Major Project Report on

"Electric Vehicles (EV) vs. Internal Combustion Engine (ICE) Vehicles: A Study on Consumer Perception, Awareness, and Adoption Readiness in India"

Submitted By
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CERTIFICATE

This is hereby certified that the project report titled "Electric Vehicles (EV) vs. Internal Combustion Engine (ICE) Vehicles: An Analysis of Customer Perception and Readiness to Adopt EVs in India" authored by Aashit Kumar Malik, roll no. 24/DMBA/02, is a research project done as part of the completion of the requirement for the award of degree of Master of Business Administration from Delhi School of Management, Delhi Technological University during the academic session 2024-26.

Date: _____

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DECLARATION

Aashit Kumar Malik, student of MBA, Delhi School of Management, Delhi Technological University, hereby certify that this project report titled "Electric Vehicles (EV) vs. Internal Combustion Engine (ICE) Vehicles: An Examination of Consumer Perception, Awareness and Adoption Intent in India" is an original piece of work carried out by myself and is being submitted for the completion of the degree of Master of Business Administration.

Date: _____

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ACKNOWLEDGEMENT

I want to take this opportunity to express my gratitude to everyone who helped me complete this research project. Firstly, I would like to thank my internal guide Dr. Apoorva Jain for their valuable suggestions and encouragement provided throughout the project.

Further, I would like to thank the Dean and other faculty members at the Delhi School of Management, Delhi Technological University, for providing an intellectual atmosphere that has helped initiate this research.

I am grateful to all the 57 respondents from different Indian states who took out some time from their schedule and participated in the survey to share their candid opinions regarding electric vehicles as compared to conventional ICE vehicles.

Lastly, but certainly not the least, I also wish to pay my respects to the researchers whose articles I referred and used for this paper and industry bodies like International Energy Agency (IEA), Society of Indian Automobile Manufacturers (SIAM), Niti Aayog, and secondary resources for providing useful information.

I am also thankful to my family and friends for providing me with moral encouragement and motivation throughout my research.

AASHIT MALIK

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EXECUTIVE SUMMARY

The automotive industry across the globe is at an inflection point. It involves the shift from conventional Internal Combustion Engines (ICE) towards electric vehicles (EV). India, being the third largest automobile market in the world, and one of the fastest growing markets for EVs, presents a unique case where consumer attitudes, existing infrastructure facilities, and incentives can be studied in relation to EV adoption.

The present research work titled "EV vs. ICE: A Study on Consumer Perception, Awareness and Adoption Readiness in India" involved the examination of consumer perception, awareness level, advantages, barriers, and purchasing intention regarding electric cars. The research study involved a primary survey conducted among a total of 57 individuals living in the northern Indian states such as Delhi, Haryana, Uttar Pradesh, and other states.

Key Findings at a Glance:

- EV awareness was particularly high, with 65% of respondents giving themselves a rating of 4 or above on a scale from 1 to 5. This suggests that the efforts by the government and media have created a good base of knowledge.

- The adoption of EVs both actual and intended was restricted by three major structural factors: lack of charging facilities (82%), high price (67%), and range concerns (47%).

- 49% of participants were willing to buy an EV, while 21% were undecided, which altogether indicates a convertible pool of nearly 70% of people.

- The three most commonly mentioned facilitators of EV adoption include greater number of charging spots (54%), lower price (44%), and extended driving range (40%).

- 60% of survey participants agreed that EVs are more environmentally friendly compared to ICE vehicles; additionally, 71% of participants reported great concern regarding the negative effect of EV battery extraction on the environment.

Six statistical hypothesis tests were run using the collected data (four Chi-Square tests and two t-tests). As a result, all six null hypotheses were rejected at 1% significance level ($p<0.0001$), which confirms that gender, income, residential location, and EV awareness are significant factors affecting EV purchase intention and related attitudes.

Strategic Implications:

The problem is not a shortage of consumer demand because the demand exists and is substantial. However, it requires the enabling ecosystem in order to make EVs practical and available to consumers. The document includes 10 recommendations related to infrastructure,

pricing policies, awareness-raising initiatives, electrification of rural areas, and technological standards.

The key point here is that India's switch to electric vehicles is already inevitable; the only issue is how rapidly this process would be accomplished. In other words, India will go electric one way or another, and the speed at which the process occurs depends on how quickly the necessary environment is established. These recommendations are formulated based on the opinions of 57 Indian consumers interviewed for the study.

Study Parameters at a Glance

Parameter	Details
Title	EV vs. ICE: A Study on Consumer Perception, Awareness, and Adoption Readiness in India
Institution	Delhi School of Management, Delhi Technological University
Survey Period	April – May 2026
Sample Size	57 Respondents
Geography	North India (Delhi, Haryana, UP, Punjab & others)
Methodology	Descriptive & Exploratory; Convenience Sampling
Statistical Tests	4 Chi-Square Tests + 2 Independent t-Tests
Key Finding	Charging infrastructure gap is the #1 barrier to EV adoption

TABLE OF CONTENTS

Certificate i
Declaration ii
Acknowledgement iii
Executive Summary iv
Table of Contents vii

CHAPTER 1: INTRODUCTION 9
1.1 Background 9
1.2 Problem Statement 10
1.3 Objectives of the Study 10
1.4 Scope of the Study 10
1.5 Significance of the Study 11

CHAPTER 2: LITERATURE REVIEW 12
2.1 Overview 12
2.2 Global EV Adoption Trends 12
2.3 EV Adoption in India: Policy and Market Context 12
2.4 Consumer Perception and Behavioural Factors 12
2.5 Environmental Considerations and the Battery Mining Debate 13
2.6 Summary of Literature 13

CHAPTER 3: RESEARCH METHODOLOGY 14
3.1 Research Design 14
3.2 Data Sources 14
3.3 Sampling Design 14
3.4 Survey Instrument 14
3.5 Data Analysis Methods 15
3.6 Research Framework Summary 15
3.7 Limitations of the Research Methodology 15
3.8 Demographic Profile of Respondents 16

CHAPTER 4: ANALYSIS, DISCUSSION AND FINDINGS 21
4.1 Introduction to the Study Context 21
4.2 Data Collection: Sources and Approach 21
4.3 Data Analysis 22
4.4 Statistical Hypothesis Testing 29
4.5 Findings and Recommendations 33

CHAPTER 5: CONCLUSION.....35

References.....37
Annexure: Survey Questionnaire.....38

CHAPTER 1: INTRODUCTION

1.1 Background

Undoubtedly, one of the major drivers of modern-day industrialisation is the automobile industry, which has been fuelled entirely through internal combustion engines for more than a century. However, due to several factors, such as the threat of climate change, urban pollution, fluctuations in crude oil price, and government policies promoting sustainability, it is becoming increasingly imperative for the auto industry to move towards electrification. An ICE vehicle refers to a vehicle running on petrol, diesel, or compressed natural gas to produce mechanical energy. Such an ICE emits pollutants in the form of carbon dioxide (CO_2), nitrogen oxides (NO_x), and particulate matter (PM).

Unlike the Internal Combustion Engines, the Electric Vehicles (EVs) run with the help of electric motors using energy supplied by rechargeable batteries. The EVs give out no direct exhaust gases at all while being considerably cheaper to operate due to the efficiency of electric motors compared to Internal Combustion Engines and the relatively low cost of electricity compared to liquid fuel. According to the International Energy Agency (IEA), there has been tremendous growth in terms of adoption of EVs globally as their number reached 40 million units in 2023 compared to merely less than 1 million in 2015..

India represents an interesting case study due to several reasons. To begin with, India happens to be the third-largest automobile market in the world by number of registered vehicles, which stand at roughly 330 million units. India suffers from extremely poor air quality in urban areas, with cities like Delhi, Kanpur, and Lucknow regularly making the list of some of the most polluted cities on the planet. India has pledged to achieve zero net carbon emission by 2070 and aims to achieve 30% penetration of electric passenger vehicles by 2030 through its NEMMP program. However, there are a number of challenges in the adoption of EVs in India. First, there is a shortage of charging infrastructure (about 12,000 public charging stations in 2024, compared to over 1.2 million fuel stations). Second, many Indians have low disposable incomes. Third, India has diverse geographical features including vast rural areas that lack electricity supply. Lastly, the internal combustion vehicle industry, which is responsible for thousands of jobs, is well-established. The Government of India has put in place measures such as the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) program to hasten the process, especially the two phases, FAME I (2015-2019) and FAME II (2019-2024), which are aimed at offering subsidies to the manufacture of EVs and to those buying EVs as well. Further, ACC battery production under the Production Linked Incentives (PLI) scheme is underway. On the other hand, India-based startups together with traditional OEMs including Tata Motors, Mahindra, Ola Electric, Ather Energy, and Hero Electric have expanded their EV product line. Consumer perception remains key in determining the rate of adoption.

1.2 Problem Statement

Although there is an increasing awareness about electric cars among people in India, the current EV adoption rate amongst the consumers is quite low compared to the maximum capacity for adoption. In spite of the favorable policy environment, reduction in battery costs, and increasing fuel prices, ICE cars continue to be dominant in the automobile industry in India. This indicates that there are still some psychological, logistical, and economic barriers which are preventing the adoption of electric cars and need further research.
In particular, this research aims to address the following questions: How do Indian consumers, especially the urban or semi-urban youth, perceive EV cars vs ICE cars?

1.3 Objectives of the Study

The particular research objective of this study are listed below:

- determine the extent of consumer awareness and knowledge about Electric Vehicle.
- determine the perceived pro and con of EVs by consumers.
- assess, consumer views on the environmental effects of using EV, includes battery mining.
- analyze consumer intention towards making the shift from Internal Combustion Engine (ICE) vehicles to Electric Vehicles.
- find out the main reason that could help convince consumer to embrace EV technology.
- give recommendations for policymaker, EV producer, and stakeholders.

1.4 Scope of the Study

This research includes a cross-sectional study that is conducted through a survey questionnaire administered to 57 participants who are from north Indian states such as Delhi, Haryana, Uttar Pradesh, Punjab,. This survey is done using digital mediums in which a pre-designed questionnaire will be distributed using Google Forms.

