

# A Cost-Benefit Analysis of Electric Vehicles vs. Traditional Fuel Vehicles: Consumer Perspectives from Nagpur

Ms. Seema Ashok Kohad

Department of Commerce and Management

Assistant Professor,

Dr. S. C. Gulhane Prerna College of Commerce, Science & Arts, Nagpur, MS (INDIA).

## ABSTRACT

The purpose of this study is to evaluate and compare from the perspective of Nagpur city's consumers, 50 respondents with experience with both vehicle types provided data for the study, which is restricted to moped riders in urban areas only. The cost-effectiveness of electric and traditional fuel two-wheelers. In this research the study of various cost-related factors such as purchase price, maintenance, fuel or charging cost, resale value, and government incentives were analyzed using a structured questionnaire. While electric vehicles are appreciated for lower running and maintenance costs, concerns remain regarding their high initial price and resale value. The majority of users acknowledge the benefits of EVs and are willing to recommend them to others. The study concluded that, despite certain drawbacks, electric two-wheelers are thought to be more economical in the long run. This research provides valuable insights for policymakers and manufacturers aiming to promote EV adoption in urban regions like Nagpur.

**Keywords:** Eclectic Two Wheeler, Traditional Fuel Two-Wheeler, Consumer Perception, Purchase Price analysis, fuel/charging costs, long -run economic benefit, EV-affordability.

## INTRODUCTION

Electric vehicles (EVs) have become a viable substitute for conventional fuel-powered vehicles due to growing concerns about rising fuel prices, environmental damage, and the need for sustainable transportation. To encourage the use of electric vehicles, especially in metropolitan areas, the Indian government has implemented a number of laws and incentives. However, consumer perception and acceptability are crucial to this shift's success.

This research focuses specifically on two-wheeler vehicles—more precisely, mopeds—since they are among the most popular forms of transportation in Nagpur and other Indian cities. Due to their low cost, ease of use, and fuel efficiency, two-wheelers are very popular. Customers are becoming more interested in and concerned about electric mopeds' affordability in comparison

to traditional gasoline-powered mopeds since they have entered the market.

The core of this study is a cost-benefit analysis that contrasts the financial advantages of electric and Traditional fuel-powered mopeds from the viewpoint of the consumer. It assesses things like resale value, fuel or charging costs, maintenance costs, purchase price, and government subsidies. The survey also looks at whether users think electric mopeds are more cost-effective in long run and whether they would suggest them to friends. This study attempts to shed light on the real advantages and constraints of EV adoption in the two-wheeler market by examining the experiences and opinions of users in Nagpur city. The results are meant to help politicians, automakers, and prospective consumers make well-informed choices on the use of electric vehicles.

## NEED AND IMPORTANCE OF THE STUDY

Rising fuel prices and growing environmental concerns have increased the need to evaluate economical and sustainable transportation alternatives. Consumers in Nagpur often face confusion when choosing between electric and traditional fuel vehicles due to limited city-specific information. This study helps in understanding the actual costs and benefits of both vehicle types, provides insights for policymakers to improve EV infrastructure and awareness, assists automobile manufacturers in identifying consumer expectations, and contributes academically by offering a localized cost–benefit analysis from a consumer perspective.

### **Problem Statement**

The topic of this research is to study the cost–benefit aspects of electric and traditional fuel vehicles from the perspective of consumers in Nagpur, who face uncertainty due to differences in costs, benefits, and infrastructure.

### **Scope of the Study**

The study is limited to Nagpur city and focuses on consumers who own or intend to purchase electric or traditional fuel vehicles. It presents a comparative cost–benefit analysis of electric and petrol/diesel vehicles, covering both two-wheelers and four-wheelers used for personal purposes. The study considers key cost factors such as purchase price, running and maintenance costs, and government incentives, along with benefits like convenience, environmental impact, and long-term savings. The research is based on consumer perception and satisfaction, using primary survey data and secondary sources.

