

# A study of Indian Electric Vehicle Passenger Cars: Challenges, Prospects and Consumer preferences

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## INTRODUCTION

Globally, the automobile industry is undergoing a significant transformation as countries are gradually shifting from conventional petrol- and diesel-powered vehicles to more sustainable alternatives such as Electric Vehicles (EVs), which are powered by electricity stored in rechargeable batteries. India, the third-largest automobile market globally (Hajare, 2025), is also a part of this major transition. In recent years, the primary stakeholders of the Indian automobile industry- the government, manufacturing companies, and general consumers have shown their rising interest in the adoption of electric passenger cars for their mobility needs. This study tries to explore both the challenges and the prospects of EV passenger cars in India, looking at current growth trends, the supporting factors, and the major challenges that are hindering large scale EV adoption by consumers.

Many scholars around the world believe that India's adoption of cleaner transport is not a choice but a compulsion, as India is one of the most air-polluted countries in the world, and the transport sector is one of the major contributors to this pollution problem. As per reports by The Energy and Resources Institute (TERI, 2025), the transport sector is responsible for up to 37% of PM2.5 concentrations in Indian cities during winter months. PM2.5 refers to very fine particulate matter that can cause serious respiratory and cardiovascular diseases. Apart from air quality, India also has a huge problem of energy dependence. It imports a large amount of crude oil each year for its transportation needs, which puts a lot of pressure on its forex reserves. A study by the Council on Energy, Environment and Water (CEEW, 2020) estimated that if Electric Vehicles contribute up to 30% of new vehicle sales by 2030, India can save up to USD 14.1 billion every year on crude oil imports. TERI (2025) further estimated that replacing old fossil fuel-based vehicles with EVs in 44 major Indian cities could reduce India's oil imports to approximately USD 106.6 billion by 2035 and will also reduce 11.5 tonnes of PM2.5 pollutants from entering the air each day.

In terms of market growth, the Indian EV passenger car segment is growing significantly each year. According to the Federation of Automobile Dealers Associations (FADA, Economic Times, 2026), electric passenger vehicle sales in India grew by 77% year-on-year, reaching 1,76,817 units in 2025, compared to only 99,975 units in 2024. EV share in the passenger car segment improved from 2.4% in 2024 to approximately 4.0% in 2025 (FADA, Economic Times, 2026). The overall Indian EV market, across all segments, crossed 2.3 million units in 2025, which is 8.36% of total automobile sales in the country (EV Reporter, 2026). On the market value side, Fortune Business Insights (2024) estimates that the Indian EV market, valued at USD 3.98 billion in 2024, will grow to USD 17.88 billion by 2032 at a CAGR of 19.0%. Grand View Research (2024) projects an even larger market size of USD 152.21 billion by 2030, growing at a CAGR of 40.7% between 2025 and 2030.

Despite these encouraging facts, there are several challenges that continue to slow down widespread adoption of EV passenger cars in India. The most significant barrier is the high upfront cost- EVs normally cost 20–40% more than petrol/diesel vehicles with equivalent parameters, primarily because of battery cost, which accounts for approximately 30–40% of the total vehicle cost (DIY Guru, 2026). The second major challenge is limited and uneven charging infrastructure. India currently has only around 12,000–15,000 public charging stations against an estimated requirement of over 2,00,000 by 2030. Most of these stations are in metro cities, leaving tier-2, tier-3 cities and rural areas majorly underserved (Times of India, 2026). Another barrier to adopting EVs among consumers is **range anxiety**, the fear that the vehicle's battery will run out before reaching a destination or a charging station. Most affordable EVs in India offer a real-world range of 250–400 km, which gets further reduced in heavy traffic or on hilly roads (Ayvens, 2025). Beyond these, long-term issues like battery degradation after 7–8 years, high battery replacement costs, an underdeveloped second-hand EV market, and the absence of large-scale lithium-ion battery recycling infrastructure are also some of the serious concerns (Times of India, 2026). Finally, a structural challenge that is often overlooked is that approximately 70% of India's electricity still comes from coal, which means the environmental benefit of EVs is partly

offset by the carbon emissions involved in electricity generation. Therefore, for a truly clean EV future, India will require not just more EVs on the road, but also faster transition to renewable energy sources.

