CINEFORUM
ISSN: 0009-7039
Vol. 66. No. S6, 2026 (Special Issue 6)

Impact Of Technological Innovation On Customer Satisfaction In Electric Vehicles: Evidence From Ev Brands In Coimbatore District

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Abstract
The transition to sustainable transportation has taken off, especially with EVs. Consumer expectations now outstrip environmental benefits demanding technological innovation, digital connectivity, brand value, and overall ownership experience. The objective of the study is to examine the factors affecting the purchase intention of the consumers in the Coimbatore district towards Electric Vehicles (EVs). In order to carry out the study the researcher is adding four technological and experiential factors including charging infrastructure, smart connectivity, brand preference and user satisfaction into the Theory of Planned Behaviour (TPB). This study adopted a cross sectional quantitative research, structured questionnaire was used and the number of respondents were 400. The data was analyzed descriptively, reliability test, validity test, correlation analysis and SEM to test the relationships hypothesized. The results show that all four factors positively affect the purchase intention and in a significant manner. User satisfaction was the strongest predictor followed by brand preference, smart connectivity, and charging infrastructure. This discovery suggests that, in the case of EVs, consumers are more likely to consider overall ownership experiences, technological sophistication and trust in trusted brands over environmental issues when evaluating EVs. This study is rich with contribution to literature and offers an integrated behavioural framework that integrates three aspects (technological, infrastructural, experiential) in one model to explain EV purchase intention. The results have practical implications for policy-makers, carmakers, charging service providers and marketers. The growth of accessible charging stations, enabling strong digital connectivity, enhancing customer satisfaction, and creating brand value will speed up EV penetration and contribute to the shift towards sustainable mobility in emerging markets..
Keywords: Electric Vehicles (EVs); Technological Innovation; Customer Satisfaction; Purchase Intention; Theory of Planned Behaviour (TPB); Smart Connectivity

Introduction

Governments, industries and consumers are embracing more sustainable mobility in the world's transport sector, which is in the midst of tremendous transformation. Road transport is a significant source of GHGs and urban air pollution, and the transition to EVs has become a key climate change measure. Battery technology, growing charging standards, governmental support, and environmental conscience are revolutionizing the global EV market and accelerating it fast. Meanwhile, technological innovation has made EVs smart mobility solutions with intelligent connectivity, smart features, and drive experiences. But for EVs to make a serious dent in the market, it will require the technology, as well as a willingness to purchase one. This has caused the researchers to express concern about the purchase intention (Sun et al. 2020; Sanguesa et al. 2021; Husain et al. 2021).

Purchase incentives, tax exemptions, tougher emission standards and charging infrastructure investment are all being encouraged by Governments to incentivize EV adoption. Battery power, range, and vehicle safety and user experience have been improved by automakers to reduce range anxiety and increase consumer confidence. Accessible charging infrastructure is important for convenience and can also minimize operational uncertainty and make EVs more appealing to potential consumers (Powell et al., 2022; Burra et al., 2024).

With the EV market getting pretty tough, people are not just considering the green aspect of the car they're buying. Today customers consider the technological innovation, smart connectivity, brand credibility, as well as the ownership experience. The smartphone integration, live navigation, over-the-air software update, and intelligent driving assistance system features increase customer engagement and enhance purchase intention (Ullah et al.,

2021; Mathai et al., 2025). As a result, people buy products based on their technology, ease of usage, brand value etc. along with sustainability.

Even though the market has grown quickly, the adoption of electric vehicles is still uneven in different countries and consumer groups. Earlier studies show that charging infrastructure, user satisfaction, and brand preference can positively affect the purchase intention (Powell et al., 2022; Burra et al., 2024; Kwon et al., 2020; Shi et al., 2025; Rajasekaran et al., 2024; Ye et al., 2025). Nevertheless, these determinants have been mainly researched in isolation, thus providing limited evidence of their joint effect within a common behaviour framework (Ma et al., 2019; Chen & Hou, 2026; Ullah et al., 2021).

