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An Analysis of Parking Facilities in Ch. Ranbir Singh OPD PGIMS, Rohtak

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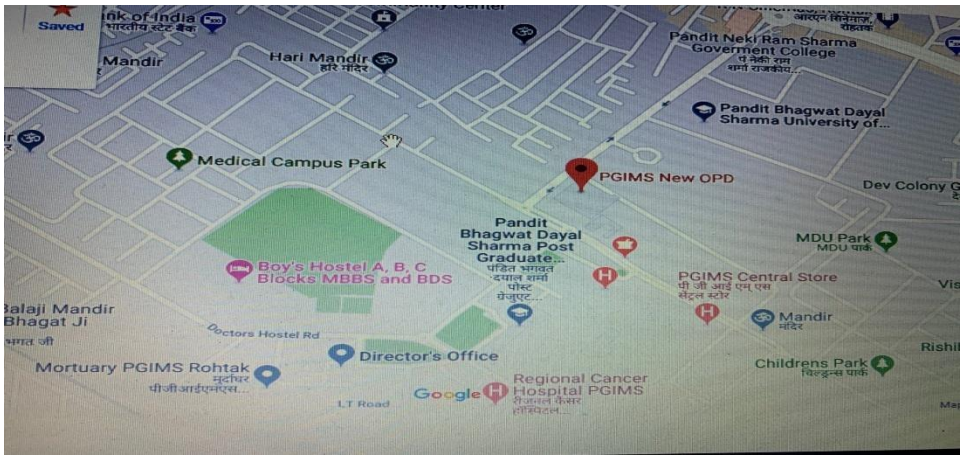
Abstract: Parking System may be defined as the system which provide sufficient parking space. Parking is influenced by the many factors. Rohtak is considered as the heart city of Haryana. It is famous for many things like PGIMS, M.D. University, Film and Television University, IIM and its culture. Rohtak city has developed in recent two decades. The population in urban areas is increasing day by day. It demands the need to provide proper public transportation and sufficient parking facilities. Rohtak has many schools, colleges, universities, private and government hospitals, shopping malls and other offices. Parking system in these areas is the need of hour. But it does not cater to the present need of facilitating a better parking system. as a consequence of this many traffic problems may be aroused such as congestion, delay, more emission of carbon, less space for parking, damage due to congestion in parking area, academic loss of students, wastage of time of patients and their assistants, doctors and other staff members. The oldest and famous institution in Rohtak is PGIMS. It is a single health university in the whole state. There is also wastage of time and extra fuel as the drivers searches proper parking space to park their vehicles. It also disturbs the peaceful environment of the schools, colleges, universities and other educational institutions. It also causes to increase the temperature and environmental pollution which is a great concern for all humanity. In the present investigation, the parking facility at Ch. Ranbir Singh OPD, PGIMS University of Health Science is selected as study area which is facing severe problems of scarcity of the parking facility. In this research paper, the Parking Facilities in Ch. Ranbir Singh OPD PGIMS, Rohtak is analyzed and discussed according to which conclusions are made and key recommendations are given.

Key Words: Public Transport, Management, Parking Congestion and Parking Facilities

1. Introduction: The term parking system can be defined as "Any building, structure, land, right of way, equipment's or facility used or useful in connection with the construction, enlargement, development, maintenance or operation of any area or building for off-street parking of motor vehicles." In this modern era, numbers of vehicles are increasing alarmingly. And this very increasement gives rises to many problems. In these days, 2 wheeler and 4 wheeler car parking waste a lots of time (Out of vehicle cost) and money (In vehicle cost) of the individuals as the drivers takes more time in finding suitable parking spot. Additional causes of congestion in traffic and environmental pollution is lacking the parking facilities. Increasing number of vehicles causes more emission of carbon and more pollution. The quantity of CO^2 emission is larger when the drivers moves round and round in search of the available space to park their vehicles in comparison to the situation when they just entered and parked their vehicles. Rohtak is considered as the heart of Haryana and an educational hub. It has many educational institutions including mainly a film university, Baba Mastnath University, M.D. University and PGIMS university of health sciences. The parking facilities in Rohtak are not properly managed as it has more number of vehicles and the less area is available for parking. This causes many problems related to parking traffic congestion, driver's frustration, delay, accidents, damage, inconvenience and air and sound pollution etc. Parking facilities also depends upon the types of parking (basically either on-street parking or off-street parking).

