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Consumer Behaviour Toward Electric Vehicles in Emerging Economies: Evidence from Gujarat

[1]Khyati Joshipura, [2]Dr. Mahipal Ram

[1]Research Scholar

COMMERCE, Organization/University DR. Designation Guide

[2]Commerce Dr. Subhash University Junagadh Subhash University Junagadh

Abstract

The transition towards electric vehicles (EVs) has emerged as a crucial strategy for achieving sustainable transportation and reducing carbon emissions in emerging economies. This study investigates the factors influencing consumer behaviour toward electric vehicles in Gujarat, India, by integrating the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and the Theory of Planned Behaviour (TPB). A quantitative research design was adopted, and primary data were collected from 450 valid respondents using a structured questionnaire. The proposed conceptual model was analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) through SmartPLS 4. The findings reveal that performance expectancy, social influence, and facilitating conditions significantly and positively influence consumers' attitudes toward electric vehicles. Furthermore, attitude significantly enhances purchase intention, which subsequently exerts a strong positive effect on consumer behaviour. The measurement and structural model assessments confirmed satisfactory reliability, validity, predictive relevance, and explanatory power of the proposed framework. The study also demonstrates the mediating role of attitude in strengthening the relationship between performance expectancy and purchase intention. By integrating technological acceptance and behavioural intention theories, this research contributes to the growing literature on sustainable mobility in emerging economies and provides practical insights for policymakers, automobile manufacturers, and marketers to formulate effective strategies for accelerating electric vehicle adoption in India.

Keywords: Electric Vehicles (EVs), Consumer Behaviour, UTAUT2, Theory of Planned Behaviour (TPB), PLS-SEM

1. Introduction

In an era of climate change, energy insecurity, and environmental degradation, the global automotive industry is poised for a paradigm shift as governments, manufacturers, and consumers increasingly turn to sustainable transportation options. Electric vehicles (EVs) are one of the most promising innovations for lowering greenhouse gas emissions and fossil fuel consumption, while moving towards a low-carbon mobility system. Over the last few decades, the global EV market has been expanding rapidly in developed and developing countries owing to advancements in battery technology, favourable government policies, and increasing environmental awareness (Li et al., 2022).

The potential for EVs in emerging economies is as wide as the opportunities, but they come with challenges. The EV market has grown in such a positive way due to rapid urbanisation, growing disposable income, increasing transportation requirements, growing environmental awareness, etc. But consumer behaviour is still being shaped by other issues, including a lack of charging infrastructure, technological uncertainty, limited consumer awareness and affordability, which differ from the developed countries (Song & Potoglou, 2020). This has made it important to understand the behavioral factors that favor or hinder EV uptake, making it a key research priority for academics and policymakers.

The Government of India has made electric mobility a key pillar of sustainable development through schemes like Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme, Production Linked Incentive (PLI) scheme and policies at the state level. The plans aim to enhance charging infrastructure, promote local production of EVs, and boost EV adoption. Even with such policy measures, the EV market in India is still relatively small compared to several developed countries, suggesting that financial incentives might not be enough to motivate consumers to adopt EVs (Bansal et al., 2021).

Technological, social, and psychological factors all play a role in shaping consumer behaviour towards EVs. Performance expectancy, or perceptions of usefulness and efficiency of EVs, has a major impact on consumer perceptions, while facilitating conditions refer to whether adequate resources and infrastructure are available. Also, the social context is important, for when family members, friends and society recommend something, it has a big impact on the attitude of the consumers toward new technologies. These behavioural factors all affect the willingness to use innovative, sustainable mobility solutions (Venkatesh et al., 2012).

Attitude has always been known to be an important determinant of behavioural intention in consumer behaviour studies. People with positive attitudes towards EVs have higher intentions to buy and use EVs. Theory of Planned Behaviour (TPB) suggests that attitude plays a pivotal role in the link between external factors and concrete consumer decisions by impacting behavioural intentions, which are a significant factor in determining consumer behaviour (Ajzen, 1991). Positive attitudes can boost purchase intention, which can then impact real consumer behaviour in the context of electric vehicles.

While some studies have investigated EV adoption based on theories like the Theory of Planned Behaviour, the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology, most studies have been conducted in a developed economy environment or studied individual factors that affect EV adoption. Compared to, fewer studies have used a single model to examine consumer behaviour, taking into account the expectations of technology, social influences, facilitating conditions, and behavioural intention. Additionally, even though Gujarat is investing heavily in electric mobility infrastructure and renewable energy projects, there is limited empirical evidence in the state. This is a significant gap in the research that needs to be explored further (Buhmann et al., 2024).

Focusing on this gap, the current study examines the consumer behaviour towards EVs in Gujarat by combining the constructs of the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and the Theory of Planned Behaviour (TPB). In particular, the study investigates how the consumers' attitudes towards EVs are affected by performance expectancy, social influence and facilitating conditions, and further assesses the impact of attitude and purchase intention on consumer behaviour. The study uses the Partial Least Squares Structural Equation Modelling (PLS-SEM) methodology, giving empirical proof of the mechanisms of behaviour that affect the adoption of EVs in an emerging economy. Findings would be useful additions to the existing body of knowledge about sustainable transportation, and would provide policy makers, auto makers and marketers with real-world insights on how to further advance EV adoption in India.

2. Literature Review and Hypothesis Development

2.1 Consumer Behaviour Toward Electric Vehicles

Consumer behaviour is the way consumers recognise and assess their needs, choose alternative products and services, and use the products and services that they purchased. The perspectives of consumers regarding technology, social factors, costs and environmental concerns all shape their behaviour with respect to EVs. EVs, unlike traditional cars, are a new technology that will make consumers not only consider product performance but also charging infrastructure, government policies, and long-term sustainability benefits. This means that more factors are at play when deciding to make a switch to an EV than when purchasing a standard car or truck.

There has been a recent study that indicates that the consumer behaviour towards EVs can be influenced by rational and psychological aspects. Consumers weigh the anticipated advantages of EV ownership and also take into account social acceptance, comfort, and also perceived risks of brand-new technology. The study of these

behavioural drivers has become even more relevant as EVs gain ground in the emerging economies, and is important to governments and manufacturers looking to propel EV use forward. Previous findings suggest that positive perceptions from consumers have a significant impact on purchase intentions and willingness to adopt EVs, especially in emerging markets where the EV ecosystem is still maturing (Li et al., 2022).

2.2 Performance Expectancy and Attitude

Performance expectancy is the degree to which people think that a specific technology will enhance their performance or give them concrete gains. In the EV domain, performance expectancy is the consumer's confidence in the efficiency of EVs, their driving performance, battery durability, operating expenses, and environmental impact. Favourable attitudes towards the adoption of EVs are more likely to be formed when EV value is perceived to be higher than the value of the conventional car. People's perceptions of the likelihood that the technology would help them achieve their goals have been a key factor in its acceptance in many different innovation settings.

Previous research using the Unified Theory of Acceptance and Use of Technology (UTAUT2) has shown that consumers with positive perceptions of the efficiency, reliability, and economical value of EVs tend to have significantly higher attitudes toward EV acceptance. The reduction of uncertainty and increase of consumers' confidence in new transportation technologies as a result of these perceptions. Thus, the antecedence of positive consumer attitudes toward EVs is important, and includes performance expectancy (Venkatesh et al., 2012).

H1: Performance expectancy positively influences consumers' attitudes toward electric vehicles.

