

Post-Purchase Satisfaction and Brand Loyalty among Non-Commercial EVs Owners: An Analytical Study of Lucknow District, Uttar Pradesh

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Abstract

As India's electric vehicle (EV) market matures beyond first-time adoption, the sustainability of the transition increasingly depends on what happens after the sale: whether owners are satisfied with their vehicles and whether that satisfaction converts into loyalty toward the brand. This analytical study examines post-purchase satisfaction and brand loyalty among private, non-commercial EV owners in Lucknow district, Uttar Pradesh. Grounded in expectation-confirmation theory and Oliver's four-stage loyalty model, a structured questionnaire was administered to 240 private EV owners selected through stratified random sampling. Data were analysed using Cronbach's alpha, Pearson correlation, multiple regression, and an independent-samples t-test in SPSS. Results show that performance confirmation, charging experience, and after-sales service quality significantly predict satisfaction, which in turn is the dominant driver of brand loyalty. The study offers actionable recommendations for OEMs, dealers, and policymakers in Uttar Pradesh's emerging EV ecosystem.

Keywords: Post-Purchase Satisfaction; Brand Loyalty; Electric Vehicles; Private EV Owners; Lucknow

1. Introduction

India's electric vehicle (EV) market is entering a new phase. For much of the last decade, research and policy attention focused almost entirely on adoption: why consumers do or do not choose an EV over a conventional vehicle (Panmand, Bamnodkar, & Tela, 2025; Vyas & Kushwah, 2023). With cumulative EV sales now crossing several million units and the Government of India's FAME and PM E-DRIVE schemes maturing (Kannur, 2025; Miao, 2022), a second and arguably more consequential question has emerged: what happens after the sale. As China's EV market has shown, once purchase incentives plateau, industry growth depends less on first-time buyers and more on whether existing owners are satisfied enough to stay loyal to the brand and recommend it to others (Liang, Yang, & Sun, 2024).

Post-purchase satisfaction and brand loyalty are not simply extensions of purchase intention; they are shaped by a different set of experiences, charging convenience, battery and range performance, after-sales service, and whether the vehicle meets the expectations set at the point of sale, that only surface once

ownership begins (Rakesh & Radhakrishna, 2025; Zhao, Gao, & Liu, 2023). Oliver's (2010) four-stage loyalty model and the expectation-confirmation paradigm (Oliver & Burke, 1999) suggest that satisfaction acts as the critical bridge between a single transaction and a durable, repeat-purchase relationship with a brand.

Uttar Pradesh, and its capital district of Lucknow in particular, represents an important but under-examined setting for this question. The state has seen a marked rise in private EV registrations, driven by state subsidies and rapid two-wheeler electrification (Bajpai, Abbas, & Mishra, 2024; Sharma & Agarwal, 2025), yet almost all existing India-focused studies examine purchase intention rather than the post-purchase experience of owners who already use these vehicles daily. This creates a gap between what is known about why people buy EVs in Uttar Pradesh and what is known about whether they remain satisfied and loyal after buying them.

This study addresses that gap by analytically examining post-purchase satisfaction and its relationship with brand loyalty among private, non-commercial EV owners in Lucknow district. The specific objectives are to identify the key determinants of post-purchase satisfaction, to test the strength of the satisfaction-loyalty relationship, and to examine whether satisfaction and loyalty vary across owner and vehicle segments, with a view to offering actionable recommendations for original equipment manufacturers (OEMs), dealers, and policymakers.

2. Literature Review

2.1 Post-Purchase Satisfaction in the EV Context

Emerging evidence indicates that EV owner satisfaction is a distinct, multi-attribute construct rather than a simple carry-over of purchase enthusiasm. Using structural equation modelling on owners in Mangaluru, India, Rakesh and Radhakrishna (2025) found that charging experience, vehicle performance, and after-sales service support jointly explained 67% of the variance in satisfaction, which in turn explained 57% of the variance in loyalty. Large-sample studies from China corroborate this multidimensionality: Liang, Yang, and Sun (2024) used explainable AI on over 1,300 EV models and found that range, motor power, and space/comfort drove satisfaction, while Zhao, Gao, and Liu (2023) and Zhao, Chen, and Jia (2024) showed that satisfaction drivers differ systematically between mini and full-size EVs, with charging satisfaction dominant for larger vehicles. In Indonesia, Wafi and Maulana (2024) found brand image and product quality jointly predicted EV customer satisfaction, while Chong, Cheng, and Wider (2025), applying the Theory of Consumption Values, found emotional value to be the strongest predictor of actual EV purchase behaviour in Malaysia.

