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The customer perception towards electric vehicles in Telangana - An analysis

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Abstract
The shift toward electric vehicles (EVs) is a key component in advancing sustainability and reducing reliance on fossil fuels. With increasing concerns about climate change and environmental degradation, EVs offer a viable alternative to traditional internal combustion engine vehicles due to their lower carbon footprint and greater energy efficiency. However, large-scale adoption depends on multiple factors, including consumer awareness, affordability, availability of charging infrastructure, and government policies.

This study explores consumer perceptions of EVs in Telangana, drawing data from 100 participants across diverse demographics. By applying statistical methods such as descriptive analysis, chi-square tests, and regression analysis, the research identifies the main drivers of EV adoption, the barriers preventing wider acceptance, and the overall satisfaction with existing charging infrastructure.

The results provide valuable insights into consumer attitudes and suggest areas for improvement to enhance confidence in EV technology. Additionally, this study presents recommendations for policymakers, manufacturers, and stakeholders to increase EV penetration in Telangana by addressing infrastructure gaps, refining incentive programs, and strengthening public awareness initiatives. A well-executed transition to EVs will contribute to a cleaner and more sustainable transportation system in the region.

Keywords: Electric vehicles, sustainable mobility, fossil fuel reduction, EV adoption, consumer behavior, infrastructure challenges, policy measures

Introduction

The adoption of electric vehicles (EVs) has gained momentum due to their environmental and economic benefits. EVs produce zero tailpipe emissions, reducing air pollution and greenhouse gases such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Additionally, they contribute to lower noise pollution in urban environments. From an economic perspective, EVs offer lower operational costs since electricity is generally cheaper than gasoline, and their simpler mechanical design results in reduced maintenance expenses. Governments globally incentivize EV adoption through tax benefits and subsidies, making them more accessible and appealing to consumers.

Beyond financial savings, EVs also support energy independence by decreasing dependence on fossil fuels while integrating with renewable energy sources. Advances in battery technology and smart grid systems have improved efficiency and performance. Expanding charging infrastructure and developing autonomous vehicle technology are further shaping the future of transportation. Additionally, the growing EV industry is generating employment and fostering economic development while promoting sustainability. With continuous innovation, EVs are poised to revolutionize the mobility sector, making transportation cleaner and more efficient.

Telangana Electric Vehicle (EV) Policy 2024

The Telangana government introduced the Electric Vehicle (EV) Policy 2024 to promote eco-friendly transportation and improve air quality, environmental sustainability, and energy efficiency. Announced on November 17, 2024, the policy includes incentives and infrastructure expansion strategies.

Key Policy Measures

Tax Exemptions

- 100% exemption on road tax and registration fees for all EV categories (two-wheelers, three-wheelers, four-wheelers, buses, and tractors) until December 31, 2026.

Financial Incentives

- A retro-fitment incentive covering 15% of the total cost (up to Rs. 15,000 per vehicle).
- Reduced interest rates on EV financing.
- Grants to expand EV charging infrastructure and support electric bus acquisitions.

Charging Infrastructure

- Establishing fast-charging stations in Hyderabad and other cities.
- Encouraging private sector participation in charging station development.

Other Initiatives

- Creating a large-scale EV and Energy Storage System (ESS) cluster with world-class infrastructure.
- Establishing a dedicated division for EV component prototyping at the T-Works Automotive Prototyping Centre.

Despite these initiatives, EV adoption in Telangana remains low. This study examines consumer perceptions, identifies influencing factors, and provides recommendations to enhance adoption rates in the region.

Literature Review

Previous studies indicate that cost, infrastructure, and environmental concerns significantly impact EV adoption.

Research by Pandit *et al*. (2024) highlights that financial incentives and government policies influence consumer decisions globally. In India, initiatives such as the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme have encouraged EV purchases (Ministry of Heavy Industries, 2023) [2]. However, challenges like high upfront costs and inadequate charging facilities continue to hinder widespread adoption.

Research by Jaiswal *et al*. (2024) emphasizes that awareness, economic considerations, and infrastructure are critical drivers of EV uptake. While incentives and charging station, availability have positively influenced adoption, issues such as range anxiety and high initial costs persist. This study extends existing research by focusing on Telangana's unique economic and infrastructural landscape.

Research Objectives and Hypotheses

Research Gaps

- **Limited Studies on Awareness:** Few studies specifically analyze EV awareness levels in Telangana.
- **Lack of Data on Purchase Decisions:** Most research identifies general influencing factors but lacks insight into consumer decision-making processes.
- **Unclear Perceptions of Benefits and Challenges:** There is a need for region-specific research to understand the actual impact of cost, infrastructure, and incentives on consumers.

