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Analysis for the Need of Parking Management System in Campus of MIT College

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Abstract – *Nowadays, due to increased population in the urban cities, there is continuous need to facilitate public transport and adequate parking facilities. Management of parking facilities in public areas like schools, colleges, hospitals and stations in the city like Pune is very essential. According to current situation, the management of parking facilities does not meet the desired requirements as per survey. In the present research work, we have considered the campus of renowned college of Pune city, facing serious problems of lack of parking facility. This leads to many serious problems like delays parking congestion, unclear orientation of parking lots, more carbon emission from vehicles in campus, academic loss of students due to time wasted in search of parking, disturbing the peace of the campus, increase in temperature and pollution, etc. In this research paper, firstly a parking supply and demand survey was prepared and distributed to 200 participants that include college students and staff members as a part of project, in order to identify the scale of parking problem in college campus. Secondly, current situation and problems of parking are analyzed systematically and thoroughly. Then, the reasons of these problems are find out. Finally, suitable suggestions are put forward.*

Key Words: **traffic supply, demand survey, questionnaire survey, back gate parking**

1. INTRODUCTION

A parking facility is generally 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".

Nowadays two wheeler or car parking steals the most valuable asset every individual has i.e. time. A lot of time is wasted in finding for an available parking space. Lack of parking spaces is an additional source of traffic congestion and pollution. More traffic means more pollution. Vehicle's CO2 emission is higher while you are circling around looking for available parking spot than you could just drive to your spot and park the vehicle.

In urban cities like Pune, the land space available for parking is so much less as compare to the population available and it is very difficult to search parking space which leads to various serious problems. Nowadays due to scarcity of parking facilities vertical parking is preferred instead of horizontal parking which accommodates more number of vehicles in less space available.

1.1 LITERATURE REVIEW

The phenomenon of "difficult parking and disorderly parking", which has serious impacts on citizens' quality of life and the running of urban roads (5).Unavailability of sufficient parking spaces at rest areas results in illegal and unsafe parking at entrance/exit ramps, and other unauthorized areas.(2)

It is found that long-term parking is the key reason causing parking congestion, which is due to unclear function orientations of the parking lots.(1)Car-parking has always been an unresolved issue in most municipal cities. Despite efforts by officials of the relevant government departments to put forth new policies and launch various solution proposals from time to time; followed by aggressive actions in the implementation of improvement action plans, their work seldom yield tangible/visible outcome, and the problem remains.(4)

The traffic on roads and parking space has been an area of concern in majority of Indian cities. To avoid these problems, recently many new technologies have been developed that help in solving the parking problems to a great extent. (6)

Thus, day by day due to rapid increase in population in the cities throughout world, industrialization, infrastructure development etc. leads to increased commercial motor vehicle traffic. The available land area is limited. Therefore, management of parking systems to improve parking characteristics is of great need.

In this paper, we have examined the current scenario of parking system in the college campus of renowned institute, making suggestions to resolve the illegal, long standing, entangled parking issues faced in the indoors.

2. CASE STUDY

2.1 Project information

The college of Maharashtra Institute of Technology situated at Paud Road, Kothrud in Pune is facing serious parking problems due to large admission of students as well as due to huge employment of staff bringing their vehicles to college, as MIT College now became MIT-WPU (World Peace University). The quantity of student's admission also increased so as the staff because of employment.

Due to large number of infrastructure buildings in the campus and lack of parking spaces, people start parking on roadside which creates so much congestion leading to improper traffic flow. MIT college consist of around 150 teaching staff and 250 non-teaching staff and the total number of undergraduate students are around 3640 and postgraduate students are around 400 .

The total area of MIT campus is 15 acres. Campus is situated at 18.519113*N and 73.8159961*E. Comparing this huge area available, there is still scarcity of parking facilities within campus.

Fig no.1: Top view of MIT College

2.2 PROBLEMS IDENTIFIED

The MIT college campus has entrance from only front gate and exit from back gate. This creates congestion at the front gate, as entry to all the institutional buildings like that of MBA, Engineering, Diploma, Commerce, BBA etc. of MIT College only from front gate. There is lack of parking facilities in the campus that is why people park their vehicles roadside which leads to delay in time to reach for the classes , more carbon emission from vehicles in campus, academic loss of students , disturbing the peace of the campus, increase in temperature and pollution, etc. This pollution can cause various dangerous diseases to anyone in the campus. To avoid the parking problems in the campus, management must take necessary actions so as to accommodate all the 2 wheelers and 4 wheelers that get parked along the roadside and will reduce all the tantrums caused because of parking problems.

