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A study on perception and preference of customers towards purchase of clean energy bikes in Karur District of Tamil Nadu

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Abstract
The study explores customer perceptions and preferences towards clean energy bike purchases in Karur District of Tamil Nadu. The study collects 400 samples, the research utilizes a questionnaire, employing a descriptive research design and simple random sampling. Questionnaire is divided into four sections like, demographics, perceptions, preferences, and the impact on purchase decisions. A pilot study ensures the questionnaire's reliability. Statistical methods, including chi-square, descriptive analysis, regression and factor analysis, summarize the data. Result confirms the significant influence of customer perceptions on drive comfort in clean energy bikes. Statistical significance is observed across variables, validating the hypothesis and emphasizing the pivotal role of customer perception in shaping drive comfort and purchase decisions. Numerous factors impact customer preferences, with charging convenience, affordability, and environmental appeal playing crucial roles. The study establishes a comprehensive test of factors influencing clean energy bike purchases, emphasizing the manifold nature of customer choices and the interaction of environmental, performance, brand, and economic considerations.

Keywords: Perception, Preference, Customers, Purchase, Clean Energy Bikes

Introduction

A clean energy bike typically refers to a bicycle that utilizes environmentally friendly and sustainable energy sources for its propulsion. The most common type of clean energy bike is an electric bike (e-bike). Electric bikes are equipped with an electric motor powered by a rechargeable battery, providing assistance to the rider's pedalling efforts. These bikes are considered clean energy alternatives as they produce zero emissions during operation, reducing environmental impact compared to traditional, combustion engine-powered vehicles. Clean energy bikes can also include innovative designs that integrate other renewable energy sources, such as solar panels or regenerative braking systems, to enhance their sustainability (Thakur *et al*., 2024) [27]. The primary goal of clean energy bikes is to offer an eco-friendly mode of transportation, promoting energy efficiency and reducing reliance on fossil fuels. In an era marked by escalating environmental concerns and an increasing demand for sustainable alternatives, the automotive industry has witnessed a transformative shift towards clean energy solutions (Gujarathi *et al*., 2018) [6]. Among these, clean energy bikes have emerged as a prominent and environmentally conscious mode of transportation.

In this way, it is aimed to investigate the complex element of customer perception and preference surrounding the purchase of clean energy bikes. As society becomes more environmentally aware, knowing the factors influencing consumer decisions in adopting clean energy bikes becomes imperative, offering insights that extend beyond individual choices to shape broader environmental policies, market strategies, and societal paradigms (Vashisth and Gupta, 2021) [28]. Clean energy bikes, propelled by electric or hybrid technologies, represent a sustainable transportation option, mitigating the ecological impact associated with traditional vehicles. As global initiatives intensify to combat climate change and reduce carbon footprints, there is a growing need to comprehend the different aspects of consumer behaviour in choosing clean energy bikes (Selva and Arunmozhi, 2020) [22]. The study aims to check the complex interaction of factors influencing customers' perceptions and preferences, contributing valuable insights to the evolving environment of sustainable transportation.

Evolution of Clean Energy Bike Market: The global push towards sustainable practices has catalysed the evolution of the clean energy bike market. Manufacturers, sensing the changing tide of consumer preferences, are investing in innovative technologies, designs, and marketing strategies to capture this emerging market. Governments are also incentivizing the adoption of clean energy transportation, aligning policies with environmental goals and promoting sustainable mobility solutions (Ranjan *et al*., 2022) [19].It recognizes the transformative potential of clean energy bikes within the broader context of sustainable transportation. It sheds light on the symbiotic relationship between customer choices and market forces, offersdiscernments that can steer the trajectory of the clean energy bike industry (Rajesh *et al*., 2022) [17].

Perception and Preference Dynamics: The decision to embrace clean energy bikes goes beyond mere functionality; it encapsulates a myriad of considerations and beliefs held by consumers. Realizing the vibrant activities of perception involves exploring how individuals interpret the environmental benefits, technological features, and overall appeal of clean energy bikes (Acharya, 2019) [1]. Customer preferences, on the other hand, delve into the specific attributes, designs, and functionalities that drive individuals to choose clean energy bikes over conventional alternatives.

Factors influencing perception encompass environmental consciousness, technological acceptance, and the perceived benefits of adopting a sustainable lifestyle (Shabir and Balan, 2025) [24]. Preference factors involve considerations such as design aesthetics, performance expectations, charging infrastructure accessibility, and the overall economic viability of clean energy bikes (Liao, 2017) [12]. This study aims to dissect these elements to provide a completerealization of the motivators and deterrents influencing the choices made by consumers.

