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A Study on Consumer Perception towards CNG Bikes

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ABSTRACT

This study investigates consumer perceptions, and preferences toward CNG (Compressed Natural Gas) bikes, aiming to understand key factors that influence consumer interest and potential adoption. The primary objective is to assess consumer attitudes and identify concerns regarding the safety of CNG bikes. Key findings indicate that young adults (18-25 years), especially males and urban residents, exhibit the most interest. Fuel efficiency and environmental benefits rank as the most valued attributes, while limited fuelling infrastructure and safety concerns are seen as primary adoption barriers. There is a statistically significant relationship between a consumer's likelihood to purchase CNG bikes and their perception of CNG vehicles relative to petrol and electric vehicles (EVs). However, age does not significantly influence consumer perception of CNG bikes. The study suggests improving infrastructure, expanding model variety, and emphasizing safety features to promote CNG bikes as an eco-friendly and viable transportation alternative.

1.INTRODUCTION

With the increasing concern over environmental degradation and the rising cost of conventional fuels, the need for sustainable and affordable transportation alternatives has become more pressing than ever. Among these alternatives, Compressed Natural Gas (CNG) has emerged as a cleaner, more economical fuel option that is gaining attention in the automotive sector. Traditionally associated with cars, CNG is now being explored for two-wheelers like bikes, offering a potential solution for reducing pollution and fuel costs in urban and rural settings.

This study aims to explore consumer perceptions towards CNG bikes, an area that remains relatively new and under-researched. While electric vehicles (EVs) have captured much of the market's attention, CNG bikes offer a different set of advantages, particularly in terms of cost efficiency, fuel availability, and lower emissions compared to gasoline-powered bikes. However, despite these benefits, the adoption of CNG bikes may be influenced by various factors, including consumer awareness, product performance, safety concerns, and the availability of refuelling infrastructure.

The primary objective of this study is to analyse the attitudes, preferences, and concerns of consumers towards CNG bikes. Additionally, the research will identify the key product features and attributes that appeal to consumers and influence their purchasing decisions. It will also address consumer concerns regarding the safety of CNG bikes and evaluate their opinions on the use of CNG as a viable fuel option, alongside the current state of CNG refuelling stations.

By understanding the perceptions and expectations of consumers, this study aims to provide insights that can guide manufacturers and policymakers in promoting CNG bikes as an eco-friendly and cost-effective mode of transportation.

2. Material and methods

2.1 Literature Review

A. Saurabh et al. (2022) - CNG on Two-Wheelers: This paper explores converting petrol-powered motorcycles to use CNG fuel, targeting pollution reduction and cost savings in India's high-pollution context. Using SolidWorks, the authors design a conversion kit with components like a CNG cylinder, reducer, and delivery valves, ensuring the motorcycle's stability, safety, and ergonomic integrity. A cost-benefit analysis shows that CNG motorcycles could be economically viable, with emissions reductions aligning with India's air quality goals, making it an attractive alternative for consumers and policymakers alike.

S. Mehta (2021) - Economic Aspects of CNG Bikes: Mehta's study investigates the economic benefits of CNG bikes compared to petrol-powered motorcycles. Despite higher initial purchase costs, CNG bikes prove more affordable in the long run due to lower fuel prices and reduced maintenance needs, particularly beneficial for frequent riders. For cost-sensitive consumers, the long-term savings from CNG bikes outweigh the initial investment.

A.K. Sharma (2020) - Consumer Awareness: Sharma's study reveals a significant lack of consumer understanding about CNG bikes, specifically around their fuel savings, emissions reduction, and maintenance benefits. While consumers recognize CNG as eco-friendly, they remain hesitant due to limited technical knowledge. The study suggests that targeted awareness campaigns are necessary to close this gap and encourage adoption.

Singh et al. (2020) - Fuel Efficiency, Maintenance, and Safety: Singh et al. identify that fuel efficiency is a primary factor in consumer interest in CNG bikes, along with low maintenance costs due to simpler engine structures. However, safety remains a concern because of CNG's pressurized gas storage, highlighting the need for reliable safety features like reinforced fuel tanks. Addressing these concerns could help enhance consumer confidence in CNG technology.

R. Gupta (2019) - Environmental Benefits of CNG Vehicles: Gupta's study indicates that environmentally conscious consumers, concerned about air pollution, are more inclined to adopt CNG bikes, given the fuel's low emissions profile. Emphasizing the reduced emissions of CNG bikes could attract eco-conscious consumers, as the ability to contribute positively to the environment aligns with their purchasing preferences.