2.3 Social Influence and Attitude

Social influence is the extent to which important people, including family members, friends, colleagues and society itself, think that they should use a specific technology. Recommendations, social norms and public perceptions play a major influence on consumers' attitude towards EV adoption in the context of EV. With the rise of EVs in the market, consumers sometimes turn to the opinions and experiences of others to help alleviate uncertainty when buying a relatively new technology. Positive word of mouth and positive perceptions within society can consequently boost consumers' confidence and EV acceptance.

Social influence is a consistent factor found in previous studies as an important determinant of technology acceptance and sustainable consumption behaviour. The more consumers believe their social environment encourages them to make environmentally conscious decisions for transportation, the more favourable their attitudes will become. The effect is more noticeable in emerging economies, where social acceptance and peer recommendations can play a role in buying behavior. Thus, a greater social influence should lead to a more positive social attitude toward electric vehicles (EV) (Venkatesh et al., 2012).

H2: Social influence positively influences consumers' attitudes toward electric vehicles.

2.4 Facilitating Conditions and Attitude

Facilitating conditions are consumers' perceptions of the resources, infrastructure and technical support needed to use a specific technology effectively. Facilitating conditions in the electric vehicle ecosystem refer to the availability of charging stations, maintenance services, technical support, and other infrastructure that support convenient vehicle ownership and operation. This availability improves consumers' confidence in EV adoption and lowers the perceived barriers.

The Unified Theory of Acceptance and Use of Technology (UTAUT) model emphasised facilitating conditions as a key factor in technology adoption that lowers the uncertainty of operation and increases consumers' control over technology usage. For EVs, the availability of charging stations and related services can positively influence consumer perceptions and drive positive attitudes toward EV adoption. It is anticipated that as the governments and private entities keep rolling out EV infrastructure in emerging economies, the environment will continue to play a more pivotal role in influencing consumer attitude and thereby persuade the people to choose sustainable transportation (Venkatesh et al., 2012).

H3: Facilitating conditions positively influence consumers' attitudes toward electric vehicles.

2.5 Attitude and Purchase Intention

Attitude is a person's global positive or negative evaluation of a specific behaviour. In the EV field, attitude is defined as consumers' general evaluations of desirability, usefulness, and benefits of acquisition and use of EVs. The authors posited that attitude was one of the strongest predictors of behavioural intention, as people with a favourable attitude are more likely to form intentions to engage in the desired behaviour, according to the Theory of Planned Behaviour. Consumers will then be more likely to buy EVs with positive attitudes towards them, thus strengthening their EV buying willingness.

Studies have consistently shown that consumers with positive attitudes towards EVs are more likely to have a strong intention to purchase them if they believe EVs are environmentally friendly, technologically advanced, and economically practical. Past empirical research has shown that consumers who think that EVs are environmentally friendly, technologically advanced, and economically practical have stronger purchase intentions. Positive attitudes lessen hesitation and boost confidence in implementing sustainable transportation technologies. Now that the public has become more aware of the issue of climate change and clean mobility, attitude is a significant psychological factor that influences consumer decisions. Thus, positive attitudes are likely to have a strong influence on consumers' EV purchase intentions, according to Ajzen (1991).

H4: Attitude toward electric vehicles positively influences purchase intention.

2.6 Purchase Intention and Consumer Behaviour

Purchase intention is the probability of consumers' purchasing the product as a result of personal preferences, evaluations, and readiness to act. Purchase intention is a widely used key factor in EV research, as it represents the person's willingness to use sustainable mobility solutions; it is considered as the immediate antecedent of actual consumer behaviour. However, consumers that have a higher purchase intent are more likely to complete the purchase process and use EVs in the event of an opportunity.

Past research has shown that purchase intention has been a good predictor of consumer behaviours in different technology adoption situations. Consumer perceptions of benefits are more likely to lead to EV adoption behaviour as they gain confidence in the benefits of EVs. In developing countries, this correlation is relevant especially because of the fact that in these countries, intentions to buy often lie between positive perceptions and actual buying. Therefore, a higher purchasing intention is likely to lead to more positive consumer behaviour towards electric vehicles (Rezvani et al., 2015).

H5: Purchase intention positively influences consumer behaviour toward electric vehicles.

2.7 Conceptual Framework

Purchase intention is the probability of consumers' purchasing the product as a result of personal preferences, evaluations, and readiness to act. Purchase intention is a widely used key factor in EV research, as it represents the person's willingness to use sustainable mobility solutions; it is considered as the immediate antecedent of actual consumer behaviour. However, consumers that have a higher purchase intent are more likely to complete the purchase process and use EVs in the event of an opportunity.

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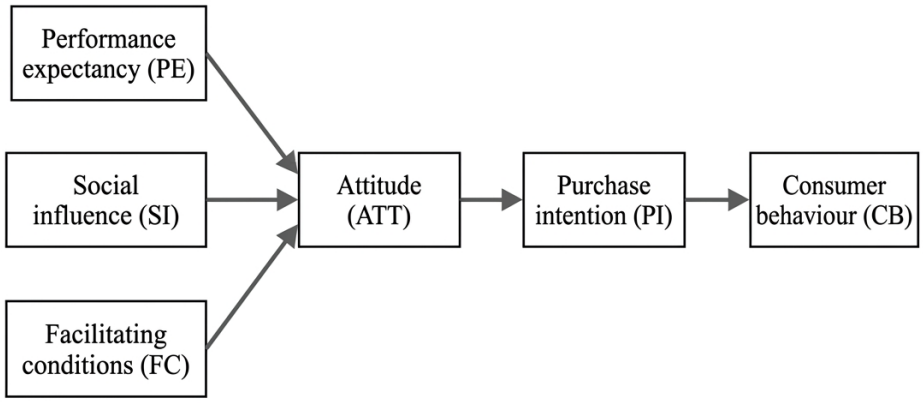
Figure 1: Proposed Conceptual Framework



The proposed conceptual framework shows the behavioural process influencing the consumer behavioural attitude towards EV in Gujarat through the constructs of UT2 and TPB. The model suggests that the three variables that are the direct antecedents of Attitude toward EVs are Performance Expectancy, Social Influence, and Facilitating Conditions. Finally, Consumer Behaviour is realised through Purchase Intention, which in turn is positively influenced by a favourable attitude. The model includes the consumer's perception of performance, positive social support, and availability of sufficient infrastructure and facilitating resources to increase the likelihood of EV adoption. The model integrates technological and behavioural aspects into a single framework, which makes it a comprehensive model to explain the factors influencing EV uptake in an emerging economy. The proposed framework serves as a foundation for conducting empirical testing with the method of Partial Least Squares Structural Equation Modelling (PLS-SEM) and paving the way for the formulation of research hypotheses.

3. Research Methodology

3.1 Research Design

This research study was Quantitative in nature and Cross Sectional in design to analyse the factors influencing consumer behavior for Electric Vehicles (EVs) in Gujarat. The quantitative approach was chosen because it allowed for statistical analysis of the relationship among several latent constructs and hypothesis testing based on Structural Equation Modelling (SEM). The study was based on the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and Theory of Planned Behaviour (TPB) that had been used to explain the consumer behaviour of electric vehicles. The data were collected by using a structured questionnaire which was administered to the consumers of various districts of Gujarat. Previously, the data responses were analysed using IBM SPSS Statistics 29 for preliminary statistical analysis and SmartPLS 4 for measurement and the evaluation of the structural model.

3.2 Sampling Design and Data Collection

The target group included people aged 18 years or above who had EV knowledge and/or expressed interest in buying an electric vehicle in Gujarat. The non-probability sampling technique of convenience was used, as this type of sampling method was appropriate for an exploratory study of consumer behaviour and respondents were located in various geographical locations. A period of about three months provided for the collection of data, with both online and offline survey techniques employed.