1.1 Parking Analysis: Parking Analysis can be defined as the analysis conducted in order to determine the total existing demand for parking for an appropriate use. Parking demand should not transcend the total supply of the existing parking spots on a particular site in order to avoid congestion and to maintain free flow of the vehicle with good level of service in major roads, collector streets etc.

1.2 Rohtak City: Rohtak is one of the main cities of Haryana and situated on the National Highway No. 10(Old) which is now renumbered into two: National Highway No. 7 and National Highway No. 9
It is situated 70 kilometers from the Delhi. It falls between 80° 51' north latitude and 76° 38' East longitudes. It lies in the south west part of Haryana. It is one of the districts and administrative headquarters of Haryana. It is 250 kilometers from the state capital-Chandigarh. It is also a part of the national capital region. It is the sixth most populous city in Haryana according to the census 2011 having population of 3,74,292 in which female and male are 176,055 and 198,237 respectively



Map: Rohtak City Map Indicating Location of OPD PGIMS

Ch. Ranbir Singh OPD at PGIMS, Rohtak

1.2.1 Parking System of OPD PGIMS University of Health and Sciences: OPD is the main area of any medical college, hospital and a health university. The OPD in PGIMS University of health and sciences is named after Ch. Ranbir Singh, father of ex. Chief Minister of Haryana Ch. Bhupender Singh Hooda. It is the single university and medical hospital in Haryana. The number of patients, medical representatives and people in PGIMS is above fifty thousand per day. Such visitors came both in private as well as in public transportation. Few years ago it was a paid parking and parking system was managed in a satisfactory manner. But now it was a free parking. Roads are widened and parking area got less in comparison in former parking system. It needed a well-structured parking system in order to cater the need of the daily visitors.

Fig. no. 1: Randomly Parked Vehicles

Fig. no. 2: Congestion at Front Gate Showing Unauthorized Parking

Fig. no. 3 Questionnaire Survey Data Collection at OPD PGIMS

2. Objectives and Scope of Study

- To determine existing parking demand and its characteristics for *Ch. Ranbir Singh OPD, PGIMS Rohtak*
- To resolve and examine existing parking area for *Ch. Ranbir Singh OPD, PGIMS Rohtak*
- To resolve future parking needs.
- To resolve the peak hours of the study area.

3. Literature Review

Mgidange (2014) [8] evaluated, "Improving the Efficiency of Parking Monitoring Systems (On-street Parking) in Jyvaskyla, Finland." This research work aimed to awaken the monitoring bodies to improve parking monitoring methods to arrive at more effective ways of managing the parking lots. The investigator ensured, "All the users of the city's infrastructures benefit and at the same time to improve traffic safety and enhance the city's image. In analyzing the vitality of the parking monitoring methods, existing control methods were studied and improvements proposed. Also new monitoring methods were studied for implementation. This was conducted through interviews/meetings with parking operators and evaluating their opinions, the use of statistical data of the past three years from the parking operators, field visit to some areas together with the wardens to observe how they work as well as their day to day challenges facing them and getting familiar with the tools and equipment they use." This study recommended some improvements in the current methods along with some new methods including improved fine ticketing machines, phone applications, public watch and readers deployed in the parking lots. These methods can give various good results in terms of making monitoring easy, accurate, reducing cheating rate and enriching an honest society.