Kumar et al. (2018) - Perception of CNG Bikes as Eco-Friendly: Kumar et al. highlight CNG bikes as a greener alternative to petrol, valued by consumers for their lower running costs and environmental benefits. However, limited CNG refueling stations deter some consumers, indicating that expanding refueling infrastructure could be key to broader adoption.

3. RESEARCH METHODOLOGY

Research methodology refers to the systematic and structured approach that researchers use to plan, conduct, and evaluate their research studies. It encompasses the techniques, strategies, procedures, and tools that researchers employ to gather and analyse information, draw conclusions, and contribute to the advancement of knowledge in their respective fields.

3.1 RESEARCH DESIGN

Descriptive research aims to accurately and systematically describe a population, situation, or phenomenon. It can answer what, where, when, and how questions, but not why questions. A descriptive research design can use a wide variety of research methods to investigate one or more variables. The researcher does not control or manipulate any of the variables, but only observes and measures them.

3.2 DATA COLLECTION

For this study, data were compiled from both primary and secondary sources.

3.2.1 PRIMARY DATA

Primary data are usually collected from the source where the data originally originates from and are regarded as the best kind of data in research. In this study, the questionnaire has been used to collect primary data. In this study, the primary data will be collected using a structured questionnaire.

3.2.2 SECONDARY DATA

Secondary data is the data that has been already collected for another purpose but has some relevance to a current research need. In this study, secondary data are collected from the feedback filled by the nurses. The secondary data for this study was obtained from internal sources.

3.3 SAMPLING METHOD

Convenience sampling is a non-probability sampling technique where subjects are selected based on their availability and ease of access to the researcher. It is commonly used in exploratory research when a population is difficult to reach, time is limited, or resources are constrained. In convenience sampling, participants are typically chosen because they are readily available or because they happen to be at the right place at the right time, making it an efficient and cost-effective method for preliminary data collection.

3.4 SAMPLE SIZE

A sample of 101 respondents is taken in this study and the required data has been collected.

3.5 TOOLS FOR ANALYSIS

ANOVA

ANOVA (Analysis of Variance) is a statistical method used to compare means among three or more groups to determine if there is a significant difference between them. It helps to identify whether the differences in group means are likely due to random chance or actual differences between the groups.

CORRELATION

A statistical measure that describes the strength and direction of a relationship between two variables. A statistical measure that describes the strength and direction of a relationship between two variables. It ranges from -1 to 1,

4.DATA ANALYSIS AND INTERPRETATION

4.1 PERCENTAGE ANALYSIS

Table 1: GENDER OF THE RESPONDENT

		Frequency	Percent	Cumulative Percent
Valid	Male	67	65.7	66.3
	Female	34	33.3	100.0
	Total	101	100.0	

The survey indicates that 66.3% of respondents are male, while 33.7% are female.

Table 2: AGE OF THE RESPONDENT

		Frequency	Percent	Cumulative Percent
Valid	Below 18	1	1.0	1.0
	18-25	59	57.8	59.4
	26-35	25	24.5	84.2
	36-45	14	13.7	98.0
	46-55	2	2.0	100.0
	Total	101	100.0	

The survey shows that the majority of respondents (58.4%) are aged between 18-25, followed by 24.8% in the 26-35 age group. A smaller portion of respondents are aged 36-45 (13.9%), while 2% fall in the 46-55 age range. Only 1% of respondents are under 18.

Table 3: OCCUPATION OF THE RESPONDENT

		Frequency	Percent	Cumulative Percent
Valid	Student	44	43.1	43.6
	Employed	32	31.4	75.2
	Self-employed	16	15.7	91.1
	Unemployed	9	8.8	100.0
	Total	101	100.0	

The survey shows that 43.6% of respondents are students, 31.7% are employed, 15.8% are self-employed, and 8.9% are unemployed.

4.2 DATA ANALYSIS

4.2.1 ANOVA

Null Hypothesis (H_0): There is no significant different between buying CNG bikes in the future and perception of CNG bikes compared to petrol/EV bikes

Alternative Hypothesis (H_1)**:** There is a significant different between buying CNG bikes in the future and perception of CNG bikes compared to petrol/EV bikes

ANOVA					
CONSIDER BUYING CNG					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	**11.371**	**4**	**2.843**	**3.690**	**.008**
Within Groups	**73.955**	**96**	**.770**		
Total	**85.327**	**100**			

The significant value is .008 is lesser than 0.05 (.008<0.05). Hence H0 is rejected. There is a significant relationship between the decision to buy CNG bikes in the future and perceptions of CNG bikes compared to petrol/EV bikes.

