International Scientific Journal of Engineering aand Management (ISJEM) ISSN: 2583-6129
Volume: 05 Issue: 04 | April – 2026 DOI:10.55041/ISJEM06949
An International Scholarly || Multidisciplinary || Open Access || Indexing in all major Database & Metadata

Customer Preference Towards Three-Wheeler Commercial Electric Vehicles: Evidence from TI Clean Mobility Private Limited

Dr. K Suresh Kumar [1] Sanjai S [2]

Department of Management Studies, Panimalar Engineering College, Affiliated to Anna University, Chennai – 600 123, Tamil Nadu, India

Abstract

This study investigates the determinants of customer preference towards three-wheeler commercial electric vehicles (EVs) in the Indian market, with particular reference to TI Clean Mobility Private Limited (Montra Electric). Against the backdrop of escalating environmental concerns, rising fossil fuel costs, and India's accelerating EV policy agenda, understanding the factors that drive adoption in the commercial three-wheeler segment is both timely and strategically significant. Primary data were collected from 144 respondents — comprising auto drivers, fleet operators, delivery workers, and business owners — using a structured questionnaire incorporating a five-point Likert scale. Descriptive statistics, Pearson correlation analysis, reliability testing (Cronbach's Alpha), and one-way ANOVA were employed to examine the relationships between the key constructs: customer awareness, battery performance, cost savings, service support, brand image, and environmental concern. Results reveal that battery performance ($r = 0.850$, $p < 0.01$) and cost savings ($r = 0.794$, $p < 0.01$) are the strongest predictors of customer preference, while awareness ($r = 0.760$, $p < 0.01$) also exerts a significant positive influence. ANOVA results confirm that after-sales service quality significantly differentiates customer preference groups ($F = 13.069$, $p < 0.001$). The study concludes that accelerating adoption of commercial electric three-wheelers requires parallel improvements in battery technology, charging infrastructure, service network breadth, and consumer-facing awareness campaigns.

Keywords: Electric Vehicles; Customer Preference; Battery Performance; Cost Savings; Service Support; Electric Mobility; Three-Wheeler Commercial Vehicles; India

1. INTRODUCTION

Transportation is a cornerstone of economic development, enabling the flow of people and goods essential to trade and industrial production. Yet the rapid expansion of motorized transport over the past century has imposed severe environmental and public health costs. Conventional vehicles powered by petrol and diesel contribute substantially to greenhouse gas emissions and urban air pollution — transportation globally accounts for approximately one-quarter of energy-related CO_2 emissions. These pressures have galvanized governments and industry stakeholders to pursue cleaner, more sustainable mobility solutions.

Electric mobility has emerged as the most promising pathway toward sustainable transportation. Electric vehicles (EVs) draw energy from rechargeable batteries, eliminating tailpipe emissions and reducing lifecycle environmental impact when charged from increasingly low-carbon electricity grids. Global EV sales surpassed 14 million units in 2023, reflecting a rapid acceleration driven by supportive policy, falling battery costs, and growing consumer acceptance (IEA, 2024).

India occupies a particularly significant position in this global transition. With one of the fastest-growing automobile markets worldwide, India faces acute challenges of urban air pollution and fossil fuel import dependency. The Government of India has responded with the Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme and state-level EV policies offering purchase subsidies, tax exemptions, and infrastructure investment. These measures have catalyzed rapid growth in domestic EV sales, particularly in the two- and three-wheeler segments where total cost of ownership advantages are most pronounced.

Electric three-wheelers occupy a uniquely important niche. India is the world's largest market for this vehicle category, which serves as the dominant mode of last-mile passenger transport and urban cargo delivery. Running costs of ₹0.4 per km for electric three-wheelers compare favorably with ₹2.1–2.3 per km for internal combustion engine (ICE) equivalents, making economic rationale compelling even at higher upfront purchase prices (CEEW, 2025). India's electric three-wheeler registrations exceeded 50% of new three-wheeler sales by 2025, placing the segment at the forefront of the country's commercial EV revolution.

