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MINISTRY OF HOUSING AND URBAN AFFAIRS
11th Urban Mobility India Conference & Expo 2018

How parking charge can act as a trigger for managing parking spaces? –A case of C.G.Road, Ahmedabad

Priyangi Panchal

INSTITUTE OF URBAN TRANSPORT (INDIA)

Need for the study

- Rapid increase in ownership of personal vehicle created many parking issues.
- Valuable urban land is being occupied by vehicles when it could have been used for other purposes.
- Even when parking is organized either it is free or cheaply priced and does not reflect the true value of the land.
- Underpriced and free parking encourages extreme automobile dependency, rapid urban sprawl, reduce demand for public transport.
- On street parking has reduced carriage width causing congestion.
- The study addresses on street parking issues with pricing mechanisms.

Objectives:

- To review existing parking condition on C.G.Road.
- To formulate appropriate pricing strategy for managing parking

Literature Review

Parking prices as parking management strategy

- Parking Pricing means that motorists pay directly for using parking facilities.
- Currently parking is provided free, subsidized, or bundled with building purchases, forcing consumers to pay for parking facilities regardless of whether or not they want it.
- Charging for parking leads to both efficiency and equity.
  - Charging based on the amount of time one parks drivers spend less time in the space, so that existing spaces will be more appropriately divided among users, instead of a few drivers occupying spaces for long periods.
  - Equity is ensure as the costs of driving will be borne by drivers, rather than spread across the population as a whole.
- **Thus,** People Park less and for less time, and the supply suddenly increases relative to demand, without the actual supply increasing.

What is right market price?

A few spaces being available in all areas at all times, so that parkers ready to pay the price can be assured of finding a convenient place.

Roth, 1965

The market price should be such that street parking remains15% vacant. Prices would vary by block and by time of day to achieve this occupancy rate.