As a result, this study proposes an integrated behavioural framework which studies the effect of charging infrastructure, smart connectivity, brand preference, and user satisfaction on consumers' purchase intention of electric vehicle. The aim is to examine whether these factors significantly influence purchase intention. It adds to the literature by providing a combined framework for technological and behavioural factors. Moreover, it has practical implications for policymakers and auto-manufacturers to promote EV adoption.

2. Literature Review

2.1 Electric Vehicle Adoption and Consumer Behaviour

The world over is adopting electric vehicles or EVs, which are achieved by the introduction of technology, concern for the environment, and government policies. Although battery and charging technology for EVs has improved, there is still no consistency in EV adoption rates in various regions, indicating that EV adoption is more likely to be influenced by other factors than by technology alone (Daramy-Williams et al., 2019). In addition to the performance of the EV, consumers evaluate them based on charging accessibility, operating costs, technological features, environmental impact, and ownership experience. Adoption is promoted by a positive attitude towards innovation and sustainability, and the concern of charging convenience and ownership risk negatively affects purchase intention (Chu et al., 2019). Digital platforms and digital information also play a role in the adoption of EVs. This renders the consumer perception a multidimensional behavioural, which relies on technology, infrastructure and market confidence (Burra et al., 2024; Ma et al., 2019).

2.2 Determinants of Purchase Intention

Previous research shows a number of technological and behavioural factors affecting the intention to buy EVs. According to Burra et al. (2024) and Powell et al. (2022), charging infrastructure helps boost consumer confidence as it decreases range anxiety and improves convenience. Connected features enhance the customer experience and perceived technological values such as smartphone connectivity, remote diagnosis, and over-the-air updates (Ullah et al., 2018; Ullah et al., 2021; Mathai et al., 2025). Brand preference reduces perceived risk by strengthening trust in the quality of the product and the after-sales service (Chen & Hou, 2026; Rajasekaran et al., 2024; Ye et al., 2025). In the same fashion, the result of repurchase intention and positive word-of-mouth is the user satisfaction due to battery performance, driving experience, and service quality (Jabbari et al., 2017; Kwon et al., 2020; Shi et al., 2025; Zhao et al., 2023). The researchers discovered that EV purchase intention is jointly impacted by three sets of factors which refer to infrastructure, technology, and experience (Husain et al., 2021; Sanguesa et al., 2021; Sun et al., 2020).

2.3 Research Gap

Most studies look at the charging infrastructure, smart connectivity, brand preference, or user satisfaction independently though EV adoption has been widely studied. Few studies try to integrate these factors into a single framework for explaining consumers' purchase intention. Existing studies are more about adoption behaviour or post-purchase experiences than purchase intention itself. By assessing the aggregated effect of the charging infrastructure, smart connectivity, brand preference and user satisfaction on intention to purchase an EV, the study addresses the above-mentioned gaps.

2.4 Theoretical Framework

This research is based on the Theory of Planned Behaviour (TPB), which explains behavioural intention from attitude, subjective norms, and perceived behavioural control. The presence of charging infrastructure in the context of electric vehicles (EVs) enhances the perceived behavioural control of individuals as it helps lessen the barriers to the adoption of EVs among people. Other things like technology innovativeness, brand preference and user satisfaction positively enhance behavioural intentions (Burra et al., 2024; Powell et al., 2022; Ullah et al.,

2021; Mathai et al., 2025; Chen & Hou, 2026; Kwon et al., 2020). Accordingly, TPB is a suitable framework to explain consumers' purchase intention towards electric vehicles.