Despite this momentum, significant barriers persist. Concerns about battery range and durability, inadequate public charging infrastructure, limited after-sales service networks, and consumer uncertainty continue to moderate adoption. Understanding which specific factors most powerfully drive and inhibit customer preference is essential for manufacturers, policymakers, and investors seeking to accelerate this transition.

This study addresses that need by empirically examining customer preference towards three-wheeler commercial EVs with specific reference to TI Clean Mobility Private Limited, whose Montra Electric brand has become a significant player in this segment. The study aims to identify and quantify the influence of awareness, cost savings, battery performance, and after-sales service support on customer preference, thereby generating actionable insights for industry practitioners and policy architects.

2. REVIEW OF LITERATURE

The academic literature on EV adoption spans behavioral economics, technology acceptance theory, and sustainable consumption research, collectively establishing a rich empirical foundation for the present study. Rezvani, Jansson, and Bodin (2015) conducted a comprehensive review of EV consumer adoption and identified environmental concern, financial incentives, and perceived performance as primary antecedents of purchase intention. The authors underscored the centrality of awareness and benefit perception in shaping behavioral outcomes. Sierzchula et al. (2014) extended this analysis to a cross-national context and demonstrated that financial incentives and infrastructure development are the most consistent predictors of EV market penetration across diverse national settings.

In emerging market contexts, Li et al. (2017) confirmed that economic benefits — particularly lower operational costs and government subsidies — are stronger drivers of EV preference than environmental motivation. Kumar and Alok (2020) found that awareness and social influence are significant determinants of EV purchase intention among Indian consumers, who increasingly view electric mobility as both cost-effective and socially responsible. Consistent with these findings, Paul and Bhattacharyya (2014) observed that long-term financial savings are a decisive factor in sustainable technology adoption in developing countries.

Research by She et al. (2017) introduced a psychological dimension, identifying perceived risk, performance anxiety, and uncertainty about battery longevity as barriers to adoption. The authors argued that enhanced service support and demonstrable product reliability can substantially mitigate these risks. This insight was reinforced by Degirmenci and Breitner (2017), who found that brand reliability and service quality moderate the negative effect of perceived risk on purchase intention.

In the commercial vehicle context, Hardman et al. (2017) studied fleet electrification decisions and concluded that operational cost savings, vehicle reliability, and charging infrastructure availability are the dominant drivers of commercial EV adoption — with economic efficiency weighted more heavily than environmental concern by commercial operators. Similarly, Noel et al. (2019) found that total cost of ownership and operational reliability are the primary criteria for fleet purchase decisions.

Recent Indian-specific research has deepened this understanding. Madhu and Sreedevi (2022), using exploratory factor analysis on 172 respondents in Bengaluru, identified five key EV adoption factors: financial barriers, performance attributes, infrastructure availability, environmental benefits, and social influence. Singh and Singh (2022) confirmed that affordability and total cost of ownership are the pivotal considerations for commercial vehicle users. Jaiswal et al. (2022) emphasized the role of peer influence and media exposure in shaping EV preference, particularly among younger urban populations.

Axsen and Kurani (2013) added a values-based perspective, demonstrating that personal environmental identity and social norms significantly predict sustainable vehicle preferences. Chen et al. (2020) showed that strong brand reputation and perceived quality enhance purchase intention, while Li et al. (2020) underscored that technical advances

in battery systems — including fast charging and extended range — are critical accelerants of consumer acceptance.

Sharma et al. (2021) highlighted after-sales service quality as a key determinant of customer retention and preference in the EV industry, noting that accessible maintenance and spare parts availability are particularly influential in commercial use contexts where vehicle downtime directly affects livelihood. Finally, Bonges and Lusk (2016) identified high initial cost, limited awareness, and inadequate infrastructure as the primary barriers to adoption, recommending targeted consumer education and cost-reduction policies as remedies.

