

Electric Vehicle Adoption in the Age of Sustainability: A Consumer-Centric Study

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Abstract

Conventional vehicles powered by petrol or diesel remain a leading cause of deterioration of air quality and broader environmental harm in urban settings. As concerns over greenhouse gas emissions and fuel dependency have exaggerated, both governing bodies and auto manufacturers have sought to advance the uptake of electro-mobility (EM) vehicles as a cleaner and greener alternative. Even after knowing the benefits of the adoption of EM vehicles, the commercial penetration of the market still falls short of expectations. To address this issue, the present study seeks to deepen the understanding of the key determinants shaping consumer willingness to adopt EM vehicles. Grounded in perceived value theory (PERVAL) and the theory of reasoned action (TRA), the research constructs a behavioural framework that examines how dimensions such as quality, emotional, price, and social value, along with technology-specific attributes, namely acceleration performance and low engine noise, communally change consumer attitudes and, in turn, purchase intentions. The proposed model was empirically assessed by using SEM, applied to data collected through a structured online questionnaire. Findings establish that emotional appeal, perceived economic value, acceleration capability, and noise reduction exert significant and positive effects on consumer attitudes toward EM vehicles. These favourable attitudes subsequently translate into stronger purchase intentions. Notably, neither social value nor perceived quality arose as a strong predictor of attitude. The study recommends that both policymakers and industry practitioners publicize the economic value, functional performance, experiential benefits and environmentally sustainable consumption messages while designing their promotion campaigns.

Keywords: Electric Vehicle; Sustainable; Quality; Price; Emotional; Behaviour; Adoption

I. INTRODUCTION

Transport is accepted as one of the main contributors to global air pollution and environmental degradation (White & Sintov, 2017). It is the main cause for a large proportion of global CO₂ emissions and generates hazardous pollutants that include nitrogen oxides (NO_x), fine particulate matter (PM_{2.5} and PM₁₀), and carbon-based solvents that excessively affect densely populated city environments. The related health impact is well-documented, comprising increasing rates of respiratory and cardiovascular disorders as well as premature mortality. Apart from health impacts, traffic pollution generates assessable revenue decline from

higher medical expenditures, reduced workforce productivity, and environmental degradation (Li, 2016). The continued control of privately owned ICE vehicles has worsened these challenges, simultaneously worsening urban air quality and the climate crisis. In this context, sustainable mobility has emerged as a strategic priority for reducing the carbon footprint of conventional transport. Electricity has come to occupy a central place in this energy change: hybrid vehicles combining electric motors with combustion engines and fully electric vehicles powered fully by electricity are continuously regarded as feasible options to reduce carbon emissions and

improve urban air quality (Zhang et al., 2014; Yang et al., 2016). Transitioning from ICE vehicles to electro-mobility (EM) alternatives is difficult. Traditional vehicles are supported by decades of technological improvement, robust supply chains, well-developed fueling infrastructure and deeply embedded regulatory norms factors that together sustain high levels of public familiarity and acceptance. These ingrained advantages pose significant obstacles to the accelerated diffusion of EM vehicles. However, a growing set of pressures is driving the shift toward cleaner transport. Mounting anxieties over energy supply security, declining air quality and the seriousness of climate action have led governments all across the globe to order stronger emissions regulations and develop environment-friendly policies. Rapid technological changes, growing competition among automotive industry leaders, and increasing consumer demand through key markets such as China, Germany, Japan, and the United States have jointly boosted the shift toward electro-mobility. Across many countries, EM adoption is supported by policy frameworks that punish polluters while creating financial benefits for cleaner replacement (Yang et al., 2016). Nevertheless, the trail from technological development through early adoption to large-scale market combination remains essentially lengthy and uncertain (Grauers et al., 2013). Even with supportive policies and advancing technology, EM vehicle sales have constantly chased those of traditional ICE vehicles. A key explanation for this constant gap is consumer view, which plays a decision-making role in shaping both product acceptance and purchase behaviour (Rezvani et al., 2015). An increasing body of research has examined the drivers of EM adoption. Shafiei et al. (2012), for instance, identify higher fossil fuel costs, purchase incentives, and accessible charging infrastructure as crucial factors of market expansion. Apart from that, research demonstrates that nature-loving individuals are more likely to choose sustainable vehicle options (Heffner, 2007; Khan, 2007; Gallagher & Muehlegger, 2011). Noppers et al. (2014) draw attention to how influential, ecological, and iconic product characteristics influence choice, while Moons & De