Kolhar (2016) [6] studied, "Off-street Parking Management Plan for Dharwad City, Karnataka, India." This study tried to evaluate the existing parking facilities in Dharwad. The researcher adopted WTP survey in order to gain the willingness of the respondents to give parking fee for providing new facilities. Special Strategies helpful in parking management in terms of short, medium and long term were discussed when applied. She calculated the proposed parking services, savings and improvement plans. "Parking demand models" are adopted with the help of SPSS software. The investigator recommended short term solution in order to solve problems immediately. She suggested that on street parking has very low operation and

maintenance cost in comparison with off street parking. Internal rate of return is seen high in on street parking. She finally revealed that long term management system such as multi-level parking can be applied in order to cater to the future parking demand.

Bhati and Gill (2018) [4] tried to Study "Various Types of Parking Spaces and Manage Multiple Level Car Parking." They confirmed, "The growing population of India has created many problems one of the challenging ones being car parking which we confront almost every day. Besides the problem of space for cars moving on the road, greater is the problem of space for a parked vehicle considering that private vehicles remain parked for most of their time. While residential projects still escape with designated parking, the real problem lie with commercial spaces many a time which is overcome by taking extra open spaces to park. Multi-level Parking systems for sometime have provided relief since they come with a number of advantages – optimal utilization of space, lower maintenance and operational cost, lower construction cost, secure and environment-friendly nature, comfortable for the drivers, cost saving for builders by saving height or depth. Multiple Level Car Parking Systems are much in vogue a method of automatically parking and retrieving cars that typically use a system of pallets and lifts and signaling devices for retrieval. They serve advantages like safety, saving of space, time and fuel space but also need to have an extra and a very detailed assessment of the parking required, space availability and traffic flow."

4. Methodology

Selection of the Topic: Various topics were analyzed and studied and this topic was selected under the guidance of honorable Supervisor.
Selection of Study Area: Rohtak City, Haryana is taken as the area of study. Parking location that has been selected for the present study is at Ch. Ranbir Singh OPD PGIMS Rohtak
Preparation of a Questionnaire: A questionnaire is prepared and developed in order to get views from the respondents. It included 8 questions regarding problems faced in parking system, mode of transportation, arrival time of respondents, willingness to reduce CO_2 emission, problem faced due to improper parking, views on free or paid parking, views on separate parking for 2 and 4 wheeler and willingness on elevated or ground parking.
Method: Descriptive Survey Method was adopted in the present study.
Tool Used: Self-developed questionnaire was used for data collection.
Sample: A sample of 200 respondents was taken for the present study.
Statistical Technique Used: Percentage is used as Statistical Technique to analyze the data.

Location: Ch. Ranbir Singh OPD, PGIMS, Rohtak
Self-developed questionnaire was adopted regarding the existing parking system at the Ch. Ranbir Singh OPD, PGIMS, Rohtak. It included the questions related to the problems faced by the patients, accompanists of patients, other persons and staff. Their responses were collected and presented in terms of tables and graphs. The respondents were patients and their accompanists (170), staff members (14) and other visitors (16). 96 of the respondents share the ride whereas 104 respondents came alone at the OPD. The data was presented in percentage.

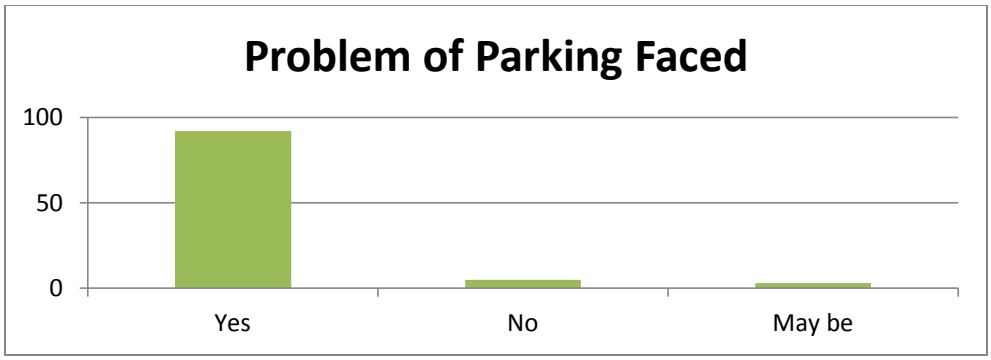
5. Analysis and Discussion of the Results

