Business Research Methods

CONSUMER PERCEPTIONS AND BARRIERS TOWARDS ADOPTION OF EV IN INDIA

Contents

Background

The adoption of electric vehicles (EVs) in India faces challenges despite government efforts to reduce carbon emissions and promote sustainable transport. Barriers include high costs, inadequate charging infrastructure, and doubts about vehicle performance. This research explores psychological and socio-economic factors affecting consumer behavior, aiming to develop strategies to accelerate EV adoption and support India's environmental and economic goals.

Challenges and Government Initiatives in India's Electric Vehicle Adoption: Addressing Low Market Share, High Emissions, and Infrastructure Needs

- **India's Low EV Market Share:** In 2024, India's electric vehicle market share was only 2%, significantly lower than China (45%) and Europe (25%).
- **Government Focus:** The Indian government is prioritizing reducing carbon emissions and promoting sustainable transportation solutions through initiatives like the Production Linked Incentive (PLI) Scheme.
- **High Greenhouse Gas Emissions:** India is the third-largest emitter of greenhouse gases globally, with the transportation sector contributing 90% of the country's CO_2 emissions.
- **Decarbonizing Through EVs:** Transitioning to electric mobility is considered one of the most effective solutions to decarbonize India's transportation sector and meet environmental goals.
- **Need for Infrastructure Development:** Despite government initiatives like FAME boosting EV sales, particularly in two- and three-wheelers, inadequate charging infrastructure and the high cost of electric four-wheelers remain significant barriers.

Research Gap

We investigated the psychological and socioeconomic barriers to the widespread adoption of electric vehicles (EVs) in India. This research provided valuable insights into why the transition to electric mobility was slower than expected.

Key Research Gaps in Consumer Awareness, Psychological Barriers, and Infrastructure Impact on EV Adoption

- ❑ Insufficient awareness among consumers about the benefits of EVs and government incentives.
- ❑ Limited research on the psychological barriers and socio-economic factors influencing EV adoption.
- ❑ Lack of comprehensive data on the impact of charging infrastructure on consumer decisions.
- ❑ Gaps in understanding how consumer attitudes towards vehicle performance and reliability affect EV adoption.
- ❑ Underexplored areas regarding the influence of marketing, brand perception, and financial considerations on purchasing decisions.

Research Questions

The research questions focus on the adoption of Electric Vehicles (EVs) in India, exploring the current landscape, challenges, and opportunities for growth in this sector .

Exploring Key Research Questions on Consumer Behavior and Barriers to EV Adoption

The research questions are structured and focus on the below mentioned areas which are the barriers for EV Adoption in India.

- General Awareness and Perception
- Psychological Barriers
- Socio-Economic Factors
- Charging Infrastructure and Convenience
- Environmental and Economic Impact
- Government Policies and Incentives
- Purchase Intentions

Exploring Key Research Questions on Consumer Behavior and Barriers to EV Adoption through Google Form:

1. Which of the following age groups do you belong to?
   - 18-25 • 26-30 • 31-35 • 36-40 • Above 40

2. How will you describe your current locality?
   - Metro • Non-Metro • Tier-2 • Urban • Rural

3. Overall, how familiar are you with electric vehicles using a five - point scale where 1 is "not at all familiar" and 5 is "very familiar"?
   Not at all familiar 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ Very familiar

4. Do you currently own or planning to own an electric vehicle?
   - Electric Vehicle Owner
   - Planning to buy an EV soon
   - Will buy an EV in the next 5-10 years
   - I am not sure now
   - I have no intention of buying electric cars

5. What is your primary source of information about EVs? (Select all that apply)
   - Online Resources and Websites
   - Word of Mouth
   - Dealerships and Automotive Industry Professionals
   - Television and Newspaper Ads
   - Other

Exploring Key Research Questions on Consumer Behavior and Barriers to EV Adoption through Google Form:

6. How would you rate your understanding of the benefits of EVs compared to traditional vehicles using a five - point scale where 1 is "not at all familiar" and 5 is "very familiar"?

Not at all familiar 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ Very familiar

7. Do you feel that electric cars improve the environment?

- Not at all
- Unsure
- Somewhat an improvement
- Definitely

8. Which of the following Automotive Brands manufacturing Electric Vehicles in India that you are familiar with? (Select all that apply)

- Ampere
- Ashok-Leyland
- Hyundai
- Mahindra
- Ola
- Revolt
- Tata
- Tesla

9. What do you think are the major barriers to owning an EV? (Select all that apply)?

- High purchase cost
- Limited Driving range
- Lack of charging infrastructure
- Long charging time
- Unfamiliarity with Technology
- Concerns about Battery Life and Replacement Cost
- Limited Consumer Choices
- Others

10. Do you prefer Electric Vehicles in public transportations (buses, three-wheelers and ride hailing services)?

Yes ◯ No ◯ Maybe ◯

Exploring Key Research Questions on Consumer Behavior and Barriers to EV Adoption through Google Form:

11. What do you think about the benefits of EVs? (Select all that apply)
    - Cost Savings on Fuel
    - Energy Independence
    - Support for Renewable Energy
    - Controls Air Pollution
    - Lower Maintenance Costs
    - None

