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A Study on Key Factors Influencing Consumer's Adoption & Purchase of Electric Cars

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Abstract

The transition towards electric vehicles (EVs) is pivotal in achieving sustainable transportation goals. This study explores consumer perception and the key factors influencing the adoption and purchase of electric cars. Drawing insights from a structured survey of 244 respondents, the study examines awareness levels, sources of information, attitudes toward new technology, and driving compatibility with EVs. It also analyzes the perceived advantages (e.g., operational cost, environmental impact, performance features) and barriers (e.g., limited range, high battery cost, charging infrastructure) that shape consumer behavior. The findings highlight a growing awareness and interest in EVs among the youth and educated population, with strong influence from digital media and government incentives. However, concerns such as recharging time, service availability, and high upfront costs remain critical deterrents. The study contributes valuable insights for policymakers and EV manufacturers to enhance market readiness, improve consumer trust, and facilitate the broader adoption of electric vehicles in India.

Keywords: Electric Vehicles (EVs), Consumer Perception, Adoption Factors, Purchase Intention, Barriers to EV Adoption

1. Introduction

The global automotive industry is undergoing a significant transformation with the rising adoption of Electric Vehicles (EVs), driven by environmental concerns, technological advancements, and evolving consumer preferences. With increasing pollution levels and the depletion of fossil fuels, there is a growing need to shift toward sustainable transportation solutions. Electric vehicles have emerged as a promising alternative due to their zero-emission capability, lower operational costs, and improved energy efficiency. India, being one of the largest automobile markets in the world, is steadily witnessing a shift in consumer awareness and governmental policy support for EVs. Despite these positive developments, the market penetration of electric vehicles remains relatively low. This gap highlights the importance of understanding consumer perception and the factors that encourage or discourage them from adopting EVs. This study aims to investigate the key factors that influence consumer attitudes and purchase decisions regarding electric cars. It explores multiple dimensions such as awareness levels, technological readiness, performance expectations, cost considerations, environmental consciousness, and infrastructural barriers. The research also considers demographic influences like age, income, education, and location to understand variations in perception. By analyzing data collected from residents of South Gujarat, the study provides actionable insights into the current state of EV awareness and adoption. It seeks to assist policymakers, manufacturers, and marketers in developing effective strategies to accelerate the transition towards electric mobility in India.

2. Literature Review

The increasing global concern over environmental degradation and fossil fuel dependency has spurred extensive research into alternative transportation solutions, among which electric vehicles (EVs) are gaining significant attention. Studies have highlighted that consumer awareness and perception play pivotal roles in the adoption of EVs (Rezvani et al., 2015). Awareness, often shaped by media, personal experiences, and peer influence, is a key driver in forming initial attitudes toward electric mobility.

Multiple factors encourage consumers to consider transitioning to EVs. Research by Hardman et al. emphasizes the importance of operational cost savings, environmental benefits, and advanced technological features as primary motivators. The present dataset confirms the relevance of these findings, where attributes like low noise, fewer vibrations, and lower maintenance emerged as attractive incentives. Moreover, government incentives, test drives, and peer recommendations significantly enhance consumer confidence, as also noted in studies by Lieven et al.

However, the adoption of EVs is not without hesitation. Numerous studies (e.g., Egbue & Long, 2012) report that concerns regarding limited range, long charging times, high battery replacement costs, and insufficient infrastructure remain critical barriers. These findings are reflected in the survey, where fear of inadequate charging stations and service support were identified as major discouraging factors.

Demographic attributes such as age, education, income, and geographic location have been found to moderate consumer attitudes. Younger, more educated, and urban populations tend to be more open to adopting EVs, as supported by Axsen & Kurani (2013). Purchase intention has also been linked with psychological factors, such as self-image, environmental consciousness, and openness to innovation (Noppers et al., 2014).

3. Research Methodology

3.1. Statement of the Problem

Despite increasing environmental concerns and governmental support, the adoption rate of electric vehicles (EVs) in India remains considerably low compared to conventional vehicles. While EVs promise numerous benefits such as zero emissions, reduced operational costs, and technological advancements, a significant section of the population continues to hesitate in switching from traditional fuel-based vehicles. This gap raises questions about the public's awareness, perception, and the real or perceived barriers that influence their decision-making. Understanding the factors that both encourage and discourage consumers in a regional context like South Gujarat is critical for aligning future marketing, policy-making, and infrastructure development to support EV adoption.

3.2. Research Questions

- What is the level of awareness of consumers regarding electric vehicles in South Gujarat?
- What key factors influence the decision to adopt and purchase electric vehicles?

3.3. Objectives of the Study

- To assess the awareness and knowledge of consumers about electric vehicles.
- To identify the motivating factors that encourage the adoption and purchase of EVs.
- To evaluate the likelihood of future purchase intentions for electric vehicles among consumers in South Gujarat.

3.4. Research Design

The study adopts a descriptive research design, aimed at understanding consumer perception and identifying key factors influencing the adoption and purchase of electric vehicles (EVs). A structured

questionnaire was employed as the primary tool to collect quantitative data from respondents residing in South Gujarat.

3.5. Data Collection Method

Primary data was gathered through a survey questionnaire, which included both closed-ended and Likert scale-based questions. The survey was distributed online to ensure wide reach and convenience of participation.

3.6. Sample Size and Sampling Technique

A total of 243 valid responses were received. The respondents were selected using convenience sampling, targeting individuals with access to the internet and basic knowledge of electric vehicles. The sample included participants from diverse age groups, education levels, income brackets, and cities within South Gujarat.