Q.1: The first question was framed with the aim to know the problems of parking faced by the respondents. The data collected were shown here

Table -1: Showing Problem of Parking Faced

Sr. No	Category	Contribution
1	Yes	92%
2	No	3%
3	Maybe	5%

Table 1 shows the views of the respondents who gave their responses to the problems of parking faced by them. 92 % respondents said that they have faced problems while parking their vehicles. On the other hand only 3% denied that they have not faced any problem while parking their vehicles. 5% responses were fell into the may be category.



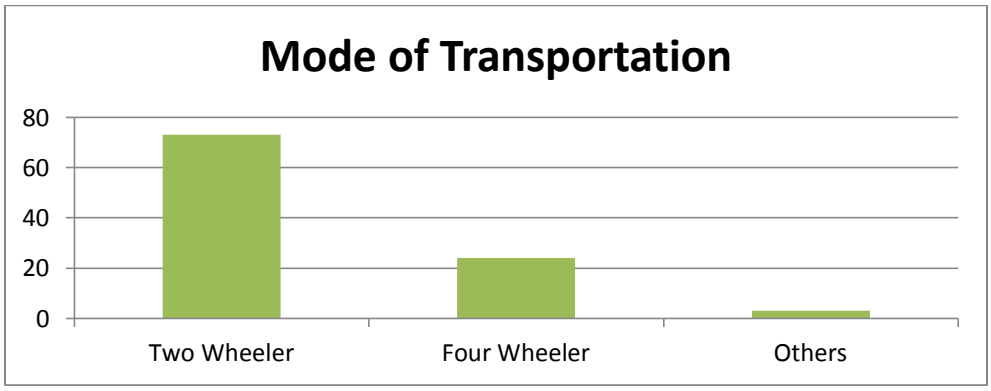
Graph 1: Showing Problem of Parking Faced

Q 2: The second question was prepared to know the mode of transportation adopted of the respondents. The collected data was represented as under:

Table -2: Showing Mode of Transportation

Sr. No	Category	Contribution
1	2 Wheeler	73%
2	4 Wheeler	24%
3	Others	3%

Table 2 shows the mode of transportation adopted by the respondents. 73% respondents said that they used 2 Wheeler and 24 % respondents said that they used 4 Wheeler. The other respondents were only 3%.



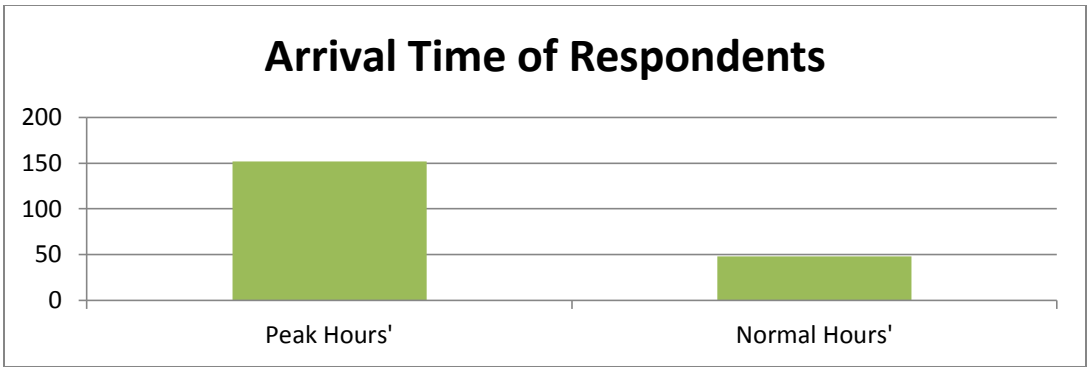
Graph 2: Showing Mode of Transportation

Q. 3: The third question was developed in order to know the arrival time of the respondents. The responses were shown as under:

Table -3: Showing Arrival Time of Respondents

Sr. No	Time	Users
1	Peak Hours'	152
2	Normal Hours'	48

Table 3 shows the arrival time of the respondents. 152 respondents visited in the peak hours while 48 respondents visited in the normal hours. Most of them were Patients and their accompanists who came in the peak hours while staff and others came in both the hours. For analyzing this, the question of mentioning the timing of arrival of respondents is made and through observational approach the peak hours' and normal hours' time is identified. Arrival time of respondents depends upon: timing of OPD of the doctors whom patients are appointed to, uncertain time for emergency ward and regular and fixed work hours for staff according to their shift.



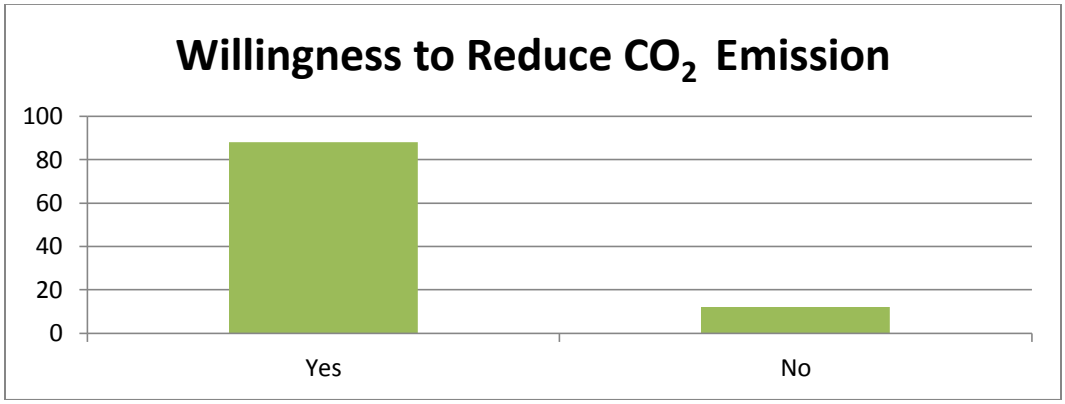
Graph 3: Showing Arrival Time of Respondents

Q. 4: The fourth question was made to know the opinions of the respondents if they want to reduce the CO_2 Emission. The data was collected and presented here:

Table -4: Showing Willingness to Reduce CO_2 Emission

Sr. No	Category	Contribution
1	Yes	88%
2	No	12%

Table 4 shows the views and willingness of the respondents to reduce CO_2 emission. 88% respondents were environmental cautions and ready to reduce CO_2 emission irrespective of their sickness and urgent work. Only 12% of the respondents negatively responded by saying no to reduce CO_2 emission. They have not showed any concern about environmental pollution.



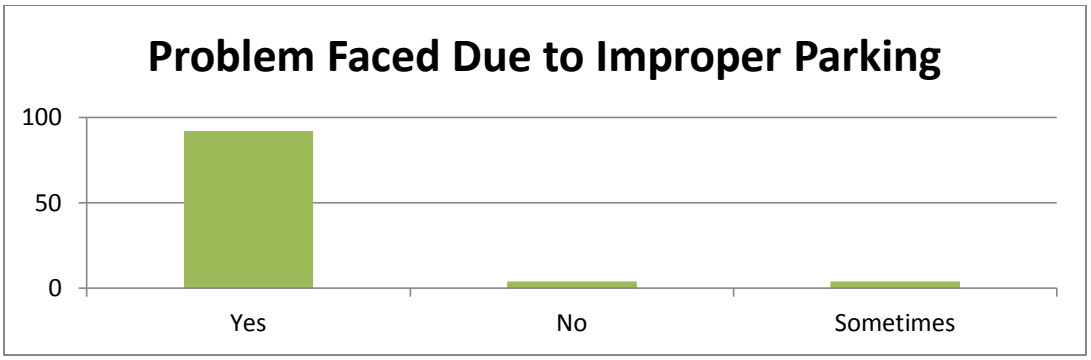
Graph 4: Showing Willingness to Reduce CO_2 Emission