1. Main entrance parking congestion

Fig. no. 2: congestion at front gate

As all the people are using front gate to approach college instead of back gate which leads to a lot of congestion at front gate area.

2. Action has been taken on illegally parked vehicles of students for violation of laws

Fig. no. 3: fine imposed on students for parking illegally

Fine imposed on the students as well as staff members for parking illegally on roadside

3. Randomly parked vehicles

Fig. no. 4: randomly parked vehicles.

This leads to lots of congestion for taking out vehicles while leaving the college.

4. Parking vehicles at the entrance of garden

Due to insufficient parking facilities, the people start to park their vehicles at the entrance of garden blocking the access to garden.

Fig. no. 5: blocking access to garden.

5. Parking in "No parking" areas

Fig. no. 6: Parking in front of private properties

Parking illegally in front of houses that leads to disturbances and problems for house owners staying nearby college.

6. Current parking capacity and situation at back gate parking

The total area available at back gate parking is 494 sq. mts out of which 156 sq. mts of area is not used for parking. Therefore total parking area available is only 338 sq. mts for 4 wheelers. Thus, there is less accommodation for 4 wheeler parking which leads students and staff members to park their vehicles along roadside.

The following picture depicts the Auto-CAD drawing of the original plan of parking near Back Gate. The parking facility is for both 2-wheelers and 4-wheelers.

The Back Gate parking comprises of 16 4-wheelers parking and 6 2-wheelers parking only at 90 degree angled parking. In the current scenario there is one entry and exit for vehicles to enter and exit for parking creating congestion and unorganized situation. Thus 156 sq. mts of area can be utilized for future parking.

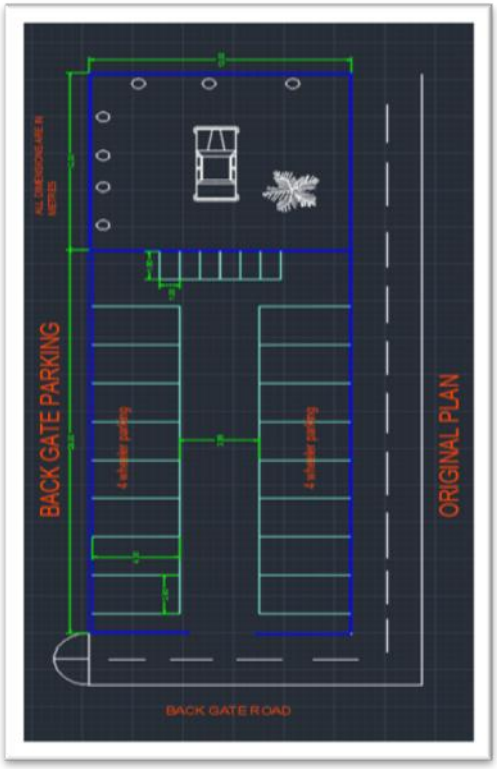

Fig. no. 7: current back gate parking facility.

2.3 METHODOLOGY

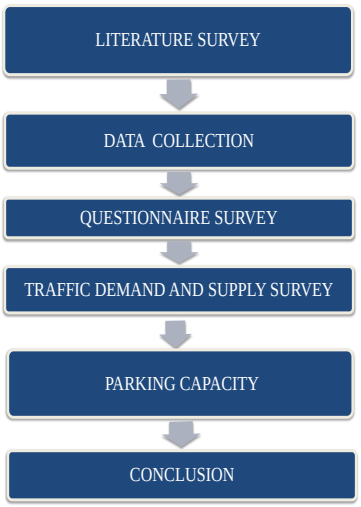

Fig. no. 8: Methodology flow chart

The primary purpose of this research work is to provide recommendation to improve campus parking at MIT. The parking study initially evaluated the existing condition,

determine primarily through reviews of existing students and staff coupled with background material study, limited parking occupancy service. The examination of existing parking conditions provided the foundation from which future parking operations, management and allocation strategies could be developed. To address future needs as well as to improve the utilization and efficiency of existing parking, parking alternative were considered for future scope.