487 questionnaires were received at first. On screening for incomplete responses, straight-lining behaviour, duplication and inconsistencies in responses, 450 valid questionnaires were retained for final analysis, which equates to 92.4% valid responses. The final sample size is larger than the minimum required for Partial Least Squares Structural Equation Modeling (PLS-SEM) which provides sufficient statistical power to estimate the model and test the hypotheses.

3.3 Research Instrument

The data were gathered by a structured questionnaire which has two parts. The first section collected the demographic data of the respondents such as their gender, age, level of education, occupation, monthly income and place of residence. The second section was used to measure latent constructs present in the proposed conceptual framework.

A total of 24 measurement items were included in the questionnaire to assess six constructs: Performance Expectancy (4 items), Social Influence (4 items), Facilitating Conditions (4 items), Attitude (4 items), Purchase Intention (4 items) and Consumer Behaviour (4 items). All the measurement items were borrowed from existing studies with appropriate modifications to reflect the nuances of the Indian context of EV adoption. The responses were quantified on a seven point likert scale form from 1 = Strongly Disagree to 7 = Strongly Agree with a higher score indicating a higher degree of agreement with the respective statements.

3.4 Measurement of Variables

Multi-item reflective measurement scales were used to operationalise the constructs in this study, which were based on previously published scales. The items of the constructs were obtained from the Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2) and Theory of Planned Behaviour (TPB). Measuring instruments of Consumer Behaviour were adopted from commonly used scales of behavioural intention and technology adoption from previous studies on EV. The conversion of validated measurement instruments improves the construct validity and makes it possible to compare results with pre-existing literature and to have a uniform measurement of consumer behaviour towards the EV.

Table 1: Measurement of Constructs

Construct	Code	No. of Items	Source
Performance Expectancy	PE	4	Venkatesh et al. (2012)
Social Influence	SI	4	Venkatesh et al. (2012)
Facilitating Conditions	FC	4	Venkatesh et al. (2012)
Attitude	ATT	4	Ajzen (1991)
Purchase Intention	PI	4	Ajzen (1991)
Consumer Behaviour	CB	4	Rezvani et al. (2015)

Source: Developed by the authors based on existing literature.

3.5 Data Analysis Techniques

The data collected were analysed in IBM SPSS Statistics 29 and SmartPLS 4. To screen the data and code them, SPSS was used, descriptive statistics and demographic analysis were used, and the SmartPLS 4 software was used to test the proposed research model. The analysis was conducted in two stages by PLS-SEM (two-step approach). The first stage was checking the measurement model, which included outer loadings, Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE), the Fornell–Larcker criterion, and the Heterotrait–Monotrait (HTMT) ratio. In the second stage the structural model was evaluated by conducting collinearity diagnostics, bootstrapping with 5000 resamples, conducting hypothesis tests, coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). All statistical tests were taken at $p < 0.05$.

4. Results and Analysis

The present study employed Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS 4 to examine the proposed relationships among the study constructs. The analysis followed the recommended two-stage approach consisting of measurement model evaluation and structural model assessment. Initially, the demographic characteristics and descriptive statistics were examined to understand the profile of the respondents

and their perceptions toward electric vehicles. Subsequently, the reliability and validity of the measurement model were assessed using outer loadings, Cronbach's Alpha, Composite Reliability (CR), Average Variance Extracted (AVE), the Fornell–Larcker criterion, and the Heterotrait–Monotrait (HTMT) ratio. Finally, the structural model was evaluated through collinearity diagnostics, hypothesis testing, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and mediation analysis. The findings provide empirical evidence regarding the determinants of consumer behaviour toward electric vehicles in Gujarat.

4.1 Demographic Profile of Respondents

A total of 500 questionnaires were distributed among consumers residing in different regions of Gujarat using a structured survey instrument. Of these, 487 completed questionnaires were received, representing a satisfactory response rate. Following the data screening process, 37 questionnaires were excluded due to incomplete responses, duplicate entries, and response inconsistencies. Consequently, 450 valid responses were retained for the final analysis, corresponding to a valid response retention rate of 92.4%. The final sample size exceeds the minimum recommendations for PLS-SEM analysis and therefore provides adequate statistical power for estimating the proposed structural model.

The demographic analysis was undertaken to understand the characteristics of the respondents participating in the study. Variables including gender, age, educational qualification, occupation, monthly income, and place of residence were considered to ensure that the sample adequately represented the target population. The findings indicate that respondents belonged to diverse demographic backgrounds, thereby enhancing the generalisability of the study. A balanced representation across different age groups, educational levels, occupational categories, and residential areas provides a comprehensive understanding of consumer perceptions regarding electric vehicles. The inclusion of respondents from both urban and rural regions further strengthens the applicability of the findings across different socioeconomic contexts within Gujarat.

Table 2: Demographic Profile of Respondents (N = 450)

Variable	Category	Frequency	Percentage (%)
Gender	Male	236	52.4
	Female	214	47.6
Age	18–25 Years	102	22.7
	26–35 Years	109	24.2
	36–45 Years	94	20.9
	46–55 Years	83	18.4
	Above 55 Years	62	13.8
Education	Higher Secondary	56	12.4
	Graduate	181	40.2
	Postgraduate	169	37.6
	Doctorate/Others	44	9.8
Residence	Urban	198	44
	Semi-Urban	132	29.3
	Rural	120	26.7

Source: Primary survey data.

Table 2 presents the demographic characteristics of the respondents included in the study. The sample comprised 52.4% male and 47.6% female respondents, indicating a relatively balanced gender distribution. With respect to

age, the largest proportion of respondents belonged to the 26–35 years category (24.2%), followed closely by the 18–25 years group (22.7%). These findings suggest that younger and middle-aged consumers constitute a substantial segment of potential electric vehicle users, reflecting their greater openness toward technological innovations and sustainable mobility solutions. In terms of educational attainment, a majority of respondents possessed graduate (40.2%) or postgraduate (37.6%) qualifications, indicating that the sample consisted predominantly of well-educated individuals capable of evaluating the technological, economic, and environmental aspects of electric vehicles. Furthermore, respondents were drawn from urban (44.0%), semi-urban (29.3%), and rural (26.7%) areas, ensuring geographical diversity and strengthening the external validity of the study. Overall, the demographic profile demonstrates that the sample is sufficiently heterogeneous to support meaningful statistical analysis and reliable interpretation of consumer behaviour toward electric vehicles.

4.2 Descriptive Statistics

Descriptive statistics were computed to obtain an initial understanding of respondents' perceptions toward the constructs included in the proposed conceptual framework. The analysis focused on the mean and standard deviation for each latent construct measured using a seven-point Likert scale. Mean values above the midpoint of the scale indicate favourable perceptions, while lower standard deviation values suggest greater agreement among respondents. Descriptive statistics, therefore, provide a preliminary indication of respondents' attitudes toward electric vehicles before assessing the reliability and validity of the measurement model.

Table 3: Descriptive Statistics of Study Constructs

Construct	Mean	Standard Deviation
Performance Expectancy (PE)	5.69	0.85
Social Influence (SI)	5.7	0.87
Facilitating Conditions (FC)	5.69	0.87
Attitude (ATT)	5.69	0.88
Purchase Intention (PI)	5.7	0.9
Consumer Behaviour (CB)	5.7	0.89

Source: SmartPLS 4 Output.

