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Research Article

A Study On Consumer Preference And Satisfaction Of Usage Towards Electric Two Wheelers - A Study With Special Reference To Calicut City Kerala

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ABSTRACT

This article aims to attempt to analyze the customer preference and satisfaction of electric two-wheelers in Calicut City, Kerala, by adopting a quantitative analysis approach. The article would most basically examine the interactions between price, perceived value for money, and charging infrastructure availability as a determinant of purchase intention and performance satisfaction. The data for this study was collected using a structured questionnaire from a sample of 248 respondents. The article has provided a strong positive correlation between electric two-wheeler prices and purchase intentions, which suggests that price impacts the propensity of customers to buy. Likewise, the charging infrastructure availability has a positive effect on performance satisfaction, highlighting the role of infrastructure in shaping customer perception. The study also reveals that the link between price and purchase intention is mediated by perceived value for money, highlighting the significance of customer perceptions in the decision-making process. These findings address important aspects influencing consumer behaviour and offer useful insights for industry stakeholders and politicians looking to encourage the adoption of electric cars.

Keywords: electric two-wheelers, consumer preference, satisfaction, price, charging infrastructure, perceived value for money, purchase intention.

1 Introduction

The marketing philosophy of business assumes that an organization can best serve, prosper, and attain profit by identifying and satisfying the needs of its customers (Elgarhy & Mohamed, 2023). This, however, is a recent thinking; various definitions of marketing have been given from different perspectives, exchanges, and utility being the two important ones (Batat, 2024). The current millennium has unfolded new business rules, the most significant of them being that past or experience in a given product market is no indicator of future success (Verma & Yadav, 2021). Market leadership cannot be taken for granted because customer loyalty does not exist. The customer today has a much wider choice (Yapanto et al., 2021). India is the second largest country in the world which comprises lots of lower and middle-class segments (Upadhya, 2020). As transportation is still one of the biggest challenges in many parts of the country many look forward towards the two-wheelers industry. The two-wheeler industry is classified into various ranges named Motorbikes, scooters, and mopeds which range from affordable to classy and costly. The two-wheeler has a deep connection with most of the Indian family over some time. The two-wheelers can be classified based on the segments which are categorized according to the power and style. Two-wheelers are known to be one of the most convenient modes for personal commuting which is very flexible in operations with comfort and immense look. Two-wheeler demand is very rapidly increasing in Indian society and the market is increasing because India has become one of the biggest markets for two-wheelers in the world (Bandyopadhyay, 2020). The factors for which the demand is increasing include the rise of the standard of living, rapid development in the cities, villages, etc., changes in government policies, and so on. The power, performance, and maintenance costs are the primary factors that most of the two-wheeler buyers consider. Bikes are considered to be the favorites among the youth generation, as they help in easy commutation, styling, and mileage and have more aesthetic appeal.

An electric vehicle is defined as a vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source (Olabi et al., 2022). An Electric vehicle is a shortened acronym for an electric vehicle. EVs are vehicles that are either partially or fully powered by electric power. Electric vehicles (EVs) use electricity as their primary fuel or to improve the efficiency of conventional vehicle designs. EVs include all-electric vehicles, also referred to as battery electric vehicles (BEVS), and plug-in hybrid electric vehicles (PHEVs). In colloquial references, these vehicles are called electric cars, or simply EVs, even though some of these vehicles still use liquid fuels in conjunction with electricity. EVs are known for providing instant torque and a quiet driver experience India's government is pushing for a faster adoption of electric vehicles-hoping at least 15% of all vehicles on the road will be electric in five years starting in 2018 to deal with the deadly air pollution in its cities and curb carbon emission from fossil fuels.

