



5. A Study On Evaluating the Feasibility of Implementing Rental E-Scooters in The University of Mumbai, Kalina Campus

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ABSTRACT:

This study investigates the feasibility of introducing rental e-scooters as a sustainable transportation option on a university campus. It examines the interest and readiness of students, faculty, and staff to adopt e-scooters, considering their transportation needs and preferences. The research identifies a strong inclination among stakeholders to use e-scooters, driven by dissatisfaction with current transportation options and their affordability within specified price points. The study evaluates financial viability and regulatory considerations, highlighting potential benefits such as improved campus mobility and reduced environmental impact. Recommendations include piloting the e-scooter program to assess user adoption and operational logistics, alongside infrastructure improvements and safety measures to ensure successful integration into campus life. Overall, the findings indicate that introducing rental e-scooters can effectively address diverse transportation needs within the university community while promoting sustainability and convenience.

KEYWORDS:

E-Scooter, University Campus, Micro-mobility.

1. Introduction:

Micro-mobility encompasses compact, human-powered or electric vehicles tailored for short urban trips. Examples of micro-mobility vehicles include electric scooters, electric bicycles, pedal bicycles and aim to offer convenient, efficient transport for activities like navigating university campuses and city centers.

The implementation of rental e-Scooters in the Kalina Campus of University of Mumbai (henceforth referred to University Campus) is a forward-thinking initiative that could potentially offer numerous benefits to the university community. This feasibility study aims to assess the practicality and viability of introducing e-Scooters as a sustainable and convenient mode of transportation within the campus.

With the increasing emphasis on sustainability and eco-friendly transportation solutions, the adoption of e-Scooters has gained significant traction worldwide. These electric vehicles offer a clean, efficient, and cost-effective alternative to traditional petrol-powered vehicles.

2. Objectives:

1. To understand the satisfaction levels of commuters towards current transportation infrastructure and facilities within the University Campus.
2. To assess the potential demand for rental e-Scooters among students, faculty and staff
3. To evaluate the feasibility of implementing rental e-Scooters in the University Campus

3. Review of Literature:

1. Moosavi, S. M. H. et al., 2022, investigates attitudes towards Shared Free-Floating Electric Scooters among university students and staff, identifying key factors like daily travel habits and age influencing its usage.
2. Chicco, A., & Diana, M. (2022) examine the usage patterns of bike sharing and e-scooter services, highlighting the distinct spatial and temporal dynamics of micro-mobility services in urban settings.

4. Research Methodology:

The feasibility study involves a combination of quantitative and qualitative research methods. Surveys will be conducted to gather data on transportation needs and preferences of commuters travelling to the University of Mumbai, Kalina Campus. Cost analysis will be conducted based on specific price points.

Expected Outcomes: The feasibility study is expected to provide valuable insights into the viability of introducing rental e-Scooters in the University Campus. It will help university authorities make informed decisions regarding the implementation of rental e-Scooters as a sustainable transportation solution.

Significance of the Study: The successful implementation of rental e-Scooters in the University Campus could serve as a model for other campuses and institutions looking to adopt sustainable transportation solutions. It could also contribute to reducing carbon emissions and promoting a greener campus environment.

Methods of Data Collection: Questionnaire method

Sample Size - 22 Respondents

Sample Profile:

- Gender
- Age group
- Occupation / Roles
- Purpose of visit to campus
- Primary mode of transportation
- Satisfaction levels with present mode of transportation within campus
- How much is the current cost of transportation?
- Feasibility of rented e-Scooter

5. Limitations of Study:

1. Since the data collection is confined to commuters travelling exclusively to the University of Mumbai, Kalina Campus, the findings may be specific to this particular campus.
2. The availability and reliability of data related to transportation patterns, user preferences, and infrastructure may vary across campuses.

6. Analysis and Interpretation of Data:

1. To understand the satisfaction towards current transportation infrastructure and facilities within the University Campus.

(H₀): There is no significant difference in satisfaction levels among different age groups regarding the current transportation infrastructure and facilities within the University Campus.

(H₁): There is a significant difference in satisfaction levels among different age groups regarding the current transportation infrastructure and facilities within the University Campus.

ANOVA					
Satisfaction levels with mode of transport within University Campus					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.576	4	2.144	2.247	.079
Within Groups	42.944	45	.954		
Total	51.520	49			

Interpretation: Null hypothesis is accepted .079 level of significance. There is no significant difference between all age groups. Commuters are of the opinion that they are not satisfied with the current mode of transport within the University Campus.

2. To assess the potential demand for rental e-Scooters among students, faculty, staff and commuters.

H₀: There is no significant difference in the willingness to use rental e-scooters among faculties, students and staff.

H₁: There is a significant difference in the willingness to use rental e-scooters among faculties, students and staff.