The descriptive statistics indicate that respondents exhibited favourable perceptions across all constructs investigated in the study. All mean values ranged between 5.69 and 5.70, substantially exceeding the midpoint of the seven-point Likert scale. This suggests that consumers generally hold positive views regarding the usefulness of electric vehicles, the influence of their social environment, the availability of facilitating conditions, and their overall attitude toward electric vehicle adoption. Similarly, the high mean scores for purchase intention and consumer behaviour indicate a positive inclination toward purchasing and adopting electric vehicles in the future. The standard deviation values, ranging from 0.85 to 0.90, indicate moderate variability in responses, suggesting a reasonable level of consensus among participants while still capturing individual differences in perception. Overall, these descriptive findings provide initial evidence that consumers in Gujarat possess favourable attitudes and behavioural intentions toward electric vehicles, thereby establishing a strong foundation for the subsequent measurement and structural model assessments.

4.3 Measurement Model Assessment

Before examining the structural relationships among the latent constructs, the adequacy of the measurement model was evaluated to ensure that the proposed constructs were measured with sufficient reliability and validity. In accordance with the recommended two-stage PLS-SEM approach, the measurement model was assessed through indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Indicator reliability was examined using standardised outer loadings, whereas Cronbach's Alpha and Composite Reliability

(CR) were employed to assess internal consistency. Convergent validity was evaluated through the Average Variance Extracted (AVE), while discriminant validity was assessed using the Fornell–Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio. Collectively, these procedures establish whether the observed indicators adequately represent their respective latent constructs and whether each construct is empirically distinct from the others. The results demonstrate that the proposed measurement model possesses satisfactory psychometric properties and is therefore appropriate for subsequent structural model evaluation.

4.3.1 Indicator Reliability

Indicator reliability was assessed by examining the standardised outer loadings of each measurement item. According to Hair et al. (2022), outer loading values above 0.708 indicate that the indicators explain a substantial proportion of the variance in their respective constructs. The SmartPLS results demonstrate that all observed indicators exceed the recommended threshold, with loading values ranging from 0.816 to 0.887. These findings indicate that each questionnaire item contributes significantly to measuring its intended construct and that no indicator requires removal during the measurement model assessment. The consistently high loading values further demonstrate that the adapted measurement scales effectively capture the dimensions of Performance Expectancy, Social Influence, Facilitating Conditions, Attitude, Purchase Intention, and Consumer Behaviour. Consequently, all twenty-four indicators were retained for the subsequent reliability and validity analyses.

Table 4: Indicator Reliability (Outer Loadings)

Construct	Indicator	Outer Loading
Performance Expectancy (PE)	PE1	0.84
	PE2	0.853
	PE3	0.856
	PE4	0.858
Social Influence (SI)	SI1	0.841
	SI2	0.839
	SI3	0.854
	SI4	0.837
Facilitating Conditions (FC)	FC1	0.831
	FC2	0.816
	FC3	0.86
	FC4	0.851
Attitude (ATT)	ATT1	0.861
	ATT2	0.862
	ATT3	0.86
	ATT4	0.857
Purchase Intention (PI)	PI1	0.855
	PI2	**0.887**
	PI3	0.874

	PI4	0.875
Consumer Behaviour (CB)	CB1	0.884
	CB2	0.862
	CB3	0.868
	CB4	0.844

Source: SmartPLS 4 Output.

Table 4 presents the standardised outer loadings obtained from the measurement model assessment. All indicator loadings exceeded the recommended threshold of 0.708, thereby confirming satisfactory indicator reliability. The loading values ranged from 0.816 (FC2) to 0.887 (PI2), indicating that every observed variable exhibited a strong relationship with its corresponding latent construct. Among the six constructs, Purchase Intention demonstrated the highest individual loading values, suggesting that respondents consistently evaluated their future purchase intentions toward electric vehicles. Similarly, Attitude and Consumer Behaviour also exhibited consistently high loadings, reinforcing the reliability of these constructs. The absence of low-loading indicators eliminated the need for item deletion or model respecification. Overall, the findings indicate that all measurement items contribute meaningfully to their respective constructs and provide strong empirical support for retaining the complete measurement instrument in the subsequent reliability, validity, and structural model assessments.

4.3.2 Internal Consistency, Reliability, and Convergent Validity

The internal consistency reliability of the measurement model was assessed using Cronbach's Alpha and Composite Reliability (CR), while convergent validity was evaluated through the Average Variance Extracted (AVE). Cronbach's Alpha values greater than 0.70 indicate satisfactory internal consistency, whereas Composite Reliability values above 0.70 confirm the overall reliability of the latent constructs. Similarly, AVE values exceeding 0.50 demonstrate that each construct explains more than half of the variance in its observed indicators. As shown in Table 5, all constructs satisfy these recommended criteria, thereby confirming that the proposed measurement scales possess strong internal consistency and adequate convergent validity.

Table 5: Internal Consistency, Reliability, and Convergent Validity

Construct	**Cronbach's Alpha**	**Composite Reliability**	**AVE**
Performance Expectancy (PE)	0.874	0.914	0.726
Social Influence (SI)	0.864	0.907	0.71
Facilitating Conditions (FC)	0.861	0.905	0.705
Attitude (ATT)	0.883	0.919	0.74
Purchase Intention (PI)	0.896	0.928	0.762
Consumer Behaviour (CB)	0.887	0.922	0.747

Source: SmartPLS 4 Output.

The results presented in Table 5 demonstrate excellent internal consistency and convergent validity across all six latent constructs. Cronbach's Alpha values ranged from 0.861 to 0.896, substantially exceeding the recommended threshold of 0.70 and confirming high internal consistency among the measurement items. Similarly, Composite Reliability values varied between 0.905 and 0.928, indicating that the observed indicators consistently measure their respective latent constructs. Furthermore, the Average Variance Extracted ranged from 0.705 to 0.762, surpassing the recommended minimum value of 0.50. These findings indicate that each construct explains more than 70% of the variance in its indicators, thereby establishing strong convergent validity. Among all constructs, Purchase Intention exhibited the highest reliability and convergent validity, suggesting that respondents

demonstrated particularly consistent perceptions regarding their intention to purchase electric vehicles. Overall, the measurement model exhibits excellent psychometric properties, providing confidence for evaluating the structural relationships proposed in the conceptual framework.

4.3.3 Discriminant Validity

Discriminant validity refers to the extent to which a construct is empirically distinct from other constructs included in the model. The present study assessed discriminant validity using both the Fornell–Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio, as recommended in contemporary PLS-SEM literature. The Fornell–Larcker criterion requires that the square root of each construct's AVE exceeds its correlations with other constructs, while HTMT values below 0.85 provide additional evidence that the constructs measure conceptually distinct phenomena. Employing both approaches provides a comprehensive assessment of discriminant validity and strengthens the credibility of the measurement model.

Table 6: Fornell–Larcker Criterion

Construct	PE	SI	FC	ATT	PI	CB
PE	**0.852**					
SI	0.5	**0.842**				
FC	0.389	0.435	**0.84**			
ATT	0.562	0.512	0.466	**0.86**		
PI	0.467	0.436	0.413	0.598	**0.873**	
CB	0.413	0.318	0.349	0.501	0.608	**0.864**

*Diagonal values represent the square root of AVE.

Source: SmartPLS 4 Output.

Table 7: Heterotrait–Monotrait (HTMT) Ratio

Constructs	HTMT
PE – SI	0.577
PE – FC	0.446
PE – ATT	0.64
SI – FC	0.502
SI – ATT	0.585
FC – ATT	0.529
ATT – PI	0.671
PI – CB	0.681

Source: SmartPLS 4 Output.