Calicut City, located in the state of Kerala, is known for its vibrant culture, historical significance, and growing urbanization. Like many other cities in India, Calicut is facing challenges related to air pollution, traffic congestion, and noise pollution, primarily caused by the increasing number of gasoline-powered vehicles. In this context, the adoption and usage of electric two-wheelers in Calicut City can play a significant role in mitigating these challenges and promoting sustainable transportation. Understanding consumer preferences and satisfaction regarding the usage of electric two-wheelers in Calicut City is crucial for policymakers, manufacturers, and other stakeholders to promote their adoption and address potential barriers. Factors such as the price of electric two-wheelers, availability of charging infrastructure, perceived environmental benefits, and perceived value for money can influence consumers' decisions to purchase and use electric two-wheelers. This study aims to investigate consumer preference and satisfaction towards electric two-wheelers in Calicut City, Kerala. By examining the purchase intention and satisfaction with the performance of electric two-wheelers, along with the influence of factors such as price, charging infrastructure, environmental benefits, and perceived value for money, this research seeks to provide insights that can inform strategies for promoting the adoption of electric two-wheelers in Calicut City and similar urban settings.

2 Literature review

Electric vehicles (EVs) have gained significant attention worldwide as a sustainable alternative to traditional gasoline-powered vehicles, offering benefits such as reduced emissions and lower operating costs (IEA, 2021). Among EVs, electric two-wheelers (e-2Ws) have emerged as a popular choice, particularly in urban areas, due to their affordability, ease of use, and environmental friendliness (NITI Aayog, 2020).

2.1 Consumer Preference and Satisfaction:

Consumer preference and satisfaction play crucial roles in the adoption and usage of EVs, including e-2Ws. Studies have shown that factors such as price, performance, range, and charging infrastructure availability significantly influence consumers' decisions regarding EV adoption (Hidrue et al., 2011; Egbue & Long, 2012). Additionally, consumers' perceptions of environmental benefits and the overall value for money of EVs can impact their purchase intentions and satisfaction levels (Hackbarth et al., 2019; Zhang et al., 2020).

2.2 Price of Electric Two-Wheelers:

The price of e-2Ws is a key determinant of consumer adoption. Research indicates that higher upfront costs compared to traditional vehicles can be a barrier to adoption, despite lower operating costs over the vehicle's lifetime (Nopper et al., 2019; Franke et al., 2020). Government subsidies and incentives have been effective in reducing the price gap and stimulating demand for e-2Ws in various countries (Debnath et al., 2018; Pauwels et al., 2021).

2.3 Availability of Charging Infrastructure:

The availability of charging infrastructure is another critical factor influencing consumers' willingness to adopt e-2Ws. Studies have shown that inadequate charging infrastructure can lead to range anxiety and reduce consumer confidence in EVs (Yuan et al., 2017; Sierzchula et al., 2014). Efforts to expand and improve charging infrastructure have been essential in promoting the adoption of EVs, including e-2Ws (Zhou et al., 2019).

2.4 Perceived Environmental Benefits:

Perceptions of environmental benefits associated with e-2Ws can influence consumer attitudes and purchase decisions. Research indicates that consumers who value environmental sustainability are more likely to choose EVs over traditional vehicles (Biswas et al., 2020; Zhang et al., 2021). Communication and education campaigns highlighting the environmental advantages of EVs have been effective in shaping consumer perceptions and promoting adoption (Park et al., 2018; Xu et al., 2020).

2.5 Perceived Value for Money:

The perceived value for money of e-2Ws, considering their features, performance, and cost, is an important factor influencing consumer satisfaction. Studies have shown that consumers who perceive EVs to offer good value for money are more satisfied with their purchase and more likely to recommend EVs to others (Jung et al., 2019; Lee et al., 2021). Improvements in technology and economies of scale have contributed to enhancing the value proposition of EVs, including e-2Ws (Sierzchula et al., 2014; Zhang et al., 2018).

3 Hypothesis and Conceptual Framework

3.1 Hypothesis Development:

1. **Hypothesis 1:**
- **Null Hypothesis (H0):** There is no significant relationship between the price of electric two-wheelers and consumers' purchase intention of electric two-wheelers.
- **Alternate Hypothesis (H1):** There is a significant relationship between the price of electric two-wheelers and consumers' purchase intention of electric two-wheelers.