Roles in Mumbai University * Would you like to commute in University campus using rental e-scooters * Cross tabulation						
			Would you like to commute in University campus using rental e-Scooters			Total
			Yes	No	May be	
Roles in Mumbai University	Faculty	Count	20	1	2	23
		Expected Count	18.9	3.2	.9	23.0
	Student	Count	13	2	0	15
		Expected Count	12.3	2.1	.6	15.0
	Staff	Count	8	4	0	12
		Expected Count	9.8	1.7	.5	12.0
Total		Count	41	7	2	50
		Expected Count	41.0	7.0	2.0	50.0

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.540 ^a	4	.110
Likelihood Ratio	7.987	4	.092
Linear-by-Linear Association	.241	1	.623
N of Valid Cases	50		

a. 6 cells (66.7%) have expected count less than Rs. 5. The minimum expected count is .48.

Interpretation: Since P Value is greater than 0.05 we accept the null hypothesis. Faculties, students and staff are willing to use rented e-Scooters within the University Campus.

3. To evaluate the feasibility of implementing rental e-Scooters in the University Campus

(H₀): There is no significant difference in the willingness to use rental e-scooters among students, faculty, and staff at different cost levels.

(H₁): There is a significant difference in the willingness to use rental e-scooters among students, faculty, and staff at different cost levels.

Role in Mumbai university * Would you consider rented e-scooter to and from University campus? * How much are you willing to spend on rented e-Scooter? Cross tabulation							
How much are you willing to spend on rented E-Scooter			Would you consider rented e-scooter to and from MU campus				Total
			Yes definitely	Yes may be	No probably not	No definitely not	
less than Rs. 5	Role in Mumbai University	Faculty	Count	2			2
			Expected Count	2.0			2.0

Role in Mumbai university * Would you consider rented e-scooter to and from University campus? * How much are you willing to spend on rented e-Scooter? Cross tabulation							
How much are you willing to spend on rented E-Scooter			Would you consider rented e-scooter to and from MU campus				Total
			Yes definitely	Yes may be	No probably not	No definitely not	
Total		Count		2			2
		Expected Count		2.0			2.0
Rs. 5 - 10	Role in Mumbai University	Faculty	Count	1	4		5
			Expected Count	1.7	3.3		5.0
	Staff	Count	2	2		4	
		Expected Count	1.3	2.7		4.0	
	Total		Count	3	6		9
			Expected Count	3.0	6.0		9.0
Rs 10-15	Role in Mumbai University	Faculty	Count	2	0	2	4
			Expected Count	2.2	.9	.9	4.0
	student	Count	6	3	2	11	
		Expected Count	6.1	2.4	2.4	11.0	
	staff	Count	2	1	0	3	
		Expected Count	1.7	.7	.7	3.0	
Total		Count	10	4	4	18	
		Expected Count	10.0	4.0	4.0	18.0	
Rs. 15-20	Role in Mumbai University	Faculty	Count	2	2		4
			Expected Count	2.2	1.8		4.0
	student	Count	2	2		4	
		Expected Count	2.2	1.8		4.0	
	staff	Count	1	0		1	
		Expected Count	.6	.4		1.0	
Total		Count	5	4		9	
		Expected Count	5.0	4.0		9.0	
Rs. 20-25	Role in Mumbai University	Faculty	Count	6		2	8
			Expected Count	6.0		2.0	8.0
	Total		Count	6		2	8

Role in Mumbai university * Would you consider rented e-scooter to and from University campus? * How much are you willing to spend on rented e-Scooter? Cross tabulation								
How much are you willing to spend on rented E-Scooter			Would you consider rented e-scooter to and from MU campus				Total	
			Yes definitely	Yes may be	No probably not	No definitely not		
		Expected Count	6.0			2.0	8.0	
Rs. 25 above	Role in Mumbai University	staff	Count	2		2	4	
		Expected Count	2.0		2.0	4.0		
	Total		Count	2		2	4	
	Expected Count		2.0		2.0	4.0		
Total	Role in Mumbai University	Faculty	Count	11	8	2	2	23
			Expected Count	12.0	7.4	2.8	.9	23.0
	Student	Count	8	5	2	0	15	
		Expected Count	7.8	4.8	1.8	.6	15.0	
	Staff	Count	7	3	2	0	12	
		Expected Count	6.2	3.8	1.4	.5	12.0	
	Total		Count	26	16	6	2	50
	Expected Count		26.0	16.0	6.0	2.0	50.0	

Chi-Square Tests						
How much are you willing to spend on rented e-scooter		Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
less than Rs. 5	Pearson Chi-Square	. ^b				
	N of Valid Cases	2				
Rs. 5 - 10	Pearson Chi-Square	.900 ^c	1	.343		
	Continuity Correction ^d	.056	1	.813		
	Likelihood Ratio	.908	1	.341		
	Fisher's Exact Test				.524	.405
	Linear-by-Linear Association	.800	1	.371		
	Pearson Chi-Square	9				
Rs 10-15	Pearson Chi-Square	3.409 ^e	4	.492		
	Likelihood Ratio	4.568	4	.335		
	Linear-by-Linear Association	1.111	1	.292		
	N of Valid Cases	18				