2.2 Theoretical Foundation: Expectation-Confirmation and Loyalty Formation

The dominant theoretical lens for post-purchase evaluation remains Oliver's expectation-confirmation/disconfirmation paradigm, which holds that satisfaction results from a comparison between pre-purchase expectations and perceived performance (Oliver & Burke, 1999; Taylor & Durand, 1979). A recent meta-analysis of 150 studies confirmed a robust positive relationship between performance expectations, confirmation, and satisfaction across product and service categories (Schiebler, Lee, & Brodbeck, 2024), while Krüger (2016) and Marzo, Martínez-Tur, and Ramos (2002) extended the paradigm cross-culturally and confirmed satisfaction's mediating role between cognitive judgement and loyalty. The model has been applied directly to electric mobility: Ngoc, Phuong, and Manh (2023) found that confirmation and perceived usefulness significantly predicted continuance intention among electric-

motorcycle users in Hanoi, while Lin, Wu, and Hsu (2012) extended the framework with a net-value construct relevant to any product involving ongoing cost, such as EV charging.

2.3 Brand Loyalty: Concept and Automotive Evidence

Brand loyalty is conceptualised as a multi-stage construct progressing through cognitive, affective, conative, and action phases (Oliver, 2010), each vulnerable to different switching incentives; Ishak and Abd Ghani (2013) and Dapena-Baron, Gruen, and Guo (2020) further distinguish loyalty's emotional ("heart"), cognitive ("head"), and habitual ("hand") components. In the automotive sector specifically, satisfaction and brand trust consistently mediate the path from brand experience to loyalty (Noprianta, Mugiono, & Yulianti, 2024; Wijaya, Hussein, & Yuniarinto, 2022), and this pattern holds across two-wheeler and four-wheeler segments in Indonesia (Theodore & Sitinjak, 2024) and India (Fachmi, 2025). Herrmann, Huber, and Braunstein (2015) and Cetin, Kuşçu, and Ozcam (2016) show satisfaction is the central determinant of loyalty and market share across the contact chain, though its effect is moderated by switching barriers, and Aruna, Kumar, and Ramesha (2025) link loyalty directly to after-sales satisfaction across global automakers.

2.4 Service Quality and After-Sales Support

After-sales service quality is repeatedly identified as a stronger loyalty driver than the initial sale itself. Applying SERVQUAL, Balinado, Prasetyo, and Young (2021) found reliability and empathy significantly predicted satisfaction at Toyota's after-sales centres, while Saidin, Wan Abdul Rahman, and Mohd Nafi (2022) and Saidin, Mokhtar, and Saad (2018) identified technical quality and customer service as the dominant loyalty drivers among Malaysian carmakers. Wan Abdul Rahman and Saidin (2021) extended this to show service quality and brand image jointly explain 87% of loyalty variance, and comparable findings emerge from Indian tier-two cities (Patel & Pushpad, 2025; May, 2025) and Indonesian dealerships (Taufan & Santoso, 2023; Rizki & Munawar, 2025). The theoretical basis for these measures traces to the SERVQUAL instrument itself (Augustyn, Seakhwa-King, & Mason, 2022; Ekinci, 2026; Hoque, Akhter, & Absar, 2023).

2.5 Charging Infrastructure and Ownership Experience

Because charging (unlike refueling) is a recurring, high-friction post-purchase touchpoint, it features prominently in loyalty research. Sah (2025) found charging accessibility and reliability explained over 40% of variance in adoption confidence, while Fussey, Akin-Onigbinde, and Skarvelis-Kazakos (2024) modelled how queueing and charger density shape satisfaction at scale. Large-sample European (Vanhaverbeke & De Clerck, 2025) and choice-experiment (Jevtić, 2023) studies converge on queueing time and reliability, rather than charger count alone, as the key satisfaction lever, a finding echoed in deep-learning analyses of charging-station reviews (Wang, Abolarin, & Wu, 2025; Clifford, Savargaonkar, & Rumsey, 2025) and infrastructure-adoption studies (Hamdare, Kaiwartya, & Jugran, 2023).