2.4 ANALYSIS

2.4.1. Questionnaire survey

Survey was carried out by making a questionnaire regarding parking problem faced by the students as well as staff, so their responses are recorded and it is represented in pie charts.

A) This question was framed to know the categories of voter for making the survey more efficient.

The total number of responses indicate are as follows;-

Table -1: Survey on voter category

Sr. No	Categories	Contribution
1	Students	97.2%
2	Staff	0.6%
3	Others	2.2%

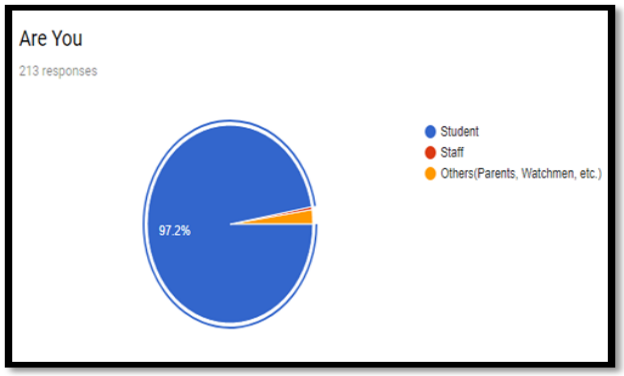

Chart -1: Survey on voter category

B) This question was framed to know about the problems of parking faced by the voters.

The total number of responses indicate are as follows;-

Table -2: Survey on problem of parking faced

Sr. No	Categories	Contribution
1	Yes	88.8%
2	No	4.9%
3	Maybe	6.3%

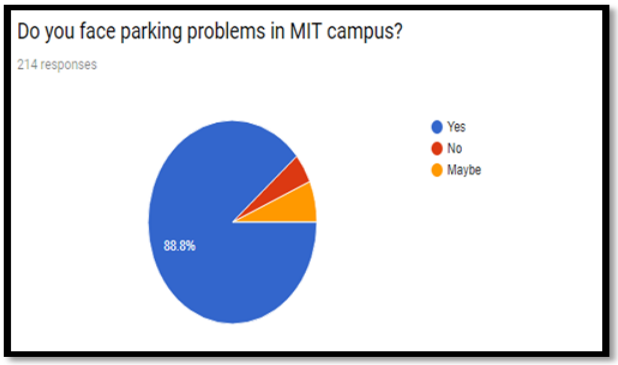

Chart -2: Survey on problem of parking faced

C) This question was framed to know the mode of transportation of the voters.

The total number of responses indicate are as follows;-

Table -3: Survey on mode of transportation

Sr. No	Categories	Contribution
1	Cycle	0.6%
2	2 Wheeler	83.2%
3	4 Wheeler	11.1%
4	Walking	4.6
5	Others	0.5

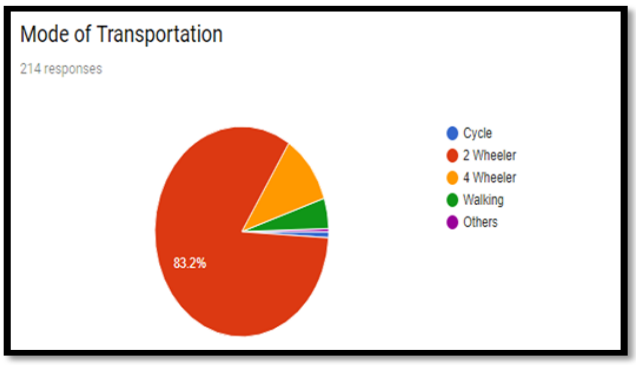

Chart -3: Survey on mode of transportation

D) This question was framed to know the timing of the voters when they reach to college.