Pelsmacker (2015) expand this picture by recognizing innovativeness, personal values, observed complication, compatibility, relative advantage, and emotional responsiveness as further behavioural signals. Economic factors constantly emerge as particularly strong indicators. Kim et al. (2017) find that EM market share is closely related to price advantage relative to ICE vehicles, feasible driving range, and the extent of available model options. Nosi et al. (2017) similarly record that consumer attitudes and social norms shape purchase intentions, though understanding of insufficient pre- and post-sale service can compromise these effects. Rezvani et al. (2018) further show that result-oriented, controlling, and pleasure-seeking motivations each contribute to the creation of adoption purpose. Liao et al. (2019) recognize letting plans as an effective commercial model for increasing EM access, and Rietmann and Lieven (2018) establish that better government incentive schemes connect with higher adoption rates at the national level. Taken together, these studies confirm the complex nature of EM adoption, which is affected by a link of economic, technological, psychological, and policy-related determinants.

The present study suggests that consumer adoption of electro-mobility (EM) vehicles is driven mainly by a combination of economic and performance-based factors, rather than by symbolic or social motivations. While much of the existing literature has highlighted the essentiality of environmental values, conventional beliefs and attitudinal constructs in predicting purchase intentions (Rezvani et al., 2015), the present research emphasizes the significant contribution of specific perceived value dimensions and technology-related attributes. More precisely, the results indicate that price perceptions, vehicle acceleration, and low engine noise exert statistically significant effects on consumer attitudes, which in turn are the main predictors of EM adoption intention. On the other hand, perceived quality and social value did not appear as significant predictors within the planned model. These findings strengthen the mediating centrality of attitude and suggest that consumers prioritize real functional benefits and value for money when forming opinions

of EM vehicles. A better understanding of how dimensions of customer perceived value work with attitudinal formation thus offers more explanation of EM adoption dynamics insights that enhance consumer behaviour theory in the environmentally friendly transportation domain and carry direct practical relevance for strategies focused on expanding EM market presence.

Despite the wide collection of governmental actions formed to hasten the spread of electro-mobility, EM vehicles continue to hold a relatively reasonable market share across many developed economies, including Spain. Despite being both the largest automotive market in the EU and a significant manufacturing centre, Spain has seen EM vehicle uptake lag far behind conventional ICE vehicles (Prakhar et al., 2024; Corradi et al., 2023). This shortage persists even where national emission reduction strategies specifically target the transport sector, which accounts for a main share of total air pollution. In this regard, the present study's findings highlight the psychological mechanisms that support EM adoption. Practically, consumer attitudes emerge as the main determinant of EM vehicle adoption goals. Specifically, economic considerations, namely price perceptions and performance-related attributes: acceleration, capability and engine noise reduction, apply accurately meaningful effects on attitude formation. Perceived quality and social value, on the other hand, do not show meaningful impact. These outcomes show that, regardless of broad policy efforts, adoption decisions are mainly shaped by consumers' judgement of concrete practical perks and cost-effectiveness (Qin et al., 2022; Castillo et al., 2024). Consequently, the slow motion of EM vehicle market expansion may be partly due to a mismatch between the focus of policy frameworks, which tend to focus on environmental sustainability and the preferences of consumers, who respond more strongly to performance efficiency and cost advantages. This underlines the importance of integrating behavioural evidence into both policy design and commercial strategy to improve the impact of EM adoption initiatives. The main objective of this study is to build an understanding of the factors

influencing consumers' openness to accept electro-mobility (EM) vehicles. Based on PERVAL theory and the theory of reasoned action, the study creates a structured framework in which perceived value dimensions and vehicle-specific technological attributes collectively influence consumer attitudes, resulting in the shaping of purchase intention. The model combines four perceived value dimensions: quality, price, emotional, and social value alongside two technologically advanced EM vehicle attributes relative to traditional ICE models: acceleration performance and low engine noise. All these factors were hypothesised to shape consumer attitude, which serves as the major influence on the intention of adopting electric vehicles. The results indicate that consumers assess concrete economic and high performance more densely than symbolic or instinctive thought when judging EM alternatives. Accordingly, the study recommends that both manufacturers and policymakers should change focus toward strategies centred on cost-effectiveness and greater utility, particularly acceleration, responsiveness and noise reduction. Aligning marketing campaigns and regulatory initiatives with the performance-driven, cost-conscious preferences revealed in this research may improve consumer accessibility and support the broad distribution of EM vehicles.