Objectives

1. Assess customer awareness of EVs in Telangana.
2. Identify key factors influencing EV purchase decisions.
3. Analyze perceived benefits and challenges of EV adoption.

Hypotheses

- **H1:** Increased awareness leads to a higher likelihood of EV adoption.
- **H2:** High upfront costs negatively impact purchase decisions.
- **H3:** Adequate charging infrastructure positively influences consumer perceptions.

Methodology

Data Collection: A structured questionnaire was used to gather data from 100 respondents, comprising both EV users and non-users of Telangana.

Sampling Technique: Participants were selected using a convenience samplingmethod the questionnaire was sent through WhatsApp groups to get the data

Duration of the study: The study is conducted from 1-1-2025 to 31-1-2025

Data Analysis Techniques

1. Descriptive statistics were used to summarize the data.
2. Chi-square tests were conducted to examine relationships between categorical variables.
3. Regression analysis was performed to identify key predictors of EV adoption.

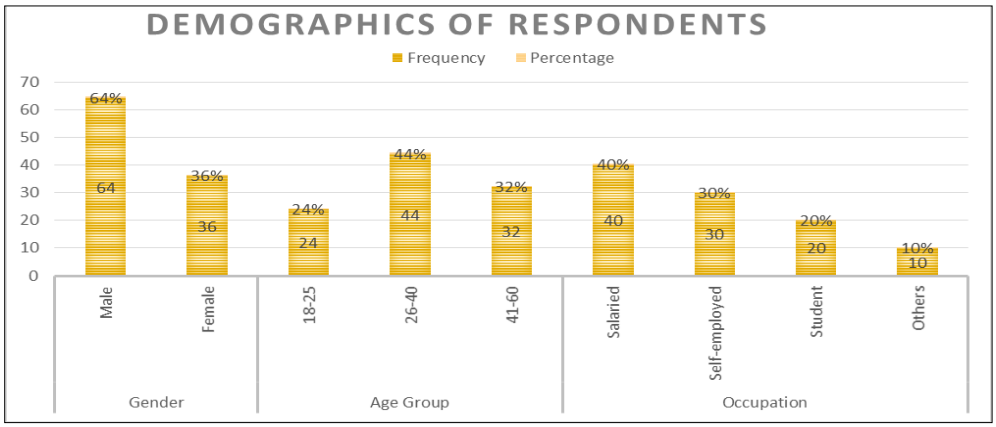
Data Analysis

1. Demographics of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	64	64%
	Female	36	36%
Age Group	18-25	24	24%
	26-40	44	44%
	41-60	32	32%
Occupation	Salaried	40	40%
	Self-employed	30	30%
	Student	20	20%
	Others	10	10%

From the above table, it can be said that most of the respondents are males (64%), and the largest age group is 26-40 years (44%), followed by 41-60 years (32%). This suggests that the survey mainly reflects the views of working professionals.

- In terms of occupation, salaried employees (40%) and self-employed individuals (30%) dominate, meaning the financial aspect of EVs might be a crucial factor for them.



2. Awareness Levels

Awareness About EVs	Yes	No
Respondents	76	24

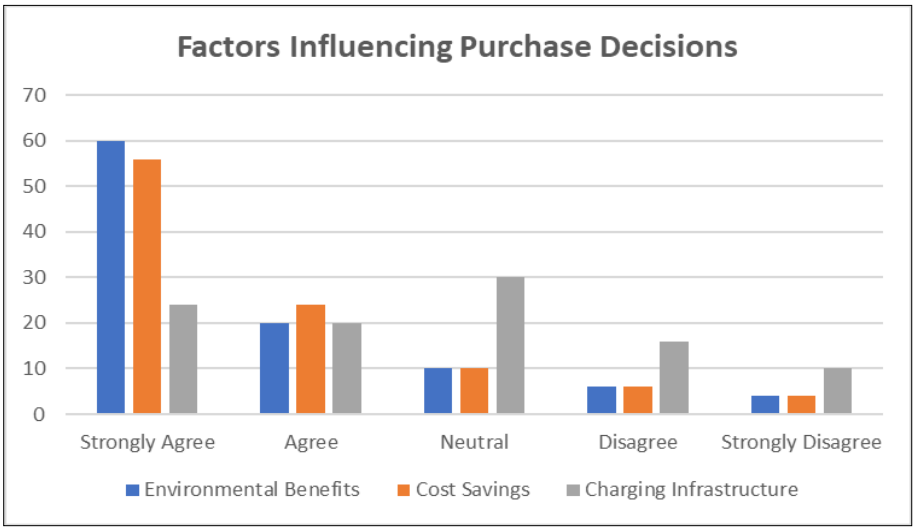
- A majority (76%) of people are already aware of EVs, but a notable 24% still lack awareness. This means that while EV adoption is growing, there is still a need for education and outreach efforts.