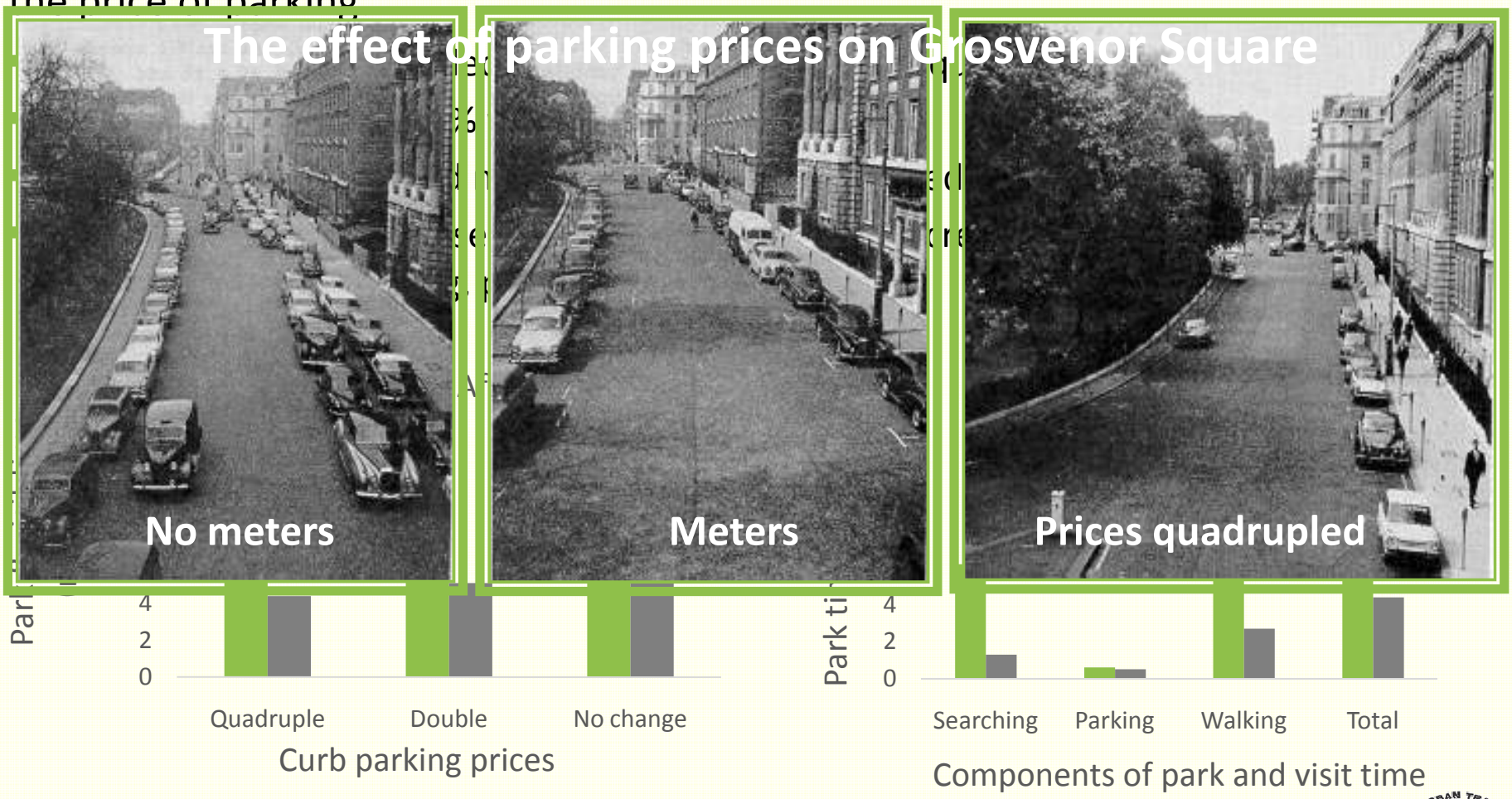
Shoup, 2011

Decide how much traffic we want and then use price to achieve that. In other words do not choose right price for parking instead set the right occupancy rate i.e. 85% and the right price will emerge automatically

Goodwin, 2001

Can pricing really manage parking efficiently?

The research conducted in central London in 1965 shows the success of raising the price of parking

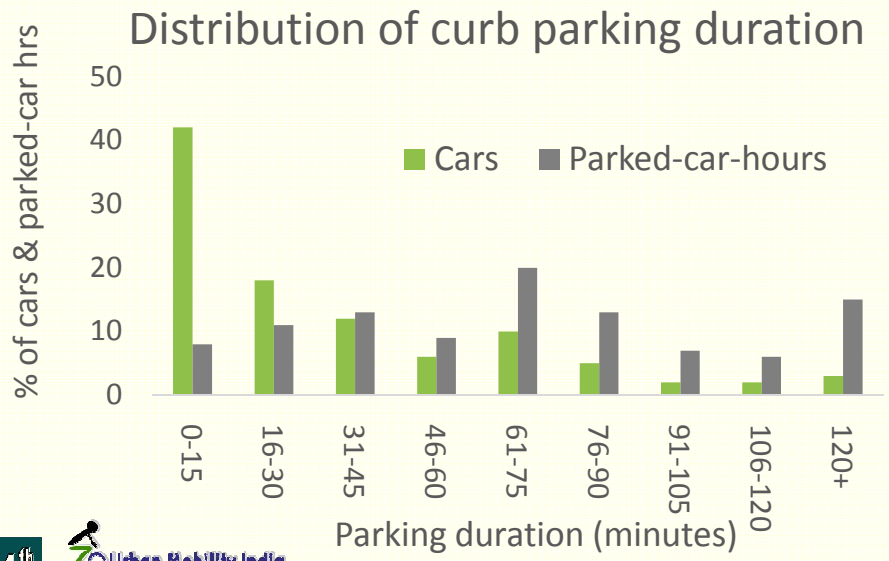


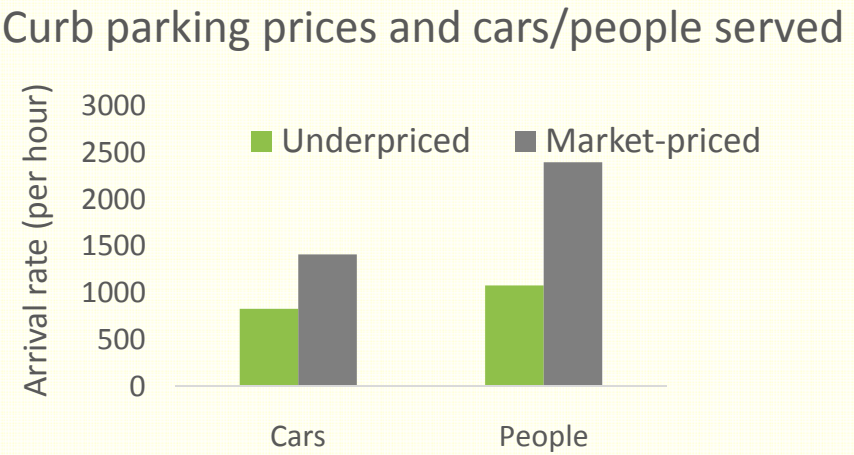
Donald Shoup, The high cost of free parking, Journal of Planning and Education Research, 2005

Raising parking charge serves more people

The study carried on parking duration in Detroit CBD, Hawley Simpson found that

- by raising the price of parking fewer people park, leaving spaces empty for those who need them.
- More people come to the district, but they spend less time.
- The most efficient use of parking is short-term; many parked cars account for few parked-car-hours.
- Thus, there are fewer cars parked, there are more people served by the existing spaces.





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Opportunity cost of parking

All land use bears an opportunity cost

- that is, the space used for parking is space no longer available for other use.
- Construction and maintenance cost of parking cannot be used elsewhere.

Drivers should bear the costs of parking, in terms of both the opportunity cost of the space their cars occupy (that is, the cost of not allowing others to use that space) and the cost of building a parking lot.

How to calculate parking price which includes opportunity cost?