In this context, this paper aims to conduct an analysis of the current state of EV passenger cars in India, examining both the opportunities that make this a promising sector and the structural, economic, and infrastructural challenges that must be addressed to achieve a sustainable EV transition.

## LITERATURE REVIEW

Over the last decade, a large body of research has grown around how Indian consumers think about and respond to electric vehicles (EVs). Researchers studying EV adoption in India have largely depended on well-known theoretical models to understand consumer behavior. The Theory of Planned Behavior (TPB) has been widely applied. According to this theory, a person's intention to do something, like buying an EV, is shaped by their attitude toward the action, the social norms around them, and how much control they feel they have over the action. Sahoo, Harichandan, Kar, and Sreejesh (2022) used an empirical study in the Indian context and found that all three TPB components significantly affected consumers' behavioral intention and actual buying behavior toward EVs. Environmental concern was also incorporated and found to be a strong predictor of actual adoption behavior (Sahoo et al., 2022).

Similarly, Nagarajan, Chidambaram, and Janarthanam (2022) applied a dual-factor approach combining Social Comparison Theory with the Technology Acceptance Model (TAM) to study EV acceptance in India. Their findings showed that consumers who compare themselves to peers who already own EVs are more likely to develop a positive attitude toward EVs themselves, suggesting that social factors play a very important role in the Indian context (Nagarajan et al., 2022).

### *Price Sensitivity and Affordability*

One of the most consistently reported findings in Indian EV research is that price is the single biggest barrier to adoption. Narwal (2023), in a study published in *Business Strategy & Development*, surveyed 173 respondents in Haryana and found that price perception had a significant influence on consumer attitude toward electric cars, which in turn affected their purchase intention. Seetharam, Venkatesan, and Nair (2024), found that purchase price and operating cost had a significantly negative influence on the intention to adopt electric four-wheelers, while driving range and charging facilities had a significantly positive impact (Seetharam et al., 2024). Supporting this, Rastogi and Singh (2024) found notable positive correlations between per capita income and EV growth in India, and negative correlations between electricity price and EV adoption — confirming that affordability is closely tied to economic conditions at the macro level as well (Rastogi & Singh, 2024).

### *Environmental Concern as a Motivator*

Environmental awareness is often cited as a key motivator for EV adoption, but Palit, Srivastava, and Jha (2022), in their empirical study published in *Energy Policy*, found that economic benefits and performance expectations as much as environmental concern, significantly influenced the behavioral intention of Indian consumers to adopt EVs. They also noted that environmental concern alone was rarely strong enough to overcome financial and infrastructural barriers. The Energy and Resources Institute (TERI) survey on Indian consumer perceptions found that while most respondents are aware of the environmental benefits of EVs, they still rank cost and range anxiety higher than environmental reasons when making their purchase decision.

### *Range Anxiety and Charging Infrastructure*

Kumar, Nair, and Rajapaksa (2022), studying middle-income residents in Hyderabad, found that range anxiety combined with the lack of a widespread charging network was the most commonly reported barrier to EV adoption. They also noted that apartment dwellers faced a unique problem of home charging being practically impossible. This is a major issue in Indian cities. Another study by Rathore, Sharma, and Gupta (2025), analyzing survey data from 400 respondents, found that charging infrastructure availability was one of the two most significant predictors of EV adoption alongside cost. Selva and Arunmozhi (2019) compared urban and rural areas and found a huge difference in EV readiness. Urban consumers showed relatively higher awareness and willingness to consider EVs, but rural consumers had very limited knowledge of charging networks and government schemes, pointing to the need for region-specific infrastructure and communication strategies.