The focus of this survey lies on personal transportation vehicles such as two-wheelers and four-wheeler and there is no commercial vehicle fleet considered along with electric public transport and industrial electrification. Timeline for primary data collection is set from April to May 2026. Collection of secondary data involves review of literature and report.

1.5 Significance of the Study

The study adds to the existing literature on the dynamics of EV adoption in India. Contrary to the literature that explores the technical aspects or the macroeconomics, of the process, the present research considers the perspective of the end user and highlights consumers view, fears, motivations, and hopes. The results of this study will prove useful for various parties interested in

the topic, including policymakers working on incentives for EVs, OEMs considering pricing policies and product designs, etc.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview

The body of work on the subject of electric vehicle adoption encompasses several fields, including environmental economics, behavioral sciences, technology management, public policy, and engineering. This chapter will provide an overview of some important papers in this field.

2.2 Global EV Adoption Trends

According to Global EV Outlook by the International Energy Agency (IEA, 2023), global sales of EVs hit the all-time high level of 14 million units in 2023, accounting for 18% of the global market share. China alone has contributed up to 60% of the global sales of EVs, with Europe and North America coming next in line. According to the IEA, there could be more than 240 million EVs on the road across the globe by 2030, which will mark one of the fastest technological revolutions ever experienced by humanity.
According to BloombergNEF Electric Vehicle Outlook (2023), the prices of batteries used in electric cars fell by more than 90% over the period between 2010 and 2023, from $1,200/kWh down to around $130/kWh. Battery prices may fall below $100/kWh in the near future (before 2030), marking the price parity point with ICE vehicles.

2.3 EV Adoption in India: Policy and Market Context

According to Global EV Outlook by the International Energy Agency (IEA, 2023), global sales of EVs hit the all-time high level of 14 million units in 2023, accounting for 18% of the global market share. China alone has contributed up to 60% of the global sales of EVs, with Europe and North America coming next in line. According to the IEA, there could be more than 240 million EVs on the road across the globe by 2030, which will mark one of the fastest technological revolutions ever experienced by humanity.
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2.4 Consumer Perception and Behavioural Factors

According to Singh, Kumar, and Sharma (2022), among the psychological determinants for purchasing EVs in urban India, environmental awareness, social influence, and trust in the government emerge as the top three predictors. This study followed the TPB theory and concluded that perceived behavioural control (PBC), which refers to customer assurance about adequate infrastructure facilities, is the strongest determinant of purchase intention.

Tyagi and Sharma (2023) studied the impact of “range anxiety” on reducing purchase intention towards EVs. Based on a structural equation modeling approach, using 300 Delhi-NCR residents, they showed that the impact of range anxiety decreases EV purchase chances by 40%. It further emerged that tackling range anxiety by enhancing range specifications and visible charging stations has an amplified impact on purchase intention..

2.5 Environmental Considerations and the Battery Mining Debate

Bhattacharya (2022) looked at the lifecycle environmental effect of EVs, particularly the mining process. It is important to note that the mining of lithium, cobalt, and nickel has considerable environmental externalities. Although EVs have a significantly reduced footprint during operation compared to ICE vehicles, the embedded carbon in manufacturing and mining should be considered for an accurate environmental analysis.
Roy and Das (2023) evaluated the deficiency of EV charging facilities in India and found that while the global ratio of EV charging stations was 1 per 20 EVs, India had only 1 per 110 EVs. It is projected that bridging this deficit will cost approximately INR 40,000 crores by 2027.

2.6 Summary of Literature

Author(s) & Year	Title / Focus	Key Finding
Bhatt & Bhatt (2021)	EV Adoption Barriers in India	Infrastructure gap and price are primary barriers to mass adoption
IEA Global EV Outlook (2023)	Worldwide EV Trends	India is among top 5 fastest-growing EV markets globally
Singh et al. (2022)	Consumer Perception of EVs in Urban India	Environmental awareness positively influences purchase intent
Niti Aayog (2022)	EV Policy Framework India	FAME-II subsidies have catalysed two-wheeler EV growth
Tyagi & Sharma (2023)	Range Anxiety & Trust Deficit	Range anxiety reduces purchase probability by ~40%
Kumar et al. (2020)	Life-Cycle Cost Comparison EV vs ICE	Over 10 years, EVs are ~30% cheaper in total ownership cost
Bhattacharya (2022)	Battery Mining Environmental Impact	Lithium extraction raises embedded-carbon concerns
Roy & Das (2023)	Charging Infrastructure Gap	India has 1 charging station per ~110 EVs vs global avg of 1 per 20

Table 2.1: Summary of Key Literature

From the literature mentioned above, it becomes clear that the pattern of adoption of EVs in India is influenced by the interaction of various elements such as supply-side elements like technology, price, and infrastructure; demand-side elements like awareness, credibility, and usefulness; and enabling factors like policy and incentives. This study will add to the bod`y of literature on EVs in India by presenting survey results from consumers in India.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research Design

This study employs a mixed-methods research design combining descriptive and exploratory approaches. The descriptive part involves the systematic collection and analysis of survey data to characterise the distribution of consumer perception, attitude, and behaviour regarding EVs. The exploratory component draws on secondary literature and open-ended survey responses to generate insights and hypotheses about underlying consumer motivations.

3.2 Data Sources

Primary Data: questionnaire survey administered through Google Forms to 57 respondents across various states in India. The questionnaire comprised 22 questions covering demographic variable, vehicle ownership, EV awareness, perceived benefit and challenges, purchase intention, and policy preferences.

Secondary Data: Published literature, govt. reports (Niti Aayog, Ministry of Heavy Industries), IEA report, and industry analyse from SIAM, BloombergNEF, and KPMG India.

3.3 Sampling Design

Sampling Method: Convenience sampling was employed, with respondents selected based on accessibility and willingness to participate. While this limits strict statistical generalisability, it is appropriate for an exploratory study aimed at generating directional insights about consumer perceptions.

Sample Size: 57 complete and valid responses were collected.

Target Population: Adults above 18 years of age residing in India who own or are potential purchasers of personal vehicles.

3.4 Survey Instrument

The structured questionnaire was designed to cover six thematic areas: (1) Respondent demographics; (2) Current vehicle ownership and usage patterns; (3) EV awareness and knowledge; (4) Perceived benefits and challenges of EVs; (5) Purchase intention and decision factors; and (6) Policy preferences for EV promotion. Rating scale questions used a 5-point Likert scale; multiple-choice questions allowed single and multi-select responses.

3.5 Data Analysis Methods

The data was analysed using the techniques:

- Frequency analysis and percentage distribution for category variables.
- Mean and distribution analysis for Likert scale response..
- Chi-Square Tests of Independence for categorical variable associations.
- Independent Samples t-Tests for comparing means between groups.

3.6 Research Framework Summary

Research Parameter	Details
Research Design	Descriptive & Exploratory
Data Type	Primary (Survey) + Secondary (Published Literature)
Survey Tool	Structured Questionnaire (Google Forms)
Sampling Method	Convenience Sampling
Sample Size	57 Respondents
Target Geography	North India (Delhi, Haryana, UP, Punjab & others)
Data Collection Period	April – May 2026
Statistical Tools	Frequency Analysis , Chi-Square , Independent t-Test
Software	Microsoft Excel,

Table 3.1: Research Framework Summary

3.7 Limitations of the Research Methodology

1. Convenience sampling introduce selection bias respondents are skewed to young, educated, urban males.
2. The sample size of 57, while adequate for exploratory purposes, do not permit statistically significant regression analysis .
3. The selfreported nature of survey responses introduces social desirability and recall bias.
4. Geographic concentration in North India limits generalisability.

3.8 Demographic Profile of Respondent

3.8.1 Age Distribution

The survey respondents were dominantly young adults, with 37 respondents (65%) in the 18–24 age bracket and 14 (25%) in the 25–31 age group. This reflects the study convenience sampling methodology conducted primarily through digital channels by younger populations.

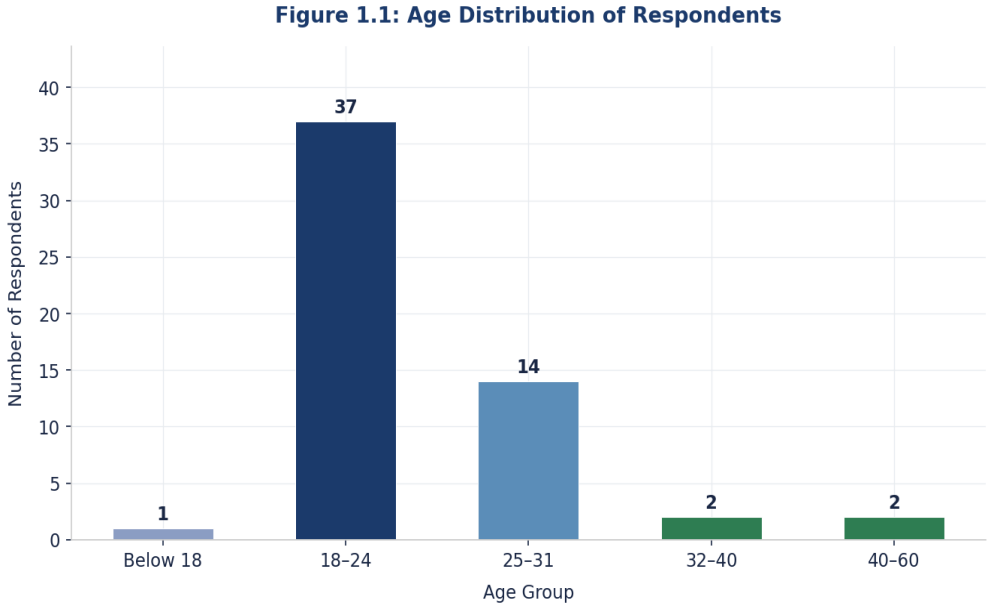

Figure 1.1: Age Distribution of Respondents | Source: Primary Survey Data, 2026

3.8.2 Gender Distribution

Male respondents are 77.2 % of the sample (44 respondents), Female respondents 17.5% (10 respondents), and others 3.5 % (2 respondents).