Impact of Perception on Purchase Decisions: The impact of customer perception on clean energy bike purchase decisions is profound, shaping the trajectory of the sustainable transportation landscape. Customers' attitudes, beliefs, and preferences play a pivotal role in influencing their decision to embrace clean energy bikes. The critical aspects driving this impact is the heightened environmental consciousness among consumers (Yegin and Ikram, 2022) [29]. As individuals become more aware of the ecological footprint associated with traditional vehicles, the appeal of clean energy bikes as an eco-friendly alternative gains prominence. Positive perceptions regarding reduced carbon emissions and a lower environmental impact drive customer to opt for clean energy bikes, aligning their transportation choices with a broader commitment to sustainability (Sathya *et al*., 2025) [21]. Moreover, customer perception extends beyond environmental considerations to encompass factors like technological acceptance and performance. The perceived reliability of clean energy bike technology, coupled with its efficiency, influences customers' confidence in making a switch (Ram, 2020) [18].

Affordability, long-term cost savings, and the convenience of charging infrastructure also contribute to shaping perceptions and, consequently, purchase decisions. As consumers increasingly seek eco-conscious and technologically advanced transportation options, clean energy bikes represent a compelling choice (Purwanto and Irawan, 2024) [16]. The impact of customer perception is not only confined to individual choices but resonates on a larger scale, influencing market trends and industry characteristics (Das, 2020) [4]. Manufacturers and policymakers alike respond to these perceptions by enhancing features, investing in sustainable technologies, and formulating policies that encourage clean energy bike adoption. In essence, customer perception acts as a driving force, steering the transition towards cleaner and more sustainable modes of transportation (Jose *et al*., 2022) [9].

Statement of the Problem

The adoption of clean energy bikes represents a vital shift towards sustainable transportation, yet indulgent the factors influencing customer decisions remains a crucial and underexplored aspect. The statement of the problem revolves around the active forces shaping perceptions and preferences in the purchase of clean energy bikes. Despite the growing global interest in eco-friendly transportation alternatives, there exists a gap in comprehending the specific drivers and deterrents guiding consumer choices in this evolving market. There is a need to investigate into the environmental consciousness of potential clean energy bike customers. While broader environmental concerns influence sustainable choices, the depth of this impact on individual decision-making processes remains uncertain. The role of technological factors in shaping customer preferences requires exploration. Accepting the level of technological acceptance, concerns, and expectations surrounding clean energy bikes is vital for manufacturers and policymakers aiming to align their offerings with consumer expectations. Economic considerations, including cost-effectiveness and long-term savings, pose significant questions about the feasibility and attractiveness of clean energy bikes to potential customers. The study aims to contribute valuable insights into the aspects influencing customer decisions regarding clean energy bike purchases, developing a deeper check of the challenges and opportunities in promoting sustainable transportation solutions.

Need for the Study

The need for this study stems from the growing imperative to accelerate the transition towards sustainable transportation and comprehend the influencing customer choices in adopting clean energy bikes. With environmental concerns reaching critical levels, learning the factors motivating individuals to embrace eco-friendly alternatives becomes paramount. Furthermore, as clean energy bikes gain traction in the market, there is a pressing need to explore technological acceptance and how these advancements align with consumer expectations. The study seeks to check the economic considerations influencing purchase decisions, contributing valuable data to manufacturers, policymakers, and businesses aiming to enhance the appeal of clean energy bikes. As a result of recognizing the distinct factors influencing customer perceptions and preferences within the regional and global context, the study aims to offer practical insights that can inform sustainable transport policies, guide industry practices, and develop a broader cultural shift towards eco-conscious mobility. In essence, the study's findings are anticipated to contribute significantly to the fields of sustainable transportation, regional development, and consumer behaviour.

Review of Literature

The review of literature pertaining to customer perception and preference regarding the purchase of clean energy bikes reveals a comprehensive exploration of factors influencing consumer choices in sustainable transportation. A prevalent theme across studies is the discernible impact of environmental consciousness on customer decision-making (Selvi and Gideon, 2023) [23]. Individuals increasingly consider the ecological footprint of their transportation choices, with clean energy bikes emerging as a favoured option due to their minimal carbon emissions (Tantau and Gavriluscu, 2019) [26]. The alignment with environmental values signifies a crucial motivational factor in shaping positive customer perceptions (Chawla *et al*., 2023) [3]. Technological acceptance stands out as a key aspect, reflecting the importance of perceived reliability and efficacy of electric or hybrid technologies (Hoang *et al*., 2022) [7]. The relationship between technological features and customer preferences, revealing that the perceived dependability of such technologies significantly influences

consumer confidence (Bhatia *et al*., 2021) [1]. The technological setting plays main role in steering customer perceptions and determining their receptivity to clean energy bike options (Kumar and Tashwanth, 2022) [11].