12. Are you aware of any government incentives or subsidies available for purchasing an EV?
    - Yes, I am fully aware.
    - Yes, I've heard of them but don't know the details.
    - No, I am not aware.
    - I'm interested in knowing

13. Do you believe EVs can fully replace conventional fuel-run vehicles?
    - Strongly disagree
    - Disagree
    - Neutral
    - Strongly agree

Research Objective

Our objective is to measure the level of awareness among consumers about the benefits of EVs and the available government incentives, and how this awareness affects their willingness to adopt EVs. We explore consumer attitudes, beliefs, and understand the unique challenges and opportunities in both settings. We can recommend strategies based on our findings to policymakers, automotive companies, and other stakeholders to overcome the identified barriers and accelerate the adoption of EVs in India.

Key Research Objectives: Understanding Barriers and Opportunities for EV Adoption

Below objectives guide the research to understand the challenges and opportunities for EV adoption, with the aim of providing actionable insights.

- **Understand Consumer Awareness:** To assess the level of consumer awareness about the benefits of electric vehicles (EVs) and the government incentives available for their purchase.
- **Explore Consumer Attitudes:** To investigate consumer attitudes, perceptions, and beliefs regarding EV adoption, including factors like vehicle performance, reliability, and environmental impact.
- **Identify Barriers to Adoption:** To identify the key barriers hindering the transition from conventional vehicles to EVs, such as high upfront costs, inadequate charging infrastructure, and socio-economic factors.
- **Analyze Psychological and Socio-Economic Factors:** To explore the psychological and socio-economic factors influencing consumer decisions to adopt or reject EV technology.
- **Provide Recommendations:** Based on the findings, offer strategic recommendations for policymakers, automotive companies, and consumers to promote the adoption of electric vehicles in India.

Research Design

Our approach will integrate both quantitative and qualitative research methods to provide a comprehensive understanding of the factors influencing EV adoption. The design ensures that the research objectives are met through systematic data collection, analysis, and interpretation.

Designing Factors	Description
Formulating Questions to Capture Ownership Experience	To completely understand the user experience, the survey must delve into daily EV usage. This includes exploring aspects like vehicle performance, battery life, maintenance requirements, and overall satisfaction levels.
Questions on the Advantages Perceived Between Electric and Gasoline-Powered Cars	It is crucial to assess why consumers may choose EVs over traditional fuel-powered cars. The survey includes questions that focus on the advantages of electric mobility, including environmental impact, operating costs, and technological advancements.
Quantifying Willingness to Pay and Financial Considerations for Electric Vehicles	Financial implications play a pivotal role in consumer decision-making. The survey assesses an individual's willingness to pay for EV purchases, including price sensitivity, the effect of incentives, and investment readiness towards new technologies.
Evaluating the Expectations and Requirements for Charging Infrastructure	It is important to understand user expectations for charging infrastructure, differentiating between home and public charging needs, range anxiety, and desired technological improvements.
Assessing Environmental Awareness and Its Influence on EV Purchase Decisions	Environmental consciousness is the key factor promoting EV adoption in India. This survey focuses on environmental concerns influencing buying decisions, including the perceived benefits of reducing carbon footprints and sustainability impacts on brand loyalty.
Queries on Brand Perception Within the EV Market	Brand perception plays a significant role in consumer choices. The survey delves into evaluating consumer trust in EV brands, the influence of marketing, and perceptions comparing domestic versus international brands.

Research Design

A systematic approach with structured surveys that gathers broad, generalizable data on consumer perceptions, attitudes, and socio-economic factors influencing EV adoption.

The **research design** is **exploratory**, using an **online survey** to assess consumer perceptions, awareness, and barriers to EV adoption in India. It combines **primary data** from structured questions and **secondary data** from case studies and reports. The sampling method is **convenience sampling**, targeting urban and rural vehicle users to gain insights into psychological, socio-economic, and infrastructural factors influencing EV adoption.

Research Methodology: Exploratory and Mixed Approach

- Exploratory Research Method is used since it is broad, flexible, and adaptive in nature.
- It is cost-effective and lays a foundation and structure for future research.
- It can help researchers find out the causes of the problem being studied, which can be elaborated on in future studies.
- Primary Research Method includes an online survey with structured questions to explore the opinions, trends, or beliefs of the target population.
- Secondary Research includes gathering information from case studies, newspapers, online websites, and government sources.