2.5 Conceptual Framework

According to the literature and the extended TPB, the study proposes a conceptual framework where charging infrastructure, smart connectivity, brand preference and user satisfaction are the independent variables which affect purchase intention. Charging infrastructure makes electric vehicle usage more convenient. Similarly, smart connectivity is an added technological advantage. Brand preference strengthens consumer trust. Also, user satisfaction prompts positive behavioural intentions. The study's hypotheses are based on a thorough integrated explanation of consumer's intention to purchase electric vehicles, which would refer to the above constructs.

3. Research Methodology

This study utilized cross-sectional explanatory research design along with quantitative research to identify the impact of charging infrastructure, smart connectivity, brand preference, and user satisfaction on consumers' purchase intention towards electric vehicles. The study is carried out in the Coimbatore District of Tamil Nadu, which has a conducive environment for the study regarding consumer behaviour as it is adapting to the increased adoption of EVs and expanding of charging infrastructure related to EVs and availability of multiple brands of automobiles at one place. The target population was composed of existing EV users and potential consumers who had knowledge of EVs and were involved in the purchase of vehicles.

A non-probability convenience sampling method was practised. Data were collected using structured questionnaires administered offline and online at automobile dealerships, charging stations, public places and online. Out of 400 questionnaires that were distributed, valid data screening was done on 372 responses which gave a 93.0% response rate.

The questionnaire had six sections on demographic information, charging infrastructure, smart connectivity, brand preference, user satisfaction, and purchase intention. All measurement items were drawn from past studies to ensure their validity and a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) was used to assess the parameters. Respondents volunteered to participate in the study, and were ensured anonymity and confidentiality during data collection.

IBM SPSS Statistics and AMOS/SmartPLS were used to analyse the data. The measurement model was assessed and hypotheses were tested at 5% significance through use of Descriptive statistics, Cronbach's Alpha, Composite Reliability (CR), Average Variance Extracted (AVE), Confirmatory Factor Analysis (CFA), Pearson correlation and Structural Equation Modelling (SEM).

4. Results and Analysis

4.1 Respondent Profile

Four hundred valid questionnaires were analysed. As shown in Table 4.1, the sample consisted of 58.3% males and 41.7% females, with most respondents aged 26–35 years (37.5%) and aged 36–45 years (29.5%). Most of them had undergraduate or postgraduate qualifications and belonged to different occupations. The majority of respondents possessed driving experience from 5 to 10 years, which shows the good sample representative choice of potential consumers of electric vehicles.

Table 1. Sample Characteristics and Descriptive Statistics (N = 400)

Variable	Category/Construct	Frequency	Percentage (%)	Mean	SD
Gender	Male	233	58.3	–	–
	Female	167	41.7	–	–
Age	18–25	72	18.0	–	–
	26–35	150	37.5	–	–
	36–45	118	29.5	–	–
	Above 45	60	15.0	–	–

Education	Undergraduate	156	39.0	–	–
	Postgraduate	182	45.5	–	–
	Doctorate	62	15.5	–	–
Occupation	Private Employee	145	36.3	–	–
	Business	98	24.5	–	–
	Government	72	18.0	–	–
	Others	85	21.2	–	–
Driving Experience	<5 Years	112	28.0	–	–
	5–10 Years	167	41.8	–	–
	>10 Years	121	30.2	–	–
Charging Infrastructure	Construct	–	–	3.71	0.69
Smart Connectivity	Construct	–	–	3.89	0.65
Brand Preference	Construct	–	–	3.98	0.61
User Satisfaction	Construct	–	–	4.11	0.57
Purchase Intention	Construct	–	–	3.95	0.63

Table 1 illustrates the demographic characteristics of the respondents and descriptive statistics. The sex distribution of sample was 58.3% males and 41.7% females. It was noted that most of the respondents belonged to the age group of 26–35 years (37.5%). Most of the individuals were undergraduates or postgraduates and belonged to different occupations. Among the various elements in the study, User Satisfaction had the highest mean: (M = 4.11, SD = 0.57). Other elements included Brand Preference (M = 3.98, SD = 0.61), Purchase Intention (M = 3.95, SD = 0.63), Smart Connectivity (M = 3.89, SD = 0.65), and Charging Infrastructure (M = 3.71, SD = 0.69). The values indicate a favourable perception towards electric vehicles.