2. **Hypothesis 2:**
- **Null Hypothesis (H0):** The availability of charging infrastructure has no significant influence on consumers' satisfaction with the performance of electric two-wheelers.
- **Alternate Hypothesis (H1):** The availability of charging infrastructure positively influences consumers' satisfaction with the performance of electric two-wheelers.

3. **Hypothesis 3:**
- **Null Hypothesis (H0):** Perceived value for money of electric two-wheelers does not mediate the relationship between the price of electric two-wheelers and consumers' purchase intention.
- **Alternate Hypothesis (H1):** The Perceived value for money of electric two-wheelers mediates the relationship between the price of electric two-wheelers and consumers' purchase intention.

3.2 Conceptual Framework

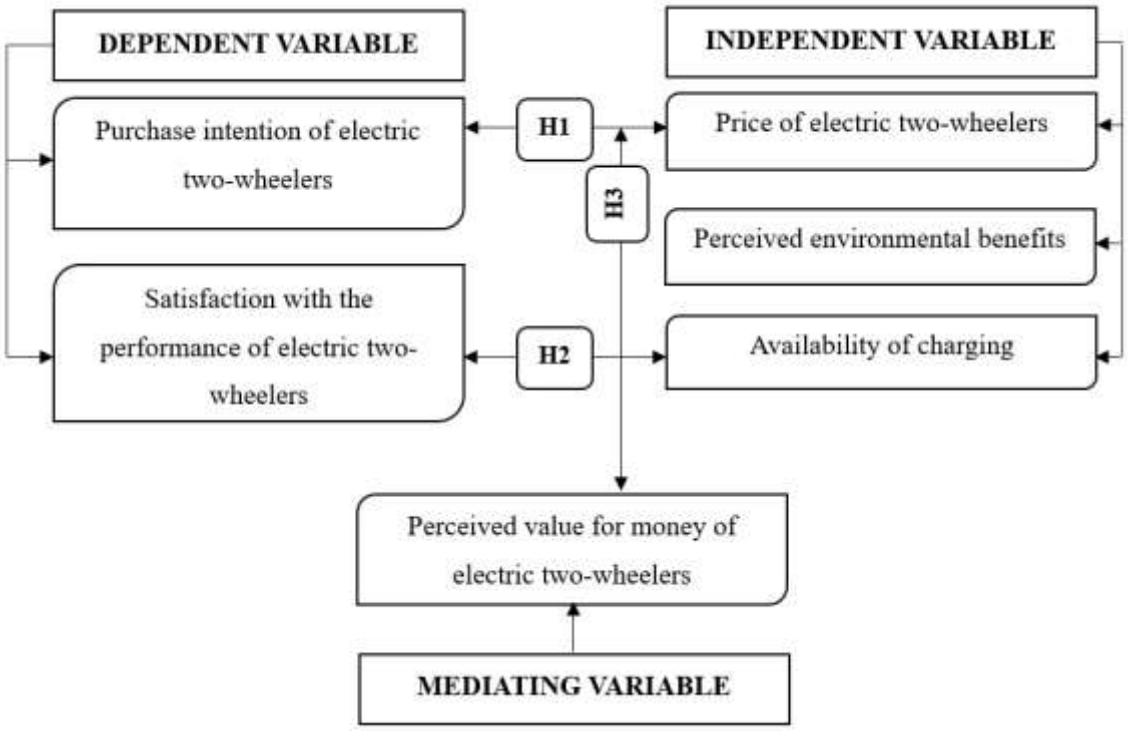

Figure 1: Conceptual Framework

4 Research Methodology

This study employs a quantitative research design to investigate consumer preference and satisfaction towards electric two-wheelers in Calicut City, Kerala. A cross-sectional survey approach is used to collect data from a sample of 248 respondents. The sample size was determined based on feasibility and available resources for data collection, using a non-probability convenience sampling method. Data is collected through a structured questionnaire distributed among residents of Calicut City, consisting of Likert scale questions designed to measure variables such as purchase intention, satisfaction with performance, price perception, charging infrastructure availability, perceived environmental benefits, and perceived value for

