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A STUDY ON FACTORS INFLUENCING SWITCHING FROM CONVENTIONAL VEHICLES TO ELECTRIC VEHICLES IN INDORE

Pranay Jain, *Senior Engineer,* *Ford Motors,* ***Germany***

Abstract

The global automotive industry is experiencing a significant transformation with the shift from conventional internal combustion engine vehicles to electric vehicles (EVs). Increasing environmental concerns, rising fuel prices, and government initiatives promoting sustainable mobility have encouraged consumers to consider electric vehicles as an alternative mode of transportation. This research paper aims to examine the factors influencing consumers in Indore city to switch from conventional vehicles to electric vehicles. The study is based on primary data collected from 120 respondents through a structured questionnaire. The research adopts a descriptive research design and analyzes various factors such as environmental awareness, cost considerations, government incentives, charging infrastructure, and technological awareness. The findings reveal that environmental concerns, lower operating costs, and government subsidies are the most significant factors motivating consumers to adopt EVs, whereas lack of charging infrastructure and high initial cost remain major barriers. The study provides useful insights for policymakers, automobile manufacturers, and stakeholders to promote electric mobility in urban cities like Indore.

Keywords: *Electric Vehicles, Consumer Behavior, Sustainable Transportation, Environmental Awareness, EV Adoption*

Introduction

Mobility sector is a vital component of the economic system of any nation. But the growth in vehicle numbers has also brought along environmental problems of air pollution, greenhouse gas emissions, and high energy consumption. The pollution caused by traditional fossil-fueled vehicles is one of the key concerns in the urban environment. With the increasing urbanisation and vehicle ownership, environmental and energy concerns have taken the fore. As a result, electric vehicles (EVs) are gaining prominence as a viable alternative to conventional combustion-based vehicles. Electric vehicles are vehicles powered by electricity that is stored in rechargeable batteries, and generate no emissions from their exhaust pipe. As a result, EVs are

seen as a "green" option and help to curb air pollution and carbon emissions. Governments around the world are promoting the use of electric vehicles to promote sustainable transport and address the challenges of global warming. The Indian government too has launched several measures to support electric mobility, such as subsidies, tax deductions and the development of charging infrastructure. This is part of efforts to reduce fossil fuel consumption and promote the adoption of alternative and clean energy sources in transportation. Despite the benefits, the transition to electric vehicles in India is still in its early stages. There are various factors that contribute to consumers' choice between traditional vehicles and electric vehicles. Environmental awareness, cost, availability of charging infrastructure, technological literacy, state incentives and attitude towards new technology are among some of the factors that can influence consumers' choice. Consumers may opt for EVs to benefit from environmental and cost savings, while others may be reluctant to adopt this technology due to upfront purchase price, range anxiety and lack of charging infrastructure. Indore, a rapidly growing city in Madhya Pradesh, has been lauded for its urban planning and green initiatives. The city is increasingly focusing on sustainable initiatives, such as waste management and sustainable transport. As fuel prices continue to soar and environmental awareness grows among the people, electric vehicles are slowly making their way into the market as an environmentally-friendly mode of transport in Indore. But there is little research on the extent of its adoption and what factors might influence consumers to switch from traditional vehicles to electric vehicles. Knowing the factors that influence consumers' perspective towards electric vehicles is crucial for policymakers, car manufacturers, and other stakeholders to promote sustainable transportation. These factors can be used to inform policymaking, infrastructure development, and public awareness of the advantages of electric vehicles. Hence, this study seeks to understand the important factors affecting consumers in Indore to make the shift from conventional vehicles to electric vehicles. Through the examination of consumer perceptions, preferences and concerns, the research aims to offer insights that will help in the adoption of electric vehicles and sustainable transport in the city.

Literature Review

Bhasin, J. and Srivastava, N. (2024) examined the factors affecting consumer decisions regarding electric vehicle adoption in India. Their study emphasized that environmental awareness and sustainability concerns are major motivating factors for consumers to adopt electric vehicles. The researchers also found that consumers who are more environmentally conscious are more willing to shift from conventional vehicles to electric vehicles. However, the study highlighted that high initial costs and limited charging infrastructure remain significant barriers to widespread adoption.

Raj, A., Anand, G., and Sujith, T. (2023) conducted a study on the factors influencing the adoption of electric vehicles in India with a focus on consumer perception and behavioral intention. Their findings revealed that economic factors

such as fuel savings and lower maintenance costs play an important role in encouraging consumers to adopt electric vehicles. The study also indicated that government incentives and supportive policies significantly influence consumers' willingness to purchase electric vehicles.

Zaino, R., Ahmed, V., Alhammadi, A., and Alghoush, M. (2024) conducted a systematic review of global research on electric vehicle adoption. The authors identified several technological, environmental, and policy-related factors that influence the adoption of electric vehicles. Their research highlighted that improvements in battery technology, availability of charging infrastructure, and government support programs are critical for increasing EV adoption. The study also pointed out that consumer trust in new technologies plays a vital role in shaping their purchasing decisions.