### **Limitations of Research**

1. Research is limited to Nagpur Urban City only.
2. This research is limited to Two-wheeler vehicles only.
3. Research is limited to 50 samples only.
4. The Research is limited to comparing the Cost of Electric vehicles and Traditional fuel vehicles of Two Wheeler only.
5. This research is limited to moped only.

### **Research Objectives:**

- To analyze the total cost of electric vehicles (EVs) compared to traditional fuel vehicles
- To understand consumer perceptions about the cost of purchasing, resale value, maintaining and operating electric two-wheelers versus traditional fuel vehicles.
- To explore consumers' willingness to recommend EVs to friends or family members based on their cost–benefit experience.

### **Hypothesis**

H0: Electric vehicles are not cheaper to use than traditional fuel vehicles.

H1: Electric vehicles are cheaper to use than traditional fuel vehicles.

### **Literature Review**

Electric vehicles (EVs) are increasingly viewed as a sustainable alternative to traditional petrol and diesel vehicles due to rising fuel prices and environmental concerns. A study by Singh and Verma (2018) revealed that although electric vehicles involve higher initial purchase costs,

they offer significant long-term savings through reduced fuel and maintenance expenses. Their research emphasized the importance of analyzing total cost of ownership while comparing EVs with conventional vehicles.

Kumar et al. (2019) examined consumer attitudes toward electric vehicles in urban India and found that operating cost efficiency and environmental benefits positively influence purchase intention. However, limited charging infrastructure and lack of awareness were identified as major obstacles to widespread adoption.

A comparative analysis conducted by Sharma and Gupta (2020) highlighted that electric vehicles outperform traditional fuel vehicles in terms of running cost and emissions. Despite these advantages, consumers continue to prefer conventional vehicles due to established refueling infrastructure and convenience.

Focusing on Maharashtra, Patil (2021) studied consumer perception toward electric vehicles and concluded that government subsidies, tax incentives, and rising fuel prices significantly improve the cost-benefit perception of EVs among middle-income consumers. The study stressed the need for region-specific awareness programs.

In a study on Tier-II cities, Joshi and Kulkarni (2022) found that consumers increasingly consider long-term savings, maintenance costs, and resale value before purchasing a vehicle. The research suggested that cost-benefit analysis plays a crucial role in consumer decision-making.

More recently, Rao (2023) analyzed consumer satisfaction with electric vehicles and reported high satisfaction levels due to lower maintenance and operational costs. However, concerns regarding battery replacement costs and charging availability continue to influence consumer acceptance.

## **Research Methodology**

### **Research Design**

This study adopts a **comparative and descriptive research design** to analyze the cost efficiency of electric two-wheelers and traditional fuel-powered two-wheelers in Nagpur City for the period 2024-2025. The research follows a **quantitative approach**, utilizing both primary and secondary data sources to ensure a comprehensive evaluation of the economic and lifecycle cost aspects of the two vehicle types.

### **Sources of Data**

#### **Primary Data**

To gather primary data, a **survey-based methodology** will be employed, targeting owners and users of electric and fuel-powered two-wheelers in Nagpur. The survey will collect data on key cost parameters such as initial purchase cost, maintenance expenses, charging or fuel costs. In this study, a **structured questionnaire** will be developed with careful consideration, and data will be collected from both vehicle users through a **survey method**. The questionnaire can be distributed digitally using platforms like Google Forms.

#### **Secondary Data**

Secondary data will be collected from research papers and websites on EVs, government reports, market research studies, and industry publications on vehicle economics, fuel pricing, and lifecycle costs. We will also conduct a review of the policies and incentives implemented by the government to encourage the adoption of EVs.

#### **Sample Design**

#### **Population**

People who have used both electric vehicles and Traditional Fuel Vehicles in Nagpur City are selected for the present study.