### *Social Influence, Lifestyle, and Brand Perception*

Indian research also shows that social influence, lifestyle aspirations, and brand trust shape EV purchase decisions in significant ways. Ramesh and Malathi (2023), found that lifestyle and conspicuous consumption positively influenced attitude toward EVs, which in turn predicted purchase intention and ecological behavior. Kumar, Singh, and Yadav (2023), examining EV adoption in Southern India, found that peer recommendations and word-of-mouth played a very important role, especially among first-time EV buyers who had no direct experience with the vehicles. Sharma, Chaudhary, and Gupta (2024), assessing eight critical factors including branding, found that vehicle desirability and

brand perception were moderately significant in consumer decision-making in the Indian EV market (Sharma et al., 2024).

### ***Government Policy and Its Influence on Consumer Attitude***

Studies also consistently show that awareness of government policy positively shapes consumer attitude and purchase intention toward EVs. Narwal (2023) specifically found that government support significantly influenced consumer attitude in Haryana, with respondents who were aware of The FAME (Faster Adoption and Manufacturing of Electric Vehicles) subsidies showing much higher purchase intention (Narwal, 2023). Gaur (2025), in a study from Uttar Pradesh, found that in less-developed states, consumer awareness of EV-related government schemes was very low, which significantly reduced purchase intention even among those who could theoretically afford an EV — underscoring the need for targeted state-level campaigns.

### ***Demographic Differences: Age, Gender, and Income***

Several Indian studies have examined how demographics affect EV preferences. Sahoo et al. (2022) found that younger and higher-income consumers are more open to EVs, as they are more comfortable with technology and face fewer budget constraints. Mittal, Tandon, and Tiwari (2024), found that education was one of the strongest positive predictors of EV adoption intention, and that gender played a moderating role, with male consumers showing slightly higher willingness to adopt EVs, though the gender gap was narrowing with increasing education levels (Mittal et al., 2024).

Kumar and Anjum (2024), in a comprehensive analysis published in the International Journal of Economics and Energy Policy, found that awareness campaigns targeting younger, educated urban consumers could have a significant multiplier effect on EV adoption because this group is more likely to influence peers and family members (Kumar & Anjum, 2024). The TERI survey found that among respondents under 25, 71% considered resale value a key concern, showing that young Indian consumers think about total cost of ownership, a more mature evaluation framework than simply comparing the sticker price of an EV versus a petrol car (TERI, 2024).

## **RESEARCH METHODOLOGY**

This study adopts a descriptive and analytical research design to examine consumer awareness, attitudes, and purchase intentions toward Electric Vehicle (EV) passenger cars in India. A quantitative survey-based approach was employed. The research is cross-sectional in nature, allowing for a snapshot assessment of consumer perceptions and behavioural intentions as they stand in the current market context. The target population comprised current and prospective automobile consumers residing in urban and semi-urban areas of India, with a specific focus on individuals who are aware of or likely to consider purchasing a passenger car. Given the constraints of time and accessibility, a convenience sampling technique was adopted.

A total of 104 responses were collected, of which 103 were valid for most analyses after accounting for missing values on select variables. Data were collected using a structured self-administered questionnaire consisting of 18 questions spanning five thematic sections: respondent demographics (Q1–Q5), current vehicle ownership and usage (Q6–Q7), EV purchase intention and awareness (Q8–Q10), brand perception and service expectations (Q11–Q14), and forward-looking attitudes toward EV adoption (Q15–Q18). The questionnaire included a mix of closed-ended question formats: dichotomous (Yes/No), Likert-type ordinal scales, nominal categorical items, and multi-select "select all that apply" items. The questionnaire was administered digitally via Google Forms and distributed through online channels. Prior to distribution, the instrument was reviewed for clarity and validity. All responses were anonymized to ensure participant confidentiality.

