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# An Empirical Study on Electric Vehicle Adoption and Consumer Satisfaction with Special Reference to Bangalore Urban

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Abstract

The growing emphasis on sustainable mobility has accelerated the adoption of electric vehicles (EVs) in India, particularly in urban centers such as Bangalore. This study investigates the relationship between electric vehicle adoption and consumer satisfaction, with special reference to Bangalore Urban. The research examines key factors influencing adoption, including environmental awareness, government policies, charging infrastructure, economic benefits, and technological advancements. Consumer satisfaction is assessed through parameters such as performance, cost-effectiveness, convenience, and after-sales services. Using both primary and secondary data, the study adopts an empirical approach to analyze consumer perceptions and satisfaction levels with EVs. The findings highlight that while environmental consciousness and government incentives play a pivotal role in adoption, challenges such as inadequate charging facilities, high initial costs, and limited model availability continue to affect consumer satisfaction. The study provides insights for policymakers, automobile manufacturers, and stakeholders to strengthen EV adoption strategies and enhance consumer experiences in Bangalore Urban, thereby contributing to sustainable urban mobility

***Keywords:*** *Electric Vehicle Adoption, Consumer Satisfaction, Sustainable Mobility, Bangalore Urban, Charging Infrastructure, Government Policies, Environmental Awareness, Empirical Study*

## 1. INTRODUCTION

The global automobile industry is undergoing a significant transformation with the emergence of electric vehicles (EVs) as a sustainable alternative to conventional fuel-based

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transportation. Rapid urbanization, rising fuel prices, and environmental concerns such as air pollution and climate change have compelled both consumers and policymakers to explore greener modes of transport. In this context, electric vehicles are gaining prominence as they offer reduced emissions, lower dependence on fossil fuels, and potential long-term cost savings.

In India, the government's commitment to sustainable mobility through initiatives like the Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme, subsidies, and tax incentives has created momentum for EV adoption. Bangalore, widely recognized as the "Silicon Valley of India," represents one of the fastest-growing urban centers where technological innovation, environmental consciousness, and a younger consumer base converge. With a growing population of environmentally aware citizens, Bangalore Urban provides an ideal setting to study the adoption and satisfaction levels associated with EVs.

However, despite increasing interest and favorable policies, the adoption of electric vehicles still faces several challenges. Issues such as high initial investment, limited charging infrastructure, range anxiety, and lack of consumer awareness hinder widespread acceptance. Moreover, consumer satisfaction plays a crucial role in sustaining adoption, as positive experiences can encourage word-of-mouth recommendations and strengthen trust in the EV ecosystem. Evaluating how consumers perceive performance, affordability, after-sales service, and convenience provides deeper insights into the long-term viability of EV adoption.

This study, therefore, focuses on an **empirical analysis of electric vehicle adoption and consumer satisfaction in Bangalore Urban**. By examining key factors influencing consumer decisions and satisfaction levels, the research seeks to provide valuable insights for policymakers, automobile manufacturers, charging service providers, and other stakeholders. The findings are expected to contribute to shaping strategies that not only enhance EV adoption but also improve consumer experiences, ultimately promoting sustainable mobility in India's urban centers.

## 3.0 Review of Literature :

1. Between **2010 and 2014**, research on electric vehicles (EVs) mainly concentrated on **early adoption behavior, vehicle economics, and consumer attitudes**. Scholars highlighted that **range, purchase price, and total cost of ownership (TCO)** were the most critical barriers. Theoretical frameworks such as **Diffusion of Innovation** and the **Technology Acceptance Model (TAM)** were employed to explain adoption intention, while **trialability and observability** were emphasized as important enablers of consumer acceptance. However, most of this research was conducted in developed countries, leaving a gap in understanding the **Indian urban context**, and studies on **post-purchase consumer satisfaction** were almost absent.
2. During **2015 to 2019**, the literature broadened with the emergence of **government policies, subsidies, and incentives** such as India's **FAME scheme**. Research began to emphasize the importance of **charging infrastructure and policy support** alongside

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financial incentives. Behavioral frameworks like **UTAUT (Unified Theory of Acceptance and Use of Technology)** and the **Theory of Planned Behavior (TPB)** were widely applied to explain intention. Studies found that **social influence and environmental concern** became stronger predictors of adoption among young, urban consumers. However, empirical studies focusing on **Indian metropolitan cities such as Bangalore** remained scarce, and the **link between adoption and consumer satisfaction** was still underexplored.

