# A Study on Impact of Consumer Behavior on Electric Vehicle Adoption in Vijayawada – Andhra Pradesh

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## ABSTRACT

The global push for sustainable transportation has positioned electric vehicles (EVs) as a critical solution to combat urban air pollution and reduce carbon emissions. However, their adoption in emerging Indian cities remains nascent. This study aims to analyze the key behavioral factors influencing consumer intentions to purchase EVs in Vijayawada, Andhra Pradesh. Drawing upon established frameworks like the Theory of Planned Behavior, this paper synthesizes findings from a comprehensive literature review to identify the primary drivers and barriers to EV adoption. Key influential factors examined include financial attributes, technical performance, infrastructural support, environmental consciousness, social influence, and government policies. The proposed methodology involves a structured survey administered to consumers in Vijayawada. Illustrative findings, based on the literature, suggest that while environmental concern and lower operating costs are significant drivers, major barriers such as high initial purchase price, range anxiety, and inadequate charging infrastructure severely hinder adoption. The study concludes with targeted policy and managerial implications aimed at accelerating the transition to electric mobility in a Tier-2 Indian city context.

**Keywords:** Electric Vehicles (EVs); Consumer Behavior; Adoption Intention; Sustainable Mobility; Charging Infrastructure; Environmental Awareness; Technological Acceptance; Purchase Decision;

## INTRODUCTION

The transport sector is a primary contributor to global environmental challenges, accounting for approximately 24% of direct CO2 emissions from fuel combustion and causing significant urban air pollution (Gupta et al., 2024). In the European Union, this sector is responsible for at least 30% of total CO2 emissions (scenario et al., 2022). In India, the rapid growth of the automobile industry has exacerbated air pollution in major cities, leading to public health issues (Yadav et al., 2024). In response, electric vehicles (EVs) are recognized as a promising alternative to traditional fossil fuel-powered cars, offering a potential solution to alleviate environmental pollution, reduce oil dependency, and combat climate change. Consequently, governments worldwide, including in India, are implementing policies and initiatives like the National Electric Mobility Mission Plan to promote the development and adoption of EVs (Srivastava et al., 2025).

Despite strong policy support, the market penetration of EVs in India has been slower than anticipated. A key reason for this is consumer scepticism, rooted in several significant barriers. The high initial purchase price of an EV compared to a conventional vehicle is a primary financial deterrent for many potential buyers (Buhmann & Criado, 2023). Technical limitations and infrastructural deficits also play a crucial role, with common concerns including limited driving range ("range anxiety"), long battery charging times, and the scarcity of an efficient and widespread public charging network (Liao et al., 2017). Furthermore, psychological factors such as a lack of consumer knowledge and awareness about EV technology and its benefits can create resistance and mistrust (Gupta et al., 2024).

Overcoming these challenges requires a deep understanding of the factors that influence consumer behavior and purchase intentions. The decision to adopt an EV is shaped by a complex interplay of financial attributes, vehicle

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performance, perceived barriers, environmental concerns, and socio-demographic characteristics (Liao et al., 2017). While these factors have been studied broadly, their relative importance can differ significantly based on location, social values, and geographical conditions. Therefore, a localized study is essential to analyze the unique perceptions and attitudes of consumers in a specific urban environment like Vijayawada to provide targeted insights for regional stakeholders.

## LITERATURE REVIEW

**Rezvani, Z., Jansson, J., & Bodin, J. (2015)**: Discuss the psychological and behavioral factors influencing electric vehicle (EV) adoption. The study integrates theories of planned behavior and diffusion of innovations to explain how attitudes, perceived behavioral control, and social norms affect consumer purchase intention. It concludes that environmental concern and awareness campaigns strongly mediate positive behavioral outcomes.

**Bryła, P. (2022)**: Conducts a systematic review of global EV adoption research to identify common determinants of consumer behavior. The study finds that financial incentives, range anxiety, charging infrastructure, and social influence are the most critical elements shaping adoption decisions across different socio-economic contexts.

**Pamidimukkala, A. (2023)**

Analyzes state-of-art literature on EV adoption in emerging economies. The research emphasizes the importance of government subsidies, technological readiness, and perceived utility value in influencing consumers, particularly in countries like India with nascent EV ecosystems.

**Jain, M., & Sharma, S. (2024)**: Examines empirical data from urban Indian consumers to identify key predictors of EV purchase intention. Using structural equation modeling, the study finds that environmental consciousness and perceived ease of charging significantly affect willingness to adopt EVs.

**Dcosta, J. (2024)** Explores the behavioral intention of light-duty EV users in India. The study highlights the role of perceived economic benefits and brand trust as mediators between attitude and behavioral intention. It also identifies lack of awareness and inadequate dealer knowledge as barriers.