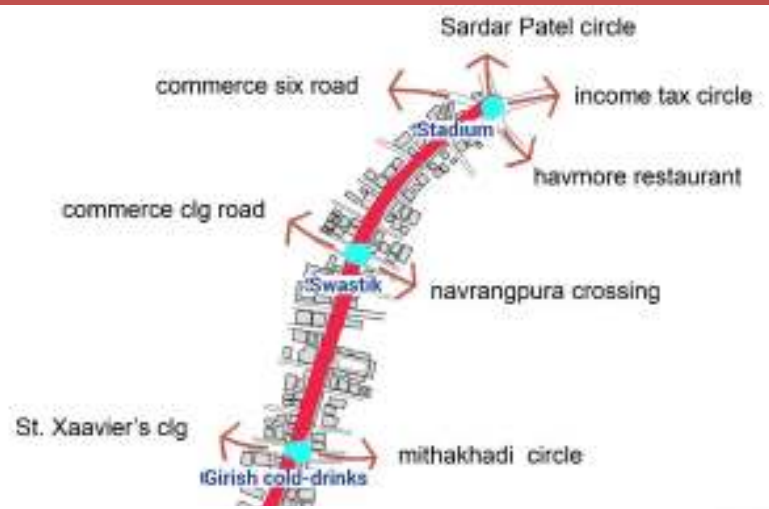
- Calculate opportunity cost by adding land value, construction cost, operation and maintenance cost, environmental and indirect cost.
- Decide the number of years after which you expect the return of the investment
- Divide total cost by number of years and the turnover rate resulting amount will be the price of parking per hour that should be charge for its opportunity cost.

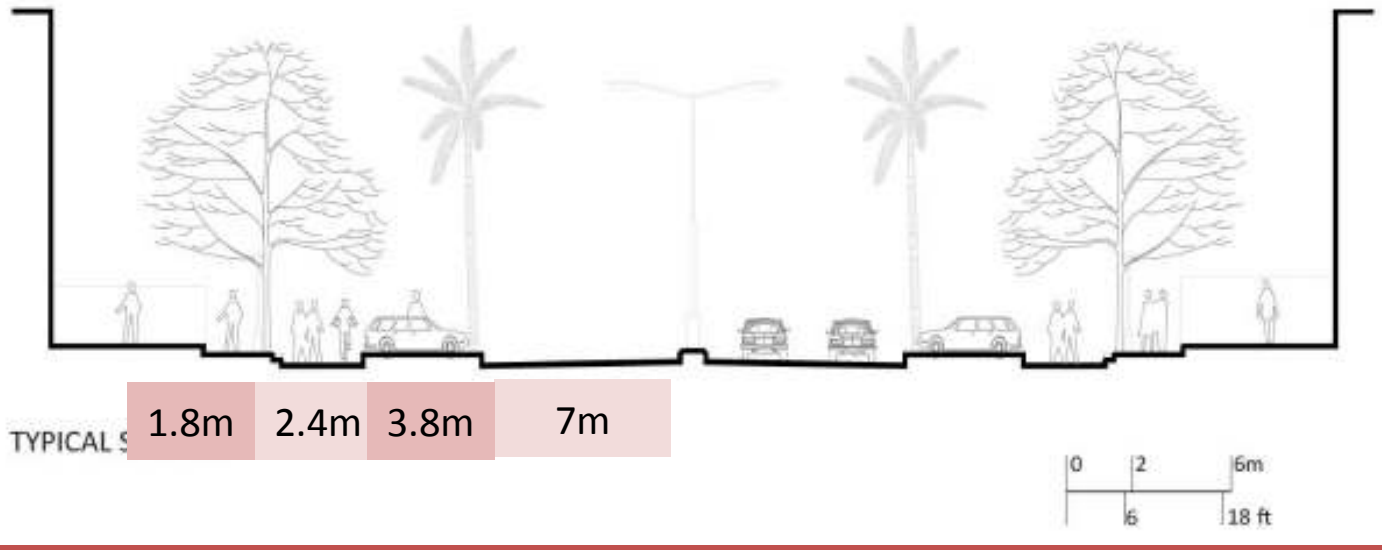
Study area

Chimanlal Girdharlal Road was redesigned in the 1990s

C G Road is a commercial street with retail business dominance.

- Total length 2.6 km
- Starts from Stadium cross roads to Panchvati cross roads.
- Total parking ca
  - Car - 400
  - two wheele
- Row : 30.48 met