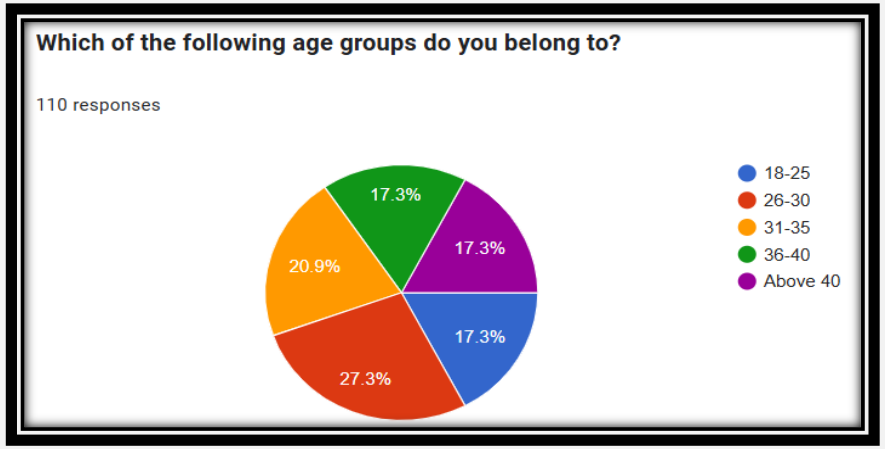
Sampling Methods and Data Collection

The study employs a **convenience sampling method**, focusing on individuals who use vehicles for daily commuting in both urban and rural areas. This method is chosen for its practicality, considering time constraints and the willingness of participants. The target population includes a diverse range of working individuals, ensuring a broad understanding of consumer perceptions and barriers toward electric vehicle adoption. By using this sampling approach, the research aims to gather relevant insights efficiently while laying the groundwork for more extensive future studies.

Data Collections: Targeted Sampling Approach for Diverse Consumer Insights

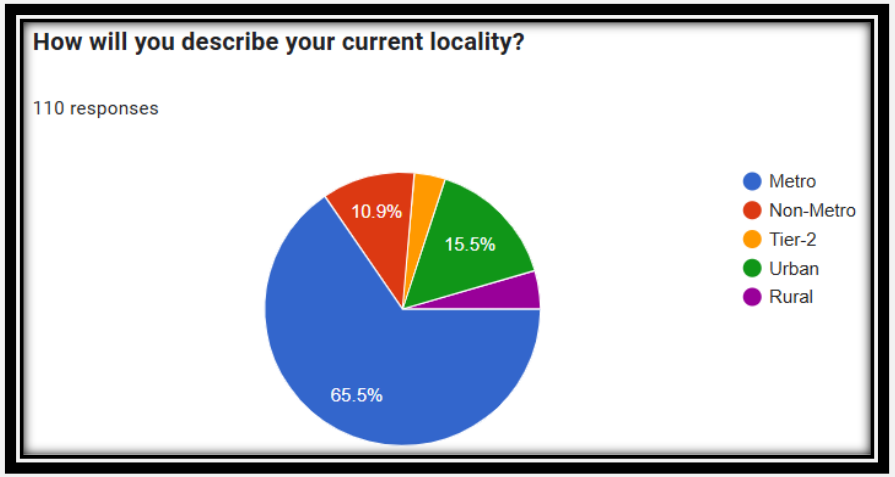
- The target population working people in both urban and rural centers and use some form of vehicle commute in their daily lives.
- Convenience sampling is used considering the limited timeframe and willingness of customers to participate in the survey.
- **Google Form** is used with the research questions to understand the demography, awareness and perception of the customers.

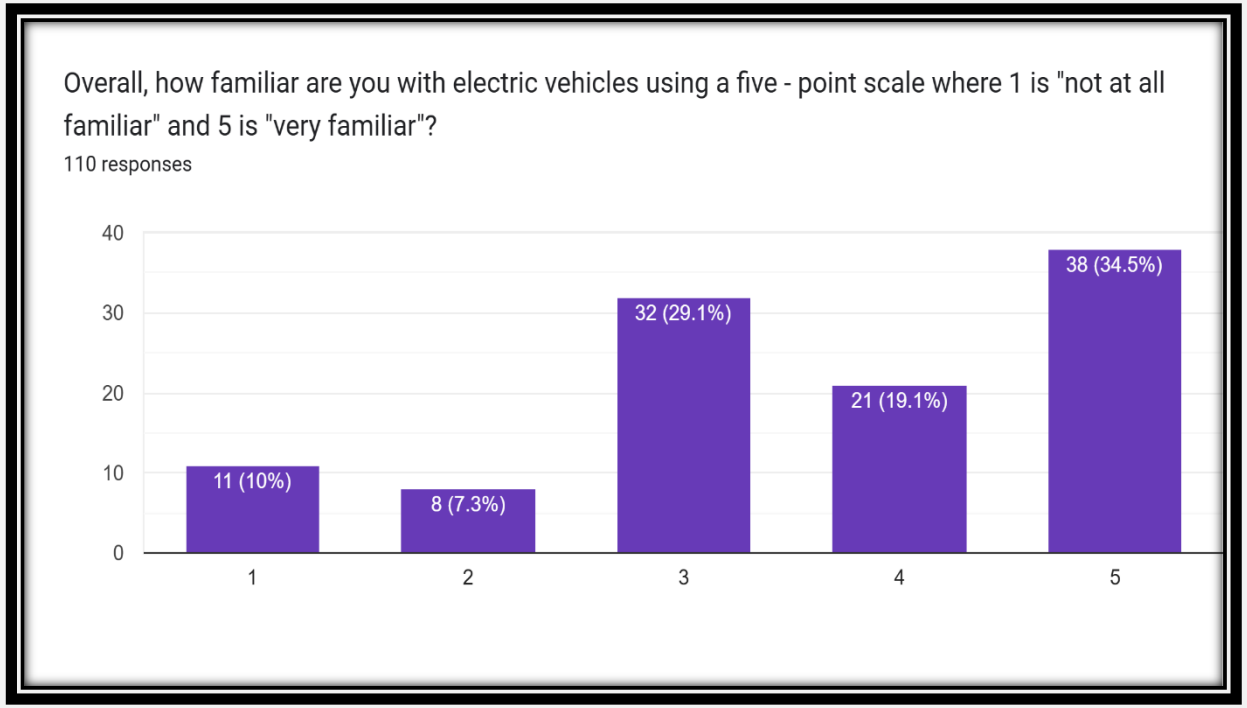
Results



Age Diversity: The survey included respondents across various age groups, ranging from 18 to above 40, providing insights into different generational perspectives on electric vehicles.

