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Customer Perception Towards Electric Vehicles: An Empirical Study of Consumer Awareness, Adoption Factors, and Purchase Intentions in Coimbatore, India

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ABSTRACT
The global transition towards sustainable transportation has accelerated the adoption of electric vehicles (EVs) as a viable alternative to internal combustion engine (ICE) vehicles. This study examines consumer awareness, perceptions, and purchase intentions towards electric vehicles among residents of Coimbatore, Tamil Nadu, India. Using a structured questionnaire administered to 100 respondents through random sampling, data were collected and analysed using simple percentage analysis, ranking scale, and chi-square tests. Findings reveal that 84% of respondents currently own an electric vehicle, with low fuel cost (32%) and environmental friendliness (28%) emerging as primary purchase motivators. Tata Motors dominates brand preference at 36%. The study also identifies limited servicing infrastructure (33%) and technical reliability concerns (27%) as the most significant barriers to wider adoption. A statistically significant relationship was established between respondents' age and the factors influencing their EV purchase decision ($\chi^2 = 49.828$, df = 16, $p < .001$). Recommendations include expanding charging and service infrastructure, targeted government incentive programmes, and aggressive digital marketing strategies to accelerate the EV transition.

Keywords: electric vehicles, consumer perception, purchase intention, EV adoption, India, Coimbatore, sustainable transportation, customer awareness

1. Introduction

The global automotive industry is at a critical inflection point. Driven by escalating concerns over greenhouse gas emissions, fossil fuel depletion, and the urgent imperatives of climate change, governments and manufacturers worldwide are pivoting toward electric vehicles (EVs) as a cornerstone of sustainable mobility. India, the world's third-largest automobile market, is no exception. The NITI Aayog's directive mandating a transition toward zero-emission vehicles (ZEVs), backed by the Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles (FAME) scheme, has placed EV adoption at the centre of national transport policy.

Despite this policy momentum, the transition from petrol-powered vehicles to EVs remains tentative among Indian consumers. The hesitation is shaped by a complex interplay of

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psychological, economic, infrastructural, and social factors. Understanding these factors—particularly at the regional level—is essential for designing interventions that translate policy ambition into market reality.

Coimbatore, Tamil Nadu's industrial hub, offers a compelling case study. As a city with significant two-wheeler and four-wheeler penetration and a growing middle class, it represents the kind of tier-two urban market that will determine the trajectory of EV adoption across India. This study investigates consumer awareness, attitudes, and purchase intentions toward EVs in Coimbatore, with the goal of offering empirically grounded insights for policymakers, manufacturers, and marketers.

2. Review of Literature

The academic literature on EV consumer behaviour has grown substantially over the past decade, reflecting the urgency of the energy transition. Fishman and Cherry (2022) documented the rapid global growth of electric bicycles, noting that research on e-bikes—and EVs more broadly—remains in early stages in many developing markets, with China leading adoption followed by European markets such as the Netherlands and Germany.

Aggarwal (2022) identified significant growth potential for the EV industry in India but cautioned that Indian consumers remain highly price-sensitive and concerned about vehicle quality and safety. This aligns with findings by Kumar et al. (2020), who mapped out the principal challenges confronting EV adoption by 2030, including the high cost of vehicles, weak charging infrastructure, and limited purchasing power among the general population.

Lingzhi Jin (2021) emphasised that customer awareness is a critical barrier to EV uptake. While the technology has improved, consumer understanding of its viability—including charging availability and range—continues to lag. This 'knowledge gap' acts as a significant drag on purchase intentions even among environmentally conscious consumers.

Bennett and Vijaygopal (2020) developed an integrated model of consumer attitude toward EVs, incorporating the role of product-user stereotypes and self-image congruence. Their work found that both direct attitudes and indirect social image considerations significantly influence willingness to purchase. Contestabile, Offer, and North (2020) reinforced that long-term EV uptake will depend heavily on battery technology advancement to reduce costs and increase energy density, alongside adequate recharging infrastructure.

Bhalla (2019) demonstrated that consumer choice of EVs is governed by multiple interdependent factors: environmental concern, cost, social acceptance, trust in technology, and infrastructure availability. She called on governments and manufacturers to invest jointly in building social legitimacy for EVs. Similarly, Dhar, Pathak, and Shukla (2016) projected that electric two-wheelers would achieve a significant share of the Indian vehicle fleet by 2050, particularly in urban areas with high two-wheeler ownership such as Delhi NCR.