2.6 EV Adoption, Policy, and Consumer Behaviour in Uttar Pradesh

Within India, Uttar Pradesh has received growing but still limited empirical attention. Bajpai, Abbas, and Mishra (2024) found income and education levels significantly correlated with EV adoption in the state, while infrastructure and incentive gaps remained key barriers. Sharma and Agarwal (2025), surveying 251 respondents across the state, found charging availability and product performance to be critical purchase-intention determinants, with urban consumers showing stronger adoption intent than rural ones. Complementary national evidence from Kulkarni (2024), Choubey (2025), Srikmara, Reddy, and Goud (2025), Chauhan, Kumar, and Chauhan (2025), and Katyal, Khandelwal, and Rajput (2025) confirms that government policy, infrastructure readiness, and psychological barriers such as range anxiety remain

dominant themes, but none of this literature extends into the post-purchase, ownership-experience phase this study addresses.

2.7 Brand Trust, Price Fairness, and Environmental Consciousness

Trust and word-of-mouth act as mediating mechanisms between experience and loyalty (Prasetyawan, Supriadi, & Sugito, 2024; Purnamabroto, Susanti, & Cempena, 2022), while perceived price fairness shapes both satisfaction and loyalty in cost-conscious, high-involvement purchases (Zietsman, Mostert, & Svensson, 2023; Nazari, Shah Hosseini, & Tabatabaie Kalejahi, 2014) - a dynamic especially relevant to EVs, whose total cost of ownership claims are central to the sales pitch. Environmental consciousness is a positive but comparatively weaker driver of both adoption and post-purchase loyalty (Khalid & Anwar, 2024; Liu, Sato, & Morikawa, 2015), with Buhmann, Rialp-Criado, and Rialp-Criado (2024) and Tsai, Kao, and Liu (2025) showing that green attitude affects loyalty largely indirectly, through attitude and perceived value rather than as a direct effect.

2.8 Dissatisfaction and Brand Switching

Finally, the inverse relationship, how dissatisfaction erodes loyalty, is well documented outside the EV context. Richins' (1987) classic study distinguished complaint behaviour, word of mouth, and switching intention as related but independent responses to dissatisfaction, and Sambandam and Lord (1995) showed switching in automobile markets is substantially explained by prior satisfaction and consideration-set dynamics. Ghasrodashti (2018) and Junaidi and Dharmmesta (2015) extend this to show that dissatisfaction, alongside variety-seeking needs, significantly predicts brand-switching behaviour, reinforcing satisfaction's role as a retention safeguard.

2.9 Research Gap

Taken together, the literature establishes three things clearly: satisfaction is multidimensional and driven substantially by charging experience and after-sales service; satisfaction is theoretically and empirically the principal antecedent of loyalty; and Uttar Pradesh's EV market is growing rapidly but understudied. What remains missing is empirical, post-purchase-stage evidence from a Tier-2 Uttar Pradesh city: existing India-focused studies (Bajpai et al., 2024; Sharma & Agarwal, 2025) examine purchase intention among prospective buyers rather than satisfaction and loyalty among existing private, non-commercial owners. This study addresses that gap by empirically testing the satisfaction-loyalty relationship among private EV owners in Lucknow district.

3. Research Methodology

3.1 Research Questions

Based on the research gap identified above, this study addresses four research questions: RQ1 - What are the key determinants of post-purchase satisfaction among private EV owners in Lucknow district? RQ2 - To what extent does post-purchase satisfaction influence brand loyalty? RQ3 - Do satisfaction and loyalty levels vary significantly across vehicle-type and demographic segments? RQ4 - What relative role do charging experience and after-sales service play compared to other satisfaction dimensions?

3.2 Objectives

O1: To identify and measure the key determinants of post-purchase satisfaction among private EV owners in Lucknow district. O2: To examine the relationship between post-purchase satisfaction and brand loyalty. O3: To test for significant variation in satisfaction and loyalty across vehicle-type and income segments. O4: To recommend strategies for OEMs, dealers, and policymakers to strengthen post-purchase loyalty.

3.3 Hypotheses

H1: Charging experience has a significant positive effect on post-purchase satisfaction.

H2: After-sales service quality has a significant positive effect on post-purchase satisfaction.

H3: Performance confirmation has a significant positive effect on post-purchase satisfaction.

H4: Post-purchase satisfaction has a significant positive effect on brand loyalty.

H5: There is no significant difference in brand loyalty between two-wheeler and four-wheeler private EV owners.

3.4 Research Design

The study follows a descriptive-cum-analytical, cross-sectional research design using a quantitative survey method, consistent with the dominant approach in the reviewed automotive and EV loyalty literature (Rakesh & Radhakrishna, 2025; Balinado, Prasetyo, & Young, 2021).