Geographical Diversity: Participants were from both urban and rural areas, capturing a wide range of views on EV adoption based on location and access to infrastructure.





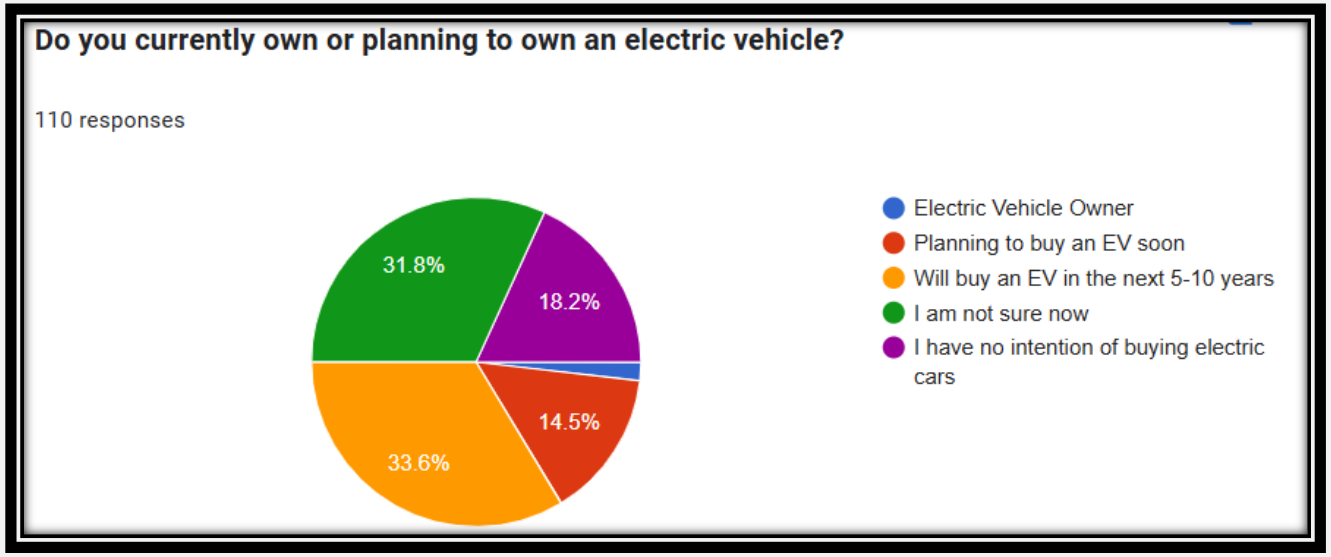
Familiarity: The survey shows that 34.5% of respondents are highly familiar with electric vehicles, while 17.3% have low familiarity, indicating a mix of awareness levels.