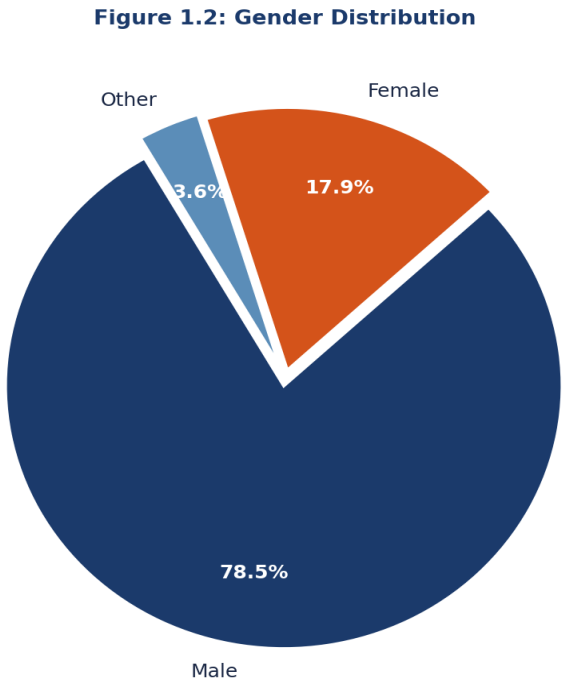

Figure 1.2: Gender Distribution | Source: Primary Survey Data, 2026

3.8.3 Occupation of Respondents

Students constitute the largest group at 77.2 % (44 respondents), followed by Corporate Employees (10.5 %, 6 respondents), and Government Service professionals (7.0 %, 4 respondents).

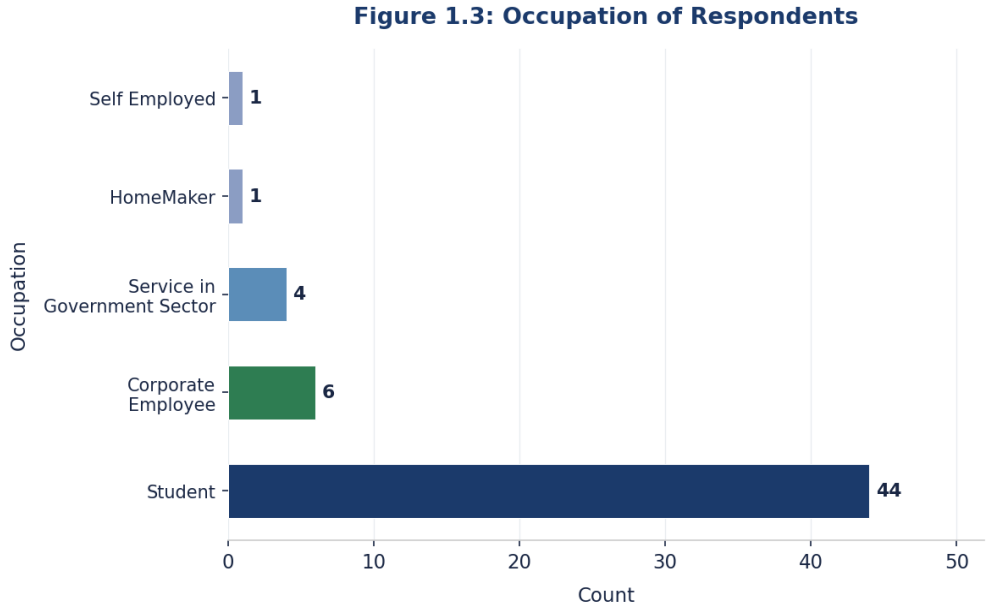

Figure 1.3: Occupation of Respondents | Source: Primary Survey Data, 2026

3.8.4 Daily Travel Distance

25 respondents travel less than 10 km and 13 respondents travel between 10 to 30 km. This means 67% of respondents travel under 30 km per day within the range of current-generation EVs.

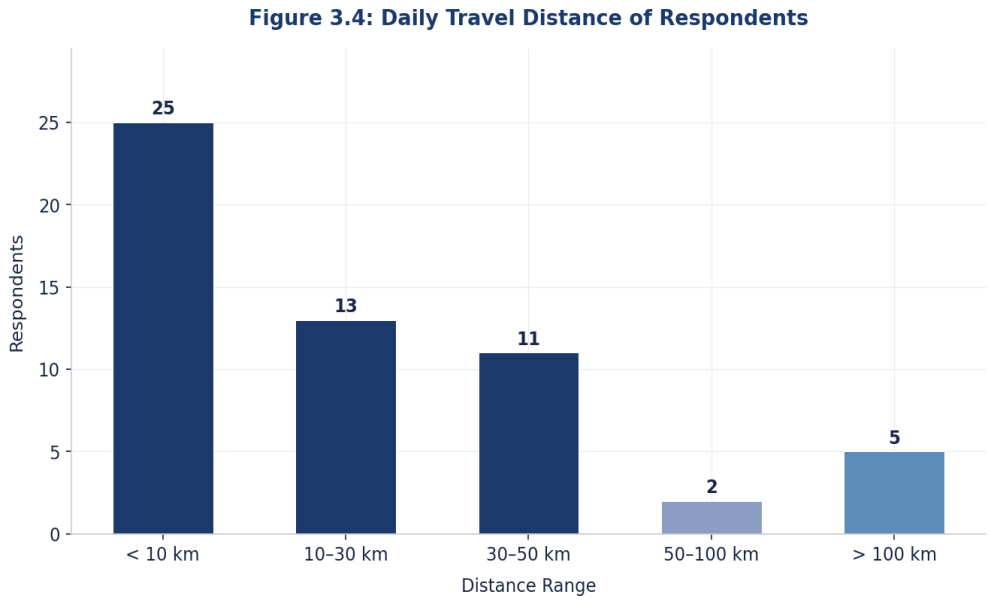

Figure 3.4: Daily Travel Distance of Respondents | Source: Primary Survey Data, 2026

3.8.5 Income Distribution

The largest income group 20 respondentsc falls in the INR 6–12 lakh bracket. This income profile is critical for interpreting barriers related to EV purchase pricing.

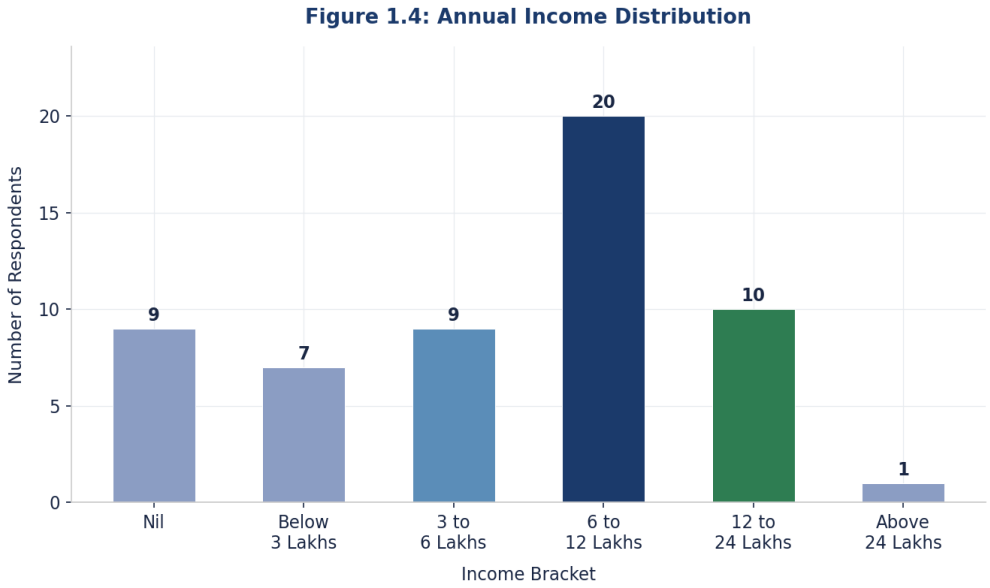

Figure 1.4: Annual Income Distribution | Source: Primary Survey Data, 2026

3.8.6 Urban vs Rural Distribution

Urban respondents comprise (42) and rural respondent (14) of the sample. Rural respondents are particularly important given the lower charging infrastructure availability outsides of major cities.

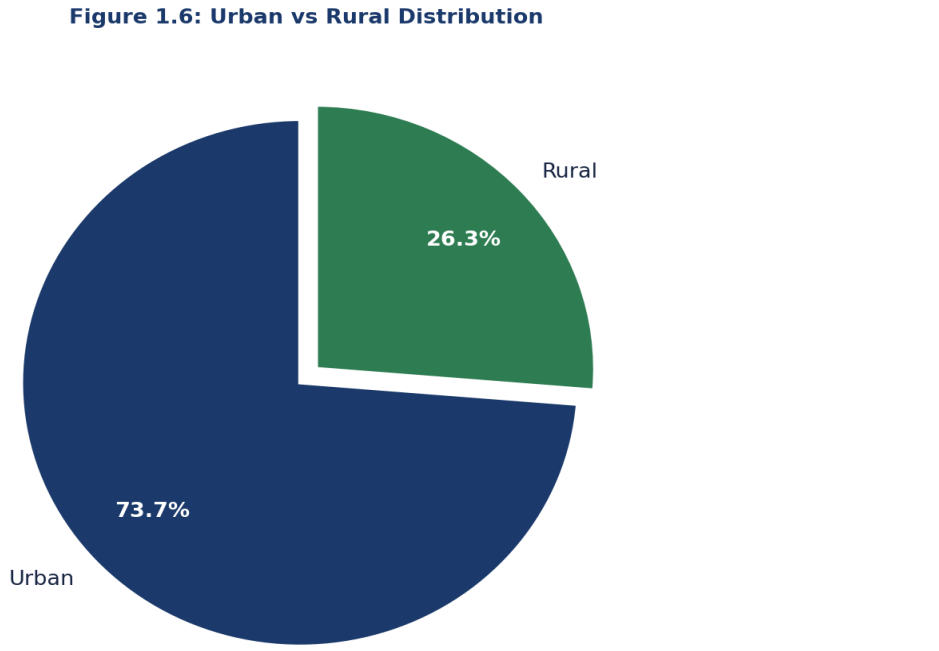

Figure 1.6: Urban vs Rural Distribution | Source: Primary Survey Data, 2026

3.8.7 Geographic Distribution — State-wise

State / UT	Respondents	% of Total
Delhi / New Delhi	23	40.4%
Haryana	16	28.1%
Uttar Pradesh	3	5.3%
West Bengal	2	3.5%
Uttarakhand / Punjab / Rajasthan / MP / Nagaland	5	8.7%
Others / Not Specified	8	14.0%

Table 3.2: Geographic Distribution of Respondents | Source: Primary Survey Data, 2026

CHAPTER 4: ANALYSIS, DISCUSSION AND FINDINGS

4.1 Introduction to the Study Context

This chapter contains the detailed analysis of the survey results obtaine by conducting a survey on 57 respondents across different states in India. Analysis been done with respect to all the research questions that stated in the study, which includes vehicle profile , EV awareness, advantage of using EVs, disadvantage of using EVs, charging facilities , environmental attitudes , purchase intention , and policies.