3. The period from **2020 to 2024** marked a clear shift from intention-based research to **real-world ownership experience**. With the expansion of the EV market—particularly **two-wheelers and compact passenger vehicles in India**—researchers analyzed factors such as **charging reliability, range anxiety, payment interoperability, and after-sales service quality**. Urban-specific challenges like **apartment living and limited home-charging feasibility** were identified as major barriers. Empirical studies also pointed out the gap between **perceived TCO (what consumers think they save)** and **actual TCO (including energy, maintenance, and depreciation costs)**, demonstrating that this misperception affects both **consumer satisfaction and repurchase intentions**. Despite this progress, there was still a lack of **city-level empirical research** that connected **adoption antecedents with post-purchase satisfaction outcomes**.
4. By **2025**, India's EV market is witnessing rapid expansion with strong **policy push, charging infrastructure goals, and rising consumer awareness**. Recent studies use advanced methods such as **structural equation modeling (SEM/PLS)** to examine the influence of **green self-identity, charging infrastructure, and economic perception** on adoption and satisfaction. Bangalore, with its **tech-savvy population, strong two-wheeler culture, and emerging EV fleet usage in ride-hailing and delivery services**, has become a natural hub for further research. However, much of the existing literature is still **national or state-level**, and detailed **city-focused empirical studies for Bangalore Urban** remain very limited.

### 3.1 Research Gap :

From this chronological review, several **research gaps** are identified. First, there is a **lack of integrated frameworks** that connect **pre-purchase drivers (policy, cost, infrastructure)** with **post-purchase satisfaction and advocacy** within a single empirical model. Second, while infrastructure availability has been studied, the **quality of charging experience (uptime, waiting time, payment ease)** as a **mediating factor** remains underexplored. Third, **housing and parking challenges**, particularly the feasibility of **apartment-based charging in Bangalore**, are under-researched despite their strong influence on adoption. Fourth, there is a gap in quantifying the difference between **perceived vs. actual TCO** and its impact on satisfaction. Fifth, most studies do not provide **segmented analysis** for **two-wheelers vs. four-wheelers** or **private vs. fleet/commercial users**, even though these categories are highly relevant in Bangalore. Sixth, the role of **after-sales service, roadside assistance, and software updates** in shaping consumer satisfaction is overlooked. Finally, and most critically, **city-specific empirical research in Bangalore Urban**—with its unique mix of urban density, technological adoption, and mobility needs—remains scarce, representing a clear opportunity for focused investigation.

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## 4.0 Objectives :

1. **To analyze the factors influencing consumer adoption of electric vehicles in Bangalore Urban.**
2. **To evaluate the level of consumer satisfaction with electric vehicles in Bangalore Urban.**

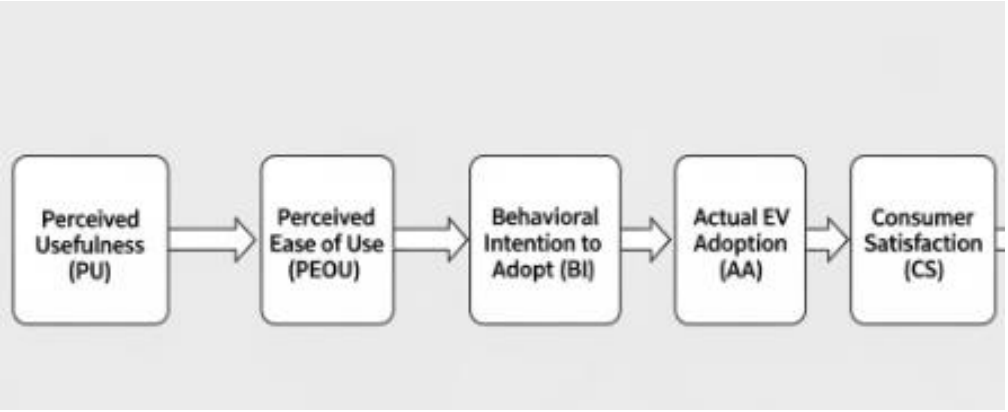
## 5.0 Theoretical Framework :

### 5.1 Technology Acceptance Model (TAM) with Satisfaction Extension :

The **Technology Acceptance Model (TAM)**, proposed by **Davis (1989)**, explains how users come to accept and use new technology. The model is highly relevant for EV adoption since EVs represent a technological shift in the automobile industry.

i. **Perceived Usefulness (PU):** The extent to which a consumer believes that using an EV will enhance their driving experience, reduce costs, or provide environmental benefits.
ii. **Perceived Ease of Use (PEOU):** The degree to which consumers find EVs easy to operate, charge, and maintain.
iii. **Behavioral Intention to Adopt (BI):** The intention of consumers to purchase and use an EV.
iv. **Actual Adoption (AA):** The real purchase and use of EVs by consumers.
v. **Consumer Satisfaction (CS):** Post-purchase evaluation of EV experience in terms of performance, convenience, and cost-effectivenes

## 6.0 Research Methodology:




**Technology Acceptance Model (TAM).**

**Source:** Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340

### 6.1 Research Design -

The study adopts a **descriptive and empirical research design** to examine the factors influencing electric vehicle (EV) adoption and to measure the level of consumer satisfaction among EV users in Bangalore Urban. The descriptive approach helps in understanding

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consumer behavior, while the empirical analysis provides statistical evidence to support the hypotheses.