The total number of responses indicate are as follows;-

Table -4: Survey on arrival time of voters

Sr. No	Time	Users
1	7 - 7:45 am	58
2	8 - 8:45 am	136
3	9 - 9:45 am	26
4	10 - 10:45 am	34
5	11 - 11:45 am	9

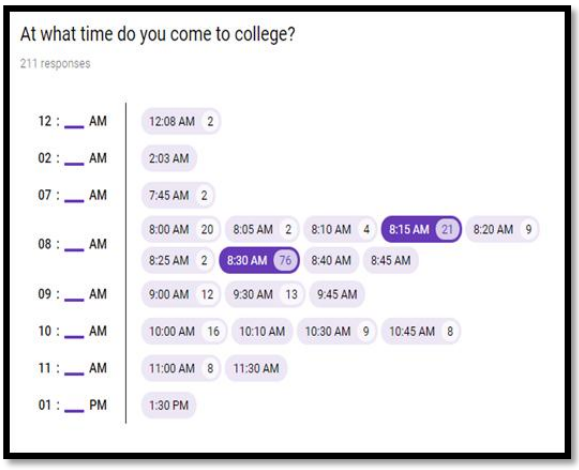

Chart -4: Survey on arrival time of voters

E) This question was framed to know whether the users come alone or by sharing the ride.

The total number of responses indicate are as follows;-

Table -5: Survey on mode of ride

Sr. No	Categories	Contribution
1	Ride sharing	48.4%
2	Alone	56.8%

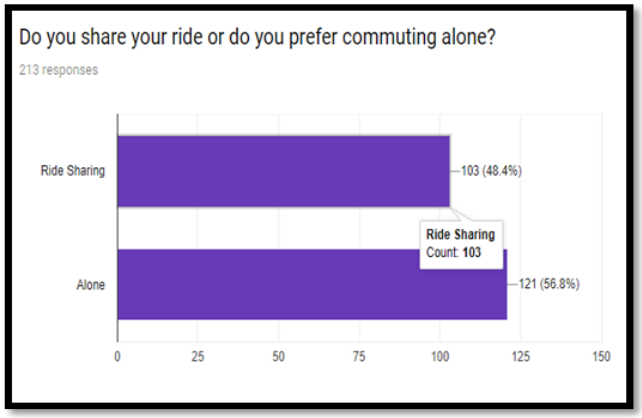

Chart-5: Survey on mode of ride

F) This question was framed to know whether the users want to reduce the CO_2 emission within the campus

The total number of responses indicate are as follows;-

Table -6: Survey on willingness to reduce CO_2 emission

Sr. No	Categories	Contribution
1	Yes	92%
2	No	8%

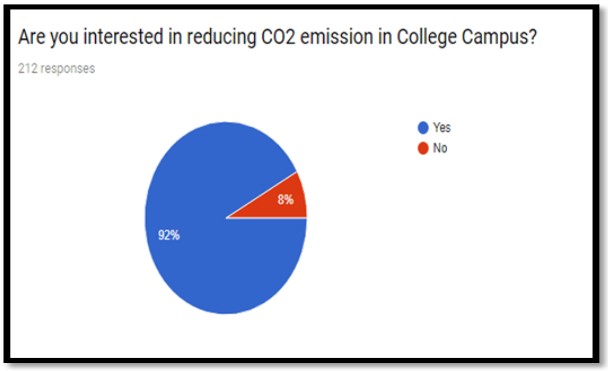

Chart -6: Survey on willingness to reduce CO_2 emission

G) This question was framed to know that how many users faces problems while taking out their vehicles due to improper parking.

The total number of responses indicate are as follows;-

Table -7: Survey on problem faced due to improper parking

Sr. No	Categories	Contribution
1	Yes	75.5%
2	No	7%
3	Sometimes	17.5%

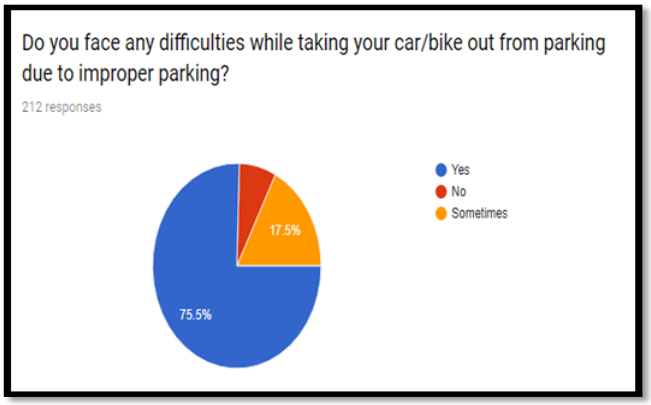

Chart -7: Survey on problem faced due to improper parking

H) This question was framed to know whether the voters are interested to come to college by cycle to reduce CO2 emission