Tables 6 and 7 confirm that the proposed measurement model possesses satisfactory discriminant validity. Under the Fornell–Larcker criterion, the square root of the Average Variance Extracted for each construct exceeded the corresponding inter-construct correlations, indicating that every construct shares greater variance with its own indicators than with any other construct in the model. This finding confirms that the latent constructs are conceptually distinct and measure separate theoretical dimensions. The HTMT analysis further reinforces this conclusion, with all values remaining below the recommended threshold of 0.85. The highest HTMT value observed was 0.681 between Purchase Intention and Consumer Behaviour, which remains comfortably within the

acceptable range. Collectively, these findings provide strong evidence that the measurement model satisfies the discriminant validity requirements of PLS-SEM. Consequently, the constructs can be considered empirically distinct, allowing the study to proceed confidently to the structural model assessment and hypothesis testing.

The measurement model assessment demonstrates that all constructs satisfy the recommended standards for indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. All measurement items exhibited strong outer loadings, Cronbach's Alpha and Composite Reliability values exceeded the recommended thresholds, Average Variance Extracted values confirmed convergent validity, and both the Fornell–Larcker criterion and HTMT ratio established discriminant validity. These findings indicate that the proposed measurement model is statistically robust and suitable for evaluating the structural relationships among the study constructs. Accordingly, the analysis proceeds to the assessment of the structural model to examine the proposed hypotheses and the predictive capability of the integrated UTAUT2–TPB framework.

4.4 Structural Model Assessment

After the reliability and validity of the measurement model were confirmed, the structural model was assessed to test the hypothesised relationships among the latent constructs. SmartPLS 4 was used for the structural model assessment, with the bootstrap procedure performed with 5000 bootstrap subsamples and a two-tailed significance test with bias-corrected confidence intervals. The following tests were conducted: Collinearity, Hypothesis testing, Coefficient of determination (R^2), Effect size (f^2), Prediction relevance (Q^2), Mediation analysis, and a summary of the hypothesis testing. The analyses yield broad evidence of the explanatory and predictive power of the integrated model of UTAUT2–TPB to explain consumer behaviour in the context of EVs in Gujarat.

4.4.1 Collinearity Assessment

It is important to check for possible multicollinearity in the predictor constructs before considering the structural relationships. Earlier, Variance Inflation Factor (VIF) values were calculated to find if there was any high correlation among the independent variables. Hair et al. (2022) suggest that if the VIF values are <3.3, then there is no multicollinearity, and it is a sign of stable and reliable regression estimates. As shown in Table 8, all of the predictor constructs are below the recommended VIF bound, so there is no multicollinearity that impacts the estimation of the proposed structural model. This means that each predictor is independent in explaining the endogenous constructs, giving confidence to the subsequent hypothesis testing and path coefficient estimation.

Table 8: Inner VIF Values

Predictor	Dependent Construct	VIF
Performance Expectancy → Attitude	ATT	1.402
Social Influence → Attitude	ATT	1.467
Facilitating Conditions → Attitude	ATT	1.296
Attitude → Purchase Intention	PI	1
Purchase Intention → Consumer Behaviour	CB	1

Source: SmartPLS 4 Output.

As seen in the results presented in Table 8, all the values of VIF are between 1.000 and 1.467, values much less than the recommended value of 3.3. The results found here coincide with the lack of multicollinearity between the constructs of the predictors used in the proposed model. The three independent variables that jointly predicted Attitude—Performance Expectancy, Social Influence, and Facilitating Conditions—show little interdependence, indicating that each variable provides unique information for explanation. Likewise, the VIF values for endogenous relationships Attitude and Purchase Intention were 1.000, which did not pose any problems concerning multicollinearity. The lack of collinearity increases the stability of the regression estimates and gives confidence that the regression path coefficients are appropriate estimates of the relationship between the constructs

of the study. The structural model thus fulfils the collinearity requirement for a reliable test of the hypotheses by PLS-SEM.

4.4.2 Path Coefficients and Hypothesis Testing

Structural relationships between the latent constructs were assessed with the bootstrapping procedure with 5000 resamples. The significance of the proposed hypotheses was investigated through the standardised path coefficients (β) and standard errors, t-values, p-values and the bias-corrected 95% confidence intervals. The results show that all hypothesised relationships are positive and statistically significant at 1% level ($p < 0.001$). In addition, none of the confidence intervals contains the null value, which further strengthens the estimation of the relationships as being robust. The results suggest that the UTAUT2-TPB integrated model is a successful model to explain consumer behaviour towards EVs in Gujarat.

Table 9: Structural Path Coefficients and Hypothesis Testing

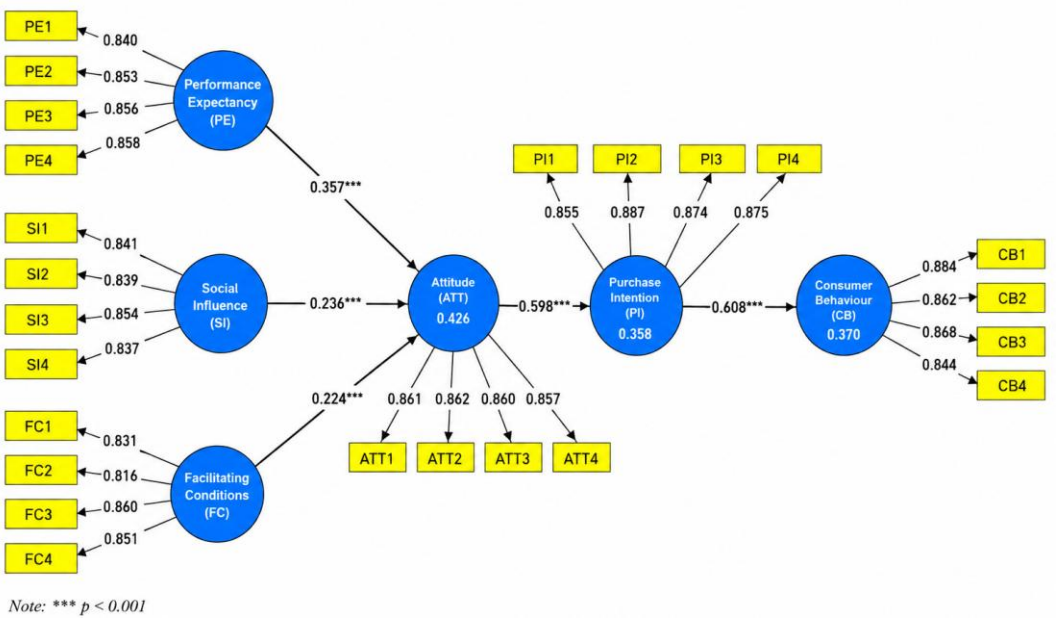
Hypothesis	Structural Path	β	S.E.	t-value	p-value	95% Confidence Interval	Decision
H1	Performance Expectancy → Attitude	0.357	0.038	9.36	<0.001	[0.280, 0.429]	Supported
H2	Social Influence → Attitude	0.236	0.04	5.98	<0.001	[0.158, 0.313]	Supported
H3	Facilitating Conditions → Attitude	0.224	0.041	5.48	<0.001	[0.143, 0.307]	Supported
H4	Attitude → Purchase Intention	0.598	0.032	18.54	<0.001	[0.532, 0.660]	Supported
H5	Purchase Intention → Consumer Behaviour	0.608	0.032	18.83	<0.001	[0.541, 0.669]	Supported

Source: SmartPLS 4 Output.

