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Analysis of Need & Design of Parking Infrastructure in Traffic Prone Areas of Pune City

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Abstract - *In this paper, we describe the need of parking facility in clustered areas of Pune city. Now a day, migration for jobs and business has increased in urban cities causing increment in population of Pune City. This leads to problems in transportation system like traffic jams, increase in pollution, limited space for parking.*

Nowadays there is lot of traffic congestion in the Fergusson College and Shaniwarwada area of Pune city. As the population is increasing day by day in the urban areas the parking facilities does not meet the supply of traffic. There is scarce of parking facilities within colleges, hospitals, commercial buildings, etc. which leads the users to park along roadside creating congestion for other users as well as traffic congestion. The need for parking facilities is essential in such congested areas of Fergusson College, Shaniwarwada, etc. In this paper, the questionnaire survey and detailed analysis of traffic survey and parked vehicle count are carried out to know the seriousness of parking problems in current parking situation and likewise the Proposal and solutions are put forward.

Key Words: **Parking problem, Pune city, Traffic congestion, F.C. Road, Shaniwarwada, Smart parking, Time-Delay, Rotary parking.**

1. INTRODUCTION

Parking management can be defined in a broad sense that it is an effective tool for the local government which helps in reduction of single occupant vehicles and encourages the mass transportation facilities to influence the other aspects of parking supply and demand. We have to develop those places which are under authentic parking zones for the better parking supply and provide the possible way of parking for those places too which are under the tag of non-parking zones

Parking is space for parking a vehicle in". Parking facilities is very essential to avoid congestion of vehicles that are caused by roadside parking of vehicles. The proper parking facilities lead to less consumption of fuel which is caused due to searching for parking space within the campus. If parking facilities are not adequate to accommodate the vehicles causing congestion then it will lead more people to park their vehicles along roadside having various problems like delay in time to reach work, pollution, health issues, increase in temperature within area.

Now a days Pune city is facing serious parking problems as there are scarce of parking facilities to accommodate the vehicles supply which is maximum than the spaces available within college campus for parking.

The objectives for the study are as follows:
1. To learn current condition of available parking system.
2. To identify and detect common parking problems in the available parking facilities.
3. To compare the current condition and put forward a design proposal in the paper for the area which is in dire need of parking.

1.1 LITERATURE REVIEW

The remarkable development of "difficult parking and disorderly parking", which has critical impacts on citizens' quality of life and the running of urban roads (3).Unobtainable of sufficient parking lots at rest areas leads to illegal and unsafe parking at entrance/exit ramps, and other unauthorized areas.(1) It is identified that long-term parking is the key reason causing parking congestion, which is because of unclear function orientations of the parking lots.(2) Recently, application issues with parking detection, reservation guarantee and vehicle to infrastructure(V2I) and Infrastructure to vehicle(I2V) communication reduces driving time ,fuel and cost (5) Multi-level car parking system (MLCPS) is one such technology which is implemented in India. It is used for optimum utilization of parking space by utilizing vertical space rather than horizontal space and G+2+2 basement construction and design based on framed structure (4)

The traffic congestion occurring roads also problem of parking space is the main area of concern in India. To avoid such problems, a lot of new solutions have been formed which help in removing the parking obstacles to good extent. (6)

2. CASE STUDY

2.1 Project information

The Pune Municipal Corporation is the civic body that governs Pune City, the second largest city of Maharashtra. It is in charge of the civic needs and infrastructure of the metropolis, which is spread over an area of 331.26 sq. km. and has 3.4 million residents.

According to newspapers, everyday Pune traffic police department has to take action against illegally parked vehicles near F.C. Road. They run out of jammers due to high amount of haphazardly parked vehicles. Illegal parking on the road has been creating jams every day. On-road parking of vehicles is one of the main reasons behind serious traffic jams in different parts of the Pune city. F.C. road is most heavily traffic volume road of city area of Pune.

It is observed that no demarcations of parking bays were made for the vehicles. Due to heavy flow of traffic it was practically difficult to implement enforcement for illegal parking which resulted in double parking and occupancy of para-transit as well as car commonly featured on both the sides of road.

Image 2: vehicle being towed at FC Road

Chaotic parking automatically reduces the carriage way width which creates conflict and delay to through traffic, apart from congestion problems. Encroachment by the street hawkers as well as illegal parking of vehicles restricted the available stretch of carriage way for through traffic.

2.2 DATA COLLECTION

2.2.1. Determination of area for study

Area of Shaniwarwada and Fergusson College road was decided as both are high traffic prone area. Because these are connected to main areas around and happen to be the important transportation routes of day to day use.