Synthesizing this body of research, it is evident that customer preference towards electric vehicles — particularly in the commercial segment — is a multidimensional construct shaped by economic, technical, informational, and experiential factors. The present study builds on these foundations to provide empirical evidence specific to three-wheeler commercial EVs in the Indian context.

3. RESEARCH METHODOLOGY

3.1 Research Design

This study employs a quantitative, cross-sectional research design to examine customer preference towards three-wheeler commercial EVs. A structured questionnaire was administered to a sample of existing and prospective users of electric three-wheelers during the study period. The quantitative approach allows for statistical testing of hypothesized relationships between key constructs.

3.2 Population and Sampling

The target population comprises customers and potential users of commercial three-wheeler vehicles in Chennai and surrounding urban areas, including auto drivers, fleet operators, delivery workers, and small business owners engaged in transportation activities. A convenience sample of 144 respondents was recruited through vehicle showrooms, charging stations, transport hubs, and professional networks. Participation was entirely voluntary and respondent anonymity was assured throughout.

3.3 Instrumentation

The questionnaire comprised two sections. Section A captured demographic and vehicle-usage information through multiple-choice items covering age, gender, occupation, monthly income, source of awareness, charging preferences, and purchase decision factors. Section B measured key theoretical constructs using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), encompassing awareness, cost savings, battery performance, brand image, environmental concern, service support, and overall customer preference. The instrument yielded a Cronbach's Alpha of 0.720, confirming acceptable internal consistency.

3.4 Hypotheses

Based on the review of literature, four directional hypotheses were formulated:

H1: Customer awareness has a significant positive relationship with preference towards three-wheeler commercial EVs.

H2: Operational cost savings have a significant positive relationship with preference towards three-wheeler commercial EVs.

H3: Battery performance has a significant positive relationship with preference towards three-wheeler commercial EVs.

H4: After-sales service support significantly differentiates customer preference groups towards three-wheeler commercial EVs.

3.5 Statistical Analysis

Data were analysed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics summarized central tendency and dispersion. Pearson product-moment correlation assessed bivariate associations between continuous constructs and customer preference. One-way ANOVA examined differences in preference across service-support groupings. Statistical significance was evaluated at the $\alpha = 0.05$ level throughout.

4. RESULTS AND ANALYSIS

4.1 Demographic Profile of Respondents

The sample (N = 144) skews toward younger, economically active males: 29.2% of respondents are aged 25–35 and 25.0% are aged 36–45, collectively accounting for over half the sample. Male respondents constitute 89.6% of the total, consistent with the predominantly male workforce composition of commercial transportation in India. By occupation, auto drivers represent the largest group (27.8%), followed by delivery workers (22.2%), business owners (20.8%), fleet owners (18.1%), and others (11.1%). Income distribution indicates that 26.4% earn ₹15,001–
₹25,000 per month and 23.6% earn ₹25,001–₹40,000, identifying middle-income earners as the primary user cohort of commercial electric three-wheelers.

Regarding awareness channels, advertisements are the leading source (25.0%), followed by friends and relatives (22.2%), social media (20.8%), dealer interactions (19.4%), and government communications (12.5%). These findings affirm that both mass-media campaigns and interpersonal word-of-mouth are significant in shaping EV awareness. Low operational cost is the most frequently cited reason for choosing EVs (29.2%), followed by environmental concern (20.8%), technology appeal (18.1%), and government subsidy (16.7%). Notably, 52.8% of respondents expressed no intention to switch to EVs in the near term, while 27.8% were undecided — underscoring that adoption hesitancy remains a real and significant challenge despite overall positive perceptions.