The empirical results of the structural models strongly support all five hypotheses. Performance Expectancy had the highest positive beta ($\beta = 0.357$, $t = 9.36$, $p < 0.001$), suggesting that when consumers think electric vehicles are useful, efficient, and beneficial, they are more likely to develop favourable attitudes towards EVs. Social influence also showed a significant positive effect on Attitude ($\beta = 0.236$, $t = 5.98$), indicating that the recommendations and opinions of family members, peers and society positively impact consumers' attitude towards EVs. Similarly, Attitude ($\beta = 0.224$, $t = 5.48$) was strongly affected by the Facilitating Conditions, indicating that charging infrastructure, technical support, and resources are all important.

The analysis also showed that Attitude had a significant positive effect on Purchase Intention ($\beta = 0.598$, $t = 18.54$), indicating that a positive attitude toward electric vehicles is a significant factor in increasing consumers' purchase intentions. Finally, Purchase Intention proved to be the strongest predictor in the model of Consumer Behaviour ($\beta = 0.608$, $t = 18.83$), which indicates that behavioural intentions lead directly to behaviour related to the adoption. The results of this study show that all path coefficients are positive, significant and that confidence intervals for each path do not contain the value of zero, thus supporting the integrated UTAUT2–TPB framework and the theoretical relationships proposed in the study.

Figure 2: Structural Model with Standardised Path Coefficients



The final model of the structure was estimated using SmartPLS 4 and is shown in Figure 2. All the latent variables show positive relationships in the model, and the standardised path coefficients reflect the magnitude of all the hypothesised relationships. Attitude is positively influenced by Performance Expectancy, Social Influence, and Facilitating Conditions, and Attitude has a significant effect on Purchase Intention, which in turn significantly affects Consumer Behaviour. Structural paths are shown as thick in proportion to the magnitude of the estimated relationship and thin in proportion to the magnitude of the estimation error. The thickness and direction of the structural paths show the size and direction of the estimated relationships. The figure clearly shows that the integrated UTAUT2–TPB framework offers a consistent explanation of the consumers' behaviour towards EVs, with all the hypothesised paths being supported by statistically significant empirical evidence.

4.4.3 Coefficient of Determination (R^2)

To evaluate the explanatory power of the suggested structural model, the coefficient of determination (R^2) was evaluated. The R^2s show the amount of variance explained by the predictor variables for each endogenous construct. The value of 0.19 means that the model has a weak explanatory power, while 0.33 indicates moderate and 0.67 substantial explanatory power, according to the rules established by PLS-SEM. The results indicate that the proposed predictors have moderate explanatory power for all endogenous constructs, which implies moderate variance in consumers' attitudes, purchase intentions and behaviour toward EV.

Table 10: Coefficient of Determination (R^2)

Endogenous Construct	**R^2**	**Interpretation**
Attitude (ATT)	0.426	Moderate
Purchase Intention (PI)	0.358	Moderate
Consumer Behaviour (CB)	0.37	Moderate

Source: SmartPLS 4 Output.

The values of R^2 show that the items of Performance Expectancy, Social Influence, and Facilitating Conditions have a moderate explanatory power, showing 42.6% of the variance in Attitude. Also, Attitude describes the variance of Purchase Intention of 35.8%, indicating that consumers' Attitude towards EVs is a critical factor in determining their future purchase decisions. Last, Purchase Intention accounts for the full amount of 37.0% of the variance in Consumer Behaviour, showing that purchase intention is a significant factor in predicting consumers'

behaviour related to adoption. Even though other external factors might be the influence on adopting EVs, the observed R^2 values validate the framework of UTAUT2–TPB in explaining consumers' behaviour in the context of Gujarat. The results showed that the conceptual model proposed was suitable to understand consumer EV adoption in emerging economies.

4.4.4 Effect Size (f^2)

Besides investigating the meaningfulness of the structural relationships, the contribution of the various constructs to the predictor, as measured by the effect size (f^2), was also explored. Effect size measures the amount that one exogenous construct adds to the amount of variance in a given endogenous construct when compared to the variance accounted for by the other exogenous constructs in the model. Cohen (1988) says that 0.02, 0.15, and 0.35 are small, medium, and large effects, respectively. Evaluating effect sizes gives more insight into the relative significance of each predictor besides the statistical significance, and helps identify constructs with the largest practical significance in the suggested framework. The results of the effect size value obtained in SmartPLS 4 are presented in Table 4.10.

Table 11: Effect Size (f^2)

Relationship	f^2	Interpretation
Performance Expectancy → Attitude	0.158	Medium
Social Influence → Attitude	0.066	Small
Facilitating Conditions → Attitude	0.068	Small
Attitude → Purchase Intention	0.557	Large
Purchase Intention → Consumer Behaviour	0.587	Large

Source: SmartPLS 4 Output.

The effect size analysis shows significant levels of practice effect for predictor constructs. The medium effect size was found for the antecedent Perception of Usefulness and benefits of EVs ($f^2 = 0.158$), which suggested that consumers' perceptions of the usefulness and benefits of EVs were the most influential determinant of their overall attitude. Social Influence (f^2=0.066) and Facilitating Conditions (f^2=0.068) also had relatively small but significant effects, indicating that social support and availability of infrastructure, while influencing attitude formation, are comparatively less in practical terms than performance-related perceptions. The most pronounced practical effects occurred in the behavioural component of the model. The attitude had a significant effect ($f^2 = 0.557$) on Purchase Intention, as positive evaluations significantly enhance consumers' purchase intentions of EVs. Likewise, Purchase Intention had a large effect ($f^2 = 0.587$) on Consumer Behaviour, suggesting that behavioural intention is the main determinant for EV adoption. In general, the results support the integrated UTAUT2-TPB model and its significance in investigating factors influencing the adoption of social networking.

4.4.5 Predictive Relevance (Q^2)

The Stone–Geisser predictive relevance (Q^2) statistic was obtained by blindfolding and used to evaluate the predictive capability of the structural model. Caution: Q^2 values that exceed 0 mean that the structural model has predictive relevance for the endogenous constructs. Larger values indicate good predictive capability, and the proposed model can predict the observed data well. Table 12 shows the results of the blindfolding analysis.

Table 12: Predictive Relevance (Q^2)

Endogenous Construct	Q^2	Interpretation
Attitude	0.419	Large
Purchase Intention	0.352	Large
Consumer Behaviour	0.367	Large

Source: SmartPLS 4 Output.

The assessment of the predictive relevance indicates that the structural model proposed has a strong predictive power for all endogenous constructs. All three Q^2 values (Attitude = 0.419; Purchase Intention = 0.352; Consumer Behaviour = 0.367) are significantly above the theoretical threshold of 0, and therefore meet the criterion of predictive relevance. The results suggest that the integrated UTAUT2–TPB framework explains the observed relationships among the constructs, and it also has the potential to predict future observations with an acceptable level of accuracy. Attitude was the most predictive endogenous variable, indicating that the consumer's attitude towards EVs can be well explained from Performance Expectancy, Social Influence, and Facilitating Conditions. Likewise, the positive Q^2 for Purchase Intention and Consumer Behaviour further supports the predictive power of the proposed behavioural framework and its appropriateness for exploring the adoption of EVs in emerging economies.