Five distinct statistical techniques were applied, each selected to address specific research objectives. Descriptive Statistics were computed for all 15 coded variables. Multiple Response Analysis (MRA) was applied to the three "select all that apply" questions (Q10, Q13, Q18). Co-occurrence analysis was additionally performed to identify pairs of items most frequently selected together. Chi-Square Tests of Independence were conducted for five variable pairs to assess whether statistically significant associations exist between demographic and attitudinal variables.

The test statistic  $\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$  compares observed cell frequencies against expected frequencies under the null hypothesis of independence. Effect size was measured using Cramér's V. A significance threshold of  $\alpha = 0.05$  was applied throughout. Coefficients were exponentiated to produce Odds Ratios (OR) with 95% confidence intervals. All analyses were conducted in SPSS.

With the rapidly changing geo-political scenario in the second quarter of 2026, qualitative analysis was conducted via consumer interviews again among a subset of the respondents to account for any change in consumer preferences in April 2026.

## RESULTS AND DISCUSSION

### Descriptive Statistics:

The sample shows younger respondents. 60.6% fall in the 18–25 age bracket (n=63), followed by 26–35 at 22.1% (n=23). The remaining three groups — 36–45 (9.6%), 46–55 (5.8%), and Above 55 (1.9%) — together account for less than 18% of the sample. Additionally, 75.7% of respondents are male (n=78) and 24.3% female (n=25). Students dominate at 56.3% (n=58), followed by Private Sector employees at 24.3% (n=25). Government Employees (8.7%, n=9) and Business Owners (7.8%, n=8) are minority groups, and "Other" accounts for just 2.9% (n=3) of respondents. Only 3.1% earn above ₹15 lakh (n=3).. Among passenger car owners, petrol vehicles are overwhelmingly dominant at 64.6% (n=64), diesel accounts for 15.2% (n=15), hybrid 7.1% (n=7), CNG vehicles at 8.1% (n=8), and EVs just 5.1% (n=5).

	Question	Response Option	Frequency (n)	% of Respondents
1	Age Group	18-25	63	60.6
		26–35	23	22.1
		36–45	10	9.6
		46–55	6	5.8
		Above 55	2	1.9
2	Gender	Male	78	75.7
		Female	25	24.3
		Prefer not to say	0	0.0
3	Occupation	Student	58	56.3
		Private Sector	25	24.3
		Government Employee	9	8.7
		Business Owner	8	7.8
		Others:	3	2.9
4	Current Vehicle Type	Petrol	64	64.6
		Diesel	15	15.2
		CNG	8	8.1
		EV	5	5.1
		Hybrid	7	7.1

### Multiple Response Analysis (MRA)

When the respondents are allowed to "select all that apply", a single person may tick multiple boxes which means the number of responses exceeds the number of respondents. Applying conventional frequency counts to such data produces percentages that sum to more than 100%, which are easy to misread. Multiple Response Analysis (MRA) solves this by introducing two distinct percentage measures:

$$\% \text{ of Respondents} = \frac{\text{Number selecting item}}{\text{Total respondents}} \times 100$$

$$\% \text{ of Responses} = \frac{\text{Number selecting item}}{\text{Total all selections made}} \times 100$$

### MRA Results Summary

Question	Cases Base (N)	Total Responses	Avg Selections/Resp	Min	Max
Q10 – Purchase Factors	103	240	<b>2.33</b>	1	6
Q13 – Adoption Challenges	103	216	<b>2.10</b>	1	6
Q18 – Expected Improvements	98	213	<b>2.17</b>	1	5

On average, respondents selected 2.1–2.3 items per question, indicating focused rather than scattered responses. The fact that many respondents used only 1–2 selections (50 out of 103 for Q10, 54 out of 103 for Q13) suggests genuine prioritization. It means respondents were simply not ticking everything available.