4.2 Structural Equation Model (SEM Results)

The proposed relationships were analyzed using Structural Equation Modelling (SEM). The model presented an acceptable fit with well-known criteria $\chi^2/df = 2.36$, CFI = 0.956, TLI = 0.948, RMSEA = 0.058, and SRMR = 0.046, gives evidence that the model fits well with the data.

Table 2. Measurement Quality, Correlations, and Structural Model Results

Construct	α	CR	AVE	PI Correlation	β	t-value	p-value	Hypothesis
Charging Infrastructure	0.861	0.901	0.646	0.58**	0.214	4.18	<0.001	H1 Supported
Smart Connectivity	0.889	0.918	0.691	0.67**	0.273	5.69	<0.001	H2 Supported
Brand Preference	0.874	0.909	0.668	0.71**	0.291	6.33	<0.001	H3 Supported
User Satisfaction	0.903	0.927	0.718	0.74**	0.347	8.07	<0.001	H4 Supported
Purchase Intention	0.885	0.912	0.722	—	—	—	—	Dependent Variable

Model Fit Indices: $\chi^2/df = 2.36$; CFI = 0.956; TLI = 0.948; RMSEA = 0.058; SRMR = 0.046.

Note: *α = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted. The convergent validity was confirmed since all CR values exceeded 0.70, and AVE values exceeded 0.50. The square root of AVE for each construct is greater than respective inter-construct correlations reflecting discriminant validity. There were significant correlations in all cases.*