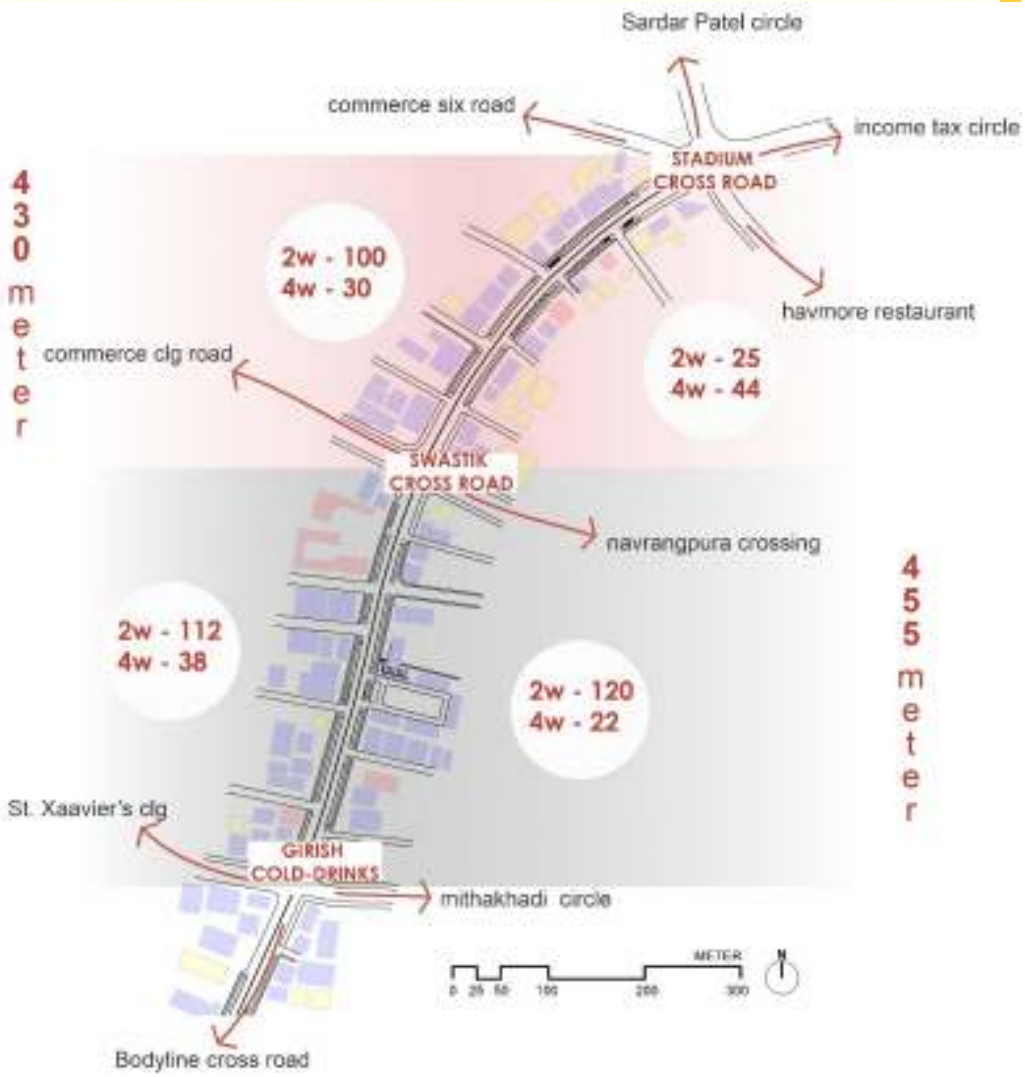
Selected stretch for study

Stadium cross road- girish cold drinks.
Length: **855m**

Type of vehicle	No. of parking space	Capacity (ECS)
Two wheeler	**358**	89
Four wheeler	**130**	130

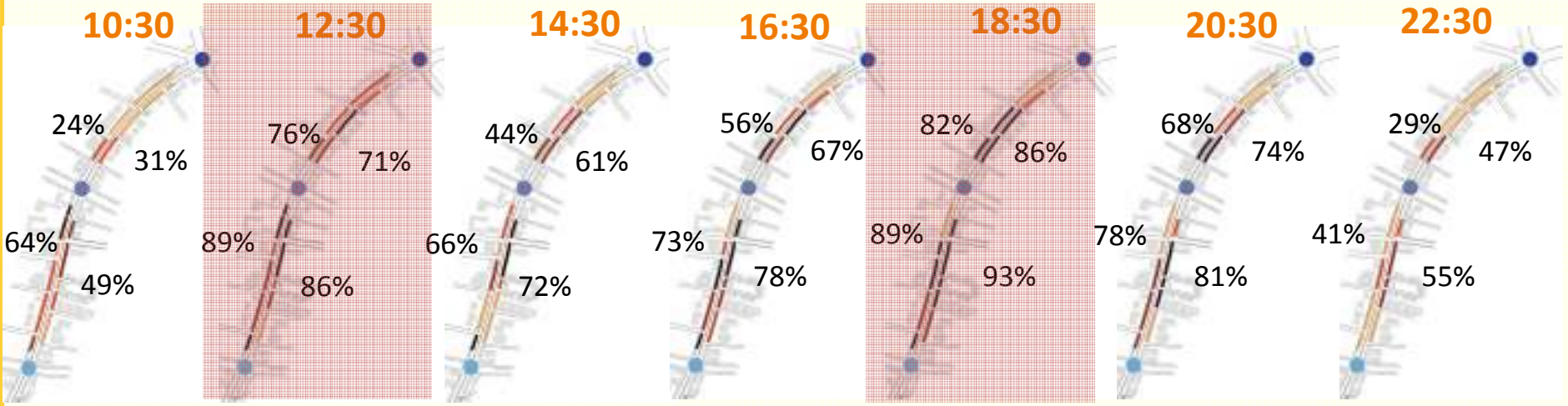
Current parking charge

Type of vehicle	2 hrs	6 hrs	12 hrs	18 hrs
Two wheeler	5	8	10	12
Three wheeler	10	15	18	21
Four wheeler	15	23	28	33