**Purchase Factors — "What Would Influence Your Decision to Buy an EV?"**

Rank	Purchase Factor	Frequency	% of Respondents	% of Responses
1	Fuel Cost Savings	62	60.2%	25.8%
2	Environmental Concerns	57	55.3%	23.8%
3	Government Subsidies	48	46.6%	20.0%
4	Brand Reputation	37	35.9%	15.4%
5	Charging/Refueling Infrastructure	18	17.5%	7.5%
6	Maintenance Cost	18	17.5%	7.5%
<b>Total</b>		<b>240</b>	—	<b>100%</b>

**Purchase Factors:** Fuel Cost Savings (60.2%) and Environmental Concerns (55.3%) form a dominant top 2 that together drives most purchase consideration. Government Subsidies (46.6%) act as the third pillar. Brand Reputation (35.9%) matters for a segment seeking societal validation apart from quality assurance. Infrastructure and Maintenance Cost concerns (17.5% each) are peripheral in the motivational framework. The typical buyer is moved primarily by economic logic reinforced by environmental values.

**Adoption Challenges — "What Are the Major Challenges for EV Adoption in India?"**

Rank	Challenge	Frequency	% of Respondents	% of Responses
1	Lack of Charging/CNG Stations	68	66.0%	31.5%
2	High Initial Cost	49	47.6%	22.7%
3	Limited Model Choices	41	39.8%	19.0%
4	Battery Life & Replacement (for EVs)	22	21.4%	10.2%
5	Safety Concerns	22	21.4%	10.2%
6	Range Anxiety (for EVs)	14	13.6%	6.5%
<b>Total</b>		<b>216</b>	—	<b>100%</b>

**Adoption Challenges:** Lack of Charging/CNG Stations (66.0%) is the single most important obstacle in the entire survey dataset. High Initial Cost (47.6%) and Limited Model Choices (39.8%) form a closely linked second tier. Battery Life (21.4%), Safety (21.4%), and Range Anxiety (13.6%) represent secondary concerns held by smaller but identifiable subgroups. The co-occurrence network confirms that infrastructure is the foundational challenge that amplifies all others.

**Expected Improvements — "What Improvements Would You Expect from EV car manufacturers?"**

Rank	Expected Improvement	Frequency	% of Respondents	% of Responses
1	Lower Prices	55	56.1%	25.8%
2	Better Infrastructure	48	49.0%	22.5%
3	More Models	45	45.9%	21.1%
4	Longer Battery Range (EV)	34	34.7%	16.0%
5	Extended Warranty/Service Packages	31	31.6%	14.6%
<b>Total</b>		<b>213</b>	—	<b>100%</b>

**Expected Improvements:** Lower Prices (56.1%) dominates the improvement agenda, acting as the universal co-occurring partner with every other desired change. Better Infrastructure (49.0%) and More Models (45.9%) are the structural pillars of the improvement agenda. Longer Battery Range (34.7%) and Extended Warranty (31.6%) represent important but secondary enhancements. EV car manufacturers should prioritise improvement in this exact order to maximise the conversion of potential buyers to actual purchasers.

### Chi-Square ( $\chi^2$ ) Test of Independence

Chi-Square ( $\chi^2$ ) Test of Independence was used to analyse whether two categorical variables are statistically associated or independent of each other.

The test statistic was computed as:

$$\chi^2 = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where  $O_{ij}$  = observed frequency and  $E_{ij}$  = expected frequency in cell (i, j).

If  $\chi^2$  exceeds the critical value at the chosen significance level ( $\alpha = 0.05$ ) and degrees of freedom (df), or equivalently if  $p < 0.05$ , we reject  $H_0$  and conclude a significant association exists.