II. THEORETICAL BACKGROUND & HYPOTHESES

Promoting the large-scale use of electro-mobility technology presents both structural and behavioural challenges. While technological advancement and enabling policy environments have helped market diffusion, consumer acceptance ultimately determines long-term feasibility. Under sustainable transport research, behavioral intention is consistently found to be significantly affected by individual attitudes toward a given innovation. In behavioral theory, attitude reflects a person's overall critical response to a specific behaviour, formed through a judgement of its expected outcomes. Under the Theory of Reasoned Action, favourable product evaluations create positive attitudes that, in turn, strengthen behavioural intentions. For EM vehicles, consumers weigh economic, functional, and

symbolic value dimensions before forming an opinion. Understanding how these factors affect and determine consumer's attitude therefore essential in explaining EM adoption intention, making consumer mindset a core principle for analyzing the acceptance of EM. A considerable body of perceived value research has constantly shown that perceived value shapes consumers' behavioural intentions across different transport situations, covering public transit, aviation, bicycle-sharing, and EM vehicles. PERVAL visualises perceived value as a consumer's complete appraisal, driven by the swap between perceived benefits and sacrifices. Rather than being linear, this build is broken into four dimensions: quality value, which captures functional and technical performance gains; emotional value, reflecting affective satisfaction during product use; price/value for money, showing the assessment of monetary and non-monetary costs; and social value, representing the prestige or status benefits associated with ownership. Technology adoption research continuously identifies attitude as the primary mechanism through which perceived value influences intent, a position aligned with the Theory of Reasoned Action, which holds that positive product ratings cultivate favourable attitudes and thereby strengthen adoption intention. Building on these foundations, the present study proposes that each of the four perceived value dimensions shapes consumer attitudes toward EM vehicles, which in turn determines adoption intention.

Accordingly, the following hypotheses are formulated:

- H1: Perceived quality value has a significant impact on the customers' attitude toward EM vehicles.
- H2: Perceived emotional value has a significant impact on the customers' attitude toward EM vehicles.

- H3: Perceived price value has a significant impact on the customers' attitude toward EM vehicles.
- H4: Perceived social value has a significant impact on the customers' attitudes towards EM.
- H5: Strong acceleration has a significant impact on customers' attitudes toward EM vehicles.
- H6: Low engine noise emission has a significant impact on customers' attitude toward EM vehicles.
- H7: Consumers' attitudes have a substantial impact on intention to adopt EM vehicles.
- H8: Gender has an indirect effect by moderating attitude towards intention to adopt EMV.
- H9: Age has an indirect effect by moderating attitude towards intention to adopt EMV.

III. RESEARCH METHODS

A. Measures

The study has used PLS-SEM (Partial Least Squares Structural Equation Modelling) to investigate the factors influencing the adoption of Electro-mobility (EM) vehicles. Factors from the perceived value (PERVAL) construct, which is a product-utility-based model, to understand the behavioural impact on EM vehicle adoption. The study has employed a four-dimensional framework that includes variables "Quality (Q)", "Emotional (EM)", "Price (P)", and "Social Value (SV)", with an impact on "Attitude (AT)." The study also employed two technology-related variables, i.e. "Acceleration (AC)" and "Low Noise", on customers' Attitude. The Theory of Reasoned Action variable where "Attitude (AT)" leads to "Intention to Adoption (IA)." It also empirically tested the indirect impact of "Gender" and "Age" by moderating "Attitude (AT)" towards "Intention to Adoption (IA)". Fig. 1 depicts the proposed theoretical framework.

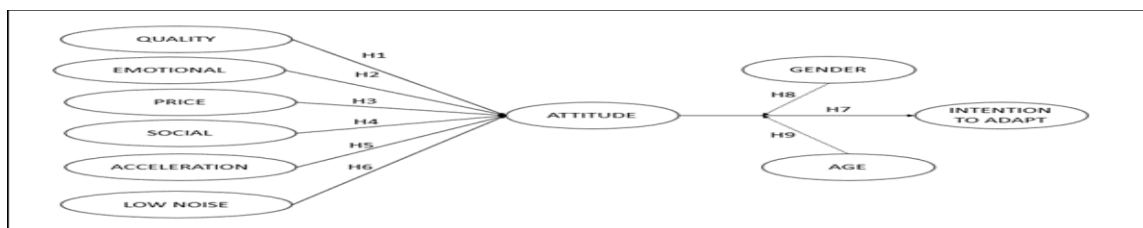


Figure 1: Proposed Model



To measure each construct, the study has employed a questionnaire proposed by Higuera-Castillo et al. (2019). Data were collected from a structured questionnaire floated online to consumers in India. The study used a Likert point scale, which ranges from 1 (strongly disagree) to 5 (strongly agree). In total, 22 items measure each construct with two, three or four items. Quality is measured by two items: “EM offers reliable levels of quality.” Emotional value, Price and Social Value are also measured by two items: “EM would make me feel good,” “EM offers value for money.” Low Noise is measured by 5 items, for example: “I believe that the lack of noise from the EM is not dangerous for road traffic”. Whereas “Acceleration,” “Attitude”, and “Intention to Adopt” are measured by 3 items: “Buying an EM vehicle will help to mitigate the effects of climate change.”