4.2 Data Collection: Sources and Approach

The primary data was collected using a questionnaire which consisted of 22 questions that were administered by Google Forms from April to May 2026, address the areas of demographics, vehicles owned , knowledge about electric vehicles, advantages/ disadvantages, purchasing intentions, and government policies. The secondary data was obtained from peer-reviewed journal articles, Niti Aayog, MOHI , IEA, BloombergNEF, and SIAM.

4.3 Data Analysis

4.3.1 Vehicle Ownership Profile

A huge percentage 45 people (78.9%)own one or more personal vehicles, while 6 (10.5%) own several. Only 5 people (8.8%) lack a vehicle at all, confirming that the sample composed of present and potential personal vehicle users.

Figure 2.1: Current Vehicle Ownership Status

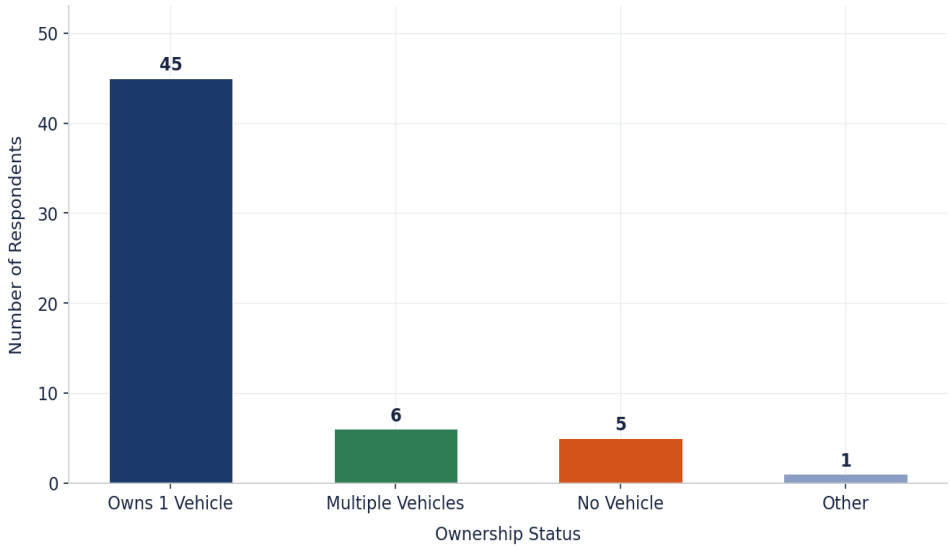

Figure ..2.1: Current Vehicle Ownership Status | Source: Primary Survey Data, 2026

ICE vehicles dominate ownership: 2-Wheeler ICE (80.7%) and 4-Wheeler ICE (66.7%). EV ownership is nascent — only 7% own a 2-Wheeler EV and 5.3% a 4-Wheeler EV — underscoring the scale of the transition ahead.

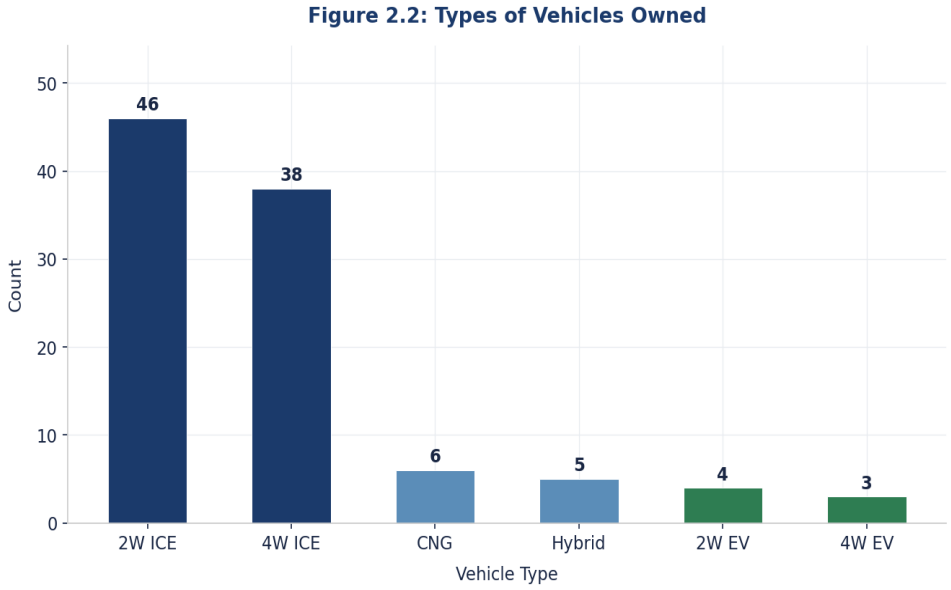

Figure 2.2: Types of Vehicles Owned | Source: Primary Survey Data, 2026

4.3.2 EV Awareness Level

EV awareness is high : 29 respondents (50.9%) rated awareness at 4/5 and 13 (22.8%) at 5 (Very High). In total, 73.7%) of respondents scored 4 or 5. Only 4 respondents (7%) scored 1 or below.

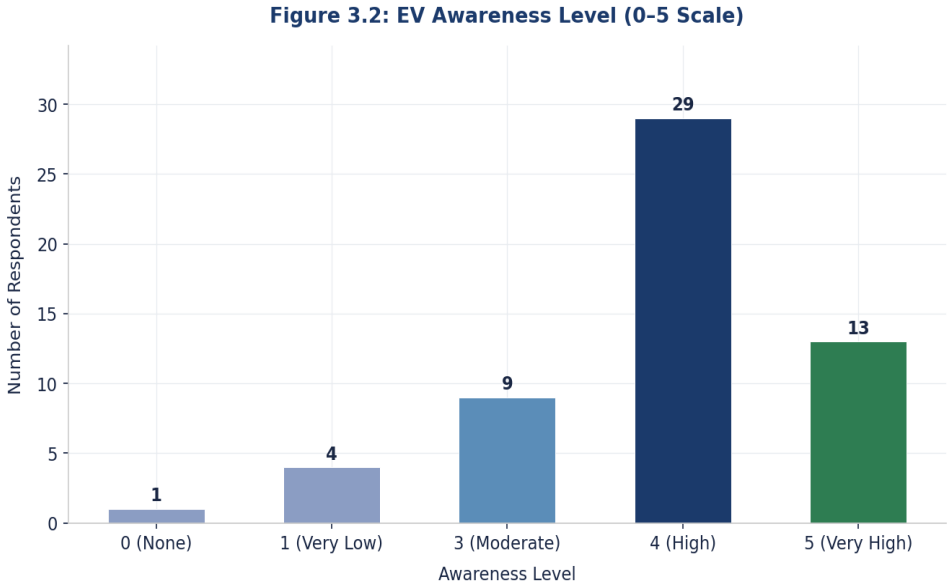

Figure 3.2: EV Awareness Level (0–5 Scale) | Source: Primary Survey Data, 2026

4.3.3 Factors Influencing Vehicle Purchase Decisions

Purchasing cost (35), miles per gallon or fuel efficiency (35), and maintenances (30) emerges as the leading considerations. Ecological concerns rank extremely poor (7). This indicates that simply relying on ecological messaging will not work – economic messaging is crucial.

Figure 3.3: Factors Influencing Vehicle Purchase Decision

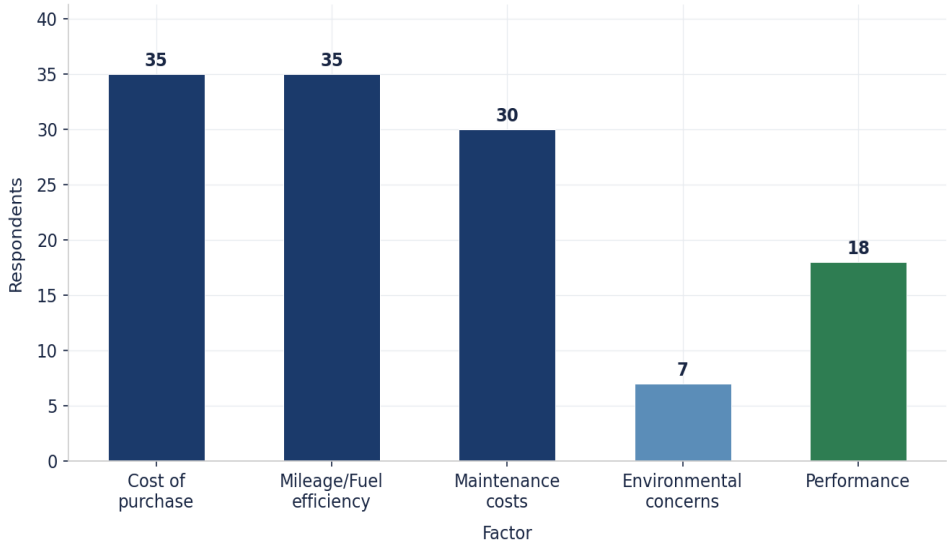

Figure 3.3: Factors Influencing Vehicle Purchase Decision | Source: Primary Survey Data, 2026