**Test 1: Gender  $\times$  Purchase Intent:** "Do males and females differ in EV/CNG buying intention?"

#### Hypotheses

**H<sub>0</sub>:** Gender and purchase intent are independent (no difference between males and females)

**H<sub>1</sub>:** Gender and purchase intent are significantly associated

#### Observed Frequencies & Row Percentages

Gender	No	Yes	Maybe	Total
Male	37 (49.3%)	32 (42.7%)	6 (8.0%)	75
Female	7 (28.0%)	5 (20.0%)	13 (52.0%)	25

#### Test Statistics

Statistic	Value
$\chi^2$ (calculated)	<b>23.6483</b>
Critical value (df=2, $\alpha=0.05$ )	5.9915
Degrees of freedom	2
p-value	<b>&lt; 0.001</b>
Cramér's V	<b>0.49</b> (Medium–Large)
Sample size	100

Since  $\chi^2 = 23.65 \gg$  critical value 5.99, and  $p < 0.001 \ll 0.05$ , **H<sub>0</sub> is rejected.**

The distribution of responses differs markedly between genders:

- **Males** are predominantly **definitive** in their response — 49.3% say "No" and 42.7% say "Yes," with only 8% undecided ("Maybe").
- **Females** are strikingly **undecided** — 52% responded "Maybe," suggesting greater openness to consideration but not firm commitment.
- Males show a higher absolute "Yes" rate (42.7%) compared to females (20%), but females' high "Maybe" share (52%) may reflect **information-seeking behavior** rather than rejection.

**Test 2: Age Group  $\times$  Purchase Intent:** "Does age affect whether someone plans to buy an EV/CNG?"

#### Hypotheses

**H<sub>0</sub>:** Age group and purchase intent are independent

**H<sub>1</sub>:** Age group and purchase intent are significantly associated

#### Observed Frequencies & Row Percentages

Age Group	No	Yes	Maybe	Total
18–25	28 (44.4%)	20 (31.7%)	15 (23.8%)	63
26–35	11 (47.8%)	11 (47.8%)	1 (4.3%)	23
36–45	4 (57.1%)	3 (42.9%)	0 (0.0%)	7
46–55	1 (16.7%)	2 (33.3%)	3 (50.0%)	6
Above 55	1 (50.0%)	1 (50.0%)	0 (0.0%)	2

**Test Statistics**

Statistic	Value
$\chi^2$ (calculated)	<b>10.9415</b>
Critical value (df=8, $\alpha=0.05$ )	15.5073
Degrees of freedom	8
p-value	<b>0.205</b>
Cramér's V	0.23 (Small)
Sample size	101
% Cells with Expected < 5	66.7% (□ Assumption violated)

Since  $\chi^2 = 10.94 < \text{critical value } 15.51$ , and  $p = 0.205 > 0.05$ ,  **$H_0$  is not rejected.**

No statistically significant age-based pattern in purchase intent emerges. However, some descriptive tendencies are worth noting:

- The **18–25 age group** (which forms 62% of the sample) shows the highest proportion of "Maybe" (23.8%), suggesting youthful openness but financial/lifecycle hesitation.
- The **26–35 age group** is the most decisive — nearly equal split between Yes (47.8%) and No (47.8%), with almost no "Maybe."
- The **46–55 group** paradoxically shows high "Maybe" (50%), possibly reflecting genuine consideration but price sensitivity.
- The sample skews heavily toward young respondents (18–25), which limits statistical power for older age groups (cells with  $n < 5$ ).

**Test 3: Occupation × Awareness Level**

"Are students more or less aware of EV cars' offerings than professionals?"