The total number of responses indicate are as follows;-

Table -8: Survey on use of cycle to reduce CO_2 emission

Sr. No	Categories	Contribution
1	Yes	21.2%
2	No	78.8%

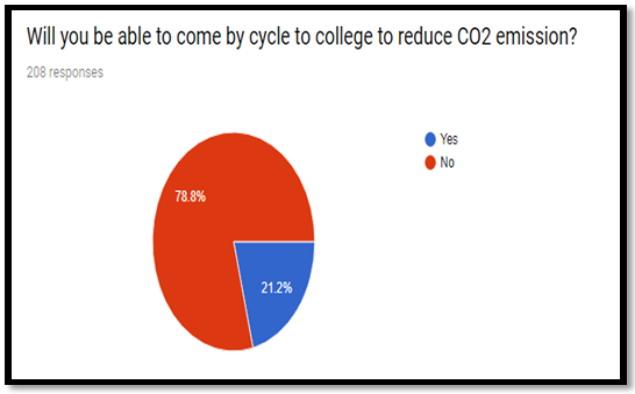

Chart -8: Survey on use of cycle to reduce CO_2 emission

I) This question was framed to know the categories of voters wants elevated parking facility or underground parking facility

The total number of responses indicate are as follows;-

Table -9: Survey on elevated or underground parking

Sr. No	Categories	Contribution
1	Elevated	52.6%
2	Underground	47.4%

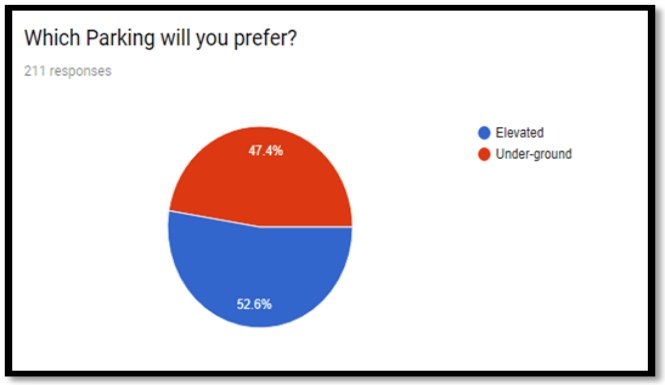

Chart-9: Survey on elevated or underground parking

J) This question was framed to know distance of users from college campus.

The total number of responses indicate are as follows;-

Table -10: Survey on Distance of user from college

Sr. No	Categories	Contribution
1	0 - 2 km	12.2 %
2	2 - 4 km	22.2 %
3	4 - 6 km	16 %
4	6 - 8 km	10.8 %
5	8 - 10 km	10.4%
6	10 - 12 km	7.3%
7	> 12 km	21.1%

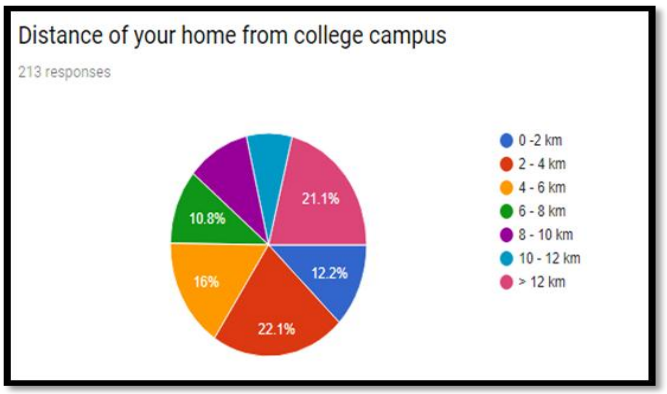

Chart -10: Survey on Distance of user from college

K) This question was framed to whether the users want free parking or paid parking.

Table -11: Survey on Free or paid parking

Sr. No	Categories	Contribution
1	Free parking	98.6%
2	Paid parking	1.4%

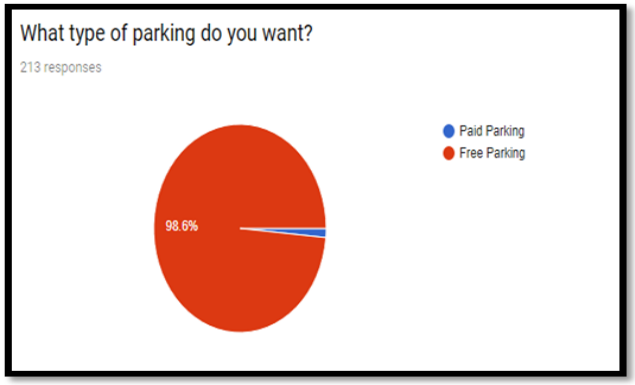

Chart -11: Survey on Free or paid parking

L) This question was framed to know whether the users are interested in using public transport.