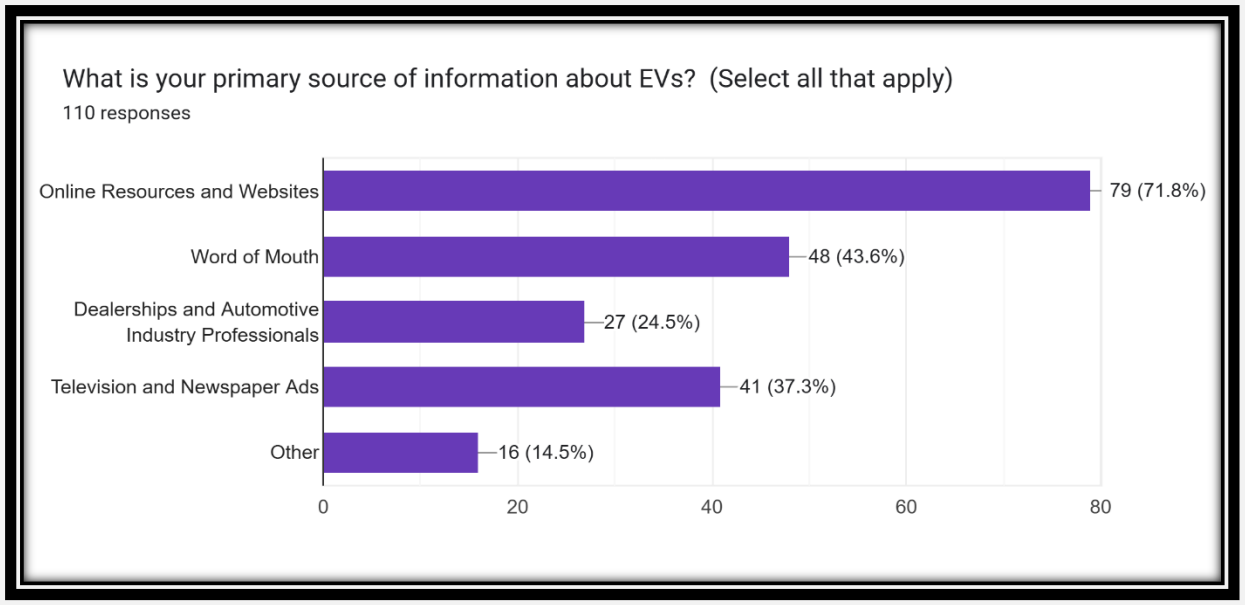
Results

EV Purchase Intentions :

• The majority of respondents (33.6%) plan to buy an electric vehicle within the next 5-10 years, indicating long-term interest in EV adoption.

• A significant portion (31.8%) of respondents are still uncertain about purchasing an EV, suggesting that more information and incentives may be needed to influence their decision.





Information Sources:

• The majority of respondents (71.8%) rely on **online resources and websites** as their primary source of information about EVs.

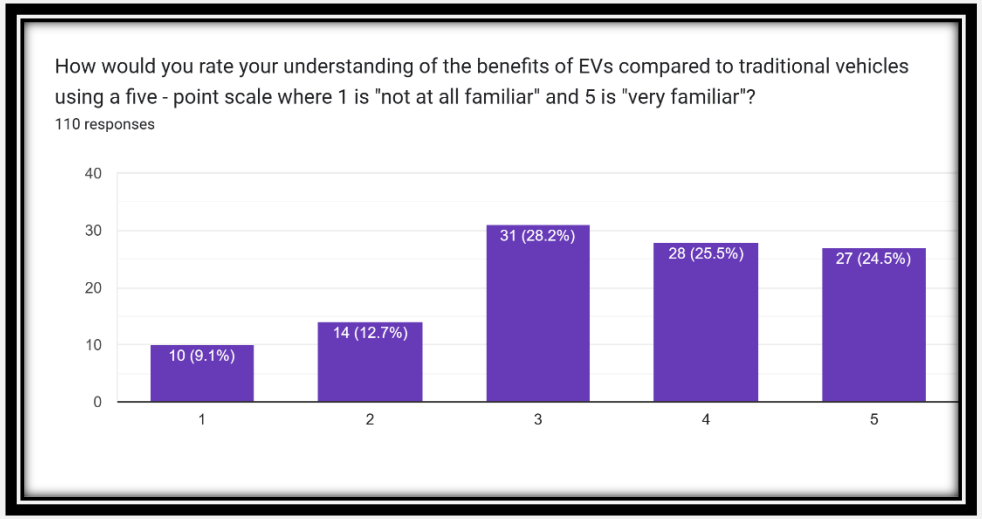
• **Word of mouth** is also a significant source, with 43.6% of respondents getting EV information from peers or social circles.

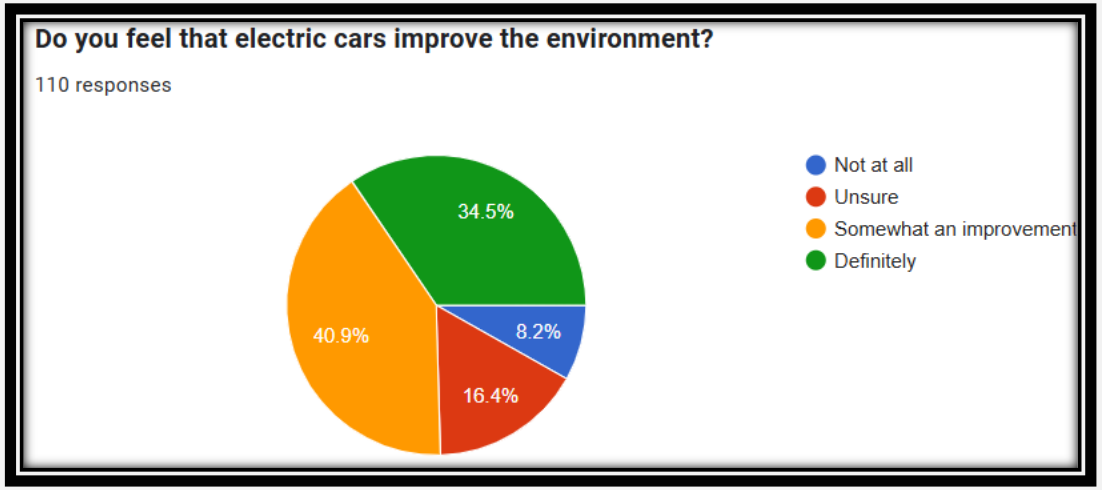
Results

Understanding of EV Benefits:

• Most respondents (28.2%) rate their understanding of EV benefits at a moderate level (3), indicating room for improvement in awareness.

• A combined 50% of participants rated their understanding highly (4 or 5), showing a significant portion is well-informed about EV benefits compared to traditional vehicles.