Table 1: Age Distribution

Category	Frequency	Percentage (%)
Below 25	18	12.5%
25–35	42	29.2%
36–45	36	25.0%
46–55	28	19.4%
Above 55	20	13.9%
Total	144	100%

Table 2: Occupation Profile

Category	Frequency	Percentage (%)
Auto Driver	40	27.8%
Delivery Worker	32	22.2%
Business Owner	30	20.8%

Fleet Owner	26	18.1%
Others	16	11.1%
Total	144	100%

Table 3: Key Barriers Cited (Major Concerns)

Category	Frequency	Percentage (%)
Battery Performance	44	30.6%
Charging Infrastructure	36	25.0%
Initial Cost	30	20.8%
Service Support	20	13.9%
Resale Value	14	9.7%
Total	144	100%

4.2 Descriptive Statistics

Table 4 presents the descriptive statistics for all Likert-scale constructs. All constructs recorded high mean values, ranging from 4.70 (service support) to 4.84 (cost savings), on the five-point scale. This pattern indicates strong aggregate agreement with positive perceptions of electric three-wheelers across all dimensions. Cost savings (M = 4.84, SD = 0.58) and environmental concern (M = 4.83, SD = 0.66) elicited the strongest endorsement, while service support (M = 4.70, SD = 0.74) exhibited the comparatively lowest mean alongside greater variability, suggesting more heterogeneous respondent experiences with after-sales service quality.

Table 4: Descriptive Statistics of Constructs (N = 144)

Variable	N	Min	Max	Mean	Std. Dev.
Awareness	144	2.00	5.00	4.8264	0.5952
Cost Savings	144	2.00	5.00	4.8403	0.5753
Battery Performance	144	1.00	5.00	4.8056	0.6062
Brand Image	144	1.00	5.00	4.7986	0.7250
Environmental Concern	144	1.00	5.00	4.8333	0.6585
Service Support	144	2.00	5.00	4.7014	0.7393
Customer Preference	144	2.00	5.00	4.8056	0.6289

4.3 Reliability Analysis

The measurement scale demonstrated acceptable reliability with a Cronbach's Alpha of 0.720 across the seven constructs. This value exceeds the commonly accepted threshold of 0.70 (Nunnally, 1978), confirming that the questionnaire items consistently measure the intended constructs and that the data are suitable for inferential analysis. All 144 responses were valid with no missing data, ensuring the integrity of the dataset.

4.4 Correlation Analysis

Pearson product-moment correlations were computed between each independent construct and the customer preference score. As summarized in Table 5, all three hypothesized relationships are statistically significant at $p < 0.01$:

Construct	r	p-value	Decision
Battery Performance vs Preference	0.850	0.000	Significant
Cost Savings vs Preference	0.794	0.001	Significant

Awareness vs Preference	0.760	0.000	Significant

Table 5: Pearson Correlation Results (Dependent Variable: Customer Preference)

Battery performance is the strongest predictor of customer preference (r = 0.850), indicating that improvements in energy efficiency, driving range, and battery durability are the most critical technical factors shaping adoption decisions. Cost savings follows closely (r = 0.794), affirming that economic rationale remains central to the commercial EV value proposition. Awareness demonstrates a substantial positive relationship (r = 0.760), consistent with literature linking informed consumers to higher EV preference. The null hypotheses for H1, H2, and H3 are therefore rejected; all three alternative hypotheses are accepted.

4.5 One-Way ANOVA: Effect of Service Support

A one-way ANOVA was conducted to determine whether after-sales service support significantly differentiates groups in their level of customer preference. Table 6 presents the results.

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.100	3	5.700	13.069	0.000
Within Groups	61.060	140	0.436		
Total	78.160	143			

Table 6: One-Way ANOVA — Effect of Service Support on Customer Preference

The ANOVA yields a statistically significant result ($F(3, 140) = 13.069$, $p < 0.001$), indicating that after-sales service quality significantly differentiates customer preference levels. Variation in service network availability, maintenance responsiveness, and support quality accounts for meaningful differences in overall EV preference across respondent groups. The null hypothesis for H4 is therefore rejected.