Shaniwarwada Area -Maharshi Annnasaheb Patwardhan Chauk -Jijamata chauk- kasaba peth police chauki

F.C. Road- Chatrapati smabhaji maharaj statue to Swami vivekanand chauk

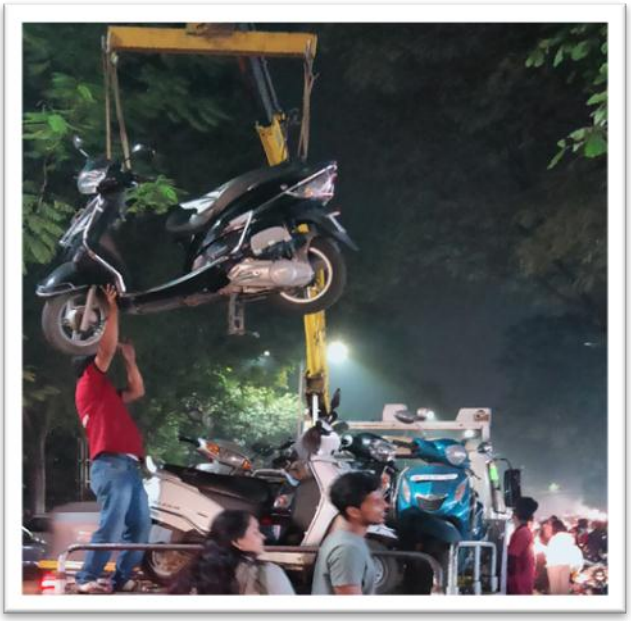
2.2.2 Manual survey of area

Number of vehicles illegally parked

A) Weekdays

Shaniwarwada area - less than 700

F.C. Road – more than 700 to 1000



B) Weekend – Saturday & Sunday

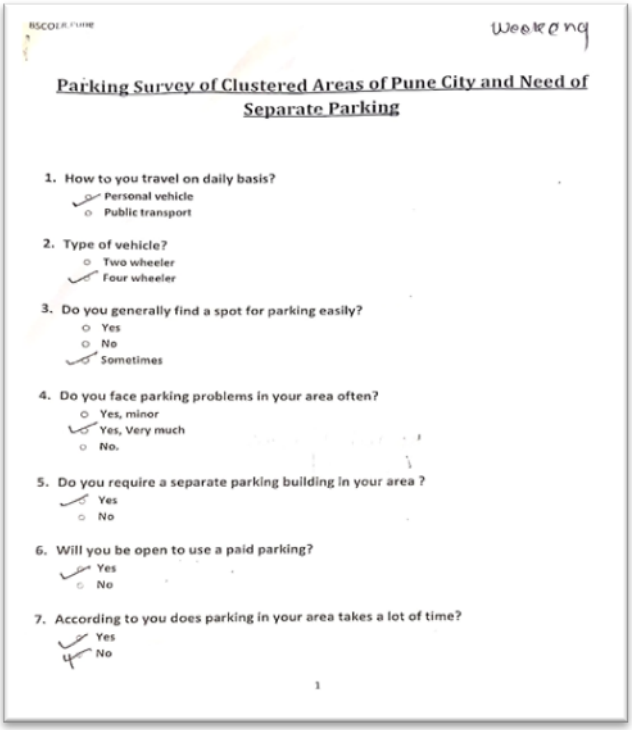
Shaniwarwada – less than 700

F.C. Road – more than 1200 to 1500

C) Exceptional data- Christmas

Shaniwarwada – less than 800

F.C. Road – more than 1500 to 1700



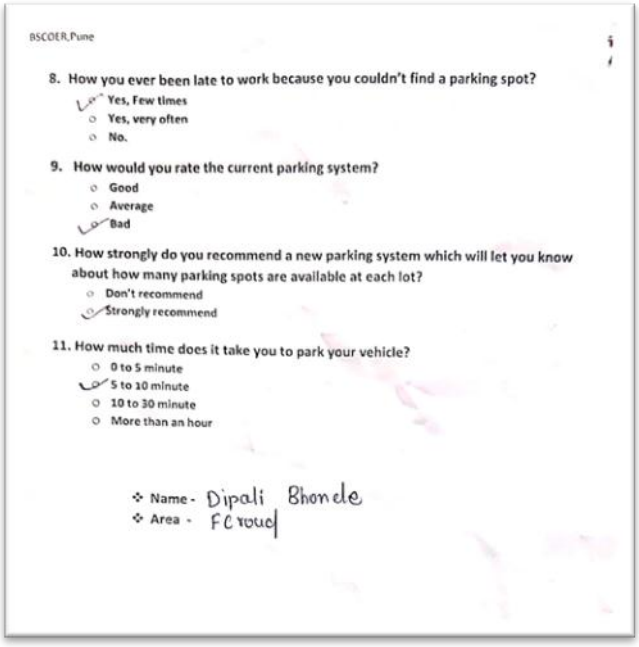
Weekend

Parking Survey of Clustered Areas of Pune City and Need of Separate Parking

1. How to you travel on daily basis?
   - ✓ Personal vehicle
   - ○ Public transport
2. Type of vehicle?
   - ○ Two wheeler
   - ✓ Four wheeler
3. Do you generally find a spot for parking easily?
   - ○ Yes
   - ○ No
   - ✓ Sometimes
4. Do you face parking problems in your area often?
   - ○ Yes, minor
   - ✓ Yes, Very much
   - ○ No.
5. Do you require a separate parking building in your area ?
   - ✓ Yes
   - ○ No
6. Will you be open to use a paid parking?