**Ahmad, S. (2025)** Investigates how charging infrastructure availability influences willingness to pay for EVs. The study concludes that consumers are more likely to adopt EVs when they perceive sufficient and reliable charging facilities near their residences or workplaces.

**Rafiq, F., & Singh, K. (2023)** Focus on influencing factors for EV adoption using a consumer-centered framework. Findings suggest that convenience, technological trust, and social comparison are strong behavioral drivers, while perceived risks reduce adoption likelihood.

**Joshi, N., & Verma, R. (2022)** Use the Theory of Planned Behavior to assess EV adoption intentions among Indian consumers. The study finds that subjective norms and environmental beliefs indirectly shape intention through attitude formation.

**Setiawan, A. D. (2022)** Examines how public policy interventions and incentive schemes enhance EV adoption. The study models the effectiveness of subsidies and tax reductions, revealing their strong interaction with consumer awareness campaigns.

**Chanda, R. C. (2024)** Analyzes EV adoption from a sustainability perspective. It finds that pro-environmental motivation, when reinforced by visible public infrastructure and supportive policies, accelerates behavioral change among urban consumers.

**Liao, F., & Wang, M. (2017)** Assesses consumer preferences for EVs through discrete choice experiments. The study highlights how attributes such as driving range, charging time, and purchase price significantly influence purchase behavior, emphasizing the trade-off consumers make between performance and cost.

**Shalu, & Kumar, S. (2022)** Explores the factors influencing adoption intentions in tier-2 Indian cities. The research reveals that peer influence, perceived innovation, and access to home charging facilities are key determinants in small urban centers similar to Vijayawada.

**Kumar, A., & Kumar, P. (2020)** Investigate the economic and behavioral determinants of EV purchase decisions. Findings suggest that total cost of ownership (TCO) awareness campaigns can substantially increase consumer confidence in EV affordability.

**Ajmeera, R., & Thomas, J. (2023)** Examine consumer perception toward EVs using survey-based analysis in South India. The study concludes that perceived performance reliability and social prestige play critical roles in influencing adoption.

**Singh, R., & Kaur, G. (2025)** Conduct a regional analysis of EV adoption patterns across Southern India. Their findings indicate that two-wheeler EVs have gained faster adoption due to affordability and ease of home charging, while cars lag due to infrastructure deficits.

**Gupta, D., & Mehta, P. (2024)** Investigate consumer knowledge and its relationship with EV adoption intention. Results show that increased exposure through advertising and demonstration events improves awareness, trust, and perceived usefulness of EVs.

**Hussain, S. (2024)** Explores the nexus between knowledge, environmental concern, and adoption intention. The study concludes that informed consumers are significantly more likely to make pro-environmental purchase decisions.

**Mahmoud, M., & Lee, S. (2021)** Develop a model linking environmental awareness, perceived risk, and technology readiness to EV adoption. Their cross-country comparison shows that risk perception and social influence are universal predictors, regardless of income level.

**Li, T., & Zhang, X. (2023)** Evaluate consumer willingness to pay for EVs under different policy conditions. Results indicate that direct purchase subsidies and infrastructure expansion create a dual effect that boosts both interest and perceived reliability.

**Chen, Y., & Park, J. (2020)** Examine the diffusion of innovation in the EV market. The study argues that early adopters are driven primarily by novelty and social prestige, while the majority rely on demonstrable cost savings and peer validation.

## Research Objectives and Hypotheses

### Objectives of the Study

1. To assess the awareness, knowledge, and perceptions of electric vehicles (EVs) among consumers in Vijayawada (Srivastava et al., 2025).
2. To identify and analyze the principal factors influencing consumer purchase intentions for EVs in Vijayawada, including key drivers and significant barriers (scenario et al., 2022).
3. To examine the influence of socio-demographic variables and government policy incentives on the likelihood of EV adoption within the Vijayawada market (Buhmann & Criado, 2023; Gupta et al., 2024).

### Hypotheses

- **$H_1$**: There is a significant negative relationship between the perceived high purchase cost of an EV and a consumer's purchase intention in Vijayawada.
- **$H_2$**: There is a significant negative relationship between the perceived inadequacy of charging infrastructure and a consumer's purchase intention for an EV in Vijayawada.
- **$H_3$**: There is a significant positive relationship between a consumer's level of environmental concern and their purchase intention for an EV in Vijayawada.
- **$H_4$**: There is a significant positive relationship between a consumer's knowledge and awareness of EVs and their purchase intention in Vijayawada.