4.3.4 Perceived Benefits of EVs

"Eco-Friendly" was the benefit known to the largests number of participants (35), then came "Lower Running Costs" (30), " Smooth and Silent Ride" (27), "Tax Subsidie/Benefits" (24), "Government Incentives" (

Figure 4.1: Perceived Benefits of EVs

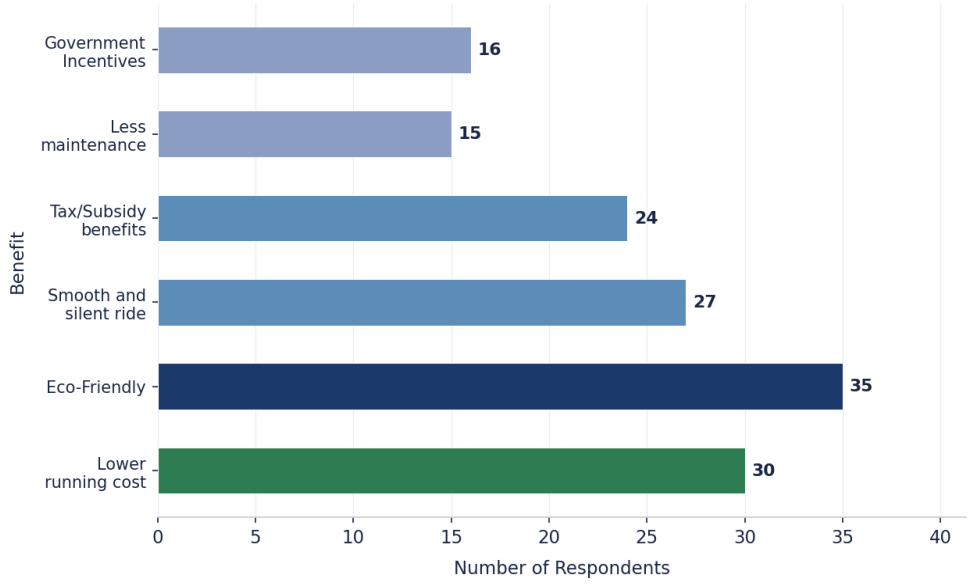

Figure 4.1: Perceived Benefits of EVs | Source: Primary Survey Data, 2026

4.3.5 Key Challenges in EV Adoption

Poor Charging Infrastucture is mentioned by most respondents as the topmost problem (46 respondents, 80.7%). The second is Expensive Car Purchases (30 respondents) , followed by Expensive BatteryChange (23), Slow Recharging (22), Low Values when Sold (17), Range Concerns (15), and Uncertain about the Technology (14)..

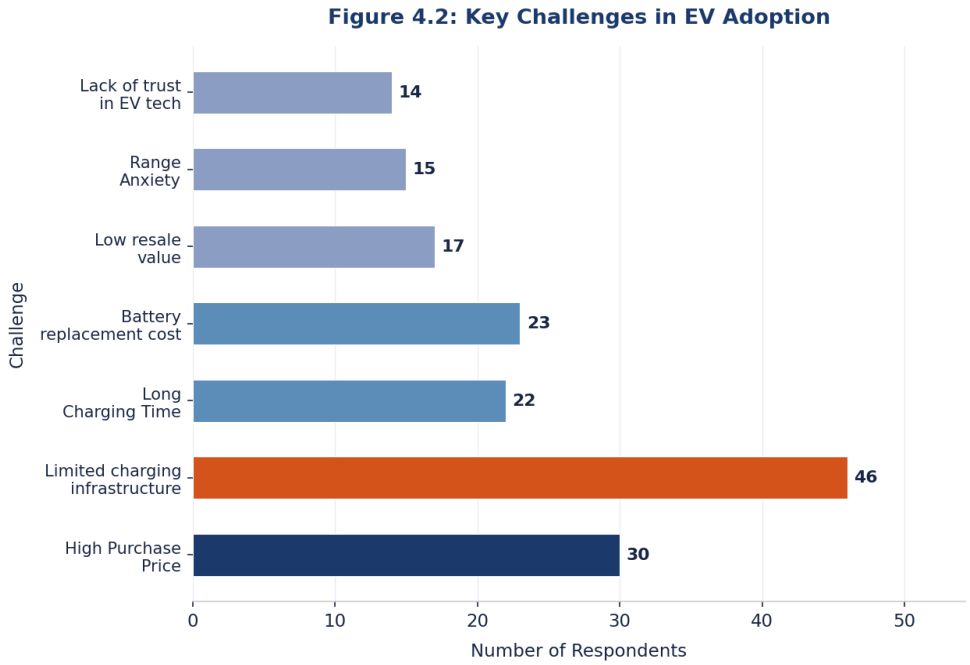

Figure .4.2: Key Chalenges in EV Adoption | Source: Primary Survey Data, 2026

4.3.6 Charging Infrastructure Assessment

Sixty percent of the respondents give a rating o f 3 or less for charging availability on the 5point scale, where 10 (17. 5%) gave 1 rating (Very Poor), 16 (28.1%) gave a 2 rating, and 19 (33.3%) gave a 3 rating..

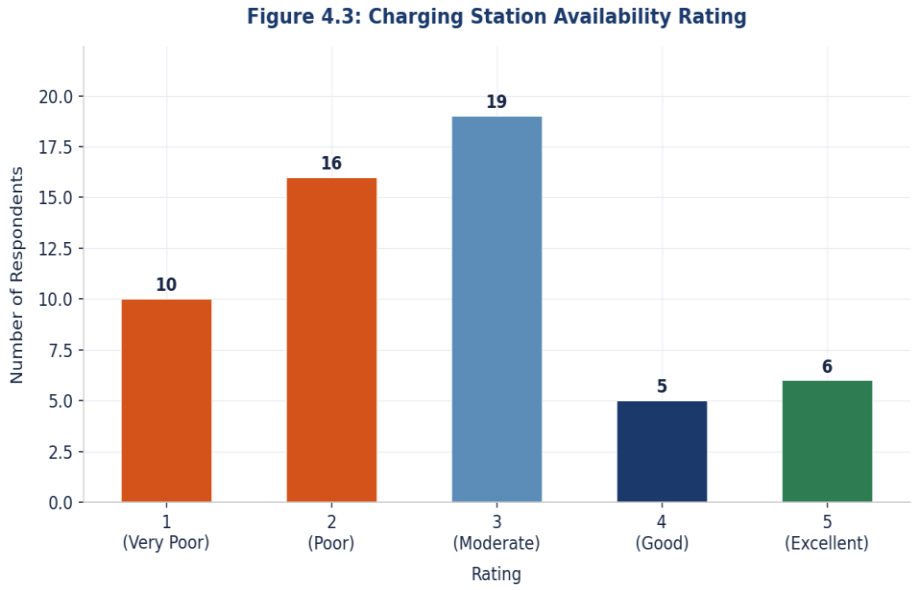

Figure 4.3: Charging Station Availablity Rating | Source: Primary Survey Data, 2026

4.3.7 Environmental Attitudes

60% of respondents (34) believe EVs are better for the environment; 38.6% (22) disagree, possibly influenced by concerns about coal-based electricity generation or battery manufacturing emissions.

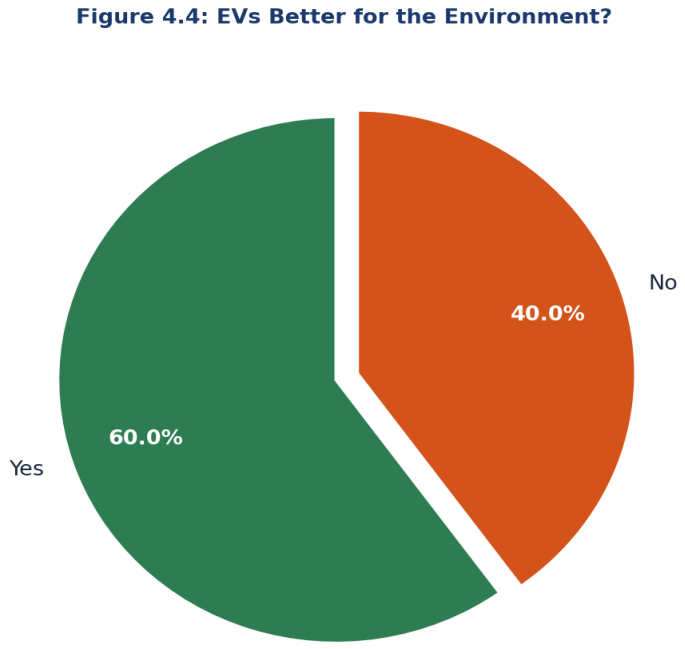

Figure 4.4: EVs Better for the Environment? | Source: Primary Survey data, 2026

As for worries over battery mining, 71 percent of participants rated the worry level to be 4 or more: 28. (49.1 percent) gave a rating of 4 (high), while 8 (14 percent) awarded a rating of 5 (very high).