The total number of responses indicate are as follows;-

Table -12: Survey on use of public transportation facility

Sr. No	Categories	Contribution
1	Yes	31.8 %
2	No	42.1 %
3	May be	26.2 %

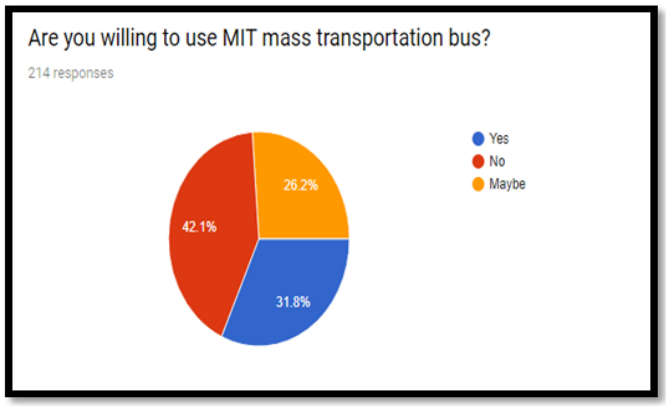

Chart -12: Survey on use of public transportation facility

M) This question was framed to know whether the users know about the Artificial Intelligence.

The total number of responses indicate are as follows;-

Table -13: Survey on knowledge about artificial intelligence

Sr. No	Categories	Contribution
1	Yes	80.3 %
2	No	19.7 %

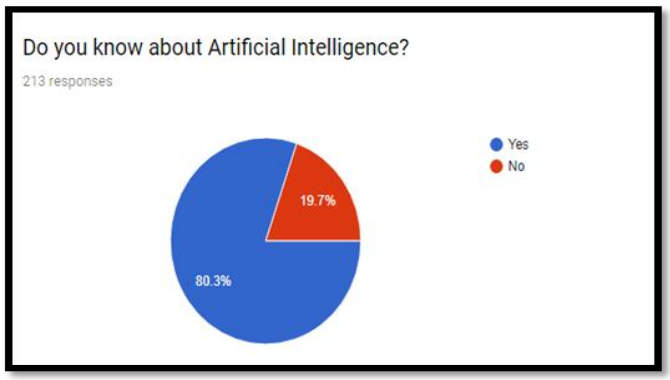

Table -13: Survey on knowledge about artificial intelligence

N) This question was framed to know whether the users want Artificial Intelligence to get implemented in parking facilities or not.

The total number of responses indicate are as follows;-

Table -14: Survey on Artificial Intelligence to get implemented in parking facilities or not.

Sr. No	Categories	Contribution
1	Yes	61.5 %
2	No	7 %
3	Maybe	31.5 %

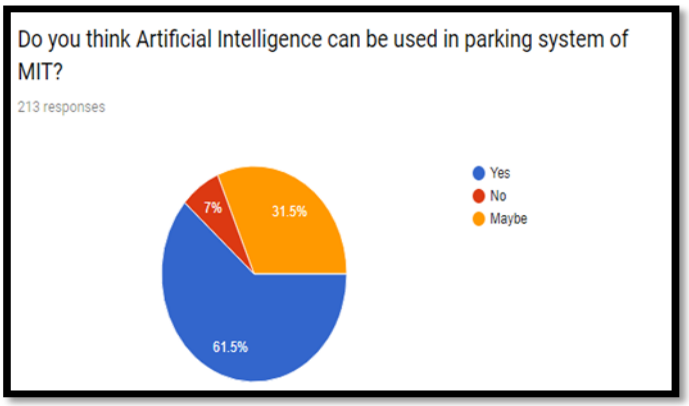

Chart -14: Survey on Artificial Intelligence to get implemented in parking facilities or not.

O) This question was framed to know whether the police had taken action on their vehicles while parking roadside.