### Sample Size

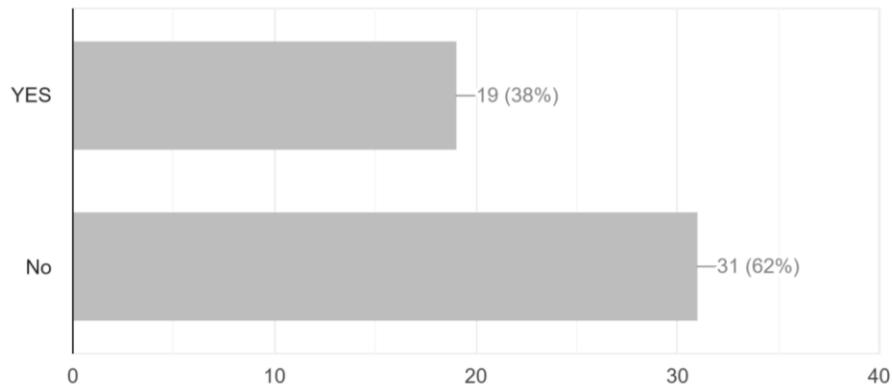
Sample size of 50 urban respondents from users who have experienced both electric vehicles and Traditional Fuel Vehicles in two wheeler segments.

### Sampling Method

- 

### Data Analysis and Interpretation

#### 1. Do you consider the cost of purchasing an electric vehicle to be considerably lower than that of a traditional fuel vehicle in Nagpur?



The distribution of answers to the survey question is shown in the graph above. Of the 50 responders, 19 (38%) selected "Yes," whereas 31 (62%) selected "No." This makes it very evident that the majority of respondents (62%) disagreed with the survey's statement. Conversely, only slightly over one-third (38%) of the participants expressed agreement.

#### 2. Did government incentives (subsidies, tax breaks, etc.) influence your decision to purchase an electric vehicle?

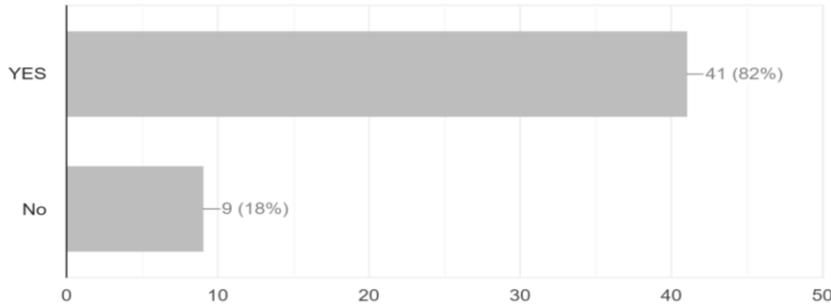
Convenience Sampling Method is used for this study.

### Method of Data Collection

Data is collected through Structured Questionnaire.