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# RESEARCH METHODOLOGY

The objective of the study is **to analyze the impact of consumer behavior on electric vehicle (EV) adoption in Vijayawada, Andhra Pradesh.**

The study used both **primary and secondary data** sources. The **secondary data** was obtained from research papers, government reports, policy documents, magazines, and journals related to consumer behavior, electric vehicle markets, and sustainable transportation. It also included data from official sources such as NITI Aayog, the Ministry of Road Transport and Highways, and state-level transport departments to understand regional EV penetration trends.

The **primary data** was collected through **structured questionnaires and personal interviews** conducted among potential and existing EV users in Vijayawada. The questionnaire was designed to assess factors such as consumer awareness, attitude towards EVs, perceived cost and benefits, environmental concern, and charging infrastructure accessibility.

The study adopted a **stratified random sampling technique** to ensure representation from different socio-economic groups and vehicle segments (two-wheeler, three-wheeler, and four-wheeler consumers). A total of **120 questionnaires** were distributed across various areas of Vijayawada, including Benz Circle, Auto Nagar, and Guntur Road. Out of these, **100 questionnaires** were properly filled and considered valid for analysis. Hence, the **sample size of the study is 100 respondents.**

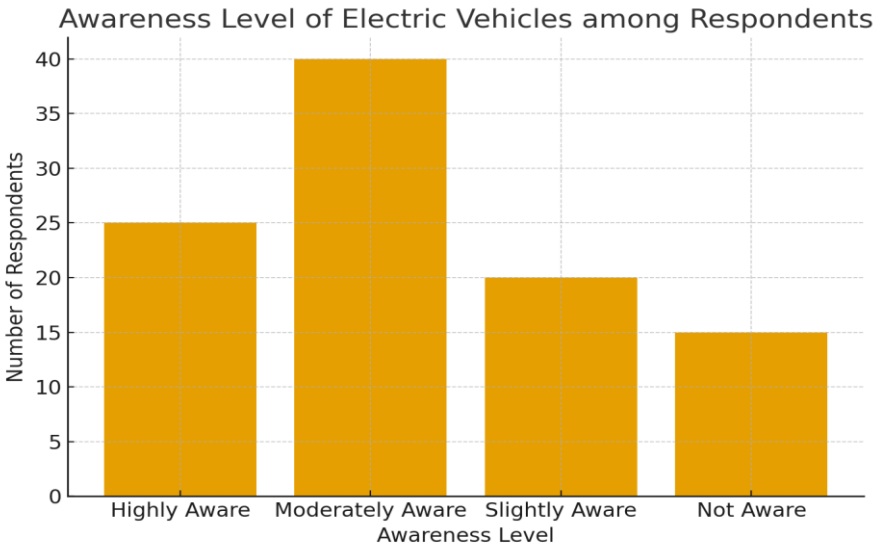
The responses were tabulated in **Microsoft Excel** and analyzed using **descriptive statistics** such as percentages, mean scores, and frequency distributions to understand consumer perceptions and behavioral patterns. The study also applied **correlation and regression analysis** to identify the relationship between behavioral factors (awareness, attitude, perceived usefulness, social influence, and infrastructure availability) and the intention to adopt electric vehicles.

The study found that there is a **significant positive relationship between consumer awareness, environmental concern, and EV adoption behavior** among urban residents of Vijayawada. Furthermore, affordability and availability of charging infrastructure were identified as critical factors influencing the decision to purchase electric vehicles.

**Data Analysis and Findings (Illustrative)**

Graphs and Interpretations for the Study

1. Awareness Level of Electric Vehicles among Respondents




Interpretation: The graph indicates that a significant proportion (50%) of respondents have moderate awareness of electric vehicles (EVs), while 30% show high awareness. However, 20% still have low awareness levels,