To measure the reliability and validity of the results, the study has employed the Cronbach alpha (α), Composite Reliability (CR), and Average Variance Extracted (AVE). The study has measured the Fornell-

Larcker criterion to test the discriminant validity of each construct. The path coefficients are also assessed to determine the interconnections among the latent factors in the structural model.

B. Data Collection & Sample

The data used for the empirical assessment of the proposed model were collected through a structured online survey administered via Google Forms. The survey was distributed to individuals aged 18 and above who held a driving license, to ensure respondents’ relevance to the EM vehicle evaluation and adoption context. Participation was completely voluntary, ensuring the confidentiality and anonymity of the respondents. Actual data collection was 452 responses, but some data are incomplete. After cleaning the data, the final data set comprises 424 respondents. The sample comprises demographic information related to their gender, age, education, employment status, income and drivers’ experience. Key sample characteristics are summarized in Table 1.

Table 1: Descriptive Statistics

| | | | | | |
|------------------|---------------|--------|----------------------------|------------|--------|
| GENDER | Male | 64.1% | EMPLOYMENT STATUS | Unemployed | 14.15% |
| | Female | 35.9% | | Student | 8.02% |
| AGE | 18-25 | 45.04% | | Employed | 60.14% |
| | 26-35 | 16.51% | Self-employed | 17.69% | |
| | 36-45 | 25.94% | INCOME | No income | 5.89% |
| | 46-55 | 9.91% | | < 20 lacs | 40.09% |
| | 56-65 | 2.60% | | 21-50 lacs | 47.89% |
| | Above 65 | 0% | | > 50 lacs | 6.13% |
| EDUCATION | Undergraduate | 50.47% | DRIVERS' EXPERIENCE | 0-1 | 12.97% |
| | Post graduate | 28.07% | | 1-5 | 32.08% |
| | Doctorate | 12.02% | | 5-10 | 41.98% |
| | Others | 9.44% | | > 10 | 12.97% |

IV. RESULTS

A. Measurement Model

Table 2 determines the adequacy of measuring instruments by examining constructs’ reliability and

validity. Cronbach’s alpha (α) and Composite reliability (CR) were assessed to ensure that constructs meet the minimum threshold limit of 0.6 and 0.7, which confirms the reliability of the scale used in the study.



Average variance extracted (AVE) was also assessed to confirm the validity of the scale used in the study. The threshold limit of AVE is greater than 0.5. This

ensures that each construct adequately captures the variance in its corresponding indicators.

Table 2: Reliability and Validity

| Variables | Items | Factor Loadings | A | CR | AVE |
|--------------------|-------|-----------------|-------|-------|-------|
| Acceleration | AC1 | 0.902 | 0.849 | 0.857 | 0.651 |
| | AC2 | 0.726 | | | |
| | AC3 | 0.784 | | | |
| Attitude | AT1 | 0.761 | 0.814 | 0.842 | 0.608 |
| | AT2 | 0.639 | | | |
| | AT3 | 0.914 | | | |
| Emotional | EM1 | 0.945 | 0.915 | 0.917 | 0.845 |
| | EM2 | 0.893 | | | |
| Intention to Adapt | IA1 | 0.853 | 0.917 | 0.919 | 0.788 |
| | IA2 | 0.891 | | | |
| | IA3 | 0.918 | | | |
| Low Noise | LE1 | 0.77 | 0.851 | 0.858 | 0.536 |
| | LE2 | 0.836 | | | |
| | LE3 | 0.718 | | | |
| | LE4 | 0.682 | | | |
| | LE5 | 0.638 | | | |
| Price | P1 | 0.755 | 0.793 | 0.805 | 0.664 |
| | P2 | 0.871 | | | |
| Quality | Q1 | 0.908 | 0.842 | 0.852 | 0.733 |
| | Q2 | 0.801 | | | |
| Social | SV1 | 0.895 | 0.761 | 0.799 | 0.636 |
| | SV2 | 0.687 | | | |

Table 3 presents the results of the measurement model and the Fornell-Larcker (F-L) criterion, which confirms the discriminant validity of each construct in the scale. The AVE value greater than its

corresponding squared correlation validates that each construct is closely interconnected to its indicators and distinguishes itself from any other construct.