Data collection and handling

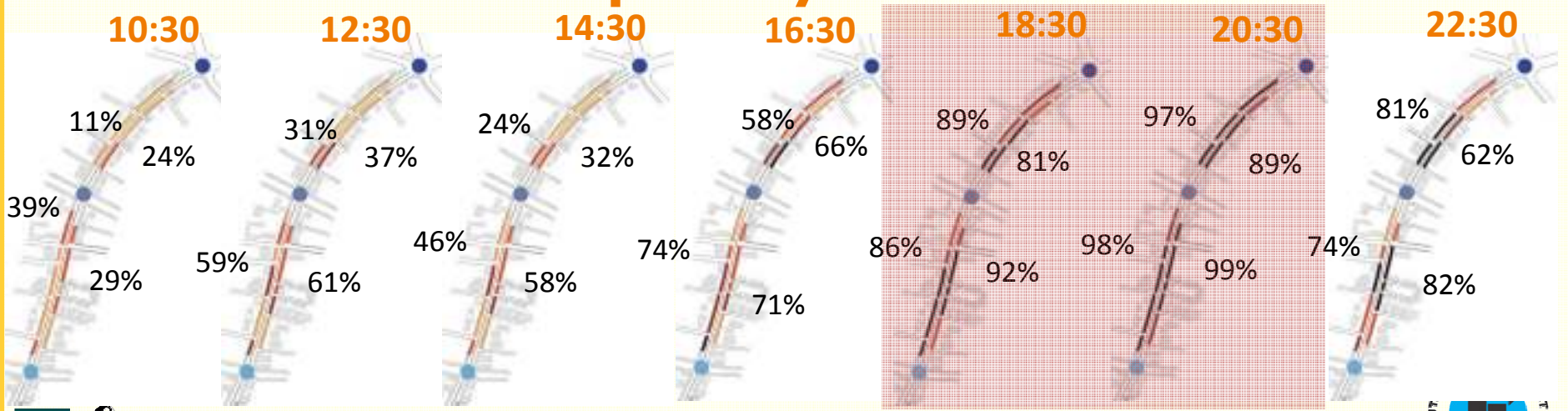
Weekday Occupancy rate



Less than 25%
25-55%
55-85%
More than 85%

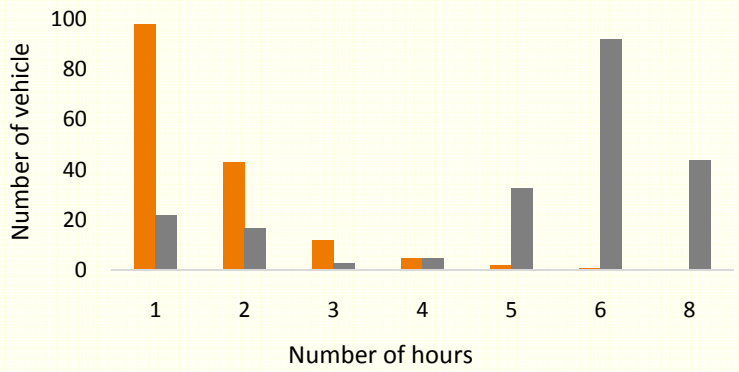
Stadium cross road
Swastik cross road
Girish cold-drinks

Weekend Occupancy rate

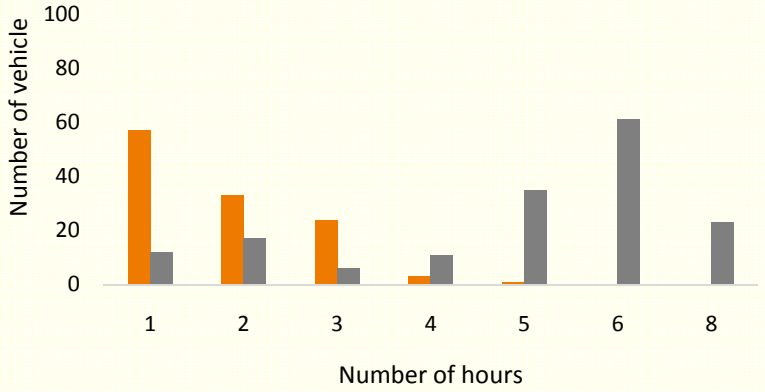


Parking duration

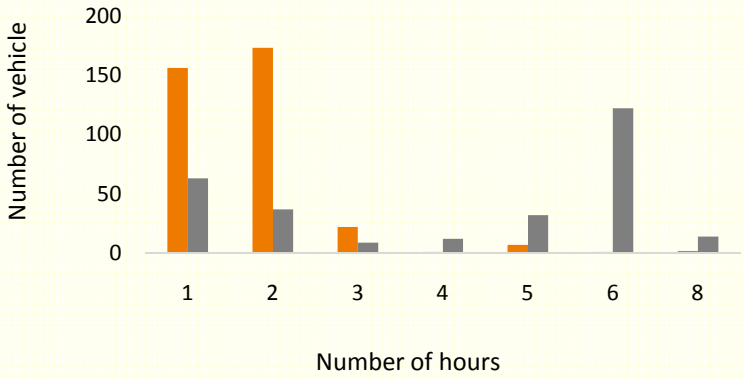
Stadium- Swastik (right side)