   - ✓ Yes
   - ○ No
7. According to you does parking in your area takes a lot of time?
   - ✓ Yes
   - ✓ No

1

Image 3: Manual Survey Form Sheet part i



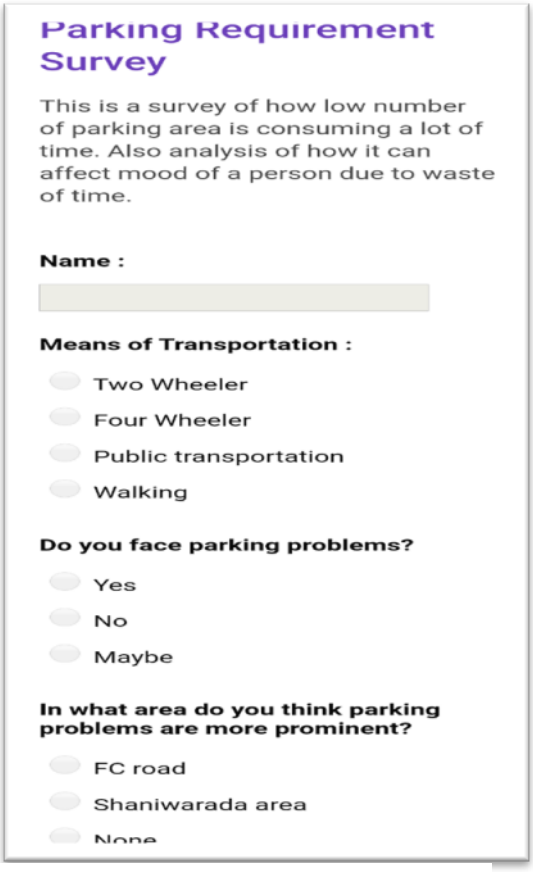
BSCOER,Pune

8. How you ever been late to work because you couldn't find a parking spot?
   - Yes, Few times
   - Yes, very often
   - No.
9. How would you rate the current parking system?
   - Good
   - Average
   - Bad
10. How strongly do you recommend a new parking system which will let you know about how many parking spots are available at each lot?
    - Don't recommend
    - Strongly recommend
11. How much time does it take you to park your vehicle?
    - 0 to 5 minute
    - 5 to 10 minute
    - 10 to 30 minute
    - More than an hour

❖ Name - Dipali Bhonde
❖ Area - FC road

Image 4: Manual Survey Form Sheet Part ii

2.2.3 Google form for survey filled form



Parking Requirement Survey

This is a survey of how low number of parking area is consuming a lot of time. Also analysis of how it can affect mood of a person due to waste of time.

Name :

Means of Transportation :

- Two Wheeler
- Four Wheeler
- Public transportation
- Walking

Do you face parking problems?