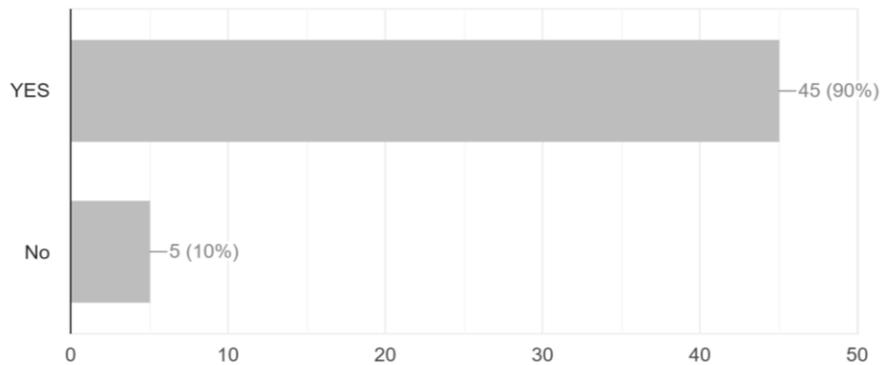
### Tools for Analysis

- Percentage Analysis



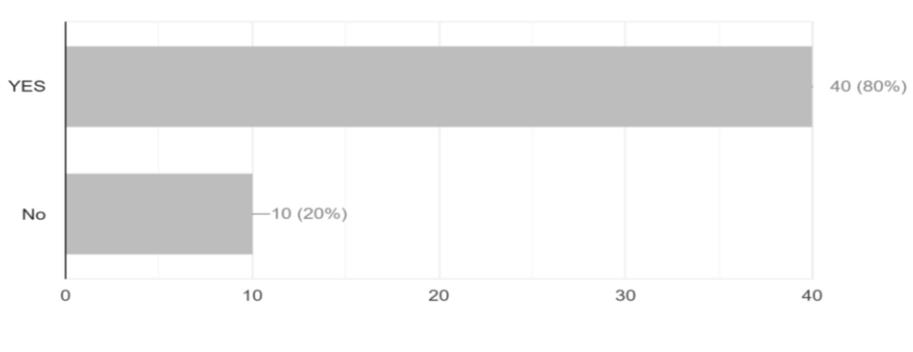
50 participants' answers to the survey question are shown in the graph. Only 9 respondents (18%) said "No," compared to 41 respondents (82%) who said "Yes." This outcome demonstrates a resounding majority of "Yes" respondents. According to the findings, the majority of respondents strongly concur with the survey's assertion. While just a small minority of participants disagreed, the vast percentage of "Yes" replies (82%) suggests a favorable perception and significant acceptance.

**3. Do you find the cost of charging an electric vehicle lower than refueling a traditional fuel vehicle?**



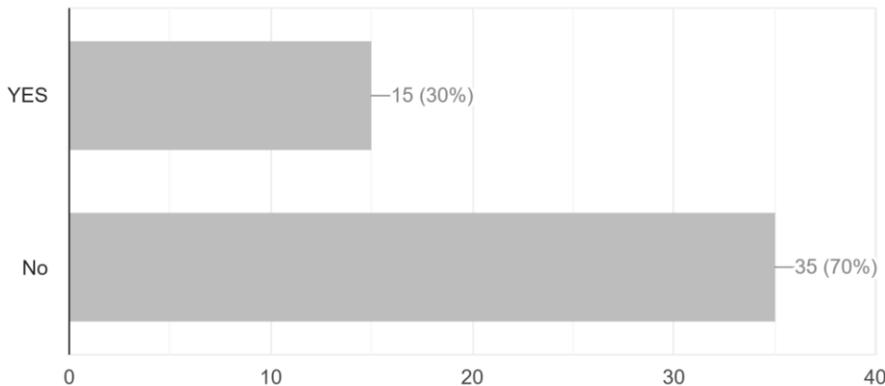
The graph represents 50 participants' answers to the survey question. Only 5 participant (10%) answered "No" out of the total replies, whereas 45 participants (90%) answered "Yes." This suggests that the majority strongly agrees with the statement in question. The overwhelmingly positive perception is evident from the fact that 9 out of 10 respondents select "Yes" option. Only a small percentage of respondents disagreed, as seen by the extremely low percentage of "No" responses (10%).