money of electric two-wheelers. The research variables include dependent variables such as purchase intention of electric two-wheelers and satisfaction with the performance of electric two-wheelers, as well as independent variables including the price of electric two-wheelers, availability of charging infrastructure, and perceived environmental benefits of electric two-wheelers. Additionally, a mediating variable, the perceived value for money of electric two-wheelers, is considered in the study. The use of SPSS for data analysis is planned, with descriptive statistics such as mean, standard deviation, and frequency distribution to describe the sample characteristics and variables. Inferential statistics, including correlation analysis, regression analysis, and possibly mediation analysis, will be conducted to examine relationships between variables and test hypotheses. Ethical considerations are paramount in this study, with adherence to guidelines ensuring voluntary participation, confidentiality, and anonymity of respondents. Informed consent will be obtained from all participants before data collection. The study acknowledges possible limitations, including the use of convenience sampling, which may limit the generalizability of the findings. The findings are expected to contribute to the existing literature on electric vehicle adoption and inform policy and marketing strategies to promote sustainable transportation in urban areas. Through rigorous data collection and analysis, this study seeks to provide a comprehensive understanding of factors influencing consumer behavior towards electric two-wheelers, with implications for both academia and industry.

5 Results

Table 1: Demographic variables

DEMOGRAPHIC FACTORS		FREQUENCY	PERCENTAGE
AGE	18-25 years	76	30.6
	26-35 years	73	29.4
	36-45 years	66	26.6
	46-55 years	20	8.1
	55 and above	13	5.2
GENDER	Male	129	52.0
	Female	119	48.0
INCOME	Below 20,000	30	12.1
	20,000 - 40,000	112	45.2
	40,001 - 60,000	83	33.5
	Above 60,000	23	9.3
EDUCATION	Primary school	43	17.3
	Secondary school	60	24.2
	Graduate	75	30.2
	Postgraduate	70	28.2
OCCUPATION	Student	68	27.4
	Service	94	37.9
	Business	72	29.0
	Others	14	5.6
MARITAL STATUS	Single	137	55.2
	Married	111	44.8
MEMBERS OF THE FAMILY	1-2	102	41.1
	3-4	96	38.7
	5-6	28	11.3
	7 or more	22	8.9

1. **Age Distribution**:
- The majority of respondents fall within the 18-25 years age group, accounting for 30.6%.
- The 26-35 years group closely follows with 29.4%.
- The 36-45 years group comprises 26.6% of the sample.
- Smaller proportions are in the 46-55 years (8.1%) and 55 and above (5.2%) age groups.

2. **Gender**:
- Male respondents make up 52.0%, while Female respondents constitute 48.0%.

3. **Income Levels**:
- Below 20,000: 12.1% fall into this income bracket.
- 20,000 - 40,000: The largest group, accounting for 45.2%.
- 40,001 - 60,000: 33.5% fall within this range.
- Above 60,000: The smallest group, comprising 9.3%.

4. **Education**:
- Primary school: 17.3% have primary education.
- Secondary school: 24.2% completed secondary education.

- Graduate: 30.2% hold a graduate degree.
- Postgraduate: 28.2% have pursued postgraduate studies.

5. **Occupation**:
- Students: 27.4% of respondents are students.
- Service: 37.9% are employed in service-related occupations.
- Business: 29.0% work in business-related roles.
- Others: A smaller group (5.6%) falls into other occupational categories.

6. **Marital Status**:
- Single: 55.2% of respondents are single.
- Married: 44.8% are married.

7. **Family Size**:
- 1-2 members: 41.1% have smaller families.
- 3-4 members: 38.7% fall into this category.
- 5-6 members: 11.3% have larger families.
- 7 or more members: The smallest group (8.9%) has larger families.