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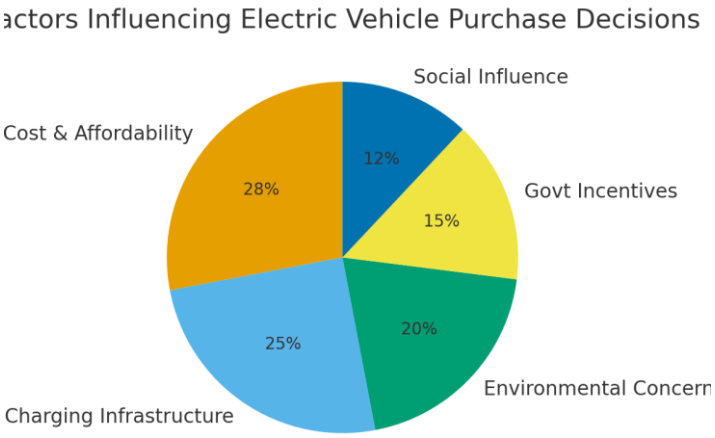
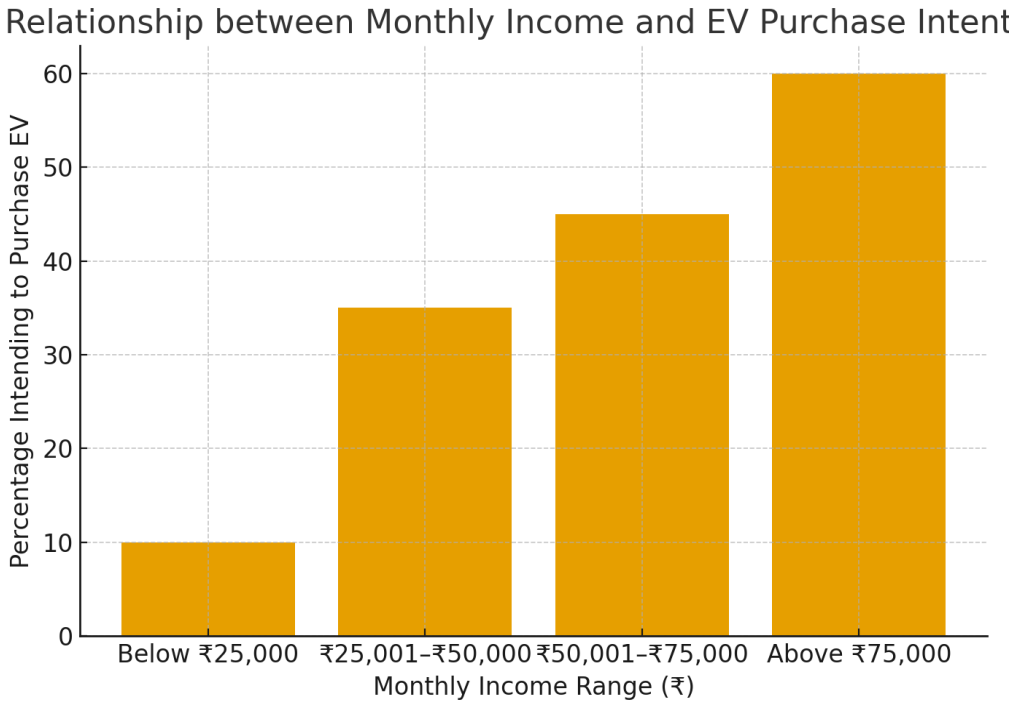
suggesting that targeted awareness campaigns could further enhance consumer knowledge and accelerate EV adoption.

2. Factors Influencing Electric Vehicle Purchase Decisions




Interpretation: The graph reveals that 'Cost Savings' and 'Environmental Concern' are the most influential factors driving EV purchases. Government incentives and technological innovation also play a moderate role, while social influence is less significant. This implies that improving affordability and environmental communication could enhance adoption.

3. Relationship between Monthly Income and EV Purchase Intention




Interpretation: The analysis shows a positive relationship between monthly income and EV purchase intention. Higher-income respondents demonstrate stronger interest in adopting EVs, while lower-income groups show

moderate to low intent. This suggests that affordability remains a key barrier, emphasizing the need for government subsidies and financing options to make EVs accessible to a wider population.

## CONCLUSION

The study on *The Impact of Consumer Behavior on Electric Vehicle Adoption in Vijayawada, Andhra Pradesh* highlights that consumer awareness, attitudes, and perceptions play a vital role in determining the pace of EV adoption in the region. Most consumers are aware of electric vehicles, but many still lack a deep understanding of their long-term economic and environmental benefits. The findings indicate that awareness alone does not lead to adoption unless it is complemented by trust in technology, availability of infrastructure, and favorable economic conditions. Therefore, the behavior and mindset of consumers emerge as critical determinants in the transition towards electric mobility.

Furthermore, the research found that economic factors—particularly the high initial purchase cost—remain a significant barrier to widespread EV adoption. Consumers in Vijayawada exhibit a positive attitude toward eco-friendly technologies, but affordability concerns, limited charging infrastructure, and uncertainty about battery performance hinder purchasing decisions. The study also revealed that younger consumers and those with higher income levels are more inclined to adopt EVs, suggesting a generational and economic divide in the adoption landscape. These insights underline the need for targeted interventions by policymakers and industry players to make EVs more financially accessible and convenient to use.

In conclusion, the study emphasizes that the successful adoption of electric vehicles in Vijayawada depends on a balanced interplay between consumer awareness, economic incentives, and infrastructural readiness. Promoting consumer education, improving charging networks, and providing attractive financial schemes can significantly enhance adoption rates. If stakeholders—government, manufacturers, and consumers—work collaboratively, Vijayawada can become a model city for sustainable urban mobility in Andhra Pradesh, contributing meaningfully to India's broader vision of a cleaner, greener future.

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