Aggarwal, Gedda, and Parikh (2019) highlighted a weight-range trade-off specific to electric two-wheelers: every additional kWh of battery capacity adds approximately 10 kg, a 10% increase in total vehicle weight, constraining the range improvements that are straightforward in four-wheelers. This structural challenge has direct implications for consumer expectations in markets where two-wheelers dominate, such as Coimbatore.

3. Objectives of the Study

The study was designed to achieve the following objectives:

- To assess consumer awareness levels regarding electric vehicles in Coimbatore.
- To measure the environmental consciousness of consumers in relation to EV purchase behaviour.
- To identify the primary factors influencing consumer perception of and preference for electric vehicles.
- To examine the role of government incentives in facilitating EV adoption.
- To determine consumer satisfaction levels with existing EV attributes including cost, range, and service availability.

4. Research Methodology

4.1 Research Design and Sampling

This study adopts a descriptive research design. Primary data were gathered through a structured questionnaire administered to 100 respondents in Coimbatore, selected using a random sampling method. The questionnaire comprised 21 items covering demographic characteristics, EV ownership status, brand preferences, purchase motivations, charging behaviour, risk perceptions, and satisfaction ratings. Secondary data were sourced from peer-reviewed journals, industry reports, government policy documents, and reputable online databases to contextualise primary findings.

4.2 Analytical Framework

Quantitative data were analysed using three statistical techniques: (1) simple percentage analysis to describe the distribution of responses across categorical variables; (2) a ranking scale to prioritise factors influencing satisfaction with EV attributes; and (3) Pearson chi-square test to examine the statistical association between respondent age and EV purchase-influencing factors. All analyses were conducted at the 95% confidence level, with $p < .05$ accepted as the threshold for statistical significance.

4.3 Scope and Limitations

The study is geographically bounded to Coimbatore city and its periurban areas. The sample size of 100 respondents, while sufficient for the statistical tools employed, limits the generalisability of findings to the broader Indian population. Additionally, the cross-sectional nature of the survey precludes longitudinal inference about attitude change. Self-reported data may be subject to social desirability bias, particularly regarding environmental motivations.

5. Results and Analysis

5.1 Demographic Profile of Respondents

The survey sample was predominantly male (71%) and young, with 52% of respondents aged 18–25 years and 28% in the 26–35 bracket. The majority held a bachelor's degree (61%), consistent with the study's urban orientation, as 63% of respondents resided in urban areas.

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Household incomes were concentrated in the ₹10,000–₹50,000 per month bracket (55%), with 25% reporting incomes below ₹10,000 and 20% above ₹50,000.

Table 1 summarises the demographic distribution of respondents.

Table 1: Demographic Profile of Respondents (n = 100)

Variable	Category	Percentage (%)
Gender	Male	71.0
	Female	29.0
Age Group	**18–25 years**	**52.0**
	26–35 years	**28.0**
	35–45 years	**10.0**
	45 and above	**9.0**
Education	High school or below	17.0
	Bachelor's degree	61.0
	Master's degree or higher	22.0
Household Income (₹/month)	**Below 10,000**	**25.0**
	10,000–50,000	**55.0**
	Above 50,000	**20.0**
Area of Residence	Urban	63.0
	Rural	36.0
	City	1.0

5.2 EV Ownership and Awareness

A striking 84% of respondents reported owning an electric vehicle at the time of the survey. While this high proportion partly reflects the self-selecting nature of the sample, it also underscores the rapid penetration of EVs among young, educated, urban consumers. Of those aware of EVs, 35% first learned about them through advertisements, 34% through social media, 18% via television, and only 13% through family or relatives. This positions digital channels—advertisements and social media combined (69%)—as the dominant awareness vectors, with significant implications for marketing strategy.

5.3 Brand Preference

Tata Motors commanded the strongest brand preference at 36%, a finding consistent with the Nexon EV's status as India's best-selling electric passenger vehicle during FY 2020–22.

Mahindra followed at 21%, MG Motor India at 19%, Hyundai at 18%, and other brands at 6%. The competitive clustering of preferences between 18% and 21% across three brands (Mahindra, MG, Hyundai) suggests that brand loyalty has yet to consolidate in this nascent segment, offering opportunities for differentiation.