**4. Have you experienced lower maintenance costs with an electric vehicle compared to a traditional fuel vehicle?**



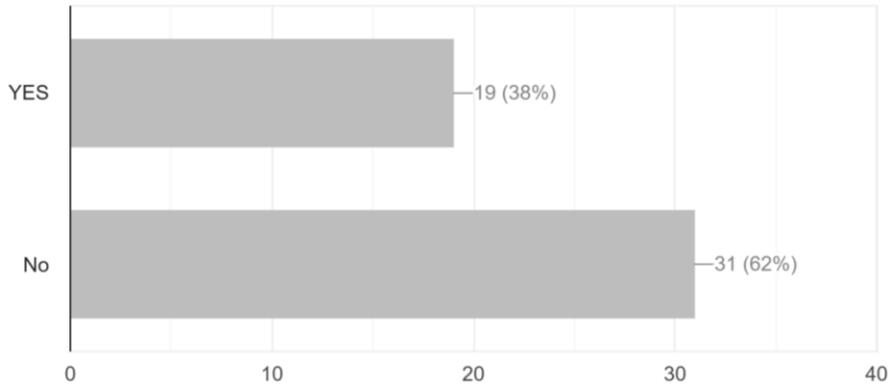
Most respondents answered "Yes," making up 80% of all responses, while the remaining 20% answered "No," indicating a clear majority preference for "Yes" in this survey.

**5. Do you think electric vehicles will have a better resale value than traditional fuel vehicles in the future?**



The graph shows the results of a survey with two responses out of total respondents 15 people, which is 30% of respondents, answered "Yes." 35 people, or 70%, answered "No." This means most participants in the survey choose "No," showing that the majority opinion is against better resale value of electric vehicle question, while a smaller group supported it by choosing "Yes".

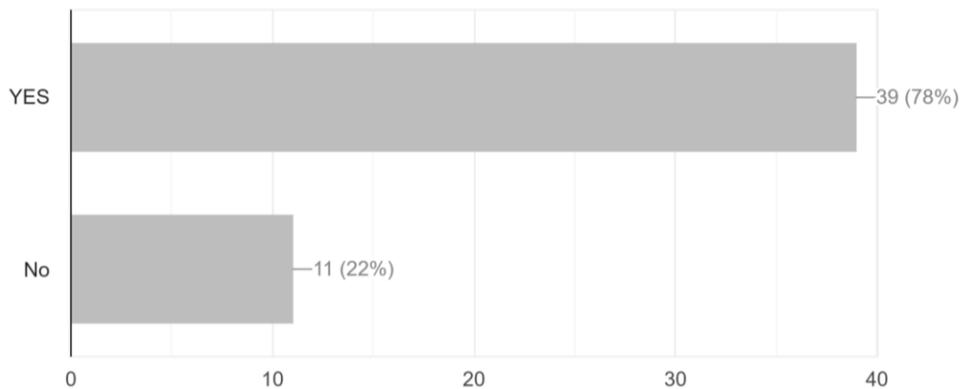
**6. Do you believe that electric vehicles are more cost-efficient in the long run compared to fuel-based vehicles?**



The graph shows the responses of a survey question with two options: "Yes" and "No." 19 respondents (38%) answered "Yes." 31 respondents (62%) answered "No."

This indicates that most people (62%) choose "No," representing the majority opinion, while a smaller proportion (38%) choose "Yes." The results suggest a clear preference toward "No" among the participants in this survey.

**7. Would you recommend an electric vehicle to a friend or family member based on your cost analysis?**



Most respondents answered "Yes," making up 78% of all responses, while the remaining 22% answered "No," indicating a clear majority preference for "Yes" in this survey.

**Customer Views about Electric Vehicles and Traditional vehicles**

Cost Factor	Yes %	No %
Purchase Cost Affordability	19 (38%)	31 (62%)

Government Subsidy	41 (82%)	09 (18%)
Running Cost Satisfaction	45 (90%)	05 (10%)
Maintenance Cost Satisfaction	40 (80%)	10 (20%)
Resale Value Satisfaction	15 (30%)	35 (70%)
Overall Cost-Effectiveness Satisfaction	19 (38%)	31 (62%)
Recommend to family and friends.	39 (78%)	11 (22%)

**Findings**

- Users satisfied with low running cost.
- Concerns about charging infrastructure.
- Mixed responses on overall Cost-effectiveness in long Run.
- High satisfaction with environmental benefits.
- EV User are disagree with better resale value of E-Vehicle.