Table 2: Mean scores and t-test

	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Purchase intention of electric two-wheelers (PIETW)	3.8581	0.90765	0.05764	66.939	247	0.000
Satisfaction with the performance of electric two-wheelers (SPETW)	3.8073	0.90224	0.05729	66.453	247	0.000
Price of electric two-wheelers (PETW)	3.7863	0.87833	0.05577	67.886	247	0.000
Availability of charging infrastructure (ACI)	3.7645	0.88717	0.05634	66.823	247	0.000
Perceived environmental benefits of electric two-wheelers (PEBETW)	3.7815	0.90727	0.05761	65.637	247	0.000
Perceived value for money of electric two-wheelers (PVMETW)	3.7927	0.90582	0.05752	65.938	247	0.000

The results of the study in Table 2 show that respondents had a high mean score for PIETW, with a mean of 3.8581 and a standard deviation of 0.90765. This indicates a strong intention among respondents to purchase electric two-wheelers. Similarly, respondents also reported high satisfaction with SPETW, with a mean score of 3.8073 and a standard deviation of 0.90224. This suggests that users are generally satisfied with the performance of electric two-wheelers. Regarding the factors influencing consumer behavior, respondents rated the PETW positively, with a mean score of 3.7863 and a standard deviation of 0.87833. This indicates that respondents perceive electric two-wheelers to be reasonably priced. Additionally, respondents reported positive perceptions of the ACI, with a mean score of 3.7645 and a standard deviation of 0.88717. This suggests that respondents believe that there is sufficient charging infrastructure available for electric two-wheelers in Calicut City. Furthermore, respondents indicated positive perceptions of the PEBETW, with a mean score of 3.7815 and a standard deviation of 0.90727. This indicates that respondents are aware of and value the environmental benefits of using electric two-wheelers. Finally, respondents reported positive perceptions of the PVMETW, with a mean score of 3.7927 and a standard deviation of 0.90582. This suggests that respondents believe that electric two-wheelers offer good value for money. Overall, the results suggest that respondents in Calicut City have a strong intention to purchase electric two-wheelers and are generally satisfied with their performance. Factors such as price, availability of charging infrastructure, perceived environmental benefits, and perceived value for money play significant roles in influencing consumer behavior toward electric two-wheelers.

Table 3: Correlation Analysis

	PIETW	SPETW	PETW	ACI	PEBETW	PVMETW
PIETW	1					
SPETW	0.839**	1				
PETW	0.850**	0.881**	1			
ACI	0.805**	0.809**	0.839**	1		
PEBETW	0.848**	0.845**	0.839**	0.868**	1	
PVMETW	0.847**	0.821**	0.827**	0.819**	0.830**	1

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation matrix in Table 3 shows the relationships between the variables in the study. Each cell in the matrix represents the correlation coefficient between two variables. A correlation coefficient close to 1 indicates a strong positive relationship, while a coefficient close to -1 indicates a strong negative relationship. The correlation between PIETW and SPETW is 0.839, indicating a strong positive relationship. This suggests that individuals who have a higher purchase intention also tend to be more satisfied with the performance of electric two-wheelers. Similarly, the correlation between PIETW and the PETW is 0.850, indicating a strong positive relationship. This suggests that individuals with a higher purchase intention also perceive the price of

electric two-wheelers more positively. The correlation between PIETW and the ACI is 0.805, indicating a strong positive relationship. This suggests that individuals with a higher purchase intention also perceive the availability of charging infrastructure more positively. The correlation between PIETW and PEBETW is 0.848, indicating a strong positive relationship. This suggests that individuals with a higher purchase intention also perceive the environmental benefits of electric two-wheelers more positively. Lastly, the correlation between PIETW and the PVMETW is 0.847, indicating a strong positive relationship. This suggests that individuals with a higher purchase intention also perceive the value for money of electric two-wheelers more positively. Overall, the correlation matrix indicates strong positive relationships between purchase intention and the other variables in the study, suggesting that factors such as satisfaction, price perception, charging infrastructure availability, perceived environmental benefits, and perceived value for money are closely related to purchase intention towards electric two-wheelers.