3.5 Universe of the Study

The universe comprises private, non-commercial EV owners residing within Lucknow district, Uttar Pradesh, covering both two-wheeler and four-wheeler segments. Commercial fleet operators, aggregator-affiliated drivers, and delivery-fleet EVs are excluded, since their ownership incentives and service expectations differ structurally from private owners.

3.6 Sample Size and Sampling Technique

Applying Cochran's formula for an unknown population at a 95% confidence level and 5% margin of error yields a minimum indicative sample of approximately 385 (Bartlett, Kotrlik, & Higgins, 2001; Taherdoost, 2017). Given practical constraints of time and access typical of primary EV-ownership research, 320 questionnaires were distributed; after removing incomplete and inconsistent responses, 240 valid responses were retained for analysis, an effective response rate of 75%. A stratified random sampling technique was used, with strata defined by vehicle type (two-wheeler and four-wheeler) proportionate to Lucknow's registered private EV mix, and respondents within each stratum contacted through dealership records, RTO-linked owner groups, and EV owner community forums across Lucknow's major zones (Gomti Nagar, Indira Nagar, Aliganj, Hazratganj, Alambagh, and Chinhat).

3.7 Tools and Techniques

A structured questionnaire, adapted from validated scales in the reviewed literature (Rakesh & Radhakrishna, 2025; Balinado et al., 2021; Oliver & Burke, 1999), was used as the primary instrument. It comprised four sections: Section A (demographic and ownership profile), Section B (five-point Likert-scale items measuring Performance Confirmation, Charging Experience, and After-Sales Service Quality), Section C (Post-Purchase Satisfaction), and Section D (Brand Loyalty). Data were analysed in SPSS using Cronbach's alpha for reliability (Kilic, 2016), descriptive statistics, Pearson correlation, multiple linear regression (to test H1-H3), simple linear regression (to test H4), and an independent-samples t-test (to test H5).

3.8 Data Collection

Primary data were collected over a six-week period through a combination of an online structured questionnaire and in-person intercept surveys at EV dealerships and charging points across Lucknow district. Secondary data supporting the literature review and instrument design were drawn from peer-reviewed journals, conference proceedings, and government policy reports identified through the SciSpace academic database and allied sources.

4. Data Analysis and Interpretation

4.1 Sample Profile

Of the 240 valid respondents, 61% were male and 39% female; 61% owned a private two-wheeler EV and 39% a four-wheeler EV; and 58% resided in Gomti Nagar, Indira Nagar, or Aliganj, the three zones with the densest private-EV concentration in Lucknow district. Table 1 summarises the full demographic and ownership profile.

Variable	Category	Frequency	Percentage
Gender	Male	146	60.8%
	Female	94	39.2%
Age	18-25 years	52	21.7%
	26-35 years	98	40.8%
	36-45 years	61	25.4%
	46 years and above	29	12.1%
Vehicle Type	Two-wheeler EV	146	60.8%
	Four-wheeler EV	94	39.2%
Ownership Duration	Less than 1 year	87	36.3%
	1-2 years	94	39.2%
	More than 2 years	59	24.5%
Residential Zone	Gomti Nagar / Indira Nagar / Aliganj	139	57.9%
	Other Lucknow zones	101	42.1%

Table 1: Demographic and Ownership Profile of Respondents (N = 240)

4.2 Reliability and Descriptive Statistics

Internal consistency of the scale was assessed using Cronbach's alpha. All five constructs exceeded the 0.70 threshold, and the overall 23-item instrument returned an alpha of 0.91, indicating strong reliability (Kilic, 2016). Table 2 presents reliability and descriptive statistics; Figure 1 visualises the mean scores.

Construct	Items	Cronbach's α	Mean	SD
Performance Confirmation	4	0.81	3.74	0.68
Charging Experience	5	0.85	3.35	0.81
After-Sales Service Quality	5	0.83	3.58	0.74
Post-Purchase Satisfaction	4	0.87	3.69	0.70
Brand Loyalty	5	0.89	3.61	0.77
Overall Scale (23 items)	23	0.91	-	-