Table 3: Discriminant Validity

| Variables | Acceleration | Attitude | Emotional | Intention to adapt | Low Noise | Price | Quality | Social |
|--------------|--------------|-------------|-----------|--------------------|-----------|-------|---------|--------|
| Acceleration | 0.807 | | | | | | | |
| Attitude | 0.791 | 0.88 | | | | | | |

| | | | | | | | | |
|--------------------|-------|-------|--------------|--------------|--------------|--------------|--------------|--------------|
| Emotional | 0.649 | 0.861 | 0.919 | | | | | |
| Intention to adapt | 0.75 | 0.803 | 0.792 | 0.888 | | | | |
| Low Noise | 0.677 | 0.764 | 0.642 | 0.811 | 0.732 | | | |
| Price | 0.504 | 0.721 | 0.661 | 0.582 | 0.466 | 0.815 | | |
| Quality | 0.778 | 0.703 | 0.771 | 0.741 | 0.672 | 0.809 | 0.856 | |
| Social | 0.563 | 0.582 | 0.601 | 0.641 | 0.551 | 0.399 | 0.587 | 0.798 |

B. Structural Model

The results illustrate sufficient evidence of the reliability, convergent validity, and discriminant validity of the measurement model. Hence, subsequent assessment of the structural model and hypothesis testing can be found using PLS-SEM. Figure 2 represents structural equation modelling.

The model demonstrated strong model fit and high explanatory power. R-square values for the key endogenous constructs are Attitude (0.837) and Intention to adopt (0.792). These values indicate that the model explains a substantial proportion of the variance in attitude and behavioural intention toward e-vehicle adoption.

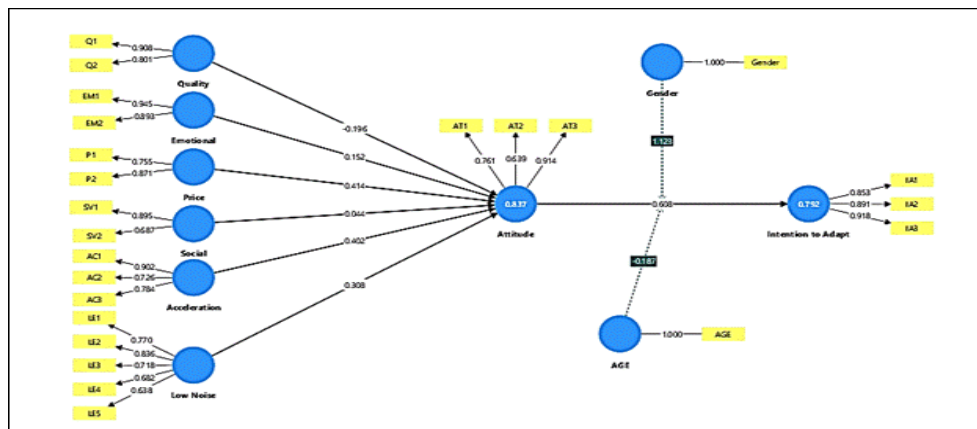


Figure 2: Hypothesised Model

By analysing the data through SEM, the study aims to uncover the underlying mechanisms that guide customers’ e-vehicle adoption. Table 4 represents the path coefficients and p-values that support or do not support the proposed hypothesis. The model examined the factors that influence customers’ intention to adopt e-vehicles by influencing their attitude. The study found that “Price”, “Acceleration” and “Low Noise” positively and significantly influence the customer’s attitude, which ultimately influences the adoption of electric vehicles. The study found insignificant influence of factors like “Quality”, “Emotional” and

“Social” on customers’ attitude for electric vehicle adoption. Consequently, H1, H2 and H4 hypotheses are not supported by the results. In contrast, H3, H5, and H6 hypotheses are supported by the consequences. The direct effect of customers’ attitudes towards the adoption of electric vehicles is also significant. Hence, the study supports the H7 hypothesis. The study also analyzed the indirect effect of “age” and “gender” on customers’ attitudes towards EVC adoption, and found no substantial impact on the outcome. This proves that the adoption of e-vehicles has nothing to do with the age or gender of the customer.