Figure 4.5: Concern Level on EV Battery Mining Impact

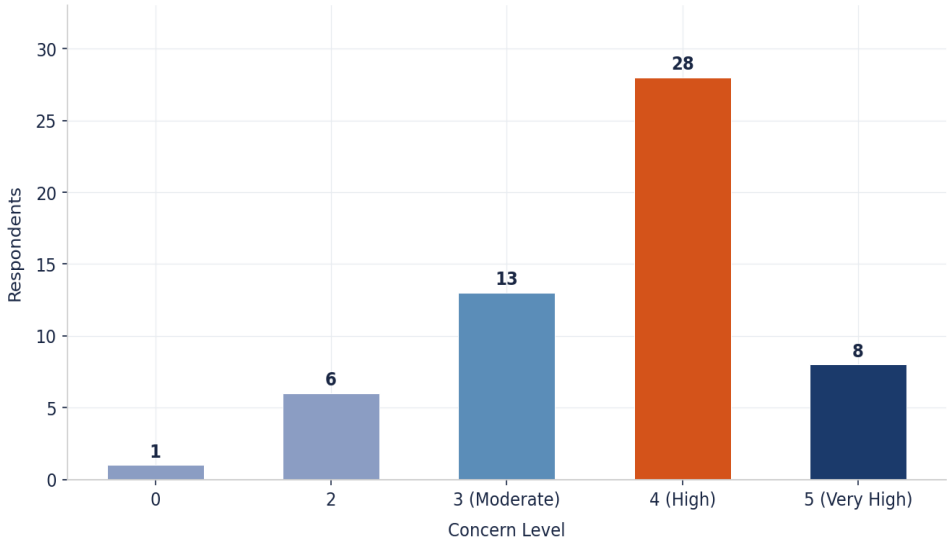

Figure 4.5: Concern Level on EV Battery Mining Impact | Source: Primary Survey Data, 2026

4.3.8 EV Purchase. Intention

The number of those who would considers buying an electric vehicle is 28 people (49.1%), “may be” for 16 people (28.1%), while 12 people (21.1%) answered “no.” Overall, roughly 77% of respondents would consider buying one

Figure 5.1: EV Purchase Intention

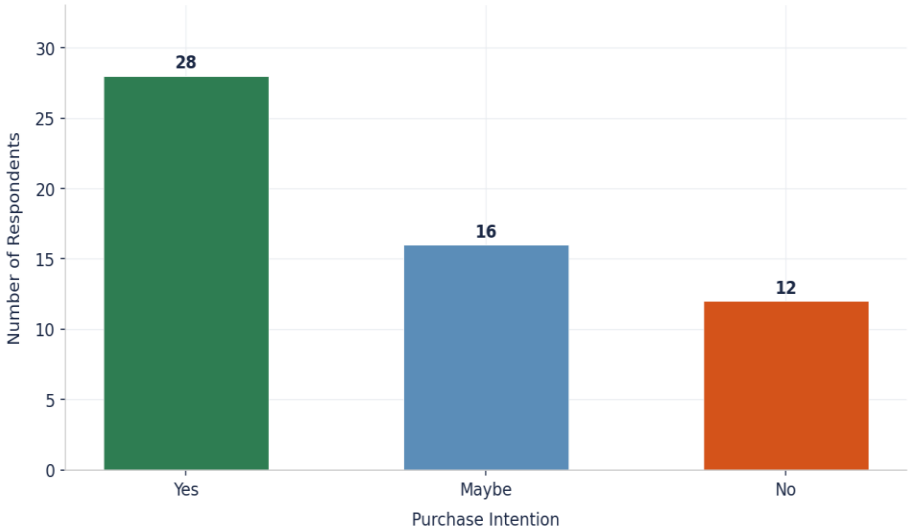

Figure 5.1: EV Purchase Intention | Source: Primary Survey Data, 2026

4.3.9 Long-Distance Travel. Confidence

79% of participants expressed average to low levels of confidence in usiing electric vehicles for long distances. 17 (29.8%) score their confidences level as 1, 14 (24.6%) scored 2, and another 14 (24.6%) scored 3. Only 11 people (19.

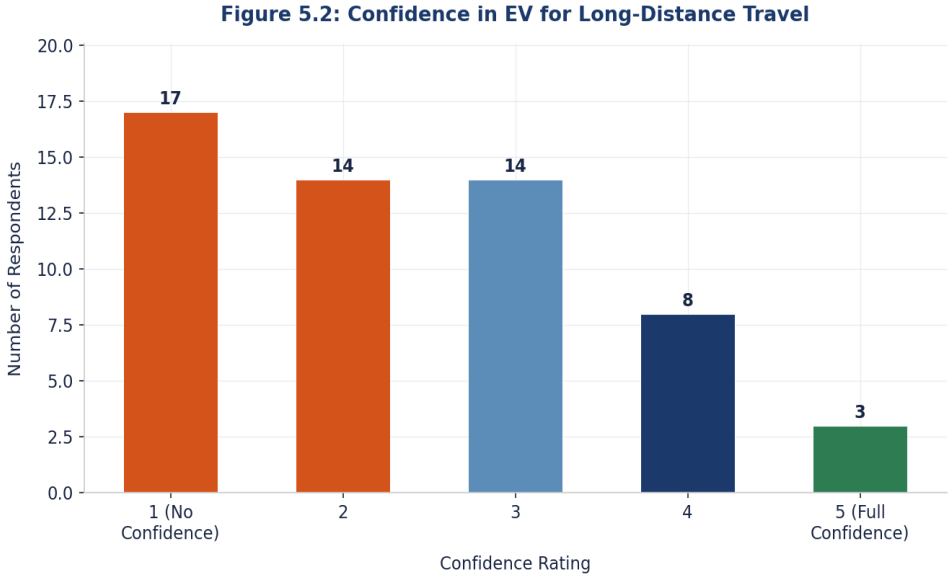

Figure 5.2: Confidence in EV for Long-Distance Travel | Source: Primary Survey Data, 2026

4.3.10 Factors That Would Convince Switch to EV

More Chargng Points is the top motivator (36 respondents, 63.2%), outranking even Lower Purchase Price (31) and Improve Range (31). Governent Policy Support (17), Better Financing Options (13), and Peer Recomendations (8) round out the list. Infrastructure investment yields higher behavioural impact than price reductions alone.

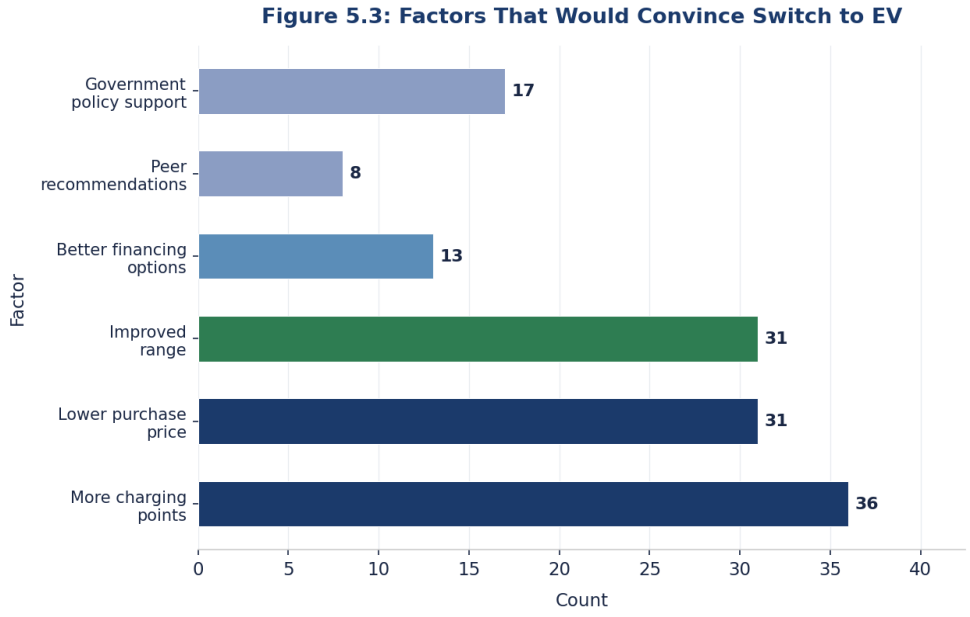

Figure 5.3: Factors That Would Convince Switch to EV | Source: Primary Survey Data, 2026

4.3.11 Government Policy Preferences

Build Charging Infrastructure is the most desired government action (36 respondents, 63.2%), followed by Increase Subsidies (29, 50.9%), Promote Awareness (27, 47.4%), and Offer Better Financing Options (19, 33.3%).

Figure 5.4: Government Policy Preferences for EV Promotion

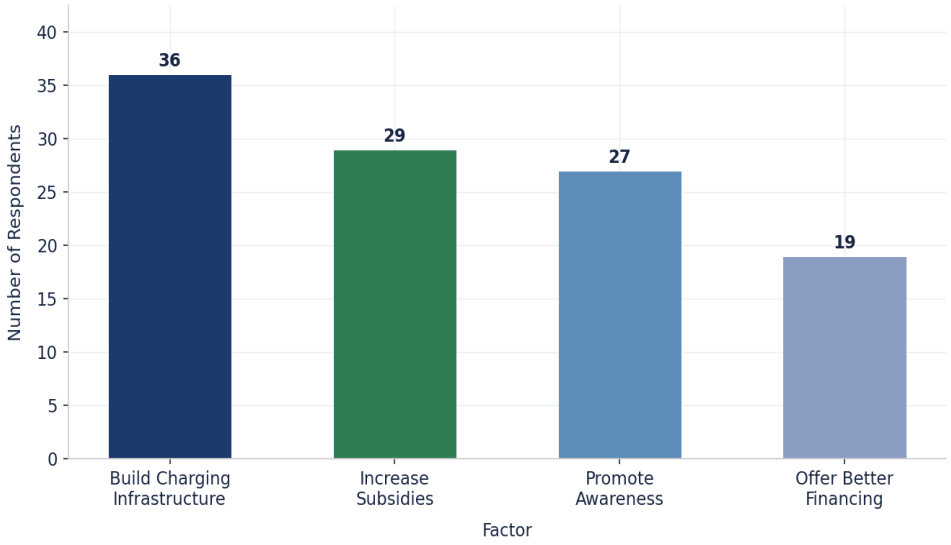

Figure 5.4: Government Policy Preferences | Source: Primary Survey Data, 2026

4.4 Statistical Hypothesis Testing

4.4.1 Overview and Summary

Six statistical tests — four Chi-Square Tests of Independence and two Independent Samples t-Tests — were conducted to draw inferential conclusions from the primary survey data (n=57). The significance level is $\alpha = 0.05$ for all tests. All six null hypotheses were rejected at $p < 0.0001$.