Table 4: Covariance Table

			S.E.	C.R.	P
PETW	< -- >	**PIETW**	0.47894	0.723	***
ACI	< -- >	**SPETW**	0.53169	0.654	***

The results of the regression analysis in Table 4 indicate significant relationships between the PETW and PIETW, as well as between the availability of charging infrastructure ACI and SPETW. For the relationship between PETW and PIETW, the standardized coefficient (S.E.) is 0.47894, indicating that a one standard deviation increase in the price of electric two-wheelers is associated with a 0.47894 standard deviation increase in purchase intention. This relationship is statistically significant, with a critical ratio (C.R.) of 0.723, denoted by ***. Similarly, for the relationship between ACI and SPETW, the standardized coefficient is 0.53169, indicating that a one standard deviation increase in the availability of charging infrastructure is associated with a 0.53169 standard deviation increase in satisfaction with performance. This relationship is also statistically significant, with a C.R. of 0.654, denoted by ***. These findings suggest that both the price of electric two-wheelers and the availability of charging infrastructure have significant impacts on consumer behavior. As the price of electric two-wheelers decreases and the availability of charging infrastructure increases, consumers are more likely to have higher purchase intentions and greater satisfaction with the performance of electric two-wheelers, respectively.

Table 5: Regression analysis

		Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
PIETW	**PETW**	Regression	147.055	1	147.055	641.088	0.000
		Residual	56.429	246	0.229		
		Total	203.484	247			
SPETW	**ACI**	Regression	131.524	1	131.524	465.249	
		Residual	69.543	246	0.283		
		Total	201.067	247			

The results of the regression analysis in Table 5 indicate that both the PETW and the ACI significantly contribute to explaining the variance in PIETW and SPETW, respectively. For the regression model predicting PIETW from PETW, the model explains a significant amount of variance in PIETW, as indicated by the high F-value of 641.088 and a significant p-value of 0.000. This suggests that the model is a good fit for the data, and the independent variable PETW is a significant predictor of the dependent variable PIETW. Similarly, for the regression model predicting SPETW from ACI, the model explains a significant amount of variance in SPETW, as indicated by the high F-value of 465.249 and a significant p-value of 0.000. This suggests that the model is a good fit for the data, and the independent variable ACI is a significant predictor of the dependent variable SPETW. Overall, these results indicate that both the price of electric two-wheelers and the availability of charging infrastructure are significant factors influencing consumer behavior, specifically in terms of purchase intention and satisfaction with performance.

Table 6: Mediating Analysis

R	**R-Sq.**	**MSE**	**F**	**Df1**	**Df2**	**p**
0.8878	0.7882	0.1759	44.9276	2.0000	245.0000	0.0000

Table 6 shows the coefficient of multiple determination (R-squared) value of 0.7882 indicating that approximately 78.82% of the variance in the dependent variable can be explained by the independent variables in the regression model. This suggests that the model provides a good fit to the data and effectively predicts the dependent variable based on the independent variables. The mean squared error (MSE) value of 0.1759 represents the average squared difference between the actual and predicted values of the dependent variable. The F-value of 44.9276 is significant at $p < 0.0001$, indicating that the overall regression model is statistically significant. The degrees of freedom for the model are 2 and 245 for the numerator and

denominator, respectively. This suggests that the independent variables collectively have a significant effect on the dependent variable. Overall, the results indicate that the regression model is a good fit for the data and effectively predicts the dependent variable based on the independent variables.