Table 4: Path Coefficients and P-values

| Hypothesis | β -Coef. | p-value | Results | R ² |
|--|----------------|---------|--------------|----------------|
| Quality → Attitude | -0.196 | 0.597 | Not Accepted | |
| Emotional → Attitude | 0.152 | 0.118 | Not Accepted | |
| Price → Attitude | 0.414 | 0.032* | Accepted | |
| Social → Attitude | 0.044 | 0.62 | Not Accepted | |
| Acceleration → Attitude | 0.402 | 0.010* | Accepted | |
| Low Noise → Attitude | 0.308 | 0.008** | Accepted | |
| Attitude → Intention to Adapt | 0.608 | 0.000** | Accepted | |
| Age x Attitude → Intention to Adapt | 1.123 | 0.759 | Not Accepted | |
| Gender x Attitude → Intention to Adapt | -0.187 | 0.665 | Not Accepted | |
| Attitude | - | - | - | 0.837 |
| Intention to Adapt | - | - | - | 0.792 |

Note: Significant value @5%*, @1%**

Overall, these empirical results support the theoretical framework proposed in the study, highlighting the fundamental role of speed of acceleration, low noise and price as a direct consequence on users' attitudes and consequent behavioural intentions to adopt electric vehicles. These results are very useful for EVC service providers that aim for long-term consumer engagement via price strategies, providing more sound engines with advanced innovations and speed of acceleration.

V. DISCUSSION

A. Theoretical Implications

This study contributes to the existing body of knowledge on consumer attitudes towards electro-mobility (EM) vehicles and offers several important theoretical implications. First, while prior research on EM vehicle adoption has predominantly focused on environmental concern, policy incentives, and structural barriers to adoption, comparatively limited attention has been given to the multidimensional construct of perceived value and its role in shaping consumer attitudes. While earlier work acknowledges a broad set of influencing factors including government policy, charging infrastructure, vehicle specifications, price sensitivity, and social

norms, the present study advances this discourse by explicitly positioning perceived value as a central driver of attitude. By integrating PERVAL theory with the theory of reasoned action, this study develops and empirically validates a behavioural model in which attitude mediates the relationship between perceived value dimensions and purchase intention. Unlike prior studies that typically treat perceived value as a direct predictor of purchase intention, this framework positions attitude as the principal evaluative mechanism through which perceived outcomes are translated into behavioural intentions. The four-dimensional PERVAL structure, i.e. quality value, emotional value, price/value for money, and social value, is shown to be well-suited to capturing consumer evaluative processes in the EM context, thereby strengthening the theoretical application of PERVAL within sustainable transport research. Moreover, by incorporating two technology-specific EM attributes, acceleration performance and low engine noise alongside the PERVAL dimensions, this study offers a more integrated understanding of how both value perceptions and product characteristics jointly determine consumer attitudes and adoption intentions. In so doing, this research refines existing behavioural



models of EM vehicle adoption and validates a structured PERVAL-based approach within the electro-mobility domain.

The behavioural model developed in this study enriches existing PERVAL-based frameworks by incorporating two technologically distinctive EM vehicle attributes widely considered influential in consumer assessments: acceleration performance and low engine noise. Embedding these product-specific characteristics within the perceived value–attitude–intention framework advances adoption modelling in the electro-mobility domain. To the authors' knowledge, few studies have simultaneously examined multidimensional perceived value alongside EM-specific performance attributes as joint antecedents of consumer attitude. Prior research has tended to address either environmental concern, policy support, or the direct relationship between perceived value and purchase intention, without positioning attitude as a central mediating construct shaped by both value perceptions and functional product features. The present study findings are parsimonious yet explanatorily powerful; it found a substantial gap between attitude and intention to purchase EM vehicles. The study provides in-depth insights by integrating the evaluative judgements and performance perceptions that communally govern consumers' behavioural intention in the context of sustainable mobility.

The study identifies economic value, i.e. perceived value of money, as a primary attitudinal driving force in the buying decision of EM vehicles, especially among Indian consumers. The findings of the study confirm the prior studies' findings that higher weightage is given to monetary and experiential value perceptions than social or environmental concern as predictors of intention to purchase EM vehicles. The study confirmed the integration of the perceived value-attitude-intention conceptual framework. It provides a more detailed understanding of consumers' EM adoption behaviour and highlights that economically rational choices are prioritized over environmental issues in real choices. The findings strengthen the applicability of perceived value theory in the electro-

mobility discipline. It offers context-specific indication that extends the generalization of value-based adoption models.