Table-15: Survey on police had taken action on their vehicles while parking roadside.

Sr. No	Categories	Contribution
1	Yes	41 %
2	No	59 %

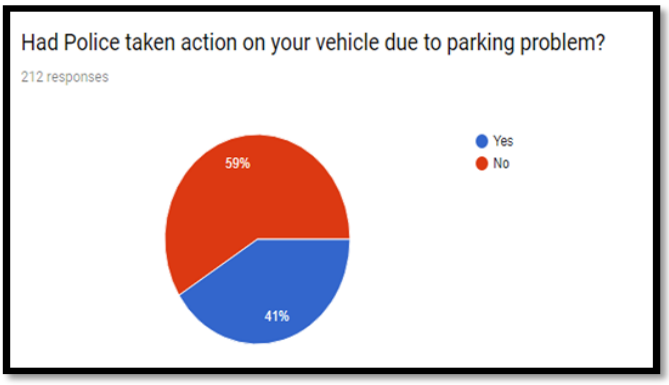

Table-15: Survey on police had taken action on their vehicles while parking roadside.

P) This question was framed to know the user's vehicle got damaged due to improper parking.

The total number of responses indicate are as follows;-

Table-16: Survey on user's vehicle got damaged due to improper parking.

Sr. No	Categories	Contribution
1	Yes	70.8 %
2	No	19.8 %
3	Maybe	9.4 %

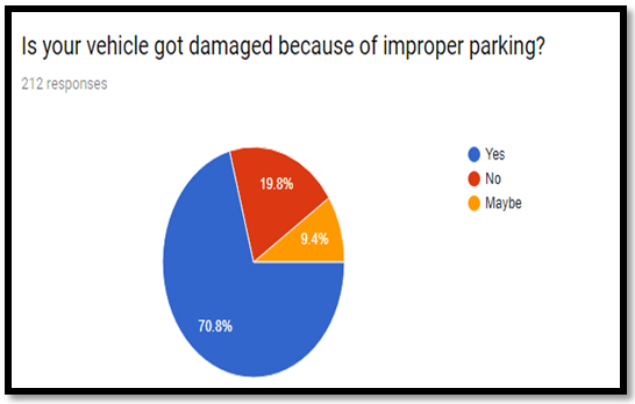

Table-16: Survey on user's vehicle got damaged due to improper parking.

Q) This question was framed to know the categories of voter for making the survey more efficient.

The total number of responses indicate are as follows;-

Table-17: Survey on Location of parking

Sr. No	Categories	Contribution
1	Front Gate	11.4%
2	Back Gate	26.5%
3	Near Globe	19.4%
4	Near your Department	19.4%
5	In front of MIT polytechnic	11.4%
6	Behind MIT Skill Development Building	4.6%
7	Other	7.3%

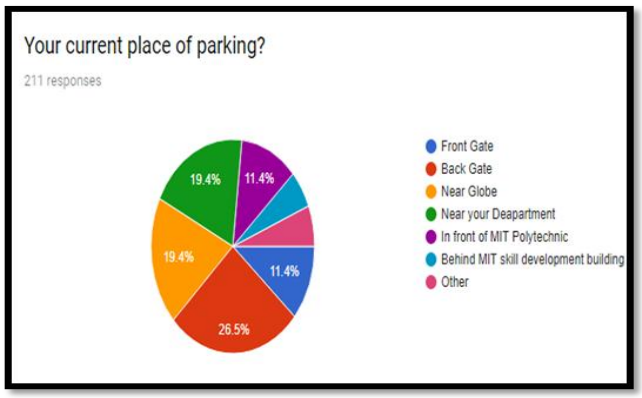

Chart-17: Survey on Location of parking

R) This question was framed to know the categories of voter for making the survey more efficient.