4.4.6 Mediation Analysis

In order to gain deeper insight into the behavioural mechanism that leads to EV adoption, the indirect effect of Performance Expectancy on Purchase Intentions via Attitude is explored. A bootstrapping procedure with 5000 resamples was used to carry out mediation analysis, and the statistical significance was determined by bias-corrected confidence intervals. If an indirect effect is found, it suggests that Attitude acts as an intervening process between consumers' perceptions of the performance of the EVs and their intention to buy them. The results of the mediation analysis are provided in Table 13.

Table 13: Mediation Analysis

Indirect Effect	β	S.E.	t-value	95% Confidence Interval	Decision
PE → ATT → PI	0.213	0.027	7.77	[0.161, 0.269]	Supported

Source: SmartPLS 4 Output.

The mediation analysis shows that Attitude completely mediates the relationship between Performance Expectancy and Purchase Intention. The indirect effect was positive ($\beta = 0.213$, $t = 7.77$, $p < 0.001$) and statistically significant, as the 95% bias-corrected confidence interval [0.161, 0.269] excluded zero, supporting the significance of the indirect effect. The results show that consumers who have a positive perception of the usefulness and benefits of EVs are more likely to have favourable attitudes toward EVs, thereby boosting their intentions to purchase EVs. Thus, the influence of PE on PI is mediated by Attitude, emphasising the consumers' evaluative beliefs as a central component in the EV adoption process. The outcomes of the mediation revealed the theoretical support for the integration of UTAUT2 and the Theory of Planned Behaviour in order to explain consumers' decision-making process for EVs.

4.4.7 Summary of Hypothesis Testing

The last step of the structural model assessment was to summarise the results of all proposed hypotheses. All the structural links showed a positive and statistically significant relationship at 1% significance level based on the bootstrapping results. Thus, all five research hypotheses were accepted. A summary of the hypothesis testing is given in Table 14.

Table 14: Summary of Hypothesis Testing

Hypothesis	Structural Relationship	β	Result
H1	Performance Expectancy → Attitude	0.357	Supported
H2	Social Influence → Attitude	0.236	Supported
H3	Facilitating Conditions → Attitude	0.224	Supported
H4	Attitude → Purchase Intention	0.598	Supported
H5	Purchase Intention → Consumer Behaviour	0.608	Supported

Source: SmartPLS 4 Output.

The results of the structural models support the integrated UTAUT2–TPB model that was proposed in this study comprehensively on the empirical level. The increase in consumers' attitudes toward EVs was proven to be statistically significant through a positive relationship between all five hypothesised relationships, with the consumers' perceptions related to the usefulness of EVs, social influences, and facilitating conditions. Moreover, findings show that Attitude is a strong predictor of Purchase Intention and Purchase Intention is the strongest predictor of Consumer Behaviour. The study results show that the extent of consumers' positive perception of the product influences product adoption behaviour primarily via its effect on behavioural intentions. Overall, the structure of the model has established the theoretical soundness of the proposed framework and yielded strong empirical evidence on the factors influencing the adoption of EVs among EV consumers in Gujarat.

This chapter reported on the empirical results of the PLS-SEM models, which were analysed by SmartPLS 4. A study sample representative of consumers from various backgrounds across Gujarat was identified from the demographic profile. The results of descriptive statistics indicated that the electric vehicles' perception towards all constructs was favourable. The measurement model assessment confirmed the satisfactory indicator reliability, internal consistency, convergent validity and discriminant validity, which meant that the measurement scales had good psychometric properties. The assessment of the structural model showed that there was no multicollinearity and that all the hypotheses were statistically supported. The model was moderately explanatory, had moderate practical effects for the main behavioural relationships, and had a strong predictive relevance. Additionally, the mediation analysis indicated that Attitude plays a significant mediating role in the relationship between Performance Expectancy and Purchase Intention. Overall, these results validate the integrated UTAUT2–TPB model and have implications for understanding factors influencing EV consumer behaviour in Gujarat.

5. Discussion

In the present study, the study used the UTAUT2 and TPB models to determine the factors influencing consumer acceptance of electric vehicles (EVs) in Gujarat. The empirical results summarise the proposed conceptual framework in full, with all five proposed relationships showing positive and statistically significant results. The findings show that consumers' perceptions of the usefulness of EVs and the role of their social context, combined with the presence of facilitating resources, are collectively determining favourable attitudes toward EVs. These attitudes subsequently enhance purchase intention, influencing consumer behaviour. The results thus further validate the use of technology acceptance and behavioural theories in this context with regard to the adoption of EVs in an emerging economy like India.

5.1 Performance Expectancy and Attitude

The results show that Performance Expectancy is the most significant antecedent of Attitude among the three exogenous constructs. Consumers may have more positive attitudes towards the adoption of EVs due to the perception that they are efficient, economical, environmentally friendly, and technologically superior. This result corroborates the underlying tenets of the UTAUT2 model, where perceived usefulness is one of the most significant factors affecting technology acceptance. From the perspective of the consumer in Gujarat, the potential functionality seems to be the key factor as opposed to environmental protection. This may be attributed to the growing public consciousness about the various benefits of modern EVs, such as long-term cost savings, reduced maintenance costs and better technology performance.

This result is in line with the findings of previous studies, which found that performance expectancy is an important determinant of technology adoption and acceptance of electric vehicles. Previous studies have also found that people are more likely to use sustainable transportation technologies if they believe that doing so provides them with improved functionality and economic benefits. Therefore, raising consumer awareness about the efficiency of vehicles, battery performance, and the cost savings over the long term could significantly boost EV adoption. Increasing the awareness of consumers about the efficiency of vehicles, battery performance, and the cost savings over time could therefore significantly boost EV adoption.

5.2 Social influence and attitude.

The findings also show that Social Influence has a significant positive impact on consumers' attitudes towards EVs. This indicates that positive recommendations from family, friends, colleagues and wider social networks are significant in developing positive attitudes towards EV adoption. The result is in line with the social aspect of UTAUT2, as it focuses on the role of normative pressure and interpersonal communication in the adoption of technology.

Consumers in emerging economies may wait for people they trust to experience and share their views on relatively new technology before they will do so. Therefore, good word-of-mouth communications, peer recommendations, and demonstrated adoption in a locale's community play a key role in building consumer confidence in EVs. Despite being more subtle, the effect of Social Influence was still significant, and serves as an important behavioural determinant that cannot be ignored by the policymaker and the automobile industry.

5.3 Facilitating Conditions and Attitude

The facilitating conditions also had a significant positive effect on EV consumer attitudes in the current study. It would seem that the availability of charging infrastructure and technical support, maintenance facilities and sufficient information helps to lower any uncertainties that may be associated with EV ownership, thus leading to better attitudes towards EV ownership. This discovery further bolsters the notion that the overall support environment is a determining factor in EV adoption.

While the practical effect size (CES) was relatively low compared to the PE, the significance of the effect suggests that infrastructure development is still essential for future adoption of EVs. Public investment in charging stations, service networks, battery replacement stations, and consumer education initiatives is likely to further build public confidence and positive attitudes towards EVs.

5.4 Attitude and Purchase Intention

In terms of their structural relationships, Attitude had the strongest positive influence on Purchase Intention among all the structural relationships. The finding is very consistent with the Theory of Planned Behaviour, which suggests that attitudes are one of the most important factors determining behavioural intentions. Consumers who have a positive perception of EVs are much more likely to state a desire to buy an EV in the future.

Based on the above findings, it can be concluded that the relationship between attitude and behaviour is very strong, so that there is a need to concentrate on improving consumer attitudes by conducting awareness campaigns, demonstration programs and experiential marketing programs as the main strategies that can be used to improve consumer attitudes in the present study. More first-hand experiences with EVs could boost positive assessments and then improve EV willingness to buy. These results also emphasise the need to consider both emotional and psychological considerations in addition to technological ones.