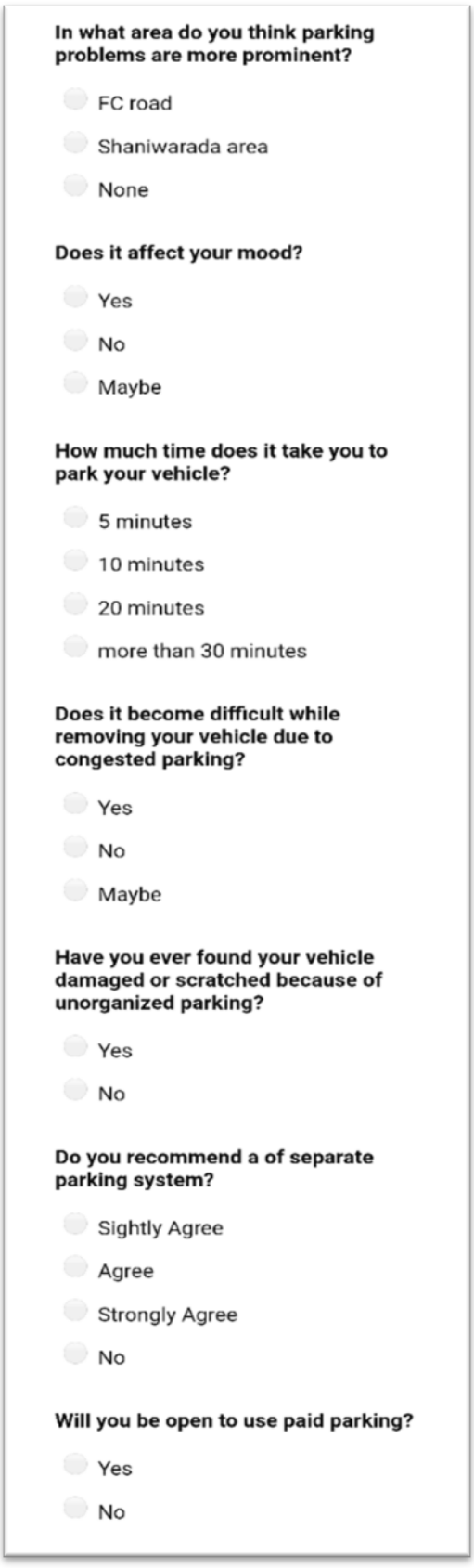
- Yes
- No
- Maybe

In what area do you think parking problems are more prominent?

- FC road
- Shaniwarada area
- None

Image 5 Google Survey Form

Sample of one form is attached for reference:



In what area do you think parking problems are more prominent?

- FC road
- Shaniwarada area
- None

Does it affect your mood?

- Yes
- No
- Maybe

How much time does it take you to park your vehicle?

- 5 minutes
- 10 minutes
- 20 minutes
- more than 30 minutes

Does it become difficult while removing your vehicle due to congested parking?

- Yes
- No
- Maybe

Have you ever found your vehicle damaged or scratched because of unorganized parking?

- Yes
- No

Do you recommend a of separate parking system?

- Sightly Agree
- Agree
- Strongly Agree
- No

Will you be open to use paid parking?

- Yes
- No

Image 6: Google survey form

3. DATA ANALYSIS AND RESULTS

From these survey data we collected via manual survey is as below:

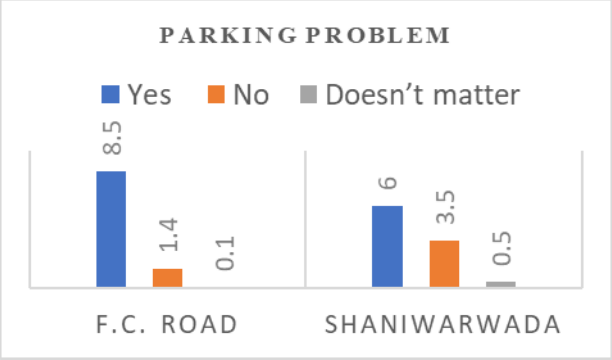
Table 1: Result table for F. C. Road

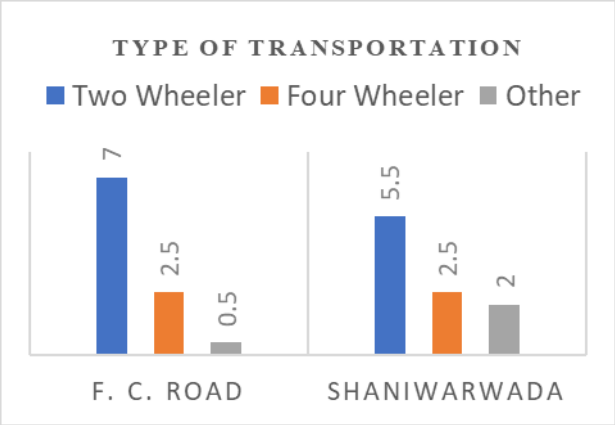
Question	Yes	No
Problem in parking?	93.50%	6.50%
Open to paid parking?	76.00%	24.00%
Is current parking system time consuming?	81.00%	19.00%
Recommend a separate parking infrastructure?	74.88%	25.22%