The total number of responses indicate are as follows;-

Table-18: Survey on user get space for parking

Sr. No	Categories	Contribution
1	Yes	5.2 %
2	No	60.2 %
3	Sometimes	34.6 %

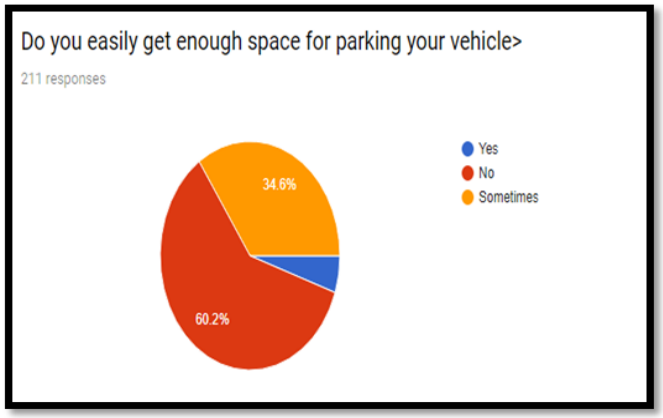

Chart-18: Survey on user get space for parking

These are all the results achieved through the survey conducted which shows a great need to improvise the parking system within the college campus.

2.5 Traffic demand and supply parking survey

Survey for parked vehicle count and parking capacity was carried out on Monday, Tuesday and Wednesday The respective count of particular day were noted in the tabular form. The survey shows that the parked vehicle count was highest on Wednesday during NIRMITEE event conducted by MIT college campus.

The 20 different locations in and around the campus where traffic demand and supply parking survey was carried out for the vehicle count of students and staff of MIT are mentioned in data table.

It can be seen from the above analysis work, majority of the vehicles of students of MIT have been parked on roadside due to lack of parking space available inside the campus.

To avoid the violation of traffic rules as well as traffic Congestion, there is need for organize parking facility which can accommodate more number of required vehicles.

	DATE- 21/03/18	DAY- WEDNESDAY		TIME- 2 pm to 5 pm			
SR. NO	PLACES	BICYCLE	2 WHEELER	AUTORICKSHAW	4 WHEELER	TOTAL	Maximum Capacity
1	MIT FRONT ROAD	8	329	12	35	384	
2	MITFRONT GATE SIDE ROAD		153		15	168	
3	MIT FRONT GATE GROUND			4	62	66	52
4	SARASWATI VISHWA A PARKING	4	769			773	762
5	SARASWATI VISHWA B PARKING -1		281		18	299	250+18= 268
6	SARASWATI VISHWA B PARKING -2	5	373			378	350
7	BEHIND MANAGEMENT BUILDING				63	63	62
8	NEAR CANTEEN(Front gate)	2	288		25	315	250+24= 274
9	OPP. TO CANTEEN	4	221			228	200
10	BEHIND POLYTECHNIC BUILDING		219			219	200
11	LEFT OF GLOBE (ROAD)	18	413		24	455	
12	RIGHT OF GLOBE (ROAD)	6	421		26	453	
13	POLYTECHNIC BUILDING PARKING		159			159	80
14	BACK GATE CAMPUS PARKING		241		32	273	56+24= 80
15	PETROLEUM BUILDING		252		17	259	220
16	CIVIL BUILDING		129		25	154	120
17	MIT COE (ROAD)				26	26	
18	MIT COE PARKING NEAR MITCOE C	4	168		13	178	156
19	MIT CRICKET GROUND						
20	BACK GATE CAMPUS ROAD	2	431	6	45	484	
	TOTAL	53	4847	22	426	5348	2824

Table-19: Traffic demand and supply survey and maximum parking capacity.

SR.NO	DAYS	TIME	TOTAL PARKED VEHICLES COUNT	MAXIMUM PARKING CAPACITY	SURPLUS VEHICLES
1	Monday	9am to 12 pm	4978	2824	2154
		2pm to 5pm	4929		2105
2	Tuesday	9am to 12 pm	5244		2420
		2pm to 5pm	5251		2427
3	Wednesday	9am to 12 pm	5302		2478
		2pm to 5pm	5348		2524

Table-20: Traffic demand and supply survey and maximum parking capacity for Mon, Tues and Wednesday

3. CONCLUSION

The campus currently has parking supply of 2824 spaces to support student enrollment as well as faculty population of approximately 4440. The current campus parking space to campus population ratio is approximately 0.63. This ratio is significantly higher than average ratio of 0.3 which is required for campuses. This means that most core campus parking lots are effectively full during peak parking time period. The development created through the research study depicts parking deficiencies within the area, hence parking supplies or demand strategies are necessary. The above analysis shows that there is lack of parking space for 2524 vehicles in the campus. So, there is great need for management of parking system of renowned college like Maharashtra Institute of technology, Pune.

ACKNOWLEDGEMENT

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