**Hypotheses**

**$H_0$ :** Occupation and awareness level are independent

**$H_1$ :** Occupation significantly influences awareness level

**Observed Frequencies & Row Percentages (Full 4-level awareness)**

Occupation	Not Aware	Low	Moderate	Very High	Total
Student	5 (8.6%)	7 (12.1%)	29 (50.0%)	17 (29.3%)	58
Private Sector	0 (0.0%)	3 (12.5%)	4 (16.7%)	17 (70.8%)	24
Govt Employee	0 (0.0%)	1 (11.1%)	5 (55.6%)	3 (33.3%)	9
Business Owner	2 (28.6%)	1 (14.3%)	1 (14.3%)	3 (42.9%)	7
Other	0 (0.0%)	0 (0.0%)	2 (66.7%)	1 (33.3%)	3

**Collapsed Awareness Table (Student vs Professional, 3 awareness bands)**

Occupation	Low (1–2)	Moderate (3)	High (4–5)	Total
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Student	12 (20.7%)	29 (50.0%)	17 (29.3%)	58
Professional	7 (17.5%)	10 (25.0%)	23 (57.5%)	40
Other	0 (0.0%)	2 (66.7%)	1 (33.3%)	3

**Test Statistics**

Statistic	Full Test (12 df)	Collapsed Test (4 df)
$\chi^2$	<b>22.10</b>	<b>9.55</b>
Critical value	21.026	9.488
p-value	<b>0.036</b>	<b>0.049</b>
Cramér's V	0.27	0.22
N	101	101
Cells with Expected < 5	75% (□)	33% (□)

**Both the full and collapsed tests reject H<sub>0</sub>.**

The pattern indicates that:

- **Private sector professionals** have the **highest awareness** — 70.8% rate their awareness as "Very High," compared to only 29.3% of students at the same level.
- **Students** cluster predominantly in "Moderate" awareness (50%), suggesting surface-level familiarity without deep knowledge.
- **Students** also have the **highest "Not Aware" rate** (8.6%) — indicating that while some students are very engaged, a few have limited exposure.
- **Business owners** show a bimodal pattern — 28.6% "Not Aware" but also 42.9% at "Very High," reflecting heterogeneous engagement.

**Summary of All Five Chi-Square ( $\chi^2$ ) Test**

Test	Variables	$\chi^2$	df	p-value	Cramér's V	Effect	Decision
T1	Gender × Purchase Intent	23.65	2	<0.001	0.49	Medium–Large	Reject H <sub>0</sub> ✓
T2	Age Group × Purchase Intent	10.94	8	0.205	0.23	Small	Fail to Reject H <sub>0</sub> ✗
T3	Occupation × Awareness Level	22.10	12	<b>0.036</b>	0.27	Small–Medium	Reject H <sub>0</sub> ✓
<b>Critical values at <math>\alpha = 0.05</math>: df=2 → 5.991</b>				df=4 → 9.488	df=8 → 15.507	df=12 → 21.026	

**Confirmatory Consumer Interviews:**

The last 6 months (December 2025 to May 2026) have been quite challenging due to rising geo-political crises, regional war affecting gulf countries, obstruction to supply of fossil fuels globally, inflation, and significant unpredictability. In order to accommodate the impact of these uncertainties on consumer opinion and preferences, in April 2026, the researcher conducted a set of qualitative interviews from a subset of the same respondents to confirm any change in consumer opinion / preferences towards EV passenger cars.

The findings of the interviews suggest that due to market uncertainties, and overall inflation, in spite of rapid technological developments in the EV segment, and rising petrol and diesel prices, a majority of consumers prefer not to buy a new EV car in the next 1-2 years' time frame. The interviews indicated that the awareness about the EV choices among the respondents was high and many of them believe that India will have better technology and brands available over the next few years.

During interviews, fuel cost savings, environmental benefits, and government subsidies emerged as the most common factors influencing positive purchase decisions, whereas concerns about maintenance cost, service center availability, and lack of optimal charging station infrastructure were the major barriers to shifting towards EVs. Most of the respondents felt that the current charging infrastructure is not sufficient and there is a need for major improvements, making charging infrastructure a clear barrier to the adoption of EVs.