Economic considerations, including the financial aspects and long-term savings associated with clean energy bikes, emerge as crucial determinants in the decision-making process (Mruzek *et al*., 2016) [15]. Customers weigh the economic implications of adopting clean energy bikes against traditional alternatives, emphasizing the significance of cost-effectiveness and financial feasibility in influencing preferences (Jansson *et al*., 2017) [8]. The unique basic forces of a particular region, result acknowledges the importance of tailoring interventions and strategies to suit the specific cultural and economic contexts (Khurana *et al*., 2020) [10]. The regional lens contributes to a richer accepting of customer perceptions within diverse settings, recognizing the contextual aspects that influence sustainable transportation choices (Sinha and Bangia, 2020) [25]. Furthermore, the importance of design aesthetics in influencing customer preferences (Gore *et al*., 2024) [5]. Beyond environmental and economic considerations, it reveals that factors such as visual appeal, ergonomic design, and overall aesthetics significantly contribute to customer choices (Rezvani *et al*., 2015) [20]. The multifaceted perspective on preferences suggests that the decision-making process is influenced by a combination of functional and aesthetic considerations (Morton *et al*., 2016) [14]. While existing studies offer valuable insights, there is a consensus on the need for more comprehensive research that integrates diverse elements into a holistic framework (Malagi and Ramya, 2022) [13]. The vibrant nature of technology, market trends, and consumer behaviour necessitates ongoing exploration to stay abreast of the latest developments in this evolving field (Buhmann and Criado, 2023) [2].

Research Objectives

The study is commenced with the ensuing objectives.

1. To examine the demographic profile of customers using clean energy bikes.
2. To assess the perception of customers towards drive comfort of clean energy bikes.
3. To investigate the preference of customers towards clean energy bikes.
4. To measure the impact of customer perception on clean energy bike purchase decisions.

Research Methodology

The aim of the study is to examine the perception and preference of customers towards purchase of clean energy bikes. The research is taking place in the Karur District of Tamil Nadu, where a significant portion of the population is interested in acquiring clean energy bikes. A total of 400 customers from diverse areas within the district were included in the study. Data collection is conducted through a field survey utilizing a questionnaire, with a descriptive research design serving as the foundation for the investigation. Probability sampling techniques, specifically simple random sampling, are employed for data collection. The questionnaire comprises four sections; the first part concentrates on demographic information, the second part explores customers' perceptions of clean energy bikes, the third part delves into customers' preferences for clean energy bikes, and the fourth part analyses the influence of customer perceptions on the decision to purchase clean energy bikes. Prior to the main data collection, a pilot study involving 50 customers was conducted to ensure the questionnaire's comprehensiveness, clarity, and reliability. Various statistical methods, including simple percentages, chi-square test, descriptive analysis, factor analysis, and regression, are utilized to summarize the gathered data. The questionnaire adopts a scale ranging from 1 to 5, where 1 indicates strong agreement and 5 indicates strong disagreement.

Results and Discussions

Examination of Demographic Profile

The demographic presentation of customers is depicted in table 1.

Table 1: Analysis of Customer Demographics

Profile	Distribution	Frequency	Percentage
Gender	Male	294	73.50%
	Female	106	26.50%
Age	Less than 30 years	103	25.75%
	30 – 50 years	183	45.75%
	More than 50 years	114	28.50%
Academic Status	School education	88	22.00%
	Degree	241	60.25%
	Post graduate	71	17.75%
Income (p.m.)	Below Rs.50,000	227	56.75%
	Rs.50,000 – 1,00,000	125	31.25%
	Above Rs.1,00,000	48	12.00%
Occupation	Employed	169	42.25%
	Business	144	36.00%
	Farmer	87	21.75%
Residential Area	Rural	136	34.00%
	Semi-Urban	173	43.25%
	Urban	91	22.75%

Source: Survey Data

Table 1 illustrates the findings regarding the demographic characteristics of customers. In terms of gender, 73.50% are male, while 26.50% are female. Regarding age distribution, 25.75% fall below the age of 30, 45.75% are between 30 and 50 years old, and 28.50% are 50 years and above. The academic background indicates that 22.00% have completed school education, 60.25% have finished undergraduate studies, and 17.75% have completed post-graduate degree. Examining monthly income, 56.75% earn less than Rs.50,000, 31.25% earn between Rs.50,000 and Rs.100,000, and 12.00% earn more than Rs.100,000. Occupation shows that 42.25% are employed in private or government organizations, 36.00% are involved in business, and 21.75% engage in agriculture. In terms of residential areas, 34.00% reside in rural areas, 43.25% in semi-urban, and 22.75% in urban locations.

