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Predictive Analysis of Growth of Electric Vehicle (EV) Market in India

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1. Abstract

India is at a key point in its shift to sustainable transportation, with electric vehicles (EVs) being a crucial solution to lower carbon emissions and reduce reliance on fossil fuels. This study performs a predictive analysis of the growth of India's EV market by looking at consumer views, government incentives, and the readiness of infrastructure using both primary and secondary data. An organized online survey was carried out with 41 digitally engaged consumers, and sales data from 2020 to 2024 was analyzed to predict future market trends. Descriptive statistics and regression analysis showed that fast-charging infrastructure and the driving experience of users greatly affect the intention to buy EVs. Predictions indicate that India's EV sales could hit 3 million units by 2026. This research offers practical insights for stakeholders to adapt to India's rapidly changing EV market.

Keywords

Electric Vehicles, Predictive Analysis, Charging Infrastructure, Consumer Behaviour, India, Market Forecast, Sustainable Mobility.

2. Introduction

As India aims to cut down on greenhouse gas emissions and lessen its dependence on fossil fuels, electric vehicles (EVs) are becoming increasingly important in national transport policy. With initiatives like FAME-II and various state-level EV policies, the Indian government has established a solid groundwork for EV adoption. However, widespread acceptance is still hindered by infrastructure issues, cost challenges, and consumer reluctance.

This study employs predictive analytics to analyze future trends in the EV market growth in India. By merging survey data with sales trends and using regression and forecasting methods, the research emphasizes the changing dynamics that influence consumer behaviours and market activity.

3. Research Objectives

This study is grounded in five core research objectives:

- RO1: To assess consumer perceptions, awareness, and concerns about electric vehicles.
- RO2: To evaluate how infrastructure and experience influence EV purchase intent.
- RO3: To analyse secondary EV sales data and forecast future market growth.
- RO4: To identify key predictors of EV adoption based on regression modelling.
- RO5: To offer strategic recommendations for stakeholders in the EV ecosystem.

4. Literature Review

Previous research highlights cost savings, environmental issues, and interest in technology as key reasons for adopting electric vehicles (EVs). Studies by Axsen et al. (2015) and Chatterjee & Singh (2022) point out the importance of peer influence and awareness in increasing EV usage. At the same time, infrastructure challenges, particularly in rural India, still hinder widespread adoption (Sahoo et al., 2021). In India, initiatives like FAME-II and battery-swapping systems are becoming more popular. However, there is a lack of consumer-focused predictive models that consider Indian demographics, especially in Tier-2 cities and smaller vehicle categories. This research addresses that gap by combining primary consumer data with trend analysis.

5. Methodology

5.1 Quantitative Approach

An organized questionnaire containing 10 Likert-scale questions was shared online. It garnered 41 valid responses, primarily from Delhi NCR and Uttar Pradesh. The survey assessed awareness, cost perceptions, infrastructure issues, trust, and the intention to buy EVs.

Secondary Data

EV sales data (2020–2024) from MoRTH and EVreporter.com were used to build a linear forecast model for 2025–2026 using Excel.

Analytical Tools

. Descriptive Statistics (mean scoring)
. Multiple Linear Regression
. Sales Forecasting (Trendline projection)

6. Analysis and Discussion

Statement Theme	Mean Score
Awareness of EV Benefits	4.22
Belief in EV Future	4.12
Govt. Subsidies Encourage Purchase	3.95
Cost-effectiveness in Long Run	4.1
Infrastructure Affects Decision	3.88

Fast-Charging Infrastructure Influence	4.17
Trust in EV Performance	3.72
Confidence in EV Tech	4.05
Purchase Intent (2–5 yrs)	4
Driving Experience Positivity	4.15

6.1 Survey Findings (Descriptive Statistics)

Chart 1: Mean Scores for EV Perceptions

Interpretation:

Respondents are highly aware of EV benefits and show a strong inclination to adopt EVs soon.

Fast-charging availability and user experience emerged as top influencers.