Q. 5: The fifth question was developed to know problems faced by the respondents due to improper parking. The data was collected and presented as under:

Table -5: Showing Problem faced due to Improper Parking

Sr. No	Category	Contribution
1	Yes	92%
2	No	4%
3	Sometimes	4%

Table 5 shows the views of the respondents on the problem faced due to improper parking. They said they have faced congestion, scratching and accidents. 92% respondents said that they faced problem due to the improper parking. Only 4% respondents said that they have not faced any kind of problem while parking. 4% respondents said they sometime faced problem due to improper parking or sometimes not.



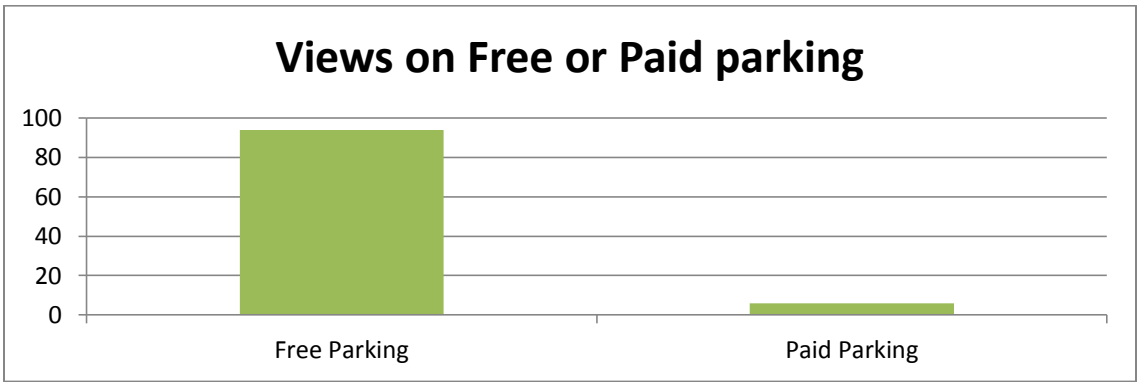
Graph 5: Showing Problem Faced due to Improper Parking

Q. 6: The sixth question was framed with the aim to know the respondents views about free parking or paid parking. The data was collected as shown here:

Table -6: Showing Free or Paid Parking

Sr. No	Category	Contribution
1	Free Parking	94 %
2	Paid Parking	6%

Table 6 shows the views of the respondents on the free and paid parking. Almost respondent about 94% were noticed in favour of free parking and only 6% of the respondents were found in favour of paid parking. They said that paid parking can be best managed and provide systematic parking.



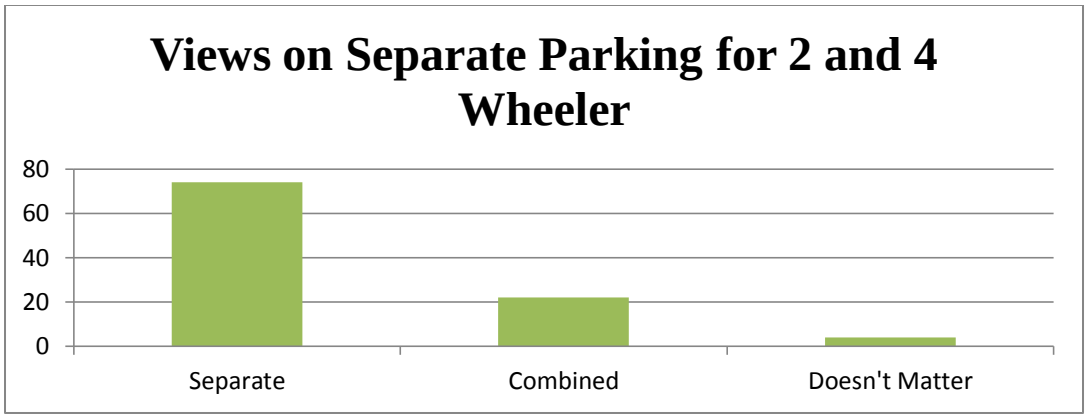
Graph 6: Showing Views on Free or Paid Parking