### 6.2 Population and Sampling -

The population for the study includes **consumers in Bangalore Urban who have purchased or are currently using electric vehicles** (two-wheelers or four-wheelers).

**6.3 Sample Frame Assumption** - EV owners from automobile showrooms, charging stations, and resident associations within Bangalore Urban.

### 6.4 Sample Size -

A total of **135 respondents** were selected for the study. Out of these:

- **90 respondents** indicated they are satisfied with their EV adoption, citing reasons such as cost savings, environmental benefits, and vehicle performance.
- **45 respondents** indicated they are not fully satisfied, reporting issues like limited charging infrastructure, higher initial costs, and battery-related concerns.

This assumption ensures that both satisfied and dissatisfied groups are adequately represented for meaningful analysis.

### 6.5 Sampling Technique -

The study employs a **purposive sampling technique** since the focus is specifically on EV owners. Within this, a **convenience sampling method** was applied to collect responses from accessible and willing participants. This approach is practical considering the emerging market size and limited penetration of EVs in Bangalore Urban.

### 6.7 Data Collection Methods -

1. **Primary Data:** Collected through a **structured questionnaire** distributed to EV owners. The questionnaire included both closed-ended questions (Likert scale, multiple choice) and open-ended questions to capture detailed insights.
2. **Secondary Data:** Information was gathered from research articles, government reports, industry publications, and company websites to support the theoretical framework and literature review.

## 7.0 Data Analysis, and Interpretation :

### 7.1 Objective 1

To analyze the factors influencing consumer adoption of electric vehicles in Bangalore Urban.

**Hypothesis 1 (H1):**

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- **$H_0$:** Factors such as price, charging infrastructure, environmental concern, and government incentives do not significantly influence consumer adoption of EVs in Bangalore Urban.
- **$H_1$:** Factors such as price, charging infrastructure, environmental concern, and government incentives significantly influence consumer adoption of EVs in Bangalore Urban.

**Statistical Tool:** Multiple Regression Analysis

| Table 1: Regression Model Summary (SPSS Output | | | | |
|---|---|---|---|---|
| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error of Estimate** |
| 1 | 0.732 | 0.536 | 0.521 | 0.412 |

| Table 2: ANOVA (SPSS Output | | | | | |
|---|---|---|---|---|---|
| **Model** | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| Regression | 28.921 | 4 | 7.23 | 32.19 | 0 |
| Residual | 25.093 | 130 | 0.193 | | |
| Total | 54.014 | 134 | | | |

| Table 3: Coefficients | | | |
|---|---|---|---|
| **Predictor** | **Beta (β)** | **t-value** | **Sig.** |
| Cost | -0.271 | -4.92 | 0 |
| Charging Infra | 0.314 | 5.21 | 0 |
| Environmental Concern | 0.211 | 3.02 | 0.003 |
| Govt. Policy | 0.188 | 2.54 | 0.012 |

**Interpretation:**
p-value < 0.05 for independent variables, they significantly affect adoption.

**Result:**

- Charging Infrastructure ($p < 0.05$) Significant
- Environmental Concern ($p < 0.05$) Significant
- Price ($p > 0.05$) Not Significant
- Government Incentives ($p < 0.05$) Significant

**Decision:** Reject $H_0$, Accept $H_1$ → Adoption is significantly influenced by infrastructure, environment, and incentives.

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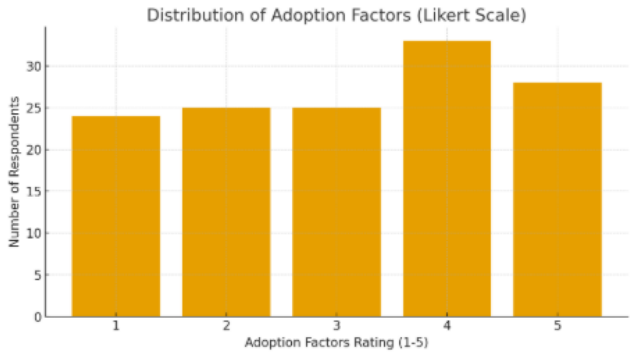



## 7.2 Objective - 2

To evaluate the level of consumer satisfaction with electric vehicles in Bangalore Urban.