Table 2: Reliability and Descriptive Statistics

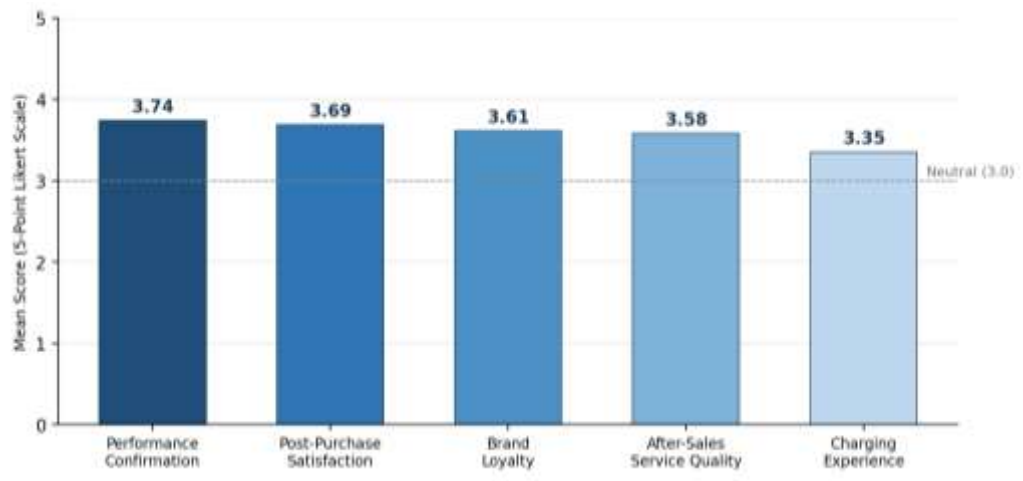


Figure 1: Mean Scores by Construct (N = 240)

Performance Confirmation and Post-Purchase Satisfaction recorded the highest mean scores, indicating that most owners felt their vehicles broadly met pre-purchase expectations. Charging Experience recorded the lowest mean ($M = 3.35$), consistent with literature identifying charging as the most friction-prone post-purchase touchpoint (Sah, 2025; Vanhaverbeke & De Clerck, 2025).

4.3 Correlation Analysis

Pearson correlation confirmed significant positive associations between all three predictor constructs and Post-Purchase Satisfaction, and between Satisfaction and Brand Loyalty (Table 3).

Construct	PC	CE	ASQ	PPS	BL
Performance Confirmation (PC)	1				
Charging Experience (CE)	0.41**	1			
After-Sales Service Quality (ASQ)	0.38**	0.35**	1		
Post-Purchase Satisfaction (PPS)	0.61**	0.58**	0.52**	1	
Brand Loyalty (BL)	0.49**	0.44**	0.46**	0.72**	1

Table 3: Pearson Correlation Matrix ($p < 0.01$, two-tailed)**

Satisfaction showed the strongest correlation with Loyalty ($r = 0.72$, $p < 0.01$), reaffirming satisfaction's central bridging role between ownership experience and brand commitment (Oliver, 2010; Rakesh & Radhakrishna, 2025).

4.4 Regression Analysis (H1-H3)

Multiple linear regression was used to test the combined and individual effects of Performance Confirmation, Charging Experience, and After-Sales Service Quality on Post-Purchase Satisfaction. The model was significant, $F(3, 236) = 79.34$, $p < 0.001$, explaining 50% of the variance in satisfaction ($R^2 = 0.50$, Adjusted $R^2 = 0.49$).

Predictor	B	SE	β	T	Sig.
(Constant)	0.82	0.21	-	3.90	.000
Performance Confirmation	0.35	0.058	0.34	6.02	.000

Charging Experience	0.25	0.049	0.29	5.11	.000
After-Sales Service Quality	0.20	0.054	0.21	3.68	.000

Table 4: Multiple Regression Results — Predictors of Post-Purchase Satisfaction

All three predictors were statistically significant, with Performance Confirmation emerging as the strongest driver ($\beta = 0.34$), followed by Charging Experience ($\beta = 0.29$) and After-Sales Service Quality ($\beta = 0.21$). H1, H2, and H3 are therefore supported.

4.5 Satisfaction-Loyalty Relationship (H4) and Segment Comparison (H5)

A simple linear regression testing satisfaction as a predictor of loyalty was also significant, $F(1, 238) = 257.40$, $p < 0.001$, $R^2 = 0.52$, $\beta = 0.72$, confirming H4. An independent-samples t-test comparing loyalty scores between two-wheeler owners ($n = 146$, $M = 3.55$) and four-wheeler owners ($n = 94$, $M = 3.71$) found no statistically significant difference, $t(238) = -1.62$, $p = 0.107$, supporting H5 and suggesting loyalty drivers operate similarly across EV segments. Figure 2 summarises the overall loyalty distribution across the sample.