4.6 Hypothesis Testing Summary

Hyp.	Statement	Tool	Statistic	p-value	Outcome
H1	Awareness → Preference	Pearson r	r = 0.760	0.000	Supported
H2	Cost Savings → Preference	Pearson r	r = 0.794	0.001	Supported
H3	Battery Performance → Preference	Pearson r	r = 0.850	0.000	Supported
H4	Service Support → Preference (group difference)	One-Way ANOVA	F = 13.069	0.000	Supported

Table 7: Hypothesis Testing Summary

5. DISCUSSION

The findings of this study present a coherent and internally consistent picture of what drives commercial EV preference in the Indian three-wheeler market. The exceptional strength of the battery performance–preference correlation (r = 0.850) reflects the acute sensitivity of commercial operators to vehicle reliability. For auto drivers and delivery workers whose livelihoods depend on uninterrupted vehicle operation, battery range anxiety and concerns about unexpected downtime are not abstract anxieties — they translate directly into lost income. This finding resonates with the conclusions of Hardman et al. (2017) and She et al. (2017) regarding the centrality of performance reliability in commercial EV adoption.

The strong effect of cost savings (r = 0.794) confirms the economic logic driving India's three-wheeler EV boom. With electricity-based running costs estimated at ₹0.4/km versus ₹2.1–2.3/km for ICE equivalents (CEEW, 2025), operators in the middle-income bracket who constitute the majority of this sample stand to make substantial savings that justify the initial cost premium. This economic case is well understood by the sample, as reflected in high mean values across cost-related Likert items. These findings align closely with Li et al. (2017) and Singh and Singh (2022), who identified cost of ownership as the dominant adoption driver in emerging market EV contexts.

Awareness's significant relationship with preference (r = 0.760) highlights an important mechanism: customers who are better informed about EV technology, benefits, and support systems are more likely to prefer EVs. The diverse awareness channels identified in this study — with advertisements, word-of-mouth, and social media together accounting for 68% of first-contact awareness — suggest that a blended communication strategy combining mass media with peer-network activation and dealer education is likely most effective. This aligns with Jaiswal et al. (2022) who found peer influence and media exposure to be significant behavioral shapers.

The ANOVA result for service support ($F = 13.069$, $p < 0.001$) is perhaps the most policy-relevant finding. It indicates that even within a sample that is broadly positive about EVs, differences in after-sales service experience create meaningful and statistically distinct preference outcomes. This is consistent with Sharma et al. (2021), who identified service quality as a key retention and preference driver in EV markets. For TI Clean Mobility specifically, the 250+ dealer touchpoints and 3S network expansion across 120+ markets signal the company's awareness of this dynamic, but the data suggest that service quality gaps remain a differentiating variable.

Importantly, the 52.8% of respondents unwilling to switch to EVs — despite acknowledging their economic and environmental benefits — reveals a credibility gap between positive attitude and behavioral intention. This "attitude–behaviour gap" is well-documented in sustainable consumption literature and typically persists until sufficient practical experience, peer observation, or risk mitigation mechanisms (such as battery warranties and service guarantees) accumulate to tip the balance. Addressing this gap is arguably the central challenge for the next phase of EV adoption in India's commercial three-wheeler market.

6. CONCLUSION AND RECOMMENDATIONS

This study provides empirical evidence that customer preference towards three-wheeler commercial EVs is primarily shaped by battery performance, cost savings, consumer awareness, and after-sales service quality. All four hypothesized relationships are statistically supported. Battery performance and cost savings emerge as the most critical determinants, underscoring that commercial operators make adoption decisions through an economic and operational lens rather than an environmental one, though environmental concern is positively valued.

Based on these findings, the following recommendations are offered. First, manufacturers should prioritize continuous investment in battery technology — specifically targeting extended range, faster charging cycles, and improved durability — to directly address the most powerful predictor of preference. Second, EV companies and logistics partners should institutionalize transparent total-cost-of-ownership calculators and financing options to make the economic case tangible and accessible for middle-income commercial operators. Third, awareness campaigns should move beyond generic promotional advertising to include operator testimonials, peer network activation, and dealer-facilitated demonstrations — leveraging the high influence of word-of-mouth identified in this study. Fourth, after-sales service infrastructure requires strategic expansion, particularly in peri-urban and high-usage commercial corridors, to reduce the service-quality variation that this study identifies as a significant differentiator of preference outcomes. Fifth, government agencies should continue and deepen incentive programmes while improving communication of subsidy pathways, given that only 12.5% of respondents cited government channels as their primary awareness source.

