as per demand in the city.
- 19) Multistory parking will be introduced.
- 20) Cross subsidies are given to a citizen.

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