4.2.2 ANOVA

Null Hypothesis (H_0): There is no significant different between features of CNG bike over petrol/EV and buying CNG in future.

Alternative Hypothesis (H_1): There is a significant different between features of CNG over petrol/EV and buying CNG in future.

ANOVA					
CONSIDER BUYING CNG					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	**3.118**	**3**	**1.039**	**1.226**	**.304**
Within Groups	**82.209**	**97**	**.848**		
Total	**85.327**	**100**			

The significant value is .008 is lesser than 0.05 (.008<0.05). Hence H0 is rejected. There is a significant relation

4.2.3 CORRELATION

Null Hypothesis (H_0): There is no significant relationship between perception of CNG bike compared to petrol/EV and age.

Alternative Hypothesis (H_1): There is a significant relationship between perception of CNG bike compared to petrol/EV and age

Correlations			
		compare to petrol and ev	**agr of the respondents**
compare to petrol and ev	**Pearson Correlation**	**1**	**.157**
	Sig. (1-tailed)		**.059**
	N	**101**	**101**
agr of the respondents	**Pearson Correlation**	**.157**	**1**
	Sig. (1-tailed)	**.059**	
	N	**101**	**101**

The Sig. value is 0.059 which is slightly greater 0.05. Hence H0 is accepted. There is no significant relationship between the perception of CNG bikes compared to petrol/EV bikes and the age of the respondents.

5. FINDINGS & SUGGESIONS

5.1 FINDINGS

Young adults aged 18-25 show the highest interest in CNG bikes, marking them as a key market. Awareness is strongest in urban areas, while suburban and rural areas lag. Students and employed individuals are more inclined towards CNG bikes, influenced mainly by friends, family, and online sources. About half of the respondents express interest in buying a CNG bike, though some remain unsure, indicating a need for more information. Safety features like fuel tank protection and emergency shut-off valves are prioritized. Consumers place higher value on fuel efficiency over acceleration or top speed, emphasizing cost savings. Key barriers to adoption are limited refueling infrastructure, few model options, and safety concerns. Environmental benefits and cost-effectiveness are primary motivators, although CNG bikes are generally rated below electric and petrol options. Refueling accessibility is an issue, with many finding stations inconvenient. Moderate interest exists for premium CNG bikes, suggesting that enhanced features could attract premium buyers. A significant relationship exists between a positive perception of CNG bikes and the likelihood of purchase, though age does not significantly impact these perceptions.

5.1 SUGGESTIONS

To boost consumer confidence, manufacturers should address specific safety concerns by emphasizing safety features such as fuel tank protection and emergency shut-off valves. Marketing efforts should leverage social media, digital advertising, and influencer partnerships to reach potential buyers, as most learn about CNG bikes online or from family and friends. Expanding the refueling infrastructure would enhance accessibility and convenience, especially in underserved regions. To overcome the current limitations in model variety, manufacturers should consider introducing a wider range of CNG bike models, potentially including premium versions to attract a broader audience. Emphasizing fuel efficiency and cost savings as primary selling points would align well with consumer interests. Partnerships with government or private sectors to raise awareness and increase access to CNG as an alternative fuel could also encourage adoption. Using consumer feedback to enhance perceptions of CNG bikes, specifically compared to petrol and electric vehicles, would be beneficial by investing in product quality and design. Furthermore, focusing on fuel tank protection and emergency shut-off valves would directly address the top safety concerns expressed by potential buyers.

5.2 CONCLUSION

The study reveals that consumer perception of CNG bikes is significantly influenced by their environmental benefits, fuel efficiency, and affordability. Many consumers view CNG bikes as a sustainable and cost-effective transportation option. However, concerns about limited CNG refueling infrastructure, safety uncertainties, and a lack of model variety hinder broader adoption. To enhance market acceptance, it is essential to expand the CNG refueling network and improve safety measures. Additionally, offering a wider range of models would address consumer preferences and needs. Building consumer trust is crucial for increasing adoption rates. By tackling these challenges, CNG bikes can emerge as a viable alternative to conventional petrol and electric vehicles. This shift can significantly contribute to a more sustainable and eco-friendly transportation sector. Ultimately, addressing consumer concerns will be key to promoting CNG bikes as a mainstream choice.

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