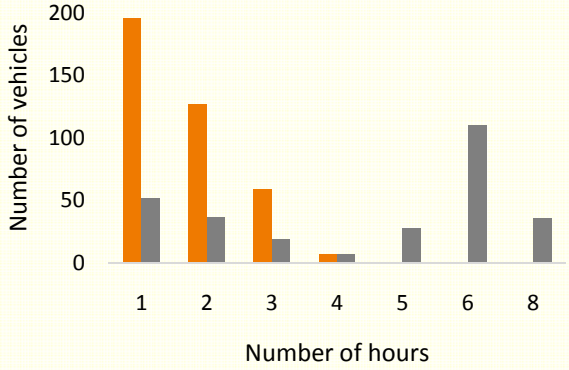
Stadium- Swastik (left side)



Swastik-Girish cold drinks(right)



Swastik-Girish cold drinks (left)



Weekend
Avg. parking duration **1.6 hours**
Recreational trips

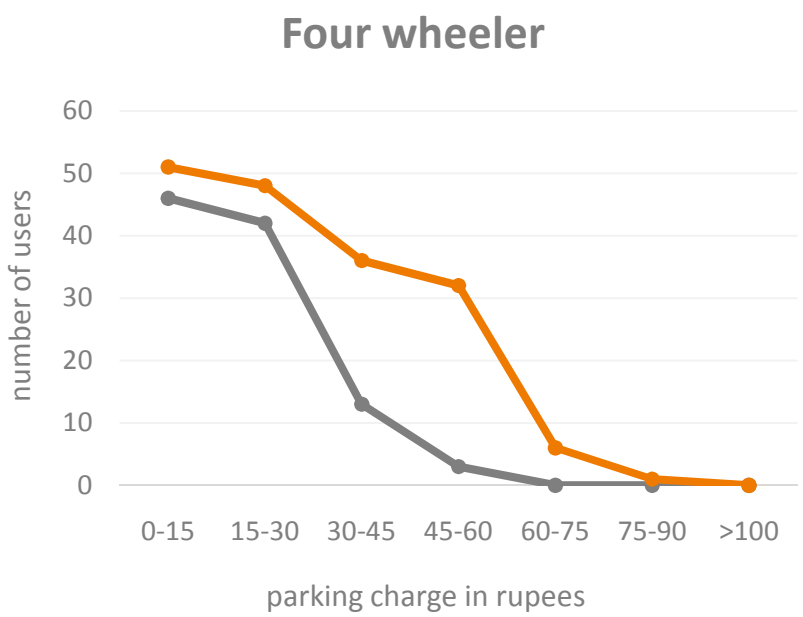
Weekday
Avg. parking duration **4.4 hours**
Work based & social trips

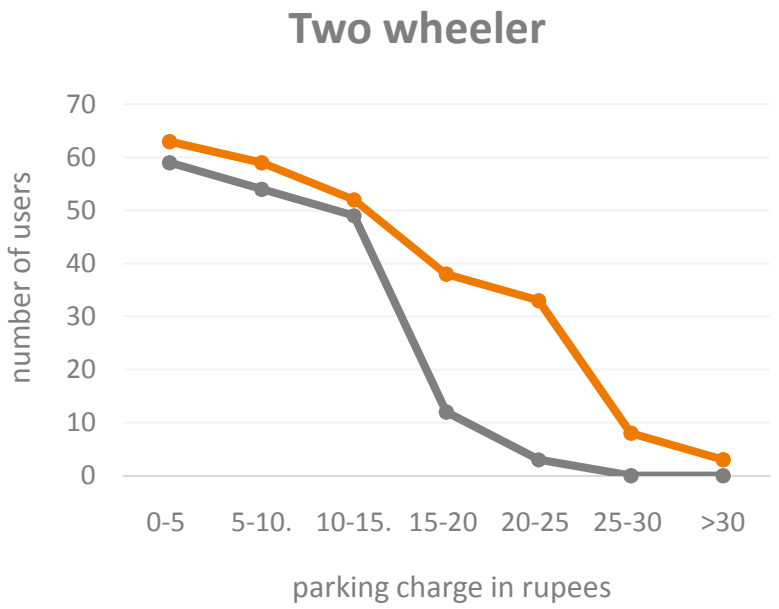
Parking turnover

PEAK		bay 1	bay 2	bay 3	bay 4	bay 5	bay 6	average
stadium -swastik	left	5.1	1.1	3.4	7.1			3.2
	right	6.3	4.8	2.2				4.8
swastik-girish	left	4.1	6.3	5.2	1.6	1.2		6.1
	right	1.3	3.6	8.9	2.4	1.8	1.2	3.7

OFF PEAK		bay 1	bay 2	bay 3	bay 4	bay 5	bay 6	average
stadium -swastik	left	1	0	2.6	2.2			1.5
	right	2	2.5	1.2				1.9
swastik-girish	left	1.8	2.8	1.7	2.4	1.2		2.1
	right	2	2	3.8	4.8	1.9	2	2.8