Future research should extend this analysis to rural and semi-urban markets, incorporate longitudinal data to track preference evolution over the adoption lifecycle, and explore the specific threshold levels of battery range and charging speed that would convert the substantial "maybe" cohort into confirmed adopters.

REFERENCES

Axsen, J., & Kurani, K. S. (2013). Connecting plug-in vehicles with green electricity through consumer demand. Environmental Research Letters, 8(1), 014013.

Bhardwaj, A., et al. (2020). Factors affecting electric vehicle adoption in developing economies: A systematic review.Sustainability, 12(18), 7634.

Bonges, H. A., & Lusk, A. C. (2016). Addressing electric vehicle (EV) sales and range anxiety through parking layout, policy and regulation. Transportation Research Part A, 83, 63–73.

CEEW. (2025). India's electric three-wheeler market: Adoption drivers and policy imperatives. Council on Energy, Environment and Water.

Chen, Y., et al. (2020). Brand image and consumer trust in the electric vehicle market. Journal of Cleaner Production, 254, 119964.

Degirmenci, K., & Breitner, M. H. (2017). Consumer purchase intentions for electric vehicles: Is green more important than price and range? Transportation Research Part D, 51, 250–260.

Hardman, S., et al. (2017). Electric vehicle adoption — looking beyond technology acceptance to a sociological framework.
Transportation Research Part A, 95, 217–233.

IEA. (2024). Global EV Outlook 2024. International Energy Agency.

Jaiswal, D., et al. (2022). Analysing the impact of social influence on electric vehicle adoption. International Journal of Computer and Engineering Sciences.

Kumar, R., & Alok, K. (2020). Adoption of electric vehicles: A literature review and prospects for sustainability. Journal of Cleaner Production, 253, 119911.

Li, W., et al. (2017). What determines electric vehicle adoption? Evidence from a cross-country study. Transportation Research Part D, 53, 310–326.

Li, X., et al. (2020). Technical advancements and consumer acceptance in EV markets. Energy Policy, 145, 111738.

Madhu, S., & Sreedevi, V. (2022). Customer preference for electric three-wheelers in Bengaluru: An exploratory factor analysis.
Journal of Management Studies, 18(2), 45–62.

Noel, L., et al. (2019). Fleet electrification in commercial transport: Drivers and barriers. Transportation Research Part A, 124, 507–523.

Nunnally, J. C. (1978). Psychometric Theory (2nd ed.). McGraw-Hill.

Paul, J., & Bhattacharyya, S. (2014). Consumer attitude toward sustainable transportation in developing countries. Journal of Consumer Behaviour, 13(4), 241–250.

Rezvani, Z., Jansson, J., & Bodin, J. (2015). Advances in consumer electric vehicle adoption research: A review and research agenda. Transportation Research Part D, 34, 122–136.

She, Z. Y., et al. (2017). What factors lead consumers to continue buying hybrid electric vehicles? Transportation Research Part A, 103, 244–255.

Sierzchula, W., et al. (2014). The influence of financial incentives and other socioeconomic factors on electric vehicle adoption.
Energy Policy, 68, 183–194.

Singh, V., & Singh, B. (2022). Affordability and total cost of ownership as drivers of EV preference in India. International Journal of Electric and Hybrid Vehicles, 14(1), 78–96.

Sharma, R., et al. (2021). Service quality and customer satisfaction in the electric vehicle industry. Asia Pacific Journal of Marketing and Logistics, 33(5), 1245–1263.

Tal, G., & Nicholas, M. A. (2017). Charging infrastructure requirements for sustainable EV adoption. Transportation Research Record, 2628(1), 10–18.

Wang, S., et al. (2018). Government incentives and infrastructure support in promoting EV adoption. Journal of Cleaner Production, 197, 225–235.