2. Perception on Drive Comfort of Clean Energy Bikes

The customer perception on drive comfort of clean energy bikes are evaluated. Therefore, the relationship between customers' perception and drive comfort of clean energy bikes are investigated using chi-square test. The hypothesis states that there is significant and positive relationship between customers' perception and drive comfort of clean energy bikes. The results are summarized in table 2.

Table 2: Chi-Square Test

Drive Comfort of Clean Energy Bikes	Chi-Square	
	Value	Sig.
Suspension system effectiveness for smooth rides	15.462	0.000
Seat comfort for extended riding comfort	19.537	0.000
Vibration levels during operation for minimized discomfort	18.634	0.000
Noise levels during operation affecting perceived comfort	21.285	0.000
Handling and manoeuvrability for ease of control	23.659	0.000
Acceleration performance effect in overall riding experience	20.166	0.000
Braking efficiency for reliable and safe stops	17.842	0.000
Riding posture and ergonomic considerations	19.621	0.000
Overall smoothness of the ride experience	17.294	0.000
Range and battery life perception for journey planning	16.583	0.000

Source: Survey Data

Table 2 exhibits the outcomes of the chi-square analysis; it reveals a strong association between customer perceptions regarding the drive comfort of clean energy bikes. The computed values demonstrate statistical significance at a 1% level of significance, thereby validating the hypothesis. Consequently, a substantial and affirmative correlation is established between customers' perceptions and the drive comfort of clean energy bikes. This affirms that customer perception significantly and positively influences the drive comfort experienced with clean energy bikes. Therefore, these variables collectively contribute to the confirmation that customer perception plays a significant and positive role in shaping the drive comfort experienced with clean energy bikes. Therefore, suchauthenticationhighlights the sophisticatedinteraction between customer perceptions and the facets of drive comfort in the realm of clean energy bikes.

3. Preference of Customers towards Clean Energy Bikes

Numerous factors influence the decisions made by customers when purchasing clean energy bikes; hence, an exploration into customer preferences is conducted. The primary objective of this research is to identify the attributes that motivate customers to opt for clean energy bikes. The t-test is employed to assess the computed mean value derived from customers' perspectives. In this statistical analysis, the significance value is determined by comparing the calculated mean value of customers with the expected mean value of 3. The results of this analysis are subsequently presented in Table 3.

Table 3: Descriptive Statistics

Variables	Mean	S.D.	t-value	Sig.
Charging convenience and accessibility	3.63	1.85	16.76	.000
Affordability and cost savings	4.06	1.51	19.73	.000
Environmental impact and green appeal	2.43	1.62	17.38	.000
Range and battery efficiency expectations	3.57	1.74	10.85	.000
Government incentives and subsidies	4.19	1.81	24.76	.000
Brand reputation and reliability	3.86	1.62	31.52	.000
Stylish design and aesthetics	2.97	0.98	15.74	.000
Technological features and innovations	2.92	0.96	13.82	.000
Ease of maintenance and serviceability	3.12	1.55	18.55	.000
Resale value and depreciation rates	3.77	1.48	14.36	.000

Source: Survey Data

Table 3 illustrates that the mean values associated with motivating factors for clean energy bikes range from 2.43 to 4.19. Notably, variables such as charging convenience and accessibility, affordability and cost savings, expectations regarding range and battery efficiency, government incentives and subsidies, brand reputation and reliability, ease of maintenance and serviceability, and resale value and depreciation rates all exhibit mean values exceeding 3. Customers express agreement as evidenced by t-values surpassing three, specifically 16.76, 19.73, 10.85, 24.76, 31.52, 18.56, and 14.36, all of which hold statistical significance at the 1% level. Consequently, it can be inferred that customer preferences for clean energy bikes are influenced by a diverse set of factors.