5.5 Purchase Intention and Consumer Behaviour

The results of the analysis showed that the strongest direct determinants of Consumer Behaviour were the variables of Purchase Intention, which acts as the main mechanism through which the positive perception is turned into intention to use in the domain of purchasing. Those who showed higher purchase intent were significantly more likely to participate in activities that were linked to EV adoption, such as information seeking, recommending to others, and future purchases.

The finding reflects the Theory of Planned Behaviour and past research on sustainable transport, which has always attributed behavioural intention as the closest predictor to actual behaviour. The findings also indicate that government policies and marketing strategies should focus on policies that are able to reinforce the purchase intention, such as financial incentives, awareness campaigns, test drive marketing and charging infrastructure improvements. These measures can help raise the adoption of EVs in the Indian automotive industry, as they build consumer confidence in the technology and make its adoption more appealing.

5.6 Theoretical Contribution

The current study extends the work done by others by combining the Unified Theory of Acceptance and Use of Technology 2 and the Theory of Planned Behaviour into a single theoretical framework for the study of EV adoption. Previous research has often used these theories separately; however, in the current research, it has been shown that technological perceptions and behavioural mechanisms can be combined to explain consumer decision-making. Moreover, the study not only extends the applicability of these theories to the context of Gujarat but also adds to the sparse empirical evidence of EV adoption in emerging economies.

5.7 Practical Implications

Automobile manufacturers, infrastructure providers, and policymakers have several important implications to take note of in the findings. First, the communications strategies need to highlight the economic and functional benefits of electric vehicles, such as reduced operating costs, increased efficiency, and environmental protection. Second, improving charging infrastructure and technical assistance will make it more likely that consumers become more confident and less hesitant. Third, manufacturers need to leverage social marketing and influencer marketing campaigns to promote positive word of mouth and enhance public perception. Last but not least, government authorities must remain as supportive as possible in the adoption of electric vehicles by providing financial incentives, awareness-raising campaigns and investments in charging infrastructure, as a means to the transition towards sustainable mobility.

6. Conclusion

Consumer behaviour towards Electric Vehicles (EVs) in Gujarat was studied by merging the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and the Theory of Planned Behaviour (TPB) into a single conceptual framework. The study, based on data collected from 450 valid respondents, was analysed using the Partial Least Squares Structural Equation Modelling (PLS-SEM) technique in SmartPLS 4, and offers empirical evidence on the factors behind behaviour to choose electric vehicles in an emerging economy.

Results showed that Performance Expectancy, Social Influence and Facilitating Conditions significantly and positively affect consumers' attitude towards electric vehicles. Of these antecedents, Performance Expectancy had the highest impact on Attitude, indicating that consumers are most likely to assess the long-term efficacy, efficiency and usefulness of EV use. Moreover, the findings show that the impact of the factor Attitude on Purchase Intention is significant, and Purchase Intention is the factor that has the greatest impact on Consumer Behaviour, supporting the sequential behavioural mechanism proposed in the integrated UTAUT2-TPB. The structural model also showed a good explanation, good predictability and a valid and statistically significant mediation of Attitude, thus confirming the proposed theoretical model. The study corroborates that perceptions of technology are not the only factors impacting the adoption of electric vehicles by consumers, but behavioural and contextual factors are also important. Positive attitude, stronger purchase intentions, and eventually positive adoption behaviour are more likely to be generated when consumers perceive the functional benefits of EVs, are supported by positive influences from their social environment, and perceive that the conditions are adequate to facilitate their purchase. The insights gained from this study can greatly help understand the shifting consumer dynamics of sustainable transport in Gujarat and extend the body of knowledge on EV adoption in emerging markets.

7. Theoretical Implications

The current research has several important theoretical contributions in the field of transport technology adoption and sustainable transportation. It exemplifies the success of the unified theory of acceptance and use of technology 2 (UTAUT2) and the theory of planned behaviour (TPB) in explaining consumer behaviour towards EVs. Although such theories have been used individually in previous studies, the current research shows that the simultaneous use of technological perceptions and behavioural mechanisms gives a more holistic picture of consumer decision-making. The strong relationships found between the variables Performance Expectancy, Social

Influence, Facilitating Conditions, Attitude, Purchase Intention and Consumer Behaviour support the complementary nature of the two theoretical perspectives.

Secondly, the study further validates and extends UTAUT2 and TPB to the context of Gujarat and provides empirical evidence from an emerging economy where EV adoption is gaining momentum. The results contribute to the existing literature by providing the relative importance of the role of perceptions of and behavioural intentions related to vehicle performance in the EV adoption process. Last but not least, the study offers a validated conceptual framework that can be used as a helpful starting point for future research on sustainable mobility, green consumer behaviour and technology acceptance in various geographical and socio-economic contexts.

8. Practical Implications

Several practical implications are drawn from the results of the present study for policymakers, automobile manufacturers, infrastructure providers and marketing practitioners looking to speed up the EV adoption. First, the government should further enhance financial incentives, tax policies and policy support for the economic benefits of EVs to consumers. Meanwhile, investments in charging infrastructure, battery-swapping stations, and service should continue to be a priority, since enabling conditions have a strong impact on consumer attitudes.

Second, car companies need to communicate focused messages on the practical advantages of EVs, such as energy efficiency, reduced operating expenses, environmental friendliness and technological advancements. Marketing campaigns also need to harness favourable social influence by integrating customer testimonials, influencer collaborations, and community involvement programs that can help reinforce positive public perception.

Last but not least, education authorities, environmental groups and public organisations could launch educational campaigns to boost consumer awareness about EVs and the myths surrounding their performance, convenience, cost of ownership and more. Overall, these efforts can help boost the adoption of EVs and increase consumer awareness of the benefits of EV ownership in emerging markets like Gujarat.

9. Limitations of the study

In spite of the contribution made, there are a few limitations of the present study. Firstly, the research was restricted to the residents of Gujarat, and hence the conclusions are not specific to other geographical areas, which may have socioeconomic conditions and infrastructure availability distinct from those of Gujarat. Secondly, the study used a cross-sectional research design that measured consumer perceptions at a specific moment in time, meaning that it did not allow for consumer attitudes and/or behavioural intentions to change across this study. Third, the framework proposed accounted for a moderate percentage of the variance in consumer behaviour, but other factors like perceived risk, environmental knowledge, trust in technology, price sensitivity, government incentives, and environmental values were not included in the current model. Lastly, the study employed self-reported survey responses that could be subject to common method bias and the self-reported perceptions of the respondents.

10. Future Research Directions

The present study has some meaningful extensions that can be conducted in the future. Adoption of EVs could be studied in several states of India, or comparative studies could be conducted between various emerging economies to enhance the external validity of the findings. Longitudinal research designs can also be used to explore fluctuations in consumer attitudes and behavioural intentions as charging infrastructure, government policies, and technological advancements continue to develop and change.

The proposed conceptual framework could be extended to include other constructs in future research, including environmental awareness, perceived risk, government incentives, price sensitivity, trust in technology and consumer innovativeness. Comparisons of EV usage between various demographic segments or EV types can also offer a greater understanding of EV consumer behaviour differences. Furthermore, the incorporation of sophisticated analytical methods like multi-group analysis (MGA), Importance–Performance Map Analysis (IPMA), or the use of artificial intelligence (AI) predictive models could provide deeper insights into EV adoption in developed and developing nations.

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