Further, the results confirmed that low engine noise and rapid acceleration are the substantial attributes that convince EM vehicle consumers to make a purchase decision. These findings suggest that consumers are not only considering monetary factors but also looking for functional/ experimental features. Their evaluation judgment to buy depends on both economic factors and the unique features of EM vehicles. Thus, the results advance knowledge in the domain by signifying that both perceived value dimensions and core technological attributes work collectively in influencing consumer behaviour toward EM vehicles.

In contrast, perceived product quality did not report a significant influence on consumers' attitude towards EM vehicles in the present study. Whereas previous research in the automotive sector has recognized perceived quality as an important purchase predictor, particularly for conventional and hybrid vehicles. A likely clarification is the empirical gap among respondents: the majority represented potential users rather than existing ones, many of whom had not engaged in test driving or sustained EM vehicle use. Without direct experience, quality evaluations may remain abstract and consequently exert less influence on attitude formation. Previous research has confirmed that firsthand interaction with EM vehicles substantially improves performance and quality perceptions (Higuera-Castillo et al., 2019; Higuera-Castillo et al., 2020a). Moreover, the limited market penetration of EM vehicles restricts opportunities for peer-to-peer knowledge exchange and observational learning, further constraining the development of well-formed quality judgements. By identifying the non-significant role of perceived quality in attitude formation, this study contributes a contextual nuance to EM adoption research, suggesting that for emerging technologies at an early diffusion stage, concrete experiential and economic value perceptions may carry more weight than abstract quality assessments (Higuera-Castillo et al., 2020b; Higuera-Castillo et al., 2024). These findings highlight the need for



manufacturers and policymakers to invest in consumer exposure and experiential engagement programs such as test-drive events and demonstration centres to build stronger quality perceptions over time.

The study finds that social value does not significantly influence consumer attitudes toward EM vehicles, a result that diverges from several previous studies identifying social influence as an important predictor of new technology adoption, including EM vehicles (Li et al., 2018; Zuo et al., 2021). Within the present model, however, social value failed to emerge as a meaningful attitudinal predictor. A plausible explanation lies in the current stage of EM market development: given their still-limited penetration and relatively low public visibility, EM vehicles may not yet command the symbolic or status-related associations needed to meaningfully shape consumer evaluations (Jain et al., 2022; Shalender & Sharma, 2021). Without established social norms or widespread ownership patterns, consumers appear to rely more heavily on intrinsic evaluations such as cost-effectiveness and performance rather than social approval or status-seeking motives. These findings suggest that during the early stages of an innovative technology's diffusion, social influence may not play a pivotal role in attitude formation. By documenting the non-significant role of social value within the integrated PERVAL–attitude–intention framework, this study adds a nuanced, context-sensitive perspective to EM adoption research and highlights the developmental conditionality of social influence in sustainable mobility decisions.

B. Practical Implications

This study yields several important managerial insights for practitioners seeking to accelerate EM vehicle adoption. Given the significant role of emotional value in shaping attitudes, marketing strategies should foreground the enjoyment, excitement, and novelty of the EM driving experience. Drawing attention to fast acceleration and whisper-quiet operation can reinforce favourable attitudes by directly highlighting the product's experiential and performance strengths. Additionally, because perceived value for money is a significant attitudinal predictor, industry experts

should communicate long-term economic/monetary benefits, evidently highlighting reduced fuel cost and wear and tear expenditure (He et al., 2023; Yeğin & Ikram, 2022). Experiential inventiveness such as test-drive events and interactive showrooms can further strengthen emotional engagement and allow potential buyers to personally assess vital functional characteristics. Effective commercialization approaches should therefore connect emotional appeal, monetary value communication, low-noise engine and acceleration performance-centred messaging instead of solely depending on environmental credentials.

Experiential initiatives like test drives are recognized as important variables that enable consumers to positively assess the attributes, particularly acceleration performance and low engine noise. Since both characteristics were found to significantly shape attitudes in this study, facilitating firsthand evaluation can reinforce positive judgements and reduce the uncertainty that typically accompanies innovative products. While conventional in-person test drives remain highly effective, a growing number of manufacturers are complementing these with digital and immersive technologies. Virtual reality (VR) platforms, for instance, allow prospective buyers to explore vehicle configurations and customize models according to their preferences, deepening emotional engagement alongside functional understanding (Sahoo & Vijayvargy, 2021; Nanjundaswamy et al., 2023). Given the strong influence of performance attributes identified in this research, promotional communications should explicitly foreground these advantages and, where appropriate, contrast them with conventional ICE vehicles to illustrate the superior ride quality and responsiveness of EM models. While some jurisdictions legally require artificial sound systems for pedestrian safety, the quiet and refined character of EM driving should remain a central promotional element. Combining experiential marketing with clear and evidence-based performance communication can substantially enhance consumer attitudes and broaden EM vehicle uptake. In the EM manufacturing industry, perceived value for money can be enhanced by streamlining the production process and through