3.7. Data Analysis Techniques

Frequency distribution and cross-tabulation were used to understand relationships between demographic variables and consumer perceptions. Further, Likert scale responses were analyzed to determine the intensity of agreement or concern across influencing and discouraging factors. The collected data was analyzed using Chi-square testing.

4. Analysis & Findings

4.1. Demographic Profile of Respondents

Category	Sub-category	%	Frequency
Age Group	21–30	31.7%	77
	31–40	35.8%	87
	41–50	24.7%	60
	51–60	6.6%	16
	Above 60	1.2%	3
Gender	Male	71.2%	173
	Female	28.8%	70
Education Qualification	Schooling	0.4%	1
	H.S.C	2.5%	6
	Undergraduate	8.6%	21
	Graduate	43.6%	106
	Postgraduate	41.2%	100
	PhD	3.7%	9
Monthly Family Income	Less than ₹20,000	10.7%	26
	₹20,001 – ₹40,000	28.4%	69
	₹40,001 – ₹60,000	35.0%	85
	More than ₹60,000	25.9%	63

The study surveyed 243 respondents, mostly males (71.2%) and primarily aged between 31–40 years (35.8%), followed by 21–30 years (31.7%). A majority held higher educational qualifications, with 43.6% being graduates and 41.2% postgraduates. In terms of monthly family income, 35% earned ₹40,001–₹60,000, indicating a largely middle-income, well-educated participant base.

4.2. Factors Encouraging Consumers to Buy an EV

The top encouraging factors for EV adoption are safety (4.34), performance (speed 4.24), test drives (4.23), and low road tax (4.23), showing that consumers prioritize safety, performance, and financial benefits. Factors like style, brand, trends, and promotions received lower mean scores (around 3.6–3.8), indicating they are less influential. Overall, practical and economic aspects outweigh emotional or brand-driven motivations in influencing purchase decisions.

4.3. Hypothesis Testing

H0: There is no dependency between age group and Interest towards Electric Cars

Age Group * Are you interested in Electric Cars? Crosstabulation

			Are you interested in Electric Cars?				
			Not at all Interested	Somewhat Interested	To a great extent	Very Little Interested	Total
Age Group	21-30	Count	2	42	28	5	77
		Expected Count	6.3	36.1	19.3	15.2	77.0
	31-40	Count	5	46	17	19	87
		Expected Count	7.2	40.8	21.8	17.2	87.0
	41-50	Count	8	22	12	18	60
		Expected Count	4.9	28.1	15.1	11.9	60.0
	51-60	Count	5	4	3	4	16
		Expected Count	1.3	7.5	4.0	3.2	16.0
	Above 60	Count	0	0	1	2	3
		Expected Count	.2	1.4	.8	.6	3.0
Total		Count	20	114	61	48	243
		Expected Count	20.0	114.0	61.0	48.0	243.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	41.792[a]	12	<.001
Likelihood Ratio	40.723	12	<.001
N of Valid Cases	243		

a. 8 cells (40.0%) have expected count less than 5. The minimum expected count is .25.

Since the p value is less than 0.05, the null hypothesis is rejected. There is a dependency between Age Group & Interest towards Electric Cars.

H0: There is no dependency between adoption rate & price hike in petrol

Due to Price Hike in Petrol, Do you feel Electric Vehicles will be Advantageous option to make use of currently and in the future? * How do you rate yourself in terms of adopting to the New Technology? Crosstabulation

			How do you rate yourself in terms of adopting to the New Technology?			
			May take time to Adopt	Not Ready to Adopt	Ready to Adopt	Total
Due to Price Hike in Petrol, Do you feel Electric Vehicles will be Advantageous option to make use of currently and in the future?	Maybe	Count	51	13	6	70
		Expected Count	35.1	4.6	30.2	70.0
	No	Count	7	3	3	13
		Expected Count	6.5	.9	5.6	13.0
	Yes	Count	64	0	96	160
		Expected Count	80.3	10.5	69.1	160.0
Total		Count	122	16	105	243
		Expected Count	122.0	16.0	105.0	243.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	72.784[a]	4	<.001
Likelihood Ratio	84.213	4	<.001
N of Valid Cases	243		

a. 2 cells (22.2%) have expected count less than 5. The minimum expected count is .86.

Since the p value is less than 0.05, the null hypothesis is rejected. There is a dependency between adoption rate & price hike in petrol.

5. Conclusion

The findings of this study highlight a growing awareness and interest in electric vehicles (EVs), particularly among younger, educated, and urban consumers in South Gujarat. 23.9% Respondents have a desire to purchase an Electric Car within 5 years whereas 38.7 % in upcoming 5-10 years, the remaining respondents are planning to purchase after 10 years. Safety, performance, and cost-saving benefits such as low road tax emerged as primary motivators for EV adoption, while limited charging infrastructure, high initial costs, and lack of service support continue to pose significant challenges. The results affirm that consumer perception is strongly influenced by digital media, test drive experiences, and government incentives. Furthermore, statistical analysis indicates that factors like age group and fluctuations in petrol prices significantly affect consumer interest and adoption rates.

5.1. Recommendations:

To accelerate EV adoption, policymakers and manufacturers must address the prevailing concerns through strategic interventions such as expanding charging networks, offering financial incentives, and enhancing after-sales service infrastructure. The study provides valuable insights for aligning marketing efforts, policy frameworks, and technological developments with consumer expectations, thereby contributing to a more sustainable and electric-powered future.

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