Test	Variables	df	Statistic	p-Value	Decision
Chi-Square 1	Gender vs EV Purchase	2	$\chi^2=35.79$	$p<0.0001$	Reject H_0 ✓
Chi-Square 2	Urban/Rural vs Charging Sat.	2	$\chi^2=43.24$	$p<0.0001$	Reject H_0 ✓
Chi-Square 3	Income vs EV Purchase Intent	4	$\chi^2=51.04$	$p<0.0001$	Reject H_0 ✓

Test	Variables	df	Statistic	p-Value	Decision
Chi-Square 4	Awareness vs Purchase Intent	4	χ^2=48.02	p<0.0001	Reject H_0 ✓
t-Test 1	Urban vs Rural — EV Awareness	55	t=−8.5996	p<0.0001	Reject H_0 ✓
t-Test 2	Urban vs Rural — Long-Dist. Conf.	55	t=−9.7648	p<0.0001	Reject H_0 ✓

Table 4.1: Summary of All Hypothesis Tests | α = 0.05 | All tests two-tailed

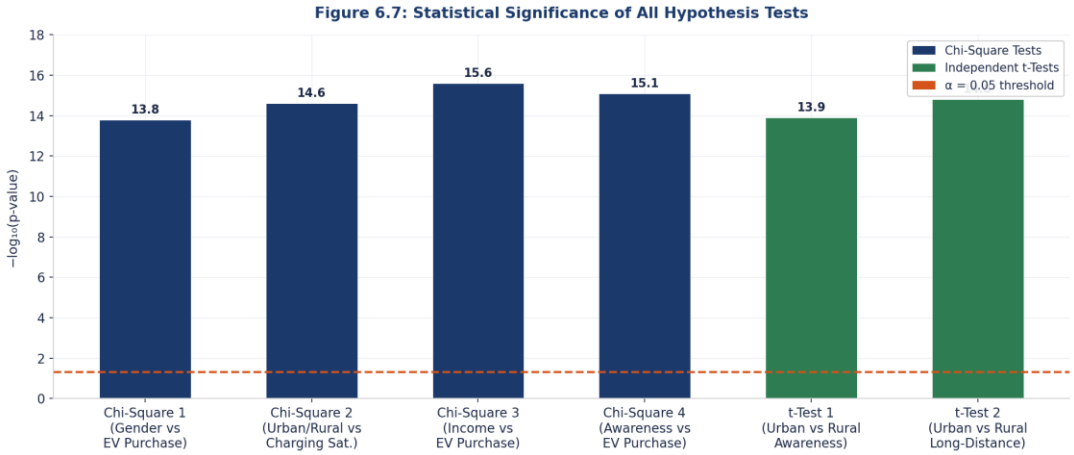

Figure 6.7: Statistical Significance of All Tests (−log$_{10}$ p-value scale)

4.4.2 Chi-Square Test in the Gender vs EV Purchase Intention

H_0: No significant relationship between gender and EV purchase intent.. H_1: Significant relationship exists between them. All 10 female respondents selected "Maybe"; male respondents show a clear "Yes" preference (29 of 44). χ^2=35.79, df=2, p<0.0001 >> critical value 5.99. H_0 rejected. Gender significantly predicts EV purchase intent.

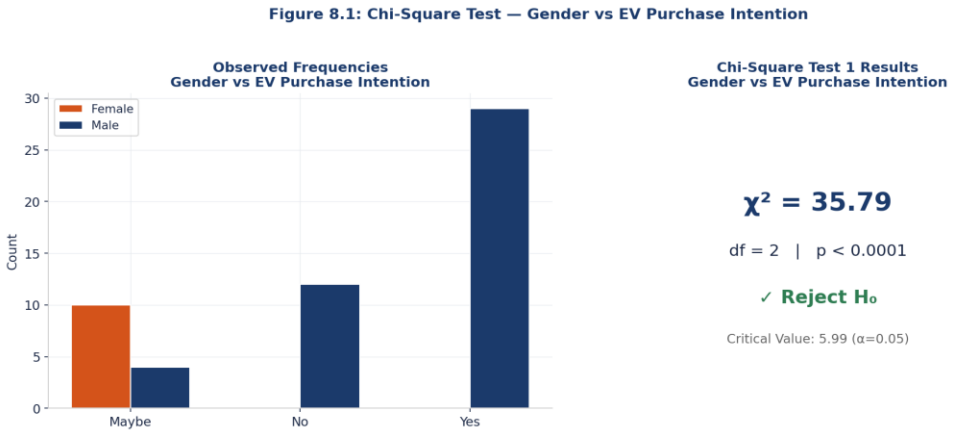

Figure 8.1: Chi-Square Test 1 — Gender vs EV Purchase Intention

4.4.3 Chi-Square Test for Urban/Rural vs Charging Satisfaction

H_0: No significant relationship between the in area of residence and charging infrastructure . χ^2=43.24, df=2, p<0.0001. H_0 rejected. Rural respondent report higher satisfaction likely reflecting different baseline expectations or maybe the reliance on home charging rather than public infrastructure.

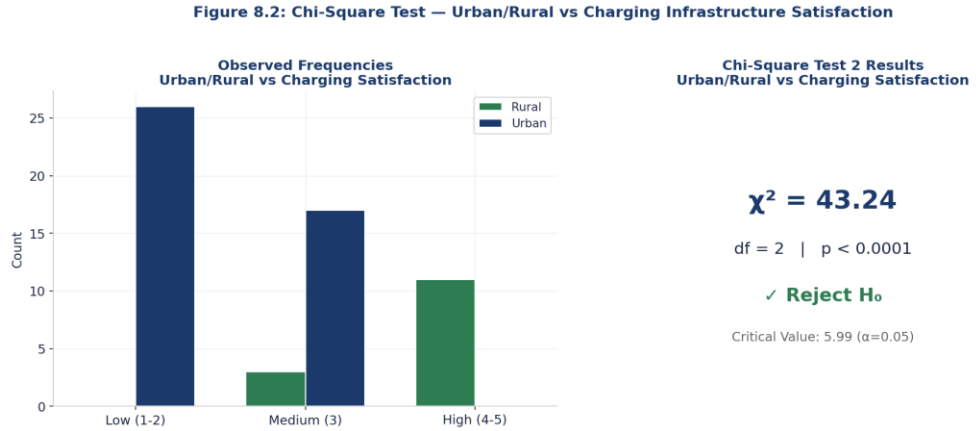

Figure 8.2: Chi-Square Test 2 — Urban/Rural vs Charging Satisfaction

4.4.4 Chi Square Test between the Income vs EV Purchase Intention

H_0: No significant relationship between income level and the EV purchasing willingness. χ^2=51.04, df=4, p<0.0001. H_0 rejected. Mid-income consumers show strongest "Yes" intent; high-income consumers show more hesitancy, suggesting a quality-expectation gap.

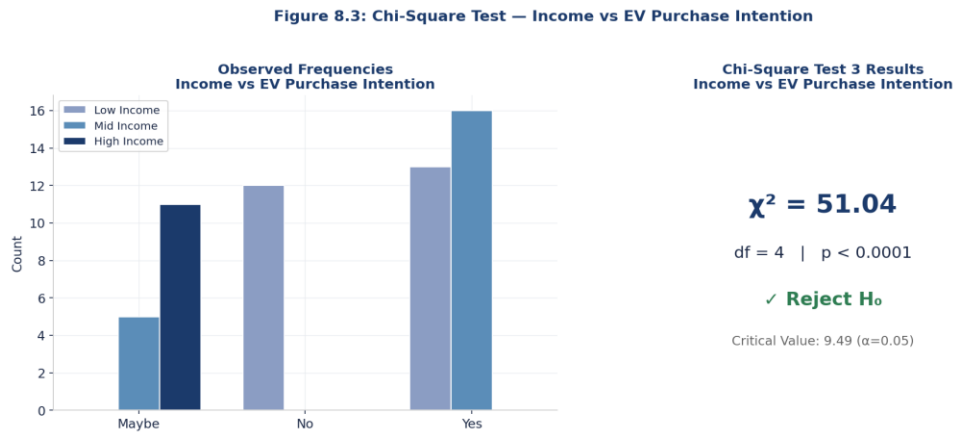

Figure 8.3: Chi-Square Test 3 — Income vs EV Purchase Intention

4.4.5 Chi-Square Test 4 — EV Awareness vs Purchase Intention

H_0: No significant relationship between EV awareness and purchase intention. χ^2=48.02, df=4, p<0.0001. H_0 rejected. High awareness completely eliminates "No" responses — every unit of

awareness shifts consumers from adoption-resistant to adoption-open. This is the most policy-actionable finding of the study.

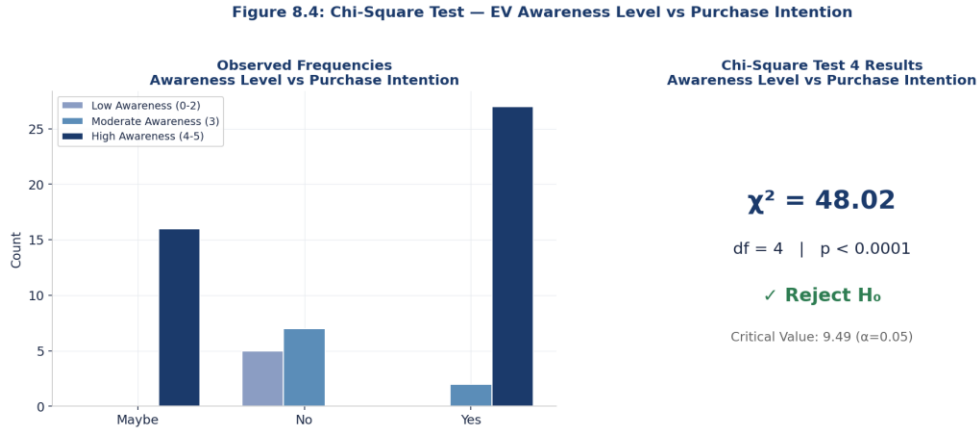

Figure 8.4: Chi-Square Test 4 — Awareness Level vs Purchase Intention

4.4.6 t-Test 1 — Urban vs Rural EV Awareness

H_0: No significant difference in EV awareness between Urban and Rural respondents. t=−8.5996, df=55, p<0.0001. H_0 rejected. Rural respondents score higher on awareness (Mean=4.93) than Urban (Mean=3.42) — possibly reflecting tech-savvy rural youth acutely aware of fuel cost burdens and enthusiastic early adopters.