5.4 Purchase Motivators and Influencing Factors

When asked to identify the single most important factor in their EV purchase decision, respondents ranked design highest (26%), followed jointly by environmental consideration and driving range (22% each), price (19%), and safety (11%). These findings reveal that aesthetic and performance attributes compete closely with sustainability concerns, challenging the assumption that environmental awareness alone drives EV adoption in India.

Examining the reasons for actually buying an EV, low fuel cost emerged as the foremost driver (32%), ahead of environmental friendliness (28%), better design (24%), quieter operation (14%), and other factors (2%). This hierarchy—economic rationale followed by environmental reasoning—suggests that the Indian EV consumer is pragmatic: sustainability is a valued co-benefit rather than the primary motivation.

Table 2 presents the distribution of purchase influencing factors.

Table 2: Factors Influencing EV Purchase Decision (n = 100)

Factor	Respondents (n)	Percentage (%)
Design	26	26.0
Environmental concern	22	22.0
Driving range	22	22.0
Price	19	19.0
Safety	11	11.0
Total	**100**	**100.0**

5.5 Charging Behaviour and Range Expectations

Charging frequency data indicate that 39% of EV owners charge their vehicles once a week, 26% daily, 22% once a month, and 13% only when required. This distribution suggests that current battery range adequately supports the daily commuting needs of most respondents without necessitating frequent recharging.

Regarding acceptable charging time, 42% of respondents would require full charge within 1 hour to consider purchasing an EV, 30% within 4 hours, 22% within 30 minutes, and only 6% were willing to wait overnight. On driving range, 42% expected a minimum of 120 km per full charge, 29% would accept 80 km, 21% required 150 km, and 8% demanded 160 km or more. These expectations are broadly within the capabilities of current mid-segment EVs, suggesting that technological barriers are less prohibitive than infrastructure and service concerns.

5.6 Risk Perceptions and Barriers

The most prominently cited risk was limited servicing options (33%), reflecting the scarcity of EV-specialised service centres relative to conventional garages. Technical malfunctions were a concern for 27% of respondents, battery fires for 24%, theft of charging cables for 15%, and insufficient charging stations for 1%.

These findings highlight that consumer confidence is tempered less by the EV technology itself and more by the supporting ecosystem—service availability, reliability records, and infrastructure security. This has direct implications for after-sales strategy and public investment priorities.

5.7 Pricing Preferences

A majority of respondents (66%) preferred to purchase an EV priced between ₹50,000 and ₹1,00,000—a range that corresponds to the mid-segment electric two-wheeler market. Only 14% were willing to spend above ₹1,00,000, indicating that four-wheelers remain aspirational for a significant share of the surveyed population. Twenty percent indicated a preference for sub-₹50,000 vehicles, underscoring the importance of entry-level options in driving mass adoption.

5.8 Government Incentives and Recommendation Behaviour

Sixty-five percent of respondents confirmed having received government incentives at the time of their EV purchase, corroborating the policy literature's assertion that subsidies and fiscal benefits are meaningful catalysts in purchase decisions. Despite this, only 40% of respondents said they would recommend EVs to others, 43% said they would not, and 17% were undecided. This 'recommend gap'—where personal ownership does not translate into advocacy—points to residual dissatisfaction with infrastructure and service quality that tempers word-of-mouth promotion.

5.9 Satisfaction with EV Attributes

Respondents were asked to rate their satisfaction across five EV-related dimensions. Cost of ownership ranked first, with the majority either satisfied or very satisfied. Environmental friendliness and service and availability ranked jointly second. Infrastructure availability and battery life presented more mixed satisfaction profiles, with higher rates of dissatisfaction, pointing to these as the most urgent areas for industry and government attention.

Table 3: Satisfaction Ranking of EV Attributes (n = 100)

Attribute	Very Satisfied	Satisfied	Neutral	Dissatisfied	Rank
Cost of ownership	36	35	14	10	**1**
Service and availability	27	39	23	11	**2**
Environmental friendliness	37	34	19	6	**2**
Infrastructure availability	21	48	10	19	**4**

Battery life	28	35	22	12	**4**

5.10 Chi-Square Test: Age and Purchase-Influencing Factors

A chi-square test of independence was conducted to examine the relationship between respondent age and the primary factor influencing their EV purchase decision. The test yielded a Pearson chi-square value of 49.828 ($df = 16$, $p < .001$), leading to rejection of the null hypothesis. It is concluded that a statistically significant association exists between respondent age and the factors influencing EV purchase intention at the 95% confidence level.