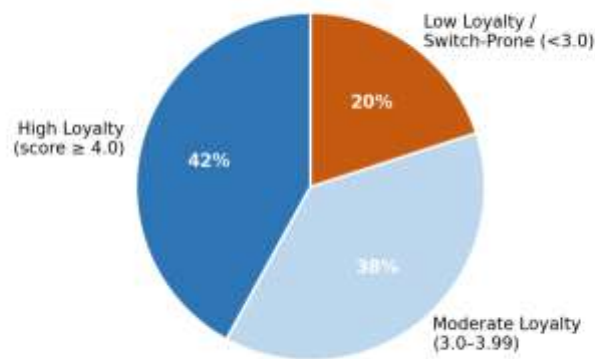


Figure 2: Brand Loyalty Segmentation Among Private EV Owners (N = 240)

H	Hypothesis	Statistic	Result
H1	Charging Experience → Satisfaction (positive)	$\beta=0.29$, $p<.001$	Supported
H2	After-Sales Service Quality → Satisfaction (positive)	$\beta=0.21$, $p<.001$	Supported
H3	Performance Confirmation → Satisfaction (positive)	$\beta=0.34$, $p<.001$	Supported
H4	Post-Purchase Satisfaction → Brand Loyalty (positive)	$\beta=0.72$, $p<.001$	Supported
H5	No significant difference in loyalty: 2-wheeler vs 4-wheeler owners	$t=-1.62$, $p=.107$	Supported

Table 5: Summary of Hypothesis Testing

5. Findings

The analysis yields six key findings. First, post-purchase satisfaction among private EV owners in Luckn-

ow is a multidimensional construct jointly shaped by performance confirmation, charging experience, and after-sales service quality, together explaining half of its variance, consistent with structural findings from Mangaluru (Rakesh & Radhakrishna, 2025) and China (Liang, Yang, & Sun, 2024). Second, performance confirmation, whether the vehicle's real-world range, comfort, and reliability matched pre-purchase expectations, is the single strongest predictor of satisfaction, underlining the practical relevance of expectation-confirmation theory to EV ownership (Oliver & Burke, 1999; Schiebler, Lee, & Brodbeck, 2024). Third, charging experience, despite having the lowest mean score of all constructs, remains a statistically significant and substantial driver of satisfaction, confirming that public and home-charging friction continues to weigh on ownership experience even after the purchase decision is made (Sah, 2025; Jevtić, 2023). Fourth, after-sales service quality, while the weakest of the three predictors, is still significant, echoing automotive-sector evidence that technical and customer-service quality shape loyalty independently of the product itself (Saidin, Wan Abdul Rahman, & Mohd Nafi, 2022; Balinado, Prasetyo, & Young, 2021). Fifth, satisfaction is confirmed as the dominant predictor of brand loyalty, explaining over half its variance on its own, reinforcing satisfaction's theorised role as the critical bridge between a single transaction and durable brand commitment (Oliver, 2010). Sixth, loyalty formation does not differ significantly between two-wheeler and four-wheeler private EV owners, suggesting manufacturers and dealers can apply a broadly similar post-purchase engagement strategy across vehicle segments in this market.

6. Conclusion

This study set out to examine post-purchase satisfaction and its relationship with brand loyalty among private, non-commercial EV owners in Lucknow district, Uttar Pradesh, an emerging EV market that existing research has examined mainly through the lens of purchase intention rather than ownership experience. The findings confirm that satisfaction is shaped substantially by performance confirmation, charging experience, and after-sales service, and that satisfaction, in turn, is the principal determinant of brand loyalty. Practically, this suggests that OEMs and dealers operating in Uttar Pradesh should prioritise three levers to protect and grow loyalty: setting and meeting realistic real-world performance expectations at the point of sale, expanding reliable home- and public-charging support in partnership with local charge-point operators, and strengthening after-sales service consistency and communication. For policymakers, the results reinforce that sustaining Uttar Pradesh's EV growth trajectory requires continued investment in charging infrastructure even as purchase-side subsidies mature.

The study's conclusions should be read alongside its limitations: the sample was confined to Lucknow district and drawn through stratified-random but practically constrained channels rather than a full probability frame, and the analysis relies on self-reported, cross-sectional data collected at a single point in ownership. Future research could extend this design longitudinally to track how satisfaction and loyalty evolve over the ownership lifecycle, replicate the model across other Uttar Pradesh cities and rural-urban segments, and incorporate brand-specific comparisons to test whether these relationships hold uniformly across OEMs.

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