Q. 7: The seventh question was made to know the views of the respondents' about separate parking for 2 and 4 Wheeler. The data was collected and shown here:

Table -7: Showing Separate Parking for 2 and 4 Wheeler

Sr. No	Category	Contribution
1	Separate	74 %
2	Combined	22%
3.	Doesn't Matter	4%

Table 7 shows the views of the respondents whether they want separate parking for 2 and 4 wheeler. 74% respondents were noticed in favour of separate parking for 2 and 4 wheeler. They said so because they have faced problems due to improper parking. 22% respondents said that they wanted combined parking for 2 and 4 wheeler whereas only 4% respondents opted that it does not matter for them. It seemed that they had sometime faced some sorts of problems and sometimes not.



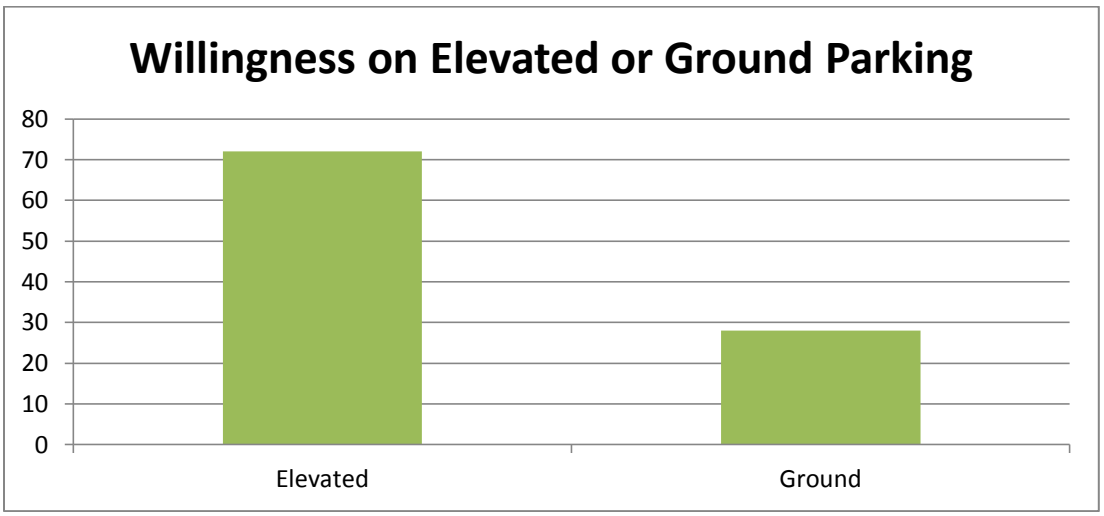
Graph 7: Showing Views on Separate Parking for 2 and 4 Wheelers

Q. 8: The eighth question was prepared to know the views of respondents about the elevated parking facility or underground parking facility. The data was collected and presented here:

Table -8: Showing Elevated or Ground Parking

Sr. No	Category	Contribution
1	Elevated	72%
2	Ground	28%

Table 8 shows the views of the respondents whether they like elevated parking or ground parking. 72% respondents were in favour of elevated parking. They said that it can provide more space and separate parking for 2 and 4 Wheeler. 28 % respondents were in favour of the ground parking system. They considered it more convenient.