6.2 Regression Analysis

Dependent Variable: Purchase Intent (Q9)
R^2 Value: 0.677
Significant Predictors:

Q6: Fast-charging infrastructure ($\beta = 0.43$, $p < 0.05$)

Q10: Driving experience ($\beta = 0.41$, $p < 0.05$)

Interpretation:

While awareness and policy support are present, purchase decisions hinge on practical factors—convenience and real-world experience.

6.3 EV Sales Forecast

Table: EV Sales (Actual & Forecasted)

Year	Sales (Units)
2020	1,60,000
2021	3,44,495
2022	10,54,938
2023	15,30,000
2024	20,22,873
2025 (Forecast)	24,95,837

2026 (Forecast)	29,86,962

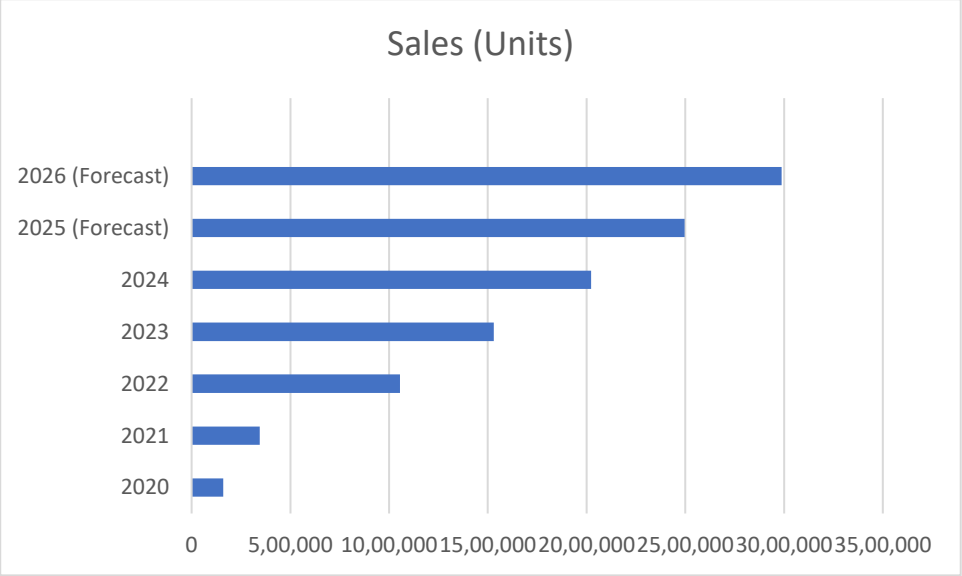

Chart 2: EV Sales Trend and Forecast (2020–2026)

Interpretation:

India's EV market is expected to grow at a compound annual rate of over 30%, nearing 3

- Million-unit sale by 2026.

7.Conclusion

This research emphasizes the swift expansion of the Indian electric vehicle (EV) market. Key data indicates a strong desire among consumers, with the ease of charging and driving experience being the main factors. Regression analysis supports these as important predictors. Sales projections suggest that India's market is gaining momentum, with the potential to exceed 3 million sales by 2026. However, to realize this potential, issues related to charging infrastructure and trust in performance need to be resolved. It is essential for the government, businesses, and investors to focus on strategic planning that includes infrastructure development, awareness initiatives, and opportunities for test drives to boost adoption.

8. Future Scope

Future studies can further enhance understanding of EV adoption in India through the following:

- **Larger and More Diverse Samples:**

Include respondents from Tier-2 cities, rural areas, and varied income groups for broader insights.

- **Segment-Specific Analysis:**

Study EV adoption separately for two-wheelers, three-wheelers, and four-wheelers to identify category-specific trends.

- **Behavioural Factors:**

Integrate variables like social influence, environmental concern, and perceived risk to improve predictive models.

- **Post-Purchase Experience:**

Examine user satisfaction, maintenance challenges, and resale value after EV adoption.

- **Advanced Forecasting Models:**

Use machine learning or time-series forecasting for more accurate and dynamic predictions.

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