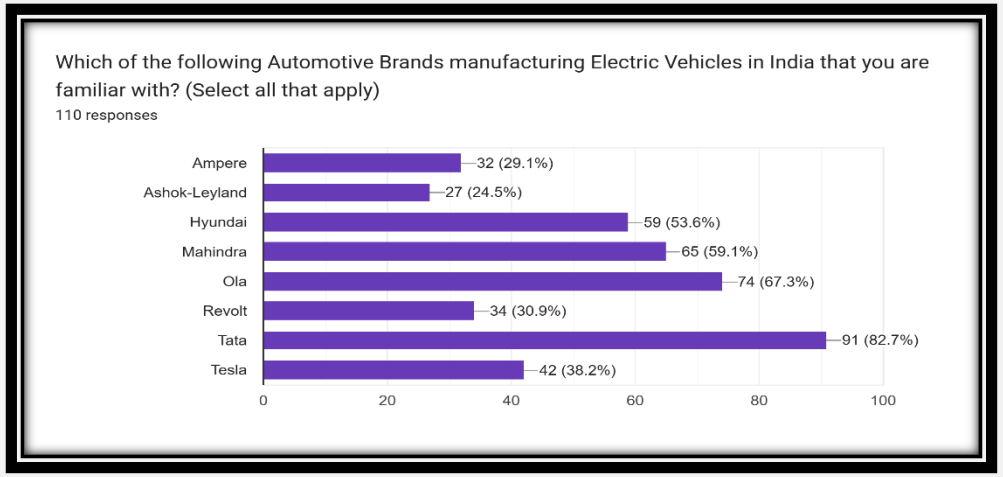


Environmental Impact Perception:

• A significant 40.9% of respondents believe that electric cars **somewhat improve** the environment, indicating a positive but cautious outlook.

• Meanwhile, 34.5% of respondents **definitely** feel that EVs have a clear positive impact on the environment, showing strong support for their environmental benefits.

Results



Brand Familiarity with EVs:

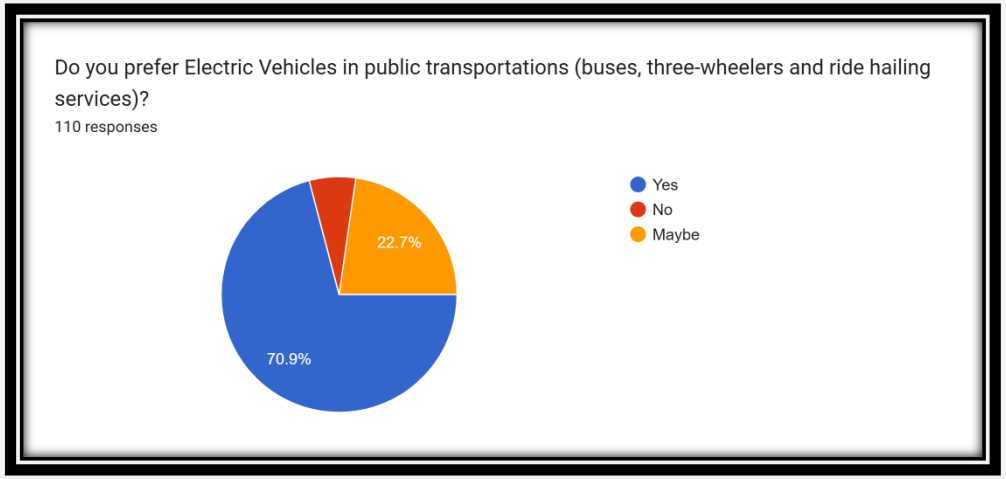
• **Tata** is the most recognized EV manufacturer in India, with 82.7% of respondents familiar with the brand, indicating strong market presence.

• **Ola** follows closely with 67.3% familiarity, while newer or lesser-known brands like **Ashok-Leyland** have lower recognition at 24.5%

EVs in Public Transportation:

• A large majority (70.9%) of respondents **prefer electric vehicles** in public transportation, showing strong support for EVs in buses, three-wheelers, and ride-hailing services.

• Only 6.4% of respondents were opposed to the idea, while 22.7% are uncertain, indicating potential for further persuasion through awareness campaigns.