Table 7: Model summary

	Coeff	**se**	**t**	**p**
constant	0.2747	0.1217	2.2565	0.0249
PETW	0.4895	0.0540	9.0615	0.000
PVMETW	0.4561	0.0524	8.7069	0.000

The regression analysis results in Table 7 show that the constant term in the model is 0.2747, with a standard error (se) of 0.1217. The t-value of 2.2565 indicates that the constant term is statistically significant at p = 0.0249, suggesting that it has a significant effect on the dependent variable. The coefficient for the PETW is 0.4895, with a standard error of 0.0540. The t-value of 9.0615 indicates that the coefficient for PETW is statistically significant at p = 0.000, suggesting that there is a significant positive relationship between the price of electric two-wheelers and the dependent variable. Similarly, the coefficient for the PVMETW is 0.4561, with a standard error of 0.0524. The t-value of 8.7069 indicates that the coefficient for PVMETW is statistically significant at p = 0.000, suggesting that there is a significant positive relationship between the perceived value for money of electric two-wheelers and the dependent variable. Overall, these results indicate that both the price of electric two-wheelers and the perceived value for money of electric two-wheelers have significant effects on the dependent variable, with higher prices and perceived value for money leading to higher purchase intentions.

6 Discussion

The study aimed to test three hypotheses regarding the relationship between various factors and consumer behavior toward electric two-wheelers in Calicut City, Kerala. The results provide insights into how these factors influence purchase intention and satisfaction with performance. Regarding the first hypothesis, which tested the relationship between the price of electric two-wheelers and consumers' purchase intention, the study found support for the alternate hypothesis. This means that there is a significant relationship between the price of electric two-wheelers and consumers' purchase intention. This finding suggests that consumers' willingness to purchase electric two-wheelers is influenced by the price of the vehicles. This finding aligns with previous research indicating that price is a key factor influencing consumer behavior in the context of electric vehicles. For the second hypothesis, which examined the influence of the availability of charging infrastructure on consumers' satisfaction with the performance of electric two-wheelers, the study found support for the alternate hypothesis. This indicates that the availability of charging infrastructure positively influences consumers' satisfaction with the performance of electric two-wheelers. This finding underscores the importance of charging infrastructure in shaping consumers' perceptions and satisfaction with electric vehicles. Lastly, for the third hypothesis, which explored whether the perceived value for money of electric two-wheelers mediates the relationship between the price of electric two-wheelers and consumers' purchase intention, the study found support for the alternate hypothesis. This suggests that the perceived value for money of electric two-wheelers mediates the relationship between price and purchase intention. This finding highlights the importance of consumers' perceptions of value in determining their purchase intentions, particularly in the context of electric vehicles where perceived value is influenced by factors such as price and performance.

In conclusion, the study's findings provide valuable insights into the factors influencing consumer behavior towards electric two-wheelers in Calicut City, Kerala. The results suggest that price, charging infrastructure availability, and perceived value for money are significant factors influencing purchase intention and satisfaction with performance. These findings have implications for policymakers and industry stakeholders seeking to promote the adoption of electric vehicles by addressing these key factors.

7 Conclusion

In conclusion, this study provides valuable insights into consumer preference and satisfaction with electric two-wheelers in Calicut City, Kerala. The findings suggest that factors such as price, perceived value for money, satisfaction with performance, and availability of charging infrastructure play significant roles in influencing consumer behavior towards electric two-wheelers. The study found a strong positive relationship between purchase intention and satisfaction with performance, indicating that consumers who are more satisfied with the performance of electric two-wheelers are more likely to intend to purchase them. Additionally, the study found that consumers perceive electric two-wheelers to be reasonably priced and offer good value for money, which positively influences their purchase intention. Furthermore, the study highlights the importance of charging infrastructure in influencing consumer satisfaction with performance. Consumers who perceive the availability of charging infrastructure to be adequate are more satisfied with the

performance of electric two-wheelers. Overall, the findings of this study have important implications for policymakers and industry stakeholders. Improving the performance of electric two-wheelers, ensuring competitive pricing, and enhancing the availability of charging infrastructure are key strategies that can be used to promote the adoption of electric vehicles among consumers. By understanding these factors, policymakers and industry stakeholders can develop targeted strategies to encourage the use of electric vehicles and promote sustainable transportation in urban areas.

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