Inspection of the cross-tabulation reveals notable patterns: younger respondents (18–25 years) are more strongly motivated by environmental concerns and price, while those in the 26–35 bracket show greater salience for design and safety. These age-differentiated preferences suggest that EV marketing and product development strategies should be segmented by age cohort rather than treating the consumer base as homogeneous.

6. Discussion

The findings of this study both corroborate and extend the existing literature on EV consumer behaviour in India. The dominance of low fuel cost as a purchase motivator (32%) is consistent with Aggarwal's (2022) characterisation of Indian consumers as price-sensitive. However, the strong showing of environmental friendliness (28%) suggests that ecological awareness is becoming a more influential purchase factor than earlier literature implied, particularly among the educated, urban youth cohort that dominates this sample.

The high EV ownership rate (84%) in the sample should be interpreted cautiously: respondents self-selected into a survey on EV perception, likely skewing toward those already engaged with the technology. Nevertheless, the significant proportion reporting government incentive receipt (65%) validates the policy literature's conclusion that fiscal subsidies are effective demand-side levers.

The most theoretically significant finding concerns the 'recommend gap': despite 84% ownership, only 40% would proactively recommend EVs to others. This divergence aligns with Bennett and Vijaygopal's (2020) framework, wherein positive product experience does not automatically translate to positive social advocacy when residual ecosystem concerns—servicing, reliability, infrastructure—remain unresolved. The EV industry's challenge, therefore, is not merely to convert sceptics into first-time buyers, but to convert satisfied owners into active advocates.

The preference for vehicles in the ₹50,000–₹1,00,000 range (66%) confirms that the electric two-wheeler segment, rather than four-wheelers, is the viable mass-market entry point for Coimbatore. This is consistent with Aggarwal, Gedda, and Parikh's (2019) analysis of the structural constraints on electric two-wheeler range improvement, which suggests that manufacturers must innovate within these constraints rather than simply scaling battery capacity.

7. Recommendations

7.1 For Policymakers

Government incentive programmes have demonstrably influenced purchase behaviour; their continuation and expansion—particularly for sub-₹1,00,000 EVs—is recommended. Simultaneous investment in public charging infrastructure and the creation of a certified EV service network are critical to addressing the top-ranked barriers of limited servicing options and technical malfunction anxiety. Policies should also target rural areas, where 36% of respondents reside, through mobile charging units and rural garage training initiatives.

7.2 For Manufacturers and Dealers

Given that design is the single most important purchase-influencing factor (26%), manufacturers should prioritise aesthetic differentiation alongside technical performance. Marketing communications should emphasise total cost of ownership—highlighting fuel savings over the vehicle's lifetime—rather than leading with upfront price comparisons to ICE vehicles. Robust after-sales service networks and transparent battery warranty programmes (akin to Tata's 8-year/160,000 km warranty on the Nexon EV) are essential for building the trust necessary to close the recommendation gap.

7.3 For Marketing Practitioners

With 69% of EV awareness derived from digital channels (social media and advertisements), marketing budgets should be concentrated online. Influencer partnerships with young urban opinion leaders, interactive digital test-drive campaigns, and user-generated content strategies can amplify word-of-mouth promotion among the 18–35 demographic. Age-segmented messaging—emphasising environmental values for younger cohorts and reliability/design for the 26–35 bracket—would better reflect the heterogeneous motivational profiles identified in this study.

8. Conclusion

This study provides empirical evidence that EV adoption in Coimbatore is driven by a pragmatic convergence of economic and environmental motivations, shaped strongly by the availability of government incentives and the growing influence of digital media. The statistically significant relationship between consumer age and purchase-influencing factors underscores the importance of demographic segmentation in EV marketing and policy design. While adoption rates are encouraging, the study reveals that consumer satisfaction is uneven across EV attributes—with cost of ownership performing well but infrastructure availability and battery life lagging. The persistent recommendation gap highlights that conversion from user to advocate requires systemic improvements in the post-purchase ecosystem, particularly servicing networks and charging infrastructure.

Future research should expand the geographic scope to multiple Indian cities, employ longitudinal designs to track attitude evolution, and incorporate qualitative methods to explore the psychological underpinnings of the recommendation gap. Comparative studies across income segments would further refine the targeting precision available to policymakers and industry actors seeking to accelerate India's electric mobility transition.

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