In terms of expectations from EV manufacturers, respondents want lower prices, more model options, superior battery range, improved infrastructure support, stronger service and warranty packages. Overall, the patterns suggest that even if we assume political and economic stability to resume in the near future, customers see strong future potential for EVs in the next 5 years, but they need clearer information, better infrastructure, more model choices, and lower perceived risk before they fully commit.

#### **Limitations:**

Even though this research provides detailed and valuable insights into the consumer preferences towards Electric Vehicle passenger cars, it cannot be generalized to a large population size and vast automobile market like India. The major limitations of this research may include:

First, the dynamic nature of consumer preferences given the globally high-tech disruption and geographical uncertainties, although the researcher tried all possible measures to keep the accuracy and timelessness of these findings.

Second, this study largely relies on convenient sampling with small sample size, which may contain inherent biases and asymmetry of a data distribution.

Third, given the fact that the EV passenger car market itself is in a nascent stage, particularly in India, the lack of long-term consumer sentiments limits the ability to assess changing consumer preferences, long-term trends, and market maturity.

Furthermore, researcher's own biasness can also be considered as one of the limiting factors for research result generalisability. Thus, acknowledging these limitations are essential when stating the conclusions drawn on consumer preferences toward EV passenger cars.

### **CONCLUSION**

The findings of this study, derived through Multiple Response Analysis (MRA) and Chi-Square ( $\chi^2$ ) Test of Independence, provide a comprehensive and statistically grounded understanding of consumer attitudes toward EV adoption in India. The MRA results, spanning 103 respondents across three multi-select questions, reveal preferences of the Indian EV consumers. Regarding purchase motivation (Q10), Fuel Cost Savings emerged as the single most important factor, cited by 60.2% of respondents, with Environmental Concerns closely behind at 55.3%. Together, they form a dominant top-two that drives most purchase consideration. Government Subsidies ranked third at 46.6%, underscoring the extent to which policy incentives remain central to decision-making in a price-sensitive market. In contrast, Charging/ Refuelling Infrastructure and Maintenance Cost each appeared at only 17.5%, suggesting that structural concerns act as secondary rather than primary motivators.

The adoption challenges data (Q13) adds to our understanding of constraints to adoption of EVs. Lack of Charging/CNG Stations was identified by 66.0% of respondents — the single highest frequency across the entire survey — making it the most near-unanimously recognized barrier in the study. High Initial Cost (47.6%) and Limited Model Choices (39.8%) form a second tier of systemic constraints, while Range Anxiety, often treated as a primary EV concern in popular discourse, ranked last at just 13.6%. This tells us that consumers appear less deterred by the technology itself than by its operational ecosystem and upfront cost. The expected improvements data (Q18) where Lower Prices was cited by 56.1% of respondents, followed by Better Infrastructure (49.0%) and More Models (45.9%), reinforces these conclusions.. The strong correspondence between identified challenges and demanded improvements points to a clear, demand-side mandate for price reduction, infrastructure development, and portfolio expansion.

The Chi-Square tests point out essential demographic details. The most statistically significant finding is the strong gender-based divergence in purchase intent (T1:  $\chi^2 = 23.65$ ,  $p < 0.001$ , Cramér's  $V = 0.49$ ). Males display predominantly definitive responses, 42.7% "Yes" while females respond heavily in the "Maybe" category at 52.0%, signalling exploratory and information-seeking behaviour rather than outright rejection. Test T5, examining Occupation versus Awareness Level ( $\chi^2 = 22.10$ ,  $p = 0.036$ ), reveals that private sector professionals exhibit significantly higher awareness (70.8% "Very High") compared to students, who predominantly cluster at moderate awareness (50%). Qualitative analysis conducted to assess changed perception towards EVs with changing geo-political scenario, also revealed that consumers are still vary of adopting EVs due to inflation and the EV industry still being at a nascent stage.

Collectively, the study demonstrates that EV adoption in India is being shaped by economic pragmatism, environmental consciousness, and structural barriers, with gender and occupation emerging as significant demographic modulators.

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