4. Customer Perception on Clean Energy Bike Purchase Decisions

Customer perceptions on clean energy bike purchases are influenced by diverse factors. Environmental considerations, including awareness of ecological impact and charging infrastructure, shape decisions. Performance and features, such as acceleration, safety, and comfort, play a crucial role. Brand reputation, style preferences, and economic factors like cost-effectiveness and ride smoothness also impact purchase choices. The ensuing conceptual framework, as shown in figure 1, is proposed to test.

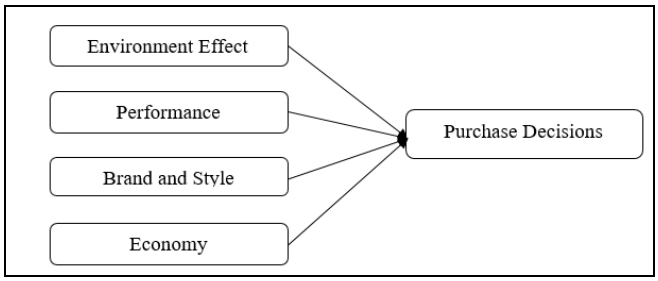

Fig 1: Conceptual Framework

The ensuing hypotheses are presented to investigate the impact ofcustomer perception with regard to purchase decisions.

H_1: Customer perception has significant impact on clean energy bike purchase decisions.

The impact of customer perception on clean energy bike purchase decisionsis measured using factor analysis and regression co-efficient. Consequently, the results of KMO and Bartlett's tests are displayed in table 4.

Table 4: Kaiser-Meyer-Olkin and Bartlett's Test

KMO Measure of Sampling Adequacy		.839
Bartlett's Test of Sphericity	Approx. Chi-Square	665.32
	Df	91
	Sig.	.000

Source: Survey Data

Table 4 illustrates the adequacy of the sample in the KMO metric. The data, possessing a value of 0.839, is deemed sufficient for factor analysis. The conducted Bartlett's test yields a highly significant result ($p<0.000$), affirming the flawless nature of the factor analysis outcomes.

Table 5: Rotated Component Matrix

Factors	Variables	Component			
		1	2	3	4
Environment Effect	Environmental impact awareness	.835	.172	.213	.183
	Charging infrastructure accessibility	.814	.094	.191	.135
	Range and battery performance	.798	.125	.173	.202
	Government incentives and subsidies	.737	.122	.134	.154
	Noise levels during bike operation	.689	.204	.072	.162
Performance	Acceleration and speed performance	.088	.815	.165	.194
	Braking efficiency and safety	.157	.763	.132	.136
	Comfort and ergonomic design	.253	.682	.121	.153
	Technological features and innovations	.234	.643	.111	.164
Brand and Style	Brand reputation and reliability	.182	.092	.795	.137
	Design aesthetics and style preferences	.151	.122	.758	.145
	Resale value and depreciation rates	.196	.163	.646	.123
Economy	Cost-effectiveness in the long run	.163	.184	.124	.785
	Perception of overall ride smoothness	.146	.213	.156	.751
	Community and peer influence	.204	.215	.161	.672

Source: Survey Data

Table 5 reveals the results of rotated matrix, it shows that all antecedents of purchase decisions such as, environment effect, performance, brand and style, and economy are accepted. The first factor, environment effect is loaded with five factors, it covers, environmental impact awareness, charging infrastructure accessibility, range and battery performance expectations, government incentives and subsidies and noise levels during bike operation. The second factor includes acceleration and speed performance, braking efficiency and safety considerations, comfort and ergonomic design and technological features and innovations. The third factor brand and style deals with three factors like, brand reputation and reliability, design aesthetics and style preferences, and resale value and depreciation rates. The fourth factor economy consists of cost-effectiveness in the long run, perception of overall ride smoothness and community and peer influence. The factors bring sufficient values for factor loading, and these factors are linked. The impact of other attributes is partially liable for the score given to any one attribute.

Table 6: R-Square and Durbin-Watson Test

Model	R Square	Dutbin-Watson
1	0.705	1.815

Source: Survey Data

Table 6 presents the outcomes of the R-Square and Durbin-Watson tests. The computed R-Square test result of 0.705 is considered acceptable for regression analysis. Additionally, the Durbin-Watson test yields a value of 1.815, indicating that autocorrelation is approaching zero or substantial variance exists between the two variables.

Table 7: Results of Anova Test

Model	F	Sig.
1	79.896	0.000

Source: Survey Data

Table 7 displays the Anova findings, revealing that the four precursors to customer perception differ significantly and can be employed to predict the dependent variable, purchase decisions. This is substantiated by the high F value of 79.896 ($p<0.000$), signifying a significant level below 1%.