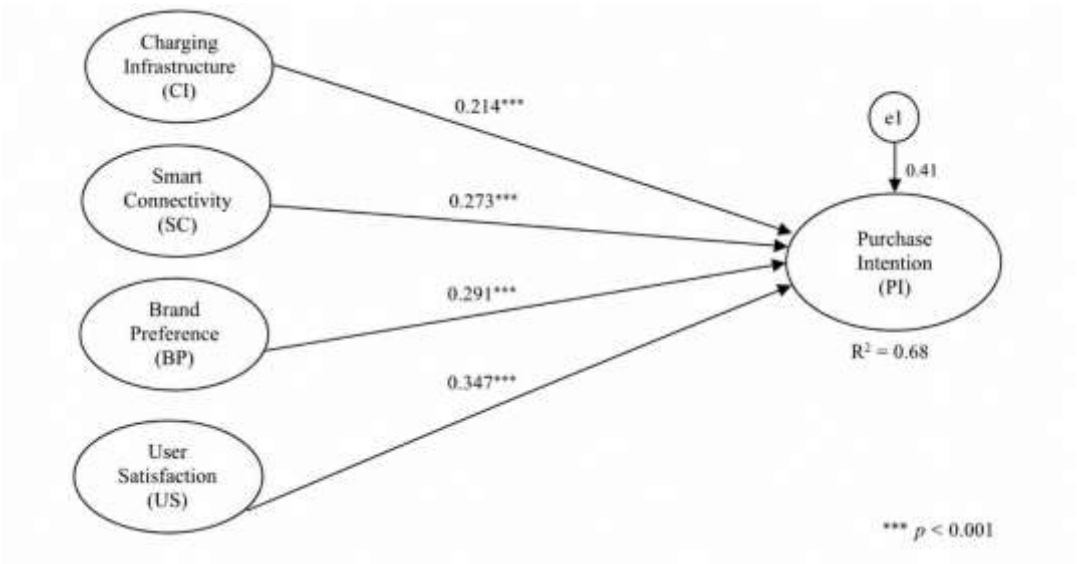

Figure 4.1 Proposed Structural Model

Results of the structural model along psychometrics are summarized in Table 2. Each of the constructs exhibited a sufficient level of internal consistency with Cronbach's $\alpha > 0.80$, a composite reliability greater than 0.90, and convergent validity with the average variance extracted (AVE) greater than 0.50. Using the Fornell–Larcker criterion, discriminant validity was also established. The correlation analysis indicates that all independent variables are positively and significantly correlated with purchase intention. The highest correlation was with User Satisfaction ($r = 0.74$). The findings of SEM revealed that Charging Infrastructure ($\beta = 0.214$), Smart Connectivity ($\beta = 0.273$), Brand Preference ($\beta = 0.291$), and User Satisfaction ($\beta = 0.347$) had a positive direct and significant influence on purchase intention, i.e. $p < 0.001$ validating all four hypotheses.

5. Discussion

5.1 Technological and Infrastructure Factors

The results confirm that charging infrastructure and smart connectivity have a positive direction with significant effects on the consumers' purchase intention towards electric vehicles, thereby supporting H1 and H2. The existence of charging infrastructure alleviates range anxiety and enhances convenience, which is important for EV adoption. However, the effect is less than technology-related and experience-related factors. The findings are consistent with those of Burra et al. (2024) and Powell et al. (2022) who reported charging infrastructure as a viable solution for improving sustainable mobility. Smart connectivity was also a key one as it appears consumers are prioritizing connectivity with their smartphones, live direction, over-the-air diagnostics and updates over a feature. The finding is consistent with the work of Ullah et al. (2018), Ullah et al. (2021), and Mathai et al. (2025) that suggests connected technologies provide new avenues for customer engagement and amplify perceptions of technological value.

5.2 Brand Preference and User Satisfaction

The H3 and H4 supports were observed as brand preference and user satisfaction, respectively, had the strongest positive effects on purchase intention. When they adopt EVs, consumers associate a trustworthy brand with superior quality and technology reliability and after-sales services. Evidence from Chen and Hou (2026), Rajasekaran et al. (2024) and Ye et al. (2025) support these findings. The strongest predictor was user satisfaction which indicates that a positive owner experience like battery performance, driving experience, charging convenience, product quality, etc., encourages further purchase intention. Kwon et al. (2020), Shi et al. (2025), and Zhao et al. (2023) reported similar results.

5.3 Overall Behavioural Perspective

The extended Theory of Planned Behaviour illustrates that intention to purchase EV is influenced by infrastructure, technology, behaviour and experience. Even if charging infrastructure is important, user satisfaction and brand preference have a stronger effect compared to charging infrastructure as the EV market

grows. The study concluded that an acceleration in EV adoption require integrated infrastructure, technology, brand positioning and product and service development with respect to customer centricity.

Conclusion

This study analyzed the effect of charging infrastructure, smart connectivity, brand preference, and user satisfaction on consumers' purchase intention towards electric vehicles using an extended Theory of Planned Behaviour (TPB). All four factors significantly positively influence purchase intention, with the highest impact exerted by user satisfaction, followed by brand preference, smart connectivity, and charging infrastructure, according to the findings. The results show that EV purchase intention is affected with technology and activity factors. To better explain consumer behaviour, there is a need to integrate both. The research incorporates the technology-related and experience-related aspects of the theory of planned behavior in order to better understand EV purchase intention.

The results suggest continued policy work needs to be directed towards continuing to increase charging infrastructure and decreasing adoption barriers. In addition, car makers need to put in the effort to enhance the performance of the battery, smart connectivity and customer experience. An acceleration of EV adoption process can be achieved by improving consumer confidence in EVs, which will improve the brand image and service quality.

The cross sectional design of the study, respondents from Coimbatore district and self reported data collection could be limiting the generalisability of the study. Future research should use a longitudinal design in various regions and a comparative design, as well as other variables such as environmental concern, institutional support, risk perception, and social contagion. Learning the new technologies such as self-driving, AI, and next generation batteries can boost our understanding of EV buying behaviour..

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