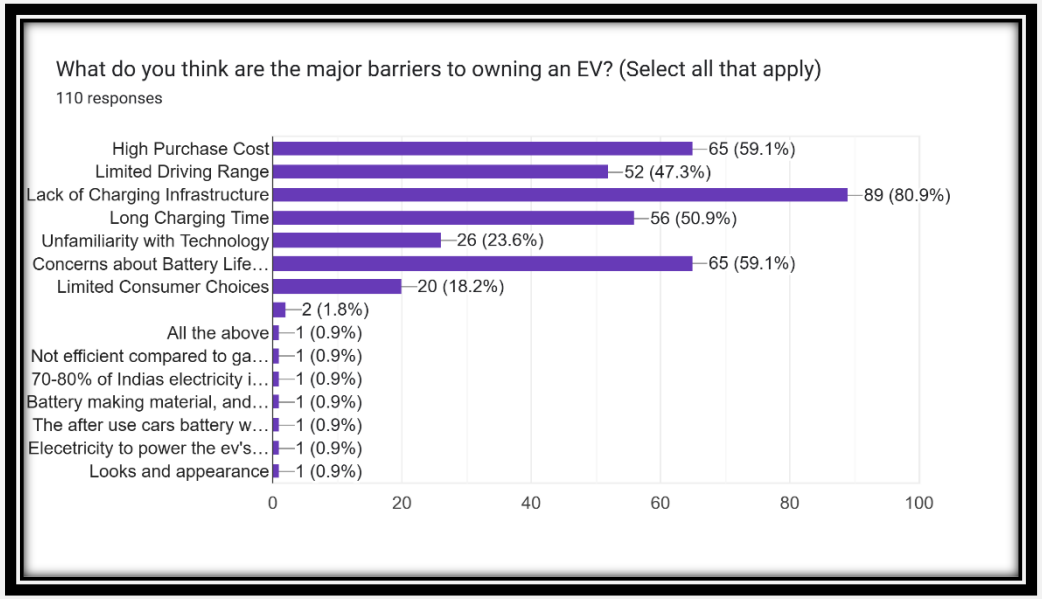


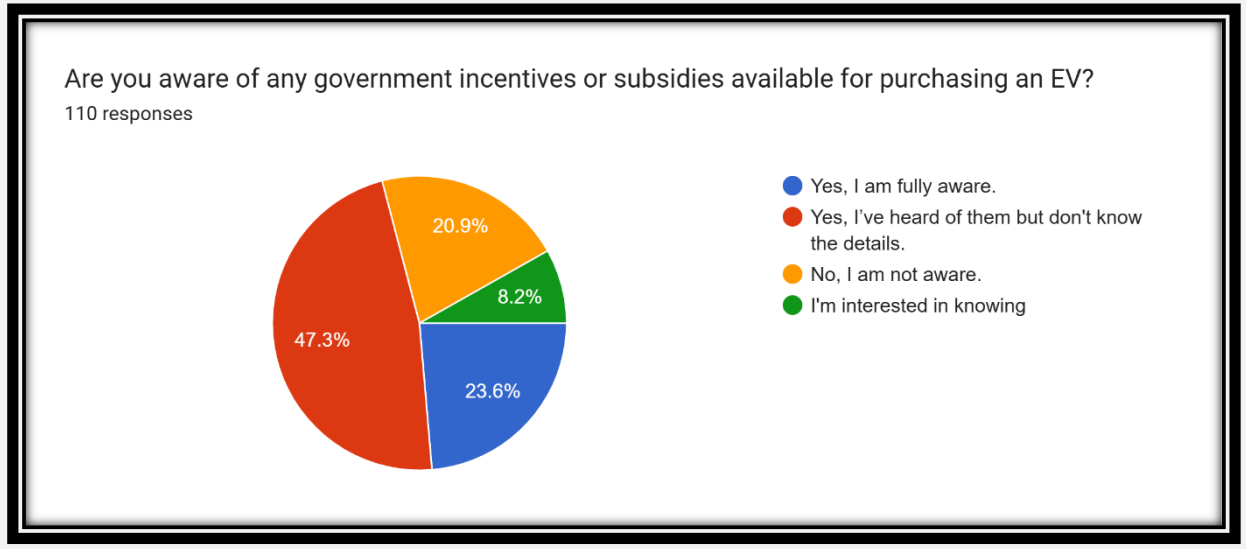
Results

Barriers to EV Ownership:

• **Lack of charging infrastructure** was the most cited barrier, with 80.9% of respondents highlighting this as a major issue in EV adoption.

• **High purchase cost** (59.1%) and concerns about **battery life and replacement costs** (59.1%) are also significant deterrents, pointing to the need for better affordability and battery-related improvements.



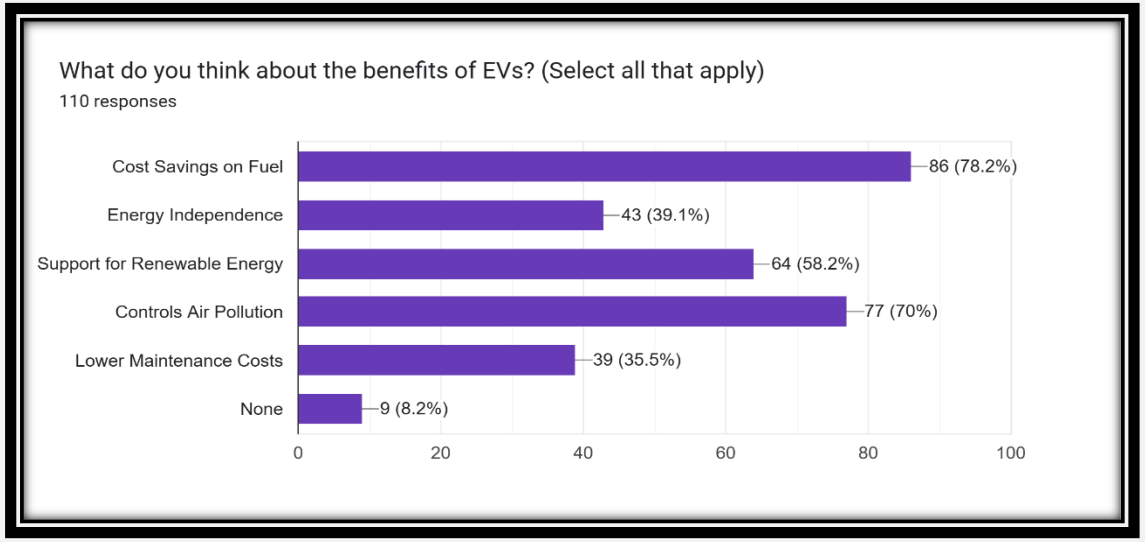


Awareness of EV Incentives:

• Almost half (47.3%) of respondents have **heard of government incentives** but do not know the details, indicating a gap in effective communication about these programs.

• A smaller portion (8.2%) are **fully aware** of the available subsidies, while 20.9% are **interested in learning more**, presenting an opportunity to increase awareness through targeted campaig

Results



Perceived Benefits of EVs:

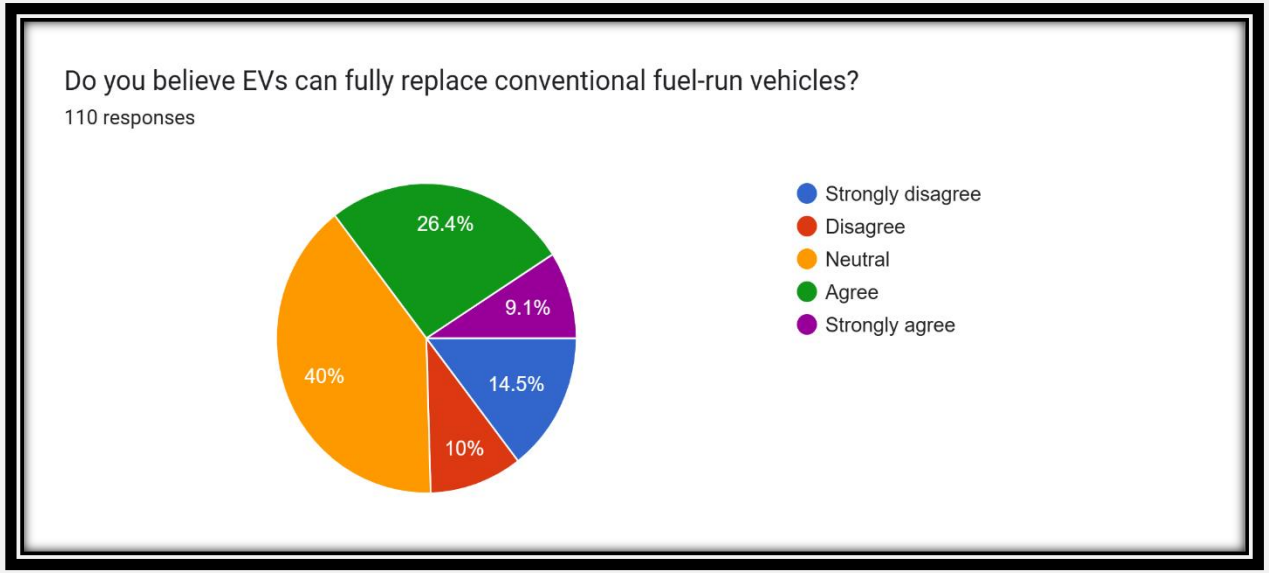
• **Cost savings on fuel** is seen as the top benefit, with 78.2% of respondents identifying it as a key advantage of electric vehicles.

• A significant 70% of respondents also believe EVs help **control air pollution**, highlighting the environmental appeal of electric mobility.

EVs Replacing Conventional Vehicles:

• **40% of respondents are neutral** on whether EVs can fully replace conventional fuel-run vehicles, indicating uncertainty about the future of electric vehicles.

• A positive 26.4% **agree** that EVs can eventually replace traditional vehicles, while only 9.1% **strongly agree**, suggesting a cautious optimism.



Discussions on Findings and Conclusions

Discussion of Findings:

- Brand perception plays a pivotal role in consumer choices within the EV market.
- Lack of awareness among customers regarding incentives and government schemes is evident. More campaigns are required to increase knowledge regarding the available schemes and subsidies provided.
- Battery technology is still in its initial stages and more innovations in increasing range and safety of battery will influence more people to buy EVs. Fuel cell batteries alternative to conventional lithium-based batteries are proving to be a promising venture and are expected to be the future of battery powered vehicles.
- Customers are open minded towards usage of EVs in public transportation. Retrofitting of fuel operated vehicles into hybrid or fully-electric vehicles would enable people leaning more to adopt EVs for their daily commute.
- Availability of charging infrastructure and time taken for charging are identified to be important criteria for customers in deciding to buy EVs.

Conclusions:

- Increase public awareness campaigns about EV benefits and incentives.
- Invest in more accessible and widespread charging infrastructure.
- Reduce EV costs through more government subsidies and financial incentives.
- Encourage private investment in charging stations and EV infrastructure.
- Support battery technology innovation to improve EV performance and range.

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