Table 8: Results of Regression Coefficient

Variables	Standardized Beta Coefficient	T	Sig.	Collinearity Statistics	
				Tolerance	VIF
1 (Constant)	.402	0.774	.631	.455	1.102
Environment Effect	.372	5.615	.000	.639	1.356
Performance	.298	5.837	.000	.627	1.259
Brand and Style	.371	4.356	.000	.716	1.167
Economy	.265	4.984	.000	.575	1.247

Source: Survey Data

Table 8 provides comprehensive insights into the statistical significance of variables influencing clean energy bike purchase decisions. All variables exhibit notable statistical significance ($p<0.000$), supported by high beta values (0.372, 0.298, 0.371, and 0.265) and corresponding t-values (5.615, 5.837, 4.356, and 4.984). The VIF values, consistently below 10, dispel concerns of multi-collinearity, affirming the unique contribution of each variable. Environmental impact, performance, brand and style, and economic factors collectively wield substantial influence on clean energy bike purchase decisions. A closer examination of the t-statistics for these variables reveals a significant association ($p<0.000$), leading to the rejection of the null hypothesis. This validation highlights the crucial role of customer perception in shaping decisions regarding the purchase of clean energy bikes. In essence, the study establishes that customer perceptions, encompassing environmental considerations, performance expectations, brand and style preferences, and economic factors, significantly impact and contribute to the decision-making process surrounding clean energy bike purchases.

Discussion

Customer perception towards the drive comfort of clean energy bikes aligns with the broader recognition of what influences individuals in embracing sustainable transportation. Exploration of aspects related to ride

comfort, including suspension effectiveness, seat comfort, vibration levels, noise impact, handling, acceleration, braking, riding posture, and overall smoothness, this objective seeks to unveil the elements shaping customers' experiences with clean energy bikes. Customer preferences explores into the aspects guiding individuals to choose clean energy bikes over traditional alternatives. It aligns with existing literature emphasizing the significance of factors such as charging convenience, affordability, environmental appeal, range expectations, government incentives, brand reputation, design aesthetics, technological features, ease of maintenance, and resale value. Realizing these preferences provides valuable insights for manufacturers, policymakers, and businesses aiming to enhance the appeal of clean energy bikes. The impact of customer perception on purchase decisions, is pivotal for comprehending the broader implications of individual choices. It validates the hypothesized positive relationship, reinforcing the notion that customer attitudes significantly influence the adoption of clean energy bikes. The synthesis of these objectives contributes to a comprehensive realization of the main aspects influencing customer choices in the arena of clean energy bikes.

Conclusion

Customer perception aspects are statistically significant on the drive comfort of clean energy bikes. All variables showing a strong association, the hypothesis is validated. It emphasizes the crucial role of customer perception in positively shaping the drive comfort experienced with clean energy bikes, emphasizing the multifaceted impact of these variables on purchase decisions. Customer preference is influenced by the varied factors with regard to clean energy bikes. Results affirm the impact of variables such as charging convenience, affordability, environmental appeal, and brand reliability on customer choices. These findings validate the hypothesis that diverse factors significantly shape customer preferences for clean energy bikes, emphasizing the multifaceted nature of influences in the decision-making process. Purchase decision is widely depended on environmental impact, performance, brand and style, and economy. The factors, each encompassing distinct attributes, exhibit sufficient values for factor loading, indicating interrelatedness. Environment effect, performance expectations, brand preferences, and economic factors collectively contribute, emphasizing its impact shaping customer choices in the realm of clean energy bike purchases. Environmental impact, performance, brand and style, and economic factors collectively wield considerable influence on decisions. It validates the pivotal role of customer perception in clean energy bike purchases. The study establishes that environmental considerations, performance expectations, brand preferences, and economic factors significantly contribute to decision-making, emphasizing the multifaceted influence of customer perceptions.

Research Implications

The implications of the study extend beyond individual consumer choices, offering valuable comprehensions for various stakeholders. Manufacturers can leverage the findings to refine product designs, emphasizing features that align with customer preferences such as charging convenience, affordability, and design aesthetics. Policymakers gain insights into factors influencing the adoption of clean energy bikes, guiding the formulation of targeted incentives and regulations. Additionally, businesses in the clean energy transportation sector can adapt marketing strategies to emphasize key drivers identified in the study. Overall, the study contributes to the sustainable mobility discourse, developing a deeper check of the factors shaping the transition towards clean energy bikes and facilitating informed decisions among industry players and policymakers.

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