Willingness to pay for parking charge

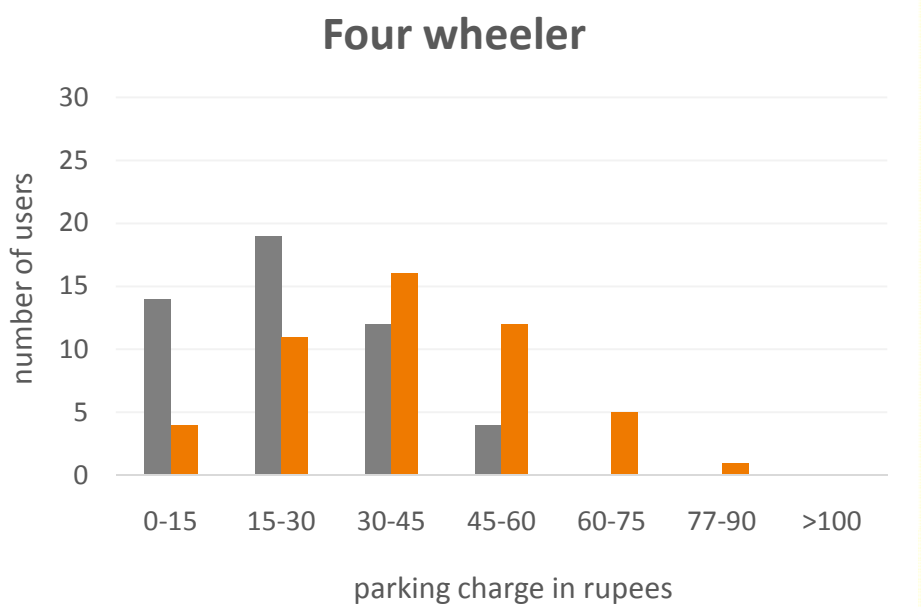


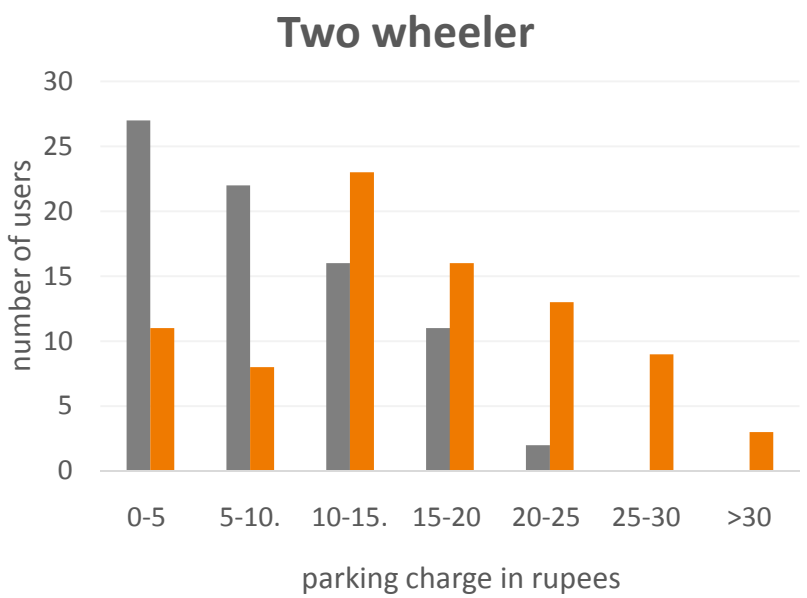


Peak hours
Avg. wtp
4w- Rs. 42
2w- Rs.19

Off-peak hours
Avg. wtp
4w- Rs. 24
2w- Rs. 12

Willingness to pay for parking charge





Weekend **Weekdays**

Price for parking to maintain 15% vacancy

	Two wheeler	Four wheeler
	price	price
Peak	**Rs.15**	**Rs.40**
Off-peak	**Rs.8**	**Rs.20**

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Model to incur true cost of land for parking space

A model is prepared for different scenarios by taking various rates per hour per space for peak and off peak duration in order to know whether the current parking charge are in accordance with the land values and if it is not then what should be the right parking charge to recover the land cost.

Financial feasibility

Four wheeler

Parking Rate per hour Peak / off peak	NPV	IRR
7.5 / 7.5	-1008116	-56%
20 / 10	-746698	-34%
30 / 15	-539797	-21%
40 / 20	-332896	-10%
50 / 25	-125995	2%
60 / 30	90906	13%