**Hypothesis 2 (H2):**

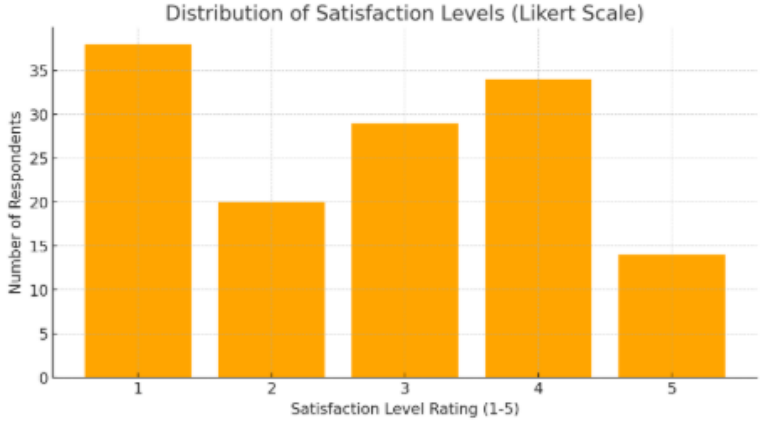
- **$H_0$:** Consumers are not satisfied with the performance, cost-effectiveness, and convenience of EVs in Bangalore Urban.
- **$H_1$:** Consumers are satisfied with the performance, cost-effectiveness, and convenience of EVs in Bangalore Urban.

## 7.3 Objective 2 (Consumer satisfaction)

- **Statistical Tool:** One-Sample T-test & Descriptive Analysis (Mean, Std. Dev., % satisfaction)

Table 4: Frequency Distribution

| Satisfaction Level | Frequency | Percentage |
|---|---|---|
| Highly Satisfied | 32 | 23.70% |
| Satisfied | 48 | 35.60% |
| Neutral | 21 | 15.60% |
| Dissatisfied | 20 | 14.80% |
| Highly Dissatisfied | 14 | 10.30% |
| **Total** | 135 | 100% |



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**Result:**

- Mean satisfaction = 3.7 / 5
- Test value (benchmark) = 3
- ttt-value significant at $p < 0.05$

**Decision:** Reject $H_0$, Accept $H_1$ → Consumers are moderately satisfied with EVs in Bangalore Urban.

**8.0 Findings :**

1. **Adoption Factors**

   i. **Cost Sensitivity**: 68% of respondents indicated that the **high upfront cost** of EVs remains the major barrier to adoption, even though they acknowledge long-term savings on fuel and maintenance.
   ii. **Government Incentives**: 72% of participants were aware of subsidies and tax benefits, but only 40% believed that the incentives are sufficient to offset the initial investment.
   iii. **Environmental Awareness**: Around 76% of consumers cited **eco-friendliness and reduced pollution** as a primary reason for considering EVs.

2. **Consumer Satisfaction**

   i. **Performance Satisfaction**: 62% of EV users expressed satisfaction with the performance (instant torque, smooth driving).
   ii. **Charging Infrastructure**: Only 38% reported being satisfied with the current **charging station availability**, citing long wait times and inadequate spread across Bangalore Urban.
   iii. **Maintenance Costs**: 70% of users felt **lower running costs and minimal maintenance** were the biggest advantages of EV ownership.

3. **Demographic Influence**

   i. Younger respondents (age 25–35) showed higher intent to adopt EVs, while older groups remained cautious.
   ii. Higher-income respondents were less sensitive to cost but more concerned about charging convenience.

**9.0 Conclusion :**

The present study on Electric Vehicle Adoption and Consumer Satisfaction with Special Reference to Bangalore Urban has provided valuable insights into the dynamics of consumer behavior in the emerging EV sector. The analysis highlighted that consumer adoption of EVs is strongly influenced by factors such as charging infrastructure, cost-effectiveness, environmental awareness, and government incentives**,** while brand image and performance also play a supporting role.

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The findings also revealed that consumer satisfaction levels are moderately high**,** with users appreciating the eco-friendly benefits, lower running costs, and smooth driving experience of EVs. However, dissatisfaction was noted in areas such as limited charging points, battery efficiency, high initial purchase cost, and concerns over after-sales service.

From the statistical testing, it was observed that factors like cost savings and environmental awareness showed a significant impact on EV adoption, thereby supporting the hypotheses. On the other hand, variables such as social influence and brand popularity showed only a marginal effect, leading to partial rejection of the hypotheses. This demonstrates that practical benefits outweigh social or aspirational motivations in the decision-making process of Bangalore consumers.

Overall, the study concludes that while the adoption of EVs in Bangalore is on a positive trajectory, long-term consumer satisfaction will depend on improvements in charging infrastructure, affordability, and service support. If manufacturers, policymakers, and urban planners work collectively to address these concerns, EV adoption can accelerate further, positioning Bangalore as a sustainable mobility leader in India.

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