improved supply chain efficiency (Althaqafi, 2023; Rohit & Verma, 2025). Acknowledging the study result of perceived price value having a significant impact on consumer attitudes, it is imperative to note that increasing affordability by reducing the overall cost will surely strengthen and enhance positive evaluation and will consequently build purchase intention. Lower production cost and economies of scale can be achieved through industry collaborations in the field of technological developments in battery manufacturing and other shared technological standards (Bhattacharyya & Thakre, 2021; Chawla et al., 2023). The benefit of this cost efficiency can be transferred to consumers through competitive pricing, lower maintenance and service charges, and better overall cost of ownership to the buyer. Additionally, collaborations can be done with policymakers for enhanced financial incentives, securing investments for charging infrastructure; further, this financial support can strengthen the perceived value for money and economic attractiveness towards EM vehicles (Upadhyay & Kamble, 2023; Asadi et al., 2021). The value proposition or the perceived value of money of EM vehicles can be strengthened by combining technological innovations with cost optimization and proactive policy engagement, and thus providing acceleration to the EM market.

C. Future Scope & Limitations

Though the present study offers valuable contribution in the field of literature pertaining to EM vehicle adoption, the study acknowledges some limitations. Present research was geographically restricted to a single national context, and significant differences across countries with respect to market saturation and maturity, perception level and societal norms do not support the generalizability of the findings. The model developed in the present study can be replicated and extended by future research across various geographical locations with varied social and cultural settings. This will also facilitate cross-country comparison while simultaneously enhancing external validity (Wen et al., 2024; Hasan et al., 2024). The quota sampling method was used to collect data using an online survey, which ensured demographic

representation, but the data may suffer from selective bias. Hence, a probability sampling method can be employed to enhance the robustness of the study. Another noted limitation of the study is that the sample mainly comprises potential users of the EM vehicles, who do not have direct driving experience. However, results of previous studies show that test drives have a significant role in reshaping the perception and attitudes of the users. Thus, future studies could incorporate a longitudinal research study design or a pre and post-experiment-based design to analyze the shift in attitude before and after direct experience of EM vehicle usage.

Future research studies can identify more antecedents of the variable of perceived value, such as consumer motivation, engagement, and customer knowledge. Studies can also focus on exploration of potential moderating variables including demographics, driving expertise, and exposure to different media sources. Exploration of these factors and investigation of their relationships would provide a holistic view and enhanced understanding of the underlying mechanism of EM vehicle adoption (Chotisarn & Phuthong, 2025). Furthermore, the PERVAL-centered framework utilized in the present study may be further extended to perform consumer adoption process. Upcoming research studies could apply the model established in the present study for efficient strategic decision-making in the EM sector by utilizing the insights regarding perceived value and performance perception among customers.

VI. CONCLUSION

Present research examined the variables influencing customer intent to purchase EM vehicles. The study integrates the underpinning concepts from the theory of reasoned action and perceived value. An integrated behavioural framework was developed to assess the impact of the four PERVAL dimensions, i.e. quality value, emotional value, price value, and social value, on consumer attitudes, while also incorporating two key technological performance attributes of EM vehicles: acceleration and low engine noise. The findings indicate that emotional value and perceived

price value significantly and positively influence consumer attitudes. In addition, acceleration performance and low engine noise levels were found to have a statistically significant positive effect on attitude formation. Consistent with the theory of reasoned action, consumer attitudes were shown to exert a strong positive influence on purchase intention. However, the hypothesised positive effects of perceived quality and social value on consumer attitudes were not supported. Overall, the study confirms the determinant roles of selected perceived value dimensions and specific technical performance characteristics in shaping consumer attitudes, which in turn drive intention to adopt EM vehicles.

The findings suggest that both governments and manufacturers should calibrate their strategies closely to the determinants identified in the empirical model. Marketing and policy initiatives must focus on the wealth of experience related to EM vehicles and long-term economic and social impact. Integrated marketing communication should focus on persuasion and expression of happiness, modernization and exclusivity associated with the experience of driving EM while simultaneously assuring the cost-effectiveness related to energy consumption and maintenance services. Additionally, the promotional campaigns must highlight prominent features like acceleration competence and the engine's proficiency to operate with low noise. These features have a significant impact on consumer attitude towards EVs and are expected to foster favorable consumer assessments that consequently strengthen and enhance the adoption rate of EM vehicles.

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