Chi-Square Tests						
How much are you willing to spend on rented e-scooter		Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Rs. 15-20	Pearson Chi-Square	.900 ^f	2	.638		
	Likelihood Ratio	1.275	2	.529		
	Linear-by-Linear Association	.400	1	.527		
	N of Valid Cases	9				
Rs. 20-25	Pearson Chi-Square	. ^g				
	N of Valid Cases	8				
Rs. 25 above	Pearson Chi-Square	. ^g				
	N of Valid Cases	4				
Total	Pearson Chi-Square	3.220 ^a	6	.781		
	Likelihood Ratio	3.988	6	.678		
	Linear-by-Linear Association	.534	1	.465		
	N of Valid Cases	50				

Willingness and Cost affordability

Classification Table ^{a,b}					
	Observed	Predicted			
		Would you like to commute in University campus using e-scooter		Percentage Correct	
		Yes	No		
Step 0	would you like to commute in University campus using e-scooter	Yes	41	0	100.0
		No	9	0	.0
	Overall Percentage				82.0
a. Constant is included in the model.					
b. The cut value is .500					

Variables in the Equation							
	B	S.E.	Wald	df	Sig.	Exp(B)	
Step 0	Constant	-1.516	.368	16.969	1	.000	.220

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	.038	1	.846
	Block	.038	1	.846
	Model	.038	1	.846

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	How much are you willing to spend on rented e-scooter?	.056	.285	.038	1	.846	1.057
	Constant	-1.711	1.074	2.540	1	.111	.181
a. Variable(s) entered on step 1: How much willing to spend on rented e-scooter.							

Interpretation: Willingness to use rented e-scooters in campus of Mumbai university and it is affordable considering the willingness of commuters.

□ $\text{Exp}(\mathbf{B}) = 1.057$

□ This indicates that the odds of willingness to use e-scooters are approximately 1.057 times higher for certain groups compared to the reference group.

□ $\text{Exp}(\mathbf{B}) = 0.181$

□ This indicates that for each unit increase in cost level, the odds of willingness to use e-scooters decrease by approximately 81.9% (since $1 - 0.181 = 0.819$).

Above table shows higher willingness of commuters if cost is Rs. 5-10 and it will decrease by 81.90% for next level increase in cost.

7. Findings and Conclusion:

1. The findings indicate that commuters are not satisfied with the current transportation options available within the University Campus.
2. There is substantial interest among students, faculty and staff at the University of Mumbai, Kalina Campus for implementing rental e-scooters as a convenient mode of intra-campus transportation.
3. Based on the findings, introducing rental e-scooters on the university campus is a viable option due to the expressed willingness of students, faculty and staff, as well as the affordability related to specified cost levels, effectively meeting their transportation needs.

Suggestions:

1. Rental e-scooters can provide a cost-effective, environmentally friendly, and convenient transportation option that enhances mobility across University campuses.
2. Pilot programs can be implemented to test user adoption, operational logistics and infrastructure readiness.
3. Collaborations can be initiated with local authorities, campus stakeholders and e-scooter rental companies to establish partnerships and regulatory frameworks.

Scope for Further Research:

1. The detailed financial feasibility of implementing and maintaining the e-Scooter fleet can be explored.
2. Identification of potential challenges and risks associated with the implementation of e-Scooters can be analysed.
3. A comprehensive plan for the successful integration of e-Scooters into the campus environment can be developed.

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9. Annexure:

Questionnaire:

Sr. no	Questions	Options	Options
1	Age	Below 18 to 64	65 and above
2	Gender	Male, Female	Prefer not to say
3	Role in University of Mumbai, Kalina campus or affiliated colleges	Students, Faculty, Staff	Other
4	Please indicate the purpose of your visit to University of Mumbai, Kalina campus	Admission, Examinations, Lectures,	Research training, administration, support staff
5	What is your primary mode of transportation within the University campus?	Walking , Cycling, Public transport (bus)	Personal fleet, Taxi, Auto
6	How satisfied are you with the frequency of transportation modes within the Mumbai University campus?	1-very satisfied	5-Very dissatisfied
7	How satisfied are you with your current mode of transportation?	1-very satisfied	5-Very dissatisfied
8	How much do you spend on transportation to and from the campus per day visit? (in INR)	Rs. 0-5	Rs. 25 and above
9	Would you consider using Rented e-scooters as a mode of transportation to and from the campus?	Yes definitely	No definitely not

Sr. no	Questions	Options	Options
10	What factors would influence your decision to use rented e-scooters on campus? (Check all that apply)	Cost effectiveness, Availability,	Convenience ,Safety
11	On a scale of 1 to 5, where 1 is "Not at all affordable" and 5 is "Very affordable," how would you rate the affordability of transportation to and from the University of Mumbai Kalina campus using existing modes?	1 is "Not at all affordable"	5 is "Very affordable,"
12	Would you prefer commuting within the university campus using rented e-scooters for mobility?	Yes	No, may be
13	How much are you willing to spend per trip for mobility within the University campus? (in INR)	Rs. 0-5	Rs. 25 and above
14	Do you have any concerns or reservations about implementing rented e-scooters on the University campus? If yes, please specify.	—	—
15	Please share any additional comments or suggestions regarding the implementation of rented e-scooters on the University campus.	—	—