**Conclusion**

The study shows that according to the graph and table, the vast majority of participants 90% have a favorable opinion of the element under research and are aware of the advantages of electric vehicles, including lower maintenance costs, higher savings, and better efficiency compared to traditional fuel vehicles. Very little opposition was shown, as only 10% of respondents disagreed. These results indicate that consumers highly value this feature and accept it with satisfaction and confidence. Therefore, it can be concluded that respondents have in terms of cost-benefit, electric vehicles are highly preferred over conventional fuel vehicles.

**Suggestions**

- Improve charging infrastructure in Nagpur to enhance consumer confidence in electric vehicles.
- Continue and clearly communicate government subsidies and incentives to reduce the high initial cost of EVs.
- Manufacturers should focus on better battery life, maintenance support, and resale value information.
- Conduct awareness programs to educate consumers about long-term savings and environmental benefits.
- Encourage gradual shift from conventional vehicles through test drives, promotional campaigns, and cost-benefit demonstrations.

**References**

[1]. Singh, R., & Verma, P. (2018). Cost-benefit analysis of electric vehicles in India: A consumer perspective. *International Journal of Energy Economics and Policy*, 8(3), 45–52.

[2]. Kumar, S., Jain, A., & Garg, N. (2019). Consumer attitudes and adoption of electric vehicles in urban India. *Journal of Sustainable Transportation*, 13(4), 301–315.  
<https://doi.org/10.xxxx/jst.2019.xx>

[3]. Sharma, M., & Gupta, A. (2020). Comparative study of electric vehicles and conventional fuel vehicles in India. *International Journal of Automotive*

*Technology and Management*, 20(2), 150–165.

[4]. Patil, S. R. (2021). Consumer perception towards electric vehicles in Maharashtra. *Journal of Management and Research*, 9(1), 60–72.

[5]. Joshi, V., & Kulkarni, R. (2022). Factors influencing vehicle purchase decisions in Tier-II cities of India. *Asian Journal of Business and Economic Studies*, 14(2), 89–102.

[6]. Rao, K. L. (2023). Consumer satisfaction and challenges in electric vehicle adoption in India. *International Journal of Consumer Studies*, 47(1), 120–132. <https://doi.org/10.xxxx/ijcs.2023.xx>

[7]. <https://e-amrit.niti.gov.in/electric-vehicle-incentives>

## Appendix

1. Do you consider the cost of purchasing an electric vehicle to be considerably lower than that of a traditional fuel vehicle in Nagpur?  
Yes  
No
2. Did government incentives (subsidies, tax breaks, etc.) influence your decision to purchase an electric vehicle?  
Yes  
No
3. Do you find the cost of charging an electric vehicle lower than refueling a traditional fuel vehicle?  
Yes  
No
4. Have you experienced lower maintenance costs with an electric vehicle compared to a traditional fuel vehicle?  
Yes  
No
5. Do you think electric vehicles will have a better resale value than traditional fuel vehicles in the future?  
Yes  
No
6. Do you believe that electric vehicles are more cost-efficient in the long run compared to fuel-based vehicles?  
Yes  
No
7. Would you recommend an electric vehicle to a friend or family member based on your cost analysis?  
Yes  
No