3. Factors Influencing Purchase Decisions

Factor	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Environmental Benefits	60	20	10	6	4
Cost Savings	56	24	10	6	4
Charging Infrastructure	24	20	30	16	10

Environmental benefits and cost savings are highly important to most respondents, with 80% agreeing that these factors matter.

- Charging infrastructure, however, is a mixed concern—only 44% agree that it influences their decision, while 36% disagree; showing that availability of charging stations is not the top concern for many buyers.



4. Chi-Square Test Results

Variable	Chi-Square Value	P-value	Significance
Awareness vs Adoption	14.25	0.001	Significant
Cost vs Adoption	12.30	0.004	Significant
Infrastructure vs Adoption	8.45	0.06	In Significant

From the above table we can observe the following

- This means people who know about EVs are more likely to adopt them.
- **Cost also plays a significant role** ($p = 0.004$), meaning financial factors (like price and running costs) strongly influence adoption.
- **Charging infrastructure is not a significant factor** ($p = 0.06$), suggesting that while some people consider it, it does not heavily determine whether they buy an EV or not.

5. Regression Analysis

The regression analysis revealed that awareness (β (Beta co-efficient) = 0.52, $p < 0.01$) and economic benefits (β (Beta co-efficient) = 0.37, $p < 0.05$) were significant predictors of EV adoption. Infrastructure (β (Beta co-efficient) = 0.25, $p = 0.06$) showed a weaker, yet marginally significant, influence.

Awareness about EVs and adoption (β = 0.52, p < 0.01)

- The β value of 0.52 means that awareness has a strong positive impact on EV adoption.
- The p-value < 0.01 indicates that this relationship is statistically highly significant.
- This means that as awareness about EVs increases, the likelihood of adoption increases significantly.

Economic Benefits and adoption (β = 0.37, p < 0.05)

- The β value of 0.37 suggests that economic benefits (such as cost savings and government incentives) positively impact EV adoption, though less strongly than awareness.
- The p-value < 0.05 means this predictor is statistically significant.
- This suggests that people are more likely to adopt EVs if they perceive financial advantages (e.g., lower fuel/maintenance costs, government subsidies).

Infrastructure and adoption (β = 0.25, p = 0.06)

- The β value of 0.25 means that better charging infrastructure is associated with higher EV adoption, but the impact is weaker compared to awareness and economic benefits.
- The p-value = 0.06 is slightly above the 0.05 threshold, meaning the effect is marginally significant but not strongly conclusive.
- This indicates that charging infrastructure plays a role in adoption, but it is not as decisive as awareness and cost benefits.

Findings

Awareness: While most respondents were aware of EVs, their understanding of incentives and operational cost savings remained limited.

Economic Factors: Cost savings and government subsidies were identified as key motivators for EV adoption. But the respondents opined that the price is high of the ev cars in comparison to petrol diesel cars and the life of the batteries are 3- 5 years which costs nearly 50 percent of the car price and the scooter and bike are with a fair price.

Infrastructure: Insufficient charging stations and prolonged charging times were highlighted as major obstacles to go to EV vehicles

Environmental Benefits: A significant majority of respondents acknowledged the environmental benefits of EVs, which positively shaped their perception towards the electric vehicles

Recommendations

Awareness Campaigns: Implement educational programs to emphasize the benefits of EVs, available incentives, and long-term cost savings.

Infrastructure Development: Expand the charging network, with a focus on rural and semi-urban regions. Encouraging the entrepreneurs assuring the continuous incomes for the installation of charging stations by sanctioning the guaranteed income in rural areas.

Subsidies and Incentives: Strengthen financial incentives and reduce the initial purchase cost of EVs. There is a dire need to give the many subsidies on the purchase of batteries

Policy Interventions: Introduce EV-friendly policies, such as reduced registration fees and tax exemptions.

Partnerships: Foster collaborations with private companies to develop public charging infrastructure.

Conclusion

This study reveals that while consumer awareness and financial incentives are strong motivators for EV adoption in Telangana, key challenges such as high upfront costs and inadequate infrastructure persist. To accelerate EV adoption, holistic policy reforms, infrastructure improvements, and extensive public awareness campaigns are essential.

By strengthening charging networks, increasing subsidies, and fostering local manufacturing, Telangana can become a leader in India's transition to sustainable transportation. Further research, including larger sample sizes and comparative analyses across states, can offer deeper insights into regional adoption patterns and inform more targeted policy measures.

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