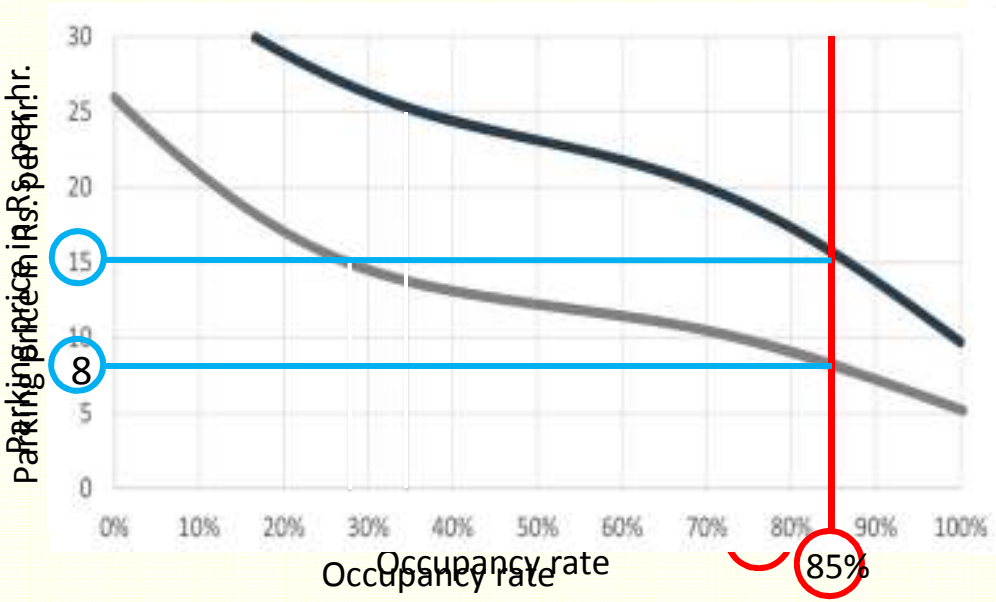
Two wheeler

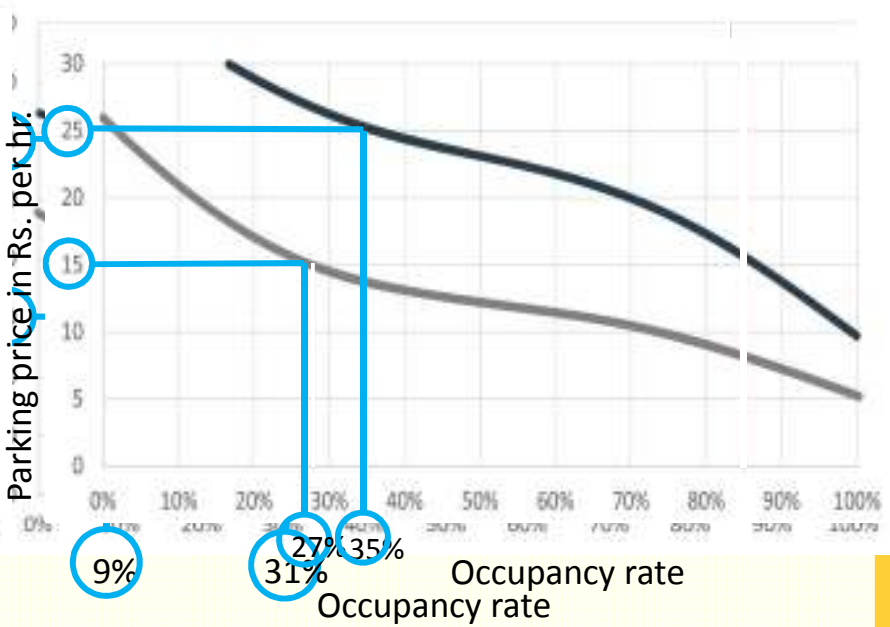
Parking Rate per hour Peak / off peak	NPV	IRR
2.5 / 2.5	-86638	-36%
5 / 2.5	-48469	-12%
10 / 5	-21594	-8%
15 / 8	-9424	3%
20 / 10	76839	8%
25 / 15	181332	14%

Conclusion

Scenario 1

For four wheeler





Demand curve for peak hours

Demand curve for Off-peak hours

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Scenario 2

Occupancy rate	Four wheeler		Two wheeler	
	Peak	Off-peak	Peak	Off-peak
0%	80	50	40	26
10%	60	42	32	21
20%	58	36	28	17
30%	55	30	27	15
40%	55	29	25	13
50%	52	27	23	12
60%	50	25	20	12
70%	47	24	18	10
80%	40	22	16	9
85%	40	20	15	8
90%	35	18	12	5
100%	30	15	10	5

Scenario 3

Four wheeler

Parking Rate per hour Peak / off peak	NPV	IRR
7.5 / 7.5	-518116	-28%
20 / 10	-347628	-13%
30 / 15	-99705	-2%
40 / 20	41603	9%
50 / 25	109287	18%
60 / 30	290906	26%

Two wheeler

Parking Rate per hour Peak / off peak	NPV	IRR
2.5 / 2.5	-41459	-18%
5 / 2.5	-12118	-6%
10 / 5	1087	5%
15 / 8	181332	14%
20 / 10	258931	23%
25 / 15	332410	31%

Future scope

- The research was confined for particular stretch but it can be further continued by studying it in detail by taking large sample size or considering more factors of cash inflow and out flow while calculating NPV.

Thank you!

- Similar study can be done for all the major roads of Ahmedabad where parking is free or under-priced.

- This study can also be clubbed with the study of off-street parking and then a combined parking management strategy can be made for managing parking spaces by using parking charge as a trigger.