Graph 8: Showing Willingness on Elevated or Ground Parking

6. Conclusion: After analyzing and discussing the collected data, certain conclusions are drawn. A large number of the respondents faced the problems of parking. They face problems like scratching, damage, accidents, delays and wastage of time and money. Most of the respondents were willing to reduce CO_2 emission. They showed great concern for environment. In the similar way, most of the respondents were in favour of free parking. There were very few respondents who were in favour of paid parking as they said paid parking can provide effective parking facilities. A large number of respondents showed usage of 2 wheeler and some respondents said usage of 4 wheeler. In 4 wheelers, they mainly used car. A large number of the responses were recorded in favour of elevated parking. After obtaining the results from the above tables and graphs by carrying out the survey which shows a great desire to invent the parking system within the study area. Hence, proper managed system is needed in order to attain objectives related to better parking facilities.

7. Recommendations

Based on the analysis and conclusions some of the key recommendations are:

1. Developers are inspired for 'unbundle' parking and minimum parking requirements should be terminated
2. On- and off-street parking management and charging should be correlated.
3. For on-street parking a price must be charged to safeguard performance standards including occupancy rates to be met.
4. Parking restrictions are to be imposed vigorously and traffic police will need to be authorized to do.
5. On-street parking should be minimized, exclusively on Local and Collector streets in order to prevent traffic congestion.
6. Off street management should be directly put into the account for effective traffic and parking operation.
7. Parking policies should be included into metropolitan transportation plans.
8. Creative parking management should be included in statewide livability initiatives, , air pollution control strategies, congestion management, climate action plans and innovative financing programs
9. Parking and commuter programs that enlarge travel choices for customers and employees must be encouraged.
10. Parking benefit districts should be created in such a way that there the revenue is returned back to the community.
11. Parking technologies that offer policy makers and customers the maximum flexibility should be taken into consideration.
12. Street space from 4 wheelers should be reclaimed for parking for other desired public uses such as sharing of the bike, widened sidewalks, shared spaces and cycling lanes.
13. Due to the non-availability of on-street parking lots, if feasible it is recommendatory to develop a multi-storey parking nearby if there is no enough land available for ground car parking.
14. In specific area, A Detailed Parking Audit can be conducted of land uses and existing buildings by a management team specially established for the same in order to resolve the actual parking demand for the different types of land use and building.
15. Parking facilities which are well coordinated with walking environments and surrounding buildings.
16. Traffic coming from opposite direction specially on one-way streets is generating traffic congestion and making it difficult to park the vehicle on the other side of the road. Restraining them by obtaining fines if they are coming in wrong direction will drastically help in curtailing the traffic congestion.

References

1. https://rohtak.gov.in/
2. Indian Road Congress (IRC 1988), New Delhi Special Publication 12 "Tentative Recommendations On The Provision of Parking Spaces For Urban Areas"
3. Indian Road Congress (IRC 2012), 103-2012 "Guidelines For Pedestrian Facilities", First Revision
4. Bhati, M., and S. Gill (2018), To Study Various Types of Parking Spaces and Manage Multiple Level Car Parking, Conference on Recent Innovations in Emerging Technology & Science.
5. National Building Code (2016) Bureau of Indian Standards (BIS) VOL.1-Part-4-Fire-and-Life-Safety, Annex H, Car Parking Facilities.
6. Kolhar, P., (2016) "Off-street Parking Management Plan for Dharwad City, Karnataka, India", Journal of Engineering Research and Studies, EISSN0976-7916.
7. S.K. Khanna, C.E.G. Justo, A. Veeraragavan. Highway Engineering., Revised 10th Edition
8. Mgidange, V., (2014), Improving the Efficiency of Parking Monitoring Systems (On-street Parking) in Jyvaskyla, Finland, B.Sc. thesis, Logistics Engineering School of Technology, JAMK University of Applied Sciences.