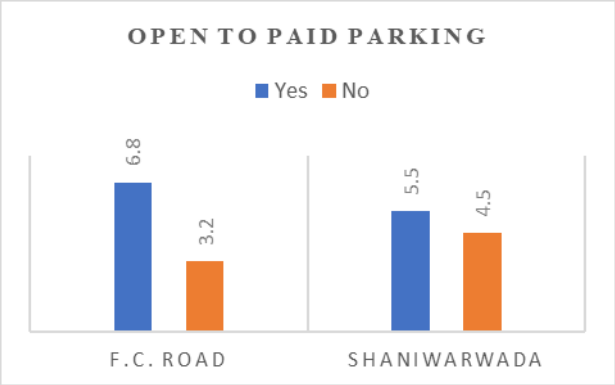
Table 2 Result table for Shaniwarwada

Question	Yes	No
Problem in parking?	83.50%	16.50%
Open to paid parking?	56.00%	44.00%
Is current parking system time consuming?	61.00%	39.00%
Recommend a separate parking infrastructure?	65.88%	24.22%

From these google survey data we collected via manual survey is as below:







From these survey data we can get to the conclusion that between the surveyed areas of city Shaniwarwada and Fergusson college road, FC road is prominent in parking problems. That is why we are going to propose a design model for this area of city.

4. METHODOLOGY

The procedure followed for the analysis of need of parking facility is depicted in methodology of our study.

Manual survey as well as google form was submitted to more than 283 people and common results were considered. Then analysis of data was done using pie charts and percentage calculation.

In future scope of this paper design of parking

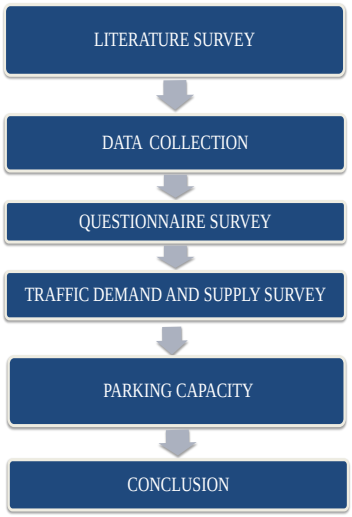


Image 7: Methodology flow chart

5. ROTARY PARKING SYSTEM

The basic problem of space required for parking a vehicle can be solved using smart parking system of parking infrastructure called vertical Rotary parking system. In this system 6 to 12 numbers of cars can be parked in space of two cars. Rotary parking system is easily installed in small area making it easy and efficient environment for clustered areas. Around the busy streets of Pune city installation of Rotary smart parking system seems extremely essential. This will generate revenue from paid parking system and will save time for public as well.

The driver can park in the empty slot then as soon as gets out of the system the car will move up in the vertical rotary movement. It will create a new vacant space for next person. In this way the system will work using smart parking technology using electronics sensors to manage rightful management of parking infrastructure.

That is why installation of rotary parking system will create a efficient and simple parking space for clustered area of the city.

6. PROTOTYPE MODEL

The prototype of project rotary parking system was created to indicate correct functioning of mini rotary parking system. Instruments used were cardboard, tiny motor want to rotate the shaft of the system. The prototype model is worked victimization the system of six cars turned and hunched whenever required victimization put in machineries. This prototype model is straightforward experimental model to check the projected project. It's a simplified version to clarify the conceptualization quickly and cheaply. The prototyping model may be a systems development technique at intervals that a example is formed, tested therefore reworked as necessary until associate applicable outcome is achieved from that the full system or product could also be developed. This model works best in eventualities where not the entire project requirements unit noted well previous time. It's associate unvarying, trial-and-error methodology that takes place between the developers and conjointly the users.

Image 8: Prototype model of parking model

7. CONCLUSION

The area currently has parking around more than 2600 spaces. The current parking space to demand which is including i illegally parked vehicles ratio is much less than 0.5. This means that most parking lots are effectively full during peak parking time period. The development created through the research study depicts parking need within the area, hence parking supplies or demand facilities are necessary. The above analysis shows that there is lack of parking space for 2524 vehicles in the area of F.C. Road. So, there is great need for management of parking system in Pune's popular street like F.C. Road as well as entertainment areas of Shaniwarwada monument. But according to data collected we can conclude that there is higher demand of separate systematically organized parking infrastructure in F.C. Road area.

8. ACKNOWLEDGMENTS

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