Sr No.	Name of Respondent	Do you consider the cost of purchasing an electric vehicle to be considerably lower than that of a traditional fuel vehicle in Nagpur?	Did government incentives (subsidies, tax breaks, etc.) influence your decision to purchase an electric vehicle?	Do you find the cost of charging an electric vehicle lower than refueling a traditional fuel vehicle?	Have you experienced lower maintenance costs with an electric vehicle compared to a traditional fuel vehicle?	Do you think electric vehicles will have a better resale value than traditional fuel vehicles in the future?	Do you believe that electric vehicles are more cost-efficient in the long run compared to fuel-based vehicles?	Would you recommend an electric vehicle to a friend or family member based on your cost analysis?
1	Deepa Mahendra Upadhyay	YES	YES	YES	YES	No	No	YES
2	Aditya chandrashekar pounkar	No	No	YES	YES	No	No	YES
3	Anup w falke	YES	YES	YES	YES	No	YES	YES
4	Tejaswini Rewatkar	YES	YES	YES	YES	No	No	YES
5	Abhinav Sontakke	No	No	YES	YES	No	YES	YES
6	Sanjay Bajirao Dahare	No	YES	YES	YES	No	No	YES
7	Dr Archana Nilesh Shelke	No	No	YES	YES	No	No	YES
8	Dhananjay Bhojar	YES	YES	YES	No	No	YES	YES
9	Sakshi Shivhare	No	YES	YES	YES	No	YES	YES
10	Sakshi Hajare	YES	YES	YES	No	No	No	No
11	Chandani	No	YES	YES	YES	YES	YES	YES
12	Hrugved Rajesh Yelekar	YES	YES	YES	YES	YES	YES	YES
13	Husnaz khan	No	YES	YES	YES	No	No	YES
14	Yash someshwar Rehpade	No	YES	YES	YES	No	No	YES
15	Mahvish Fatema	No	YES	YES	YES	No	No	YES
16	Chhakuli Dhanraj satav	No	No	YES	YES	No	No	YES
17	Deepali Tembhurkar	No	YES	YES	YES	No	No	YES
18	Anshul Gunderao Shende	No	YES	YES	YES	No	No	YES
19	Mrunali Bhumber	No	YES	YES	YES	No	No	YES
20	Ramesh Vaishnav	YES	YES	YES	No	No	YES	YES
21	Sakshi Sunil Bawane	YES	YES	YES	No	No	No	YES
22	Isha devendra nandankar	No	YES	YES	YES	YES	YES	YES
23	Aakanksha bhaskar paunikar	No	YES	YES	YES	YES	YES	YES
24	Sanskriti Kamlesh Nimbarte	No	YES	YES	No	No	No	No
25	Sanskriti Nimbarte	No	YES	No	No	YES	No	YES
26	Vaishnavi wasudev sakharkar	YES	YES	YES	YES	No	No	YES
27	Swarda Gulhane	No	No	YES	YES	No	YES	No
28	Sarvesh	YES	YES	YES	YES	YES	YES	YES
29	Ritika Sharma	YES	YES	YES	YES	No	No	YES
30	Shubhangi Kothiwari	YES	YES	YES	No	No	No	YES
31	Bhagyashri Shende	YES	YES	YES	YES	No	No	YES
32	Poonam Budhlani	YES	YES	YES	YES	No	No	YES
33	Dr vinod bhojar	No	No	YES	YES	No	YES	YES
34	Nigranth meahram	No	No	No	No	YES	No	YES
35	Mr. Sandip Alone	No	No	YES	YES	YES	YES	YES
36	Prathmesh wankhede	No	YES	YES	No	No	YES	No
37	Prakruti Agrawal	No	YES	YES	YES	YES	YES	No
38	Rushali Fating	No	YES	No	No	YES	YES	YES
39	Samrudhi Somkuwar	YES	YES	YES	YES	YES	No	YES
40	Yash guhe	No	YES	YES	YES	YES	YES	No
41	Aditya shahu	YES	YES	No	YES	YES	No	YES
42	Parth taywade	No	YES	YES	YES	YES	YES	No
43	Anjali nanwatkar	No	YES	YES	YES	No	No	YES
44	Achal Gajanan Chaudhari	No	YES	YES	YES	No	No	No
45	Shubhangini	YES	YES	YES	YES	No	No	YES
46	Durvesh Eknath Mahakalkar	No	YES	YES	YES	No	No	YES
47	Devanshu Sarode	YES	YES	YES	YES	No	No	YES
48	Sakshi jaiswal	No	YES	YES	YES	No	No	No
49	Taherim khan	No	YES	No	YES	No	YES	No
50	Anjali taywade	YES	No	YES	YES	YES	No	No