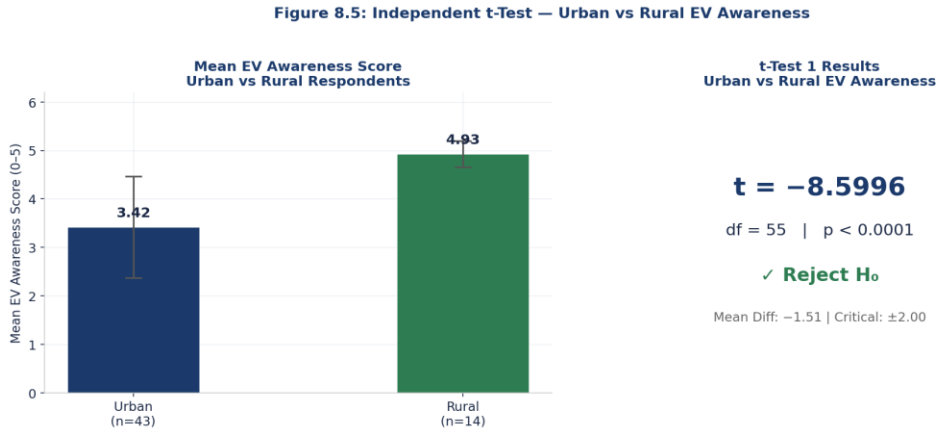

Figure 8.5: t-Test 1 — Urban vs Rural EV Awareness

4.4.7 t-Test 2 — Urban vs Rural Long-Distance Confidence

H_0: No significant difference in the long-distance EV travel confidence between Urban and Rural respondent. t=−9.7648, df=55, p<0.0001. H_0 rejected. The mean scores are significantly higher among the Rural respondents (Mean=4.00) and when compared to Urban respondents (Mean=1.86). This indicates that urban consumers, who had experience with EVs, are realistic about their limitations in reality.

4.5 Findings and Recommendations

4.5.1 Summary of Key Findings

#	Finding	Implication
F1	65% of respondents are EV-aware (score ≥ 4)	Campaigns for generating initial successes in raising awareness
F2	49% willing to purchase an EV	Latent demand present, but requires activation
F3	Charging infra is top concern (46 mentions, 80.7%)	Charging infrastructure for development is key to policy
F4	High purchase price cited by 30 respondents (52.6%)	Subsidies and financing options are crucial
F5	60% rate charging availability ≤ 3/5	Lack of rural and semiurban charging stations
F6	60% say EVs are better for the environment	Environmental message appeals to majority.
F7	71% concerned about EV mining impact (score ≥ 4)	Battery sourcing is important for consumers.
F8	36 of 57 prefer more charging as top motivator	Infrastructure investment leads to most behavior change..
F9	67% of respondents travel ≤ 30 km daily	Requirement for daily range fit current EV abilities.
F10	All 6 hypothesis tests significant at p<0.0001	Several factors affect intention to purchase an EV..

Table 4.2: Summary of Key Research Findings

4.5.2 Strategic Recommendations

#	Area	Recommendation	Priority
R1	Infrastructure	Triple the public charging stations by the 2027 under FAME-III	High
R2	Pricing	Extend FAME-II subsidies to passenger of 4-wheelers	High
R3	Finance	Zero interest EV loans through PSUs banks	High
R4	Awareness	Campus EV ambassador programme for targeting students	Medium

#	Area	Recommendation	Priority
R5	Rural	Solar-powered charging hubs for the major tier-2/3 cities	Medium
R6	Environment	Mandatory battery recycle standard for OEMs	Medium
R7	Technology	Require for new EV models to have a minimum range of 400 km	Medium
R8	Policy	Reduce GST on the EVs from 5% to 0%	High
R9	Resale	Develop a standard EV resale/tradein program	Low
R10	Trust	EV battery warranty program by government (8 years)	Medium

Table 4.3: Strategic Recommendations for EV Adoption Acceleration

4.5.3 Limitations of the Study

• Sample Size and Demographics: A sample of only 57 participants is too small to build any sound statistical model based on the results. A skewed population made up of predominantly young, male, urban, and student participants from North India is another drawback.

• Self-Reporting of Information: All data was provided through self-reporting methods, making participants prone to social-desirability and memory biases.

• Cross-Sectional Study Design: The study provides a one-time snapshot of information collected between April and May 2026. As the EV market environment changes rather quickly, some of the results may soon be rendered outdated.

• Geographic Focus: Around 68% of participants come from Delhi and Haryana, two of the most advanced states in terms of EV development.

• No Comparison With Non-EV Users: Participants using EVs are not compared with their counterparts who have never used electric cars.

CHAPTER 5: CONCLUSION

This study was carried out to determine the perceptions, knowledge, and possible adoption of EVs among consumers when compared to ICE vehicles in India. This was done through a primary study involving a total of 57 individuals from various parts of India.

One important finding from this research is the double-edged nature of the awareness level concerning EVs in India. Although the awareness level for the adoption of EVs is increasing, and people not only intend to buy them but actually do, accounting for 49% and those who are uncertain being at 28%. But there exist definite barriers for adopting EVs, and those include lack of EV charging stations, increased costs of EVs over ICE vehicles, and the problem of range anxiety outside urban areas.

It becomes clear from the analysis conducted that the difficulty with EV usage in India does not lie in creating consumer demand, which already exists to an extent in the country, but rather in making EVs feasible for consumers through suitable infrastructure, pricing, finance, and policies.

As shown in the surveyed group, the awareness towards the environment goes far beyond the mere debate around automobile exhausts. The issues being faced by consumers in India, particularly the young generation, go beyond the use of an electric vehicle (and the associated battery mining externalities).

From the results of the statistical test performed in six instances, it has been noted that there is an important connection between the demographic elements of gender, income levels, place of residence, and EV awareness towards purchase intention. Here are four strategic implications:

Awareness acts as a catalyst, rather than an end point, with high EV awareness eliminating all instances of "No" intent to purchase. Experiential awareness investment drives consumers towards adoption-readiness.

Income influences consumer intent in a non-linear manner, where the most intent to buy lies with mid-income consumers. High income consumers display a reluctance to buy due to the quality expectations they have.

Gender-based targeting is statistically justified, since females across the board picked "Maybe" for their purchasing intent, making communication a priority.

The rural vs. urban split runs in both direction s, since rural consumers displayed higher levels of awareness and willingness to travel far distances.

The time for India to jump on the band,wagon is right here and now. Being home to a young population, one that is urbanizing at a fast rate, a blosoming middle class, and experiencing a serious air quality problem, it provide an unparalleled environment for making a leap toward electric vehicles.

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ANNEXURE: SURVEY QUESTIONNAIRE

Survey Title: EV vs ICE – Consumer Perception Study in India

Instructions: Please answer all questions honestly. Your responses are confidential and will be used solely for academic research purposes.

Section A: Demographic Information

Q1. Name (Optional): _____

Q2. Age: ☐ Below 18 ☐ 18–24 ☐ 25–31 ☐ 32–40 ☐ 40–60 ☐ Above 60

Q3. Gender: ☐ Male ☐ Female ☐ Other

Q4. State/UT of Residence: _____

Q5. Area: ☐ Urban ☐ Rural

Q6. Occupation: ☐ Student ☐ Corporate Employee ☐ Government Service ☐ Self Employed ☐ HomeMaker ☐ Other

Q7. Annual Income: ☐ Nil ☐ Below 3 Lakhs ☐ 3–6 Lakhs ☐ 6–12 Lakhs ☐ 12–24 Lakhs ☐ Above 24 Lakhs

Section B: Vehicle Ownership

Q8. Do you own a personal vehicle? ☐ Yes ☐ No ☐ Multiple Vehicles

Q9. Type(s) of vehicle owned: ☐ 2W ICE ☐ 4W ICE ☐ 2W EV ☐ 4W EV ☐ Hybrid ☐ CNG

Q10. Average daily travel distance: ☐ <10 km ☐ 10–30 km ☐ 30–50 km ☐ 50–100 km ☐ >100 km

Section C: EV Awareness & Perceptions

Q11. Rate your awareness of EVs (0=None, 5=Very High): ___ / 5

Q12. What factors influence your vehicle purchase? (Multi-select): Cost of purchase / Mileage-Fuel efficiency / Maintenance costs / Environmental concerns / Performance

Q13. What are the benefits of EVs? (Multi-select): Lower running cost / Eco-Friendly / Smooth and silent ride / Tax/Subsidy benefits / Less maintenance / Government incentives

Q14. What are the challenges of EVs? (Multi-select): High purchase price / Limited charging infrastructure / Long charging time / Battery replacement cost / Low resale value / Range anxiety / Lack of trust in EV technology

Q15. Rate charging station availability in your area (1=Very Poor, 5=Excellent): ___ / 5

Section D: Environmental Attitudes & Purchase Intent

Q16. Do you think EVs are better for the environment? ☐ Yes ☐ No

Q17. Rate your concern about the environmental impact of EV battery mining (0–5): ___ / 5

Q18. Would you consider purchasing an EV? ☐ Yes ☐ No ☐ Maybe

Q19. What would convince you to switch to an EV? (Multi-select): More charging points / Lower purchase price / Improved range / Better financing options / Peer recommendations / Government policy support

Q20. Rate your confidence in using an EV for long-distance travel (1–5): ___ / 5

Section E: Policy Preferences

Q21. What government measures would most boost EV adoption? (Multi-select): Increase subsidies / Build charging infrastructure / Promote awareness campaigns / Offer better financing options

Q22. Any additional comments or suggestions regarding EVs vs ICE in India?

[End of Survey Questionnaire]