Shalu and Pandey, A. (2025) explored consumer intention toward electric vehicle adoption in the Indian context. Their research revealed that social influence, environmental concern, and government incentives significantly impact consumers' attitudes toward electric vehicles. The study concluded that awareness campaigns and supportive policies can help increase consumer confidence in electric mobility.

Srivastava, N. (2024) investigated the determinants influencing electric vehicle adoption in India. The findings suggested that factors such as technological awareness, perceived usefulness, and environmental responsibility strongly influence consumers' intentions to adopt EVs. The research also emphasized that improving charging infrastructure and reducing the cost of EVs can significantly increase adoption rates.

Parul, P. and Sweta (2025) studied consumer behavior toward electric vehicles in India. Their research found that government subsidies, rising fuel prices, and environmental benefits are key factors encouraging consumers to switch to electric vehicles. However, the study also highlighted challenges such as limited charging stations, lack of technical knowledge, and uncertainty regarding battery performance.

Research Gap

From the review of existing literature, it is evident that many studies have examined the factors influencing electric vehicle adoption at national and global levels. However, limited research has been conducted specifically on **consumer perceptions and adoption behavior in cities like Indore.** Therefore, the present study attempts to fill this gap by analyzing the factors influencing consumers in Indore to switch from conventional vehicles to electric vehicles.

Research Methodology

Research Design

The study uses a descriptive research design to examine the factors influencing consumers to switch from conventional vehicles to electric vehicles in Indore. This design helps in understanding consumer awareness, attitudes, and preferences regarding electric vehicles.

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Nature of the Study

The research is quantitative in nature, as it involves collecting numerical data through a structured questionnaire and analyzing it using statistical techniques.

Sources of Data

The study is based on both primary and secondary data.

- **Primary data** were collected from respondents through a questionnaire survey.
- **Secondary data** were obtained from research journals, books, reports, and online sources related to electric vehicles.

Sample Size and Sampling Technique

A total of 120 respondents from Indore city were selected for the study using the convenience sampling method.

Data Collection Tool

A structured questionnaire was used to collect data regarding consumer awareness, factors influencing EV adoption, barriers to adoption, and future purchase intentions.

Data Analysis Techniques

The collected data were analyzed using statistical tools such as percentage analysis, reliability analysis (Cronbach's Alpha), Chi-square test, and regression analysis to identify the key factors influencing the adoption of electric vehicles.

Objectives

1. To analyze the level of consumer awareness about electric vehicles among residents of Indore.
2. To identify the key factors that influence consumers to switch from conventional vehicles to electric vehicles, such as environmental concerns, cost savings, government incentives, and technological awareness.
3. To examine the major barriers affecting the adoption of electric vehicles, including high initial cost, lack of charging infrastructure, and limited driving range.
4. To provide suitable suggestions and recommendations for promoting the adoption of electric vehicles in Indore.

Data Analysis & Interpretation

Reliability Analysis (Cronbach's Alpha)

Table 1: Reliability Statistics

Cronbach's Alpha	Number of Items
0.842	6

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Interpretation - The Cronbach's Alpha value is **0.842,** which is higher than the acceptable threshold of**0.70.** This indicates that the questionnaire items used in the study are **reliable and internally consistent** for measuring factors influencing the adoption of electric vehicles.

Table 2: Item-Total Statistics

Variables	**Corrected Item Total Correlation**	**Cronbach's Alpha if Item Deleted**
Environmental Concern	0.612	0.821
Cost Saving	0.645	0.815
Government Incentives	0.589	0.826
Charging Infrastructure	0.573	0.829
Technological Awareness	0.604	0.820
Fuel Price Concern	0.618	0.818

Interpretation- All variables show **item-total correlation above 0.50,** which indicates that each factor significantly contributes to the reliability of the scale.

Table 3: Awareness about Electric Vehicles

Response	**Respondents**	**Percentage**
Yes	98	81.7%
No	22	18.3%
Total	120	100%

Interpretation- The majority of respondents (81.7%) are aware of electric vehicles, indicating growing awareness of EV technology among consumers.

Table 4: Major Factors Influencing EV Adoption

Factor	Respondents	Percentage
Environmental concern	30	25%
Lower operating cost	28	23.3%
Government incentives	22	18.3%
Rising fuel prices	20	16.7%
Technological innovation	20	16.7%
Total	120	100%

Interpretation-Environmental concerns and lower operating costs are the most influential factors encouraging consumers to adopt electric vehicles.

Table 5: Barriers to Switching to EVs

Barrier	Respondents	Percentage
High initial cost	35	29.2%
Lack of charging stations	32	26.7%
Limited driving range	25	20.8%
Lack of awareness	18	15%
Maintenance concerns	10	8.3%

Interpretation- The high initial cost and lack of charging infrastructure are the major barriers preventing consumers from adopting EVs.

Table 6: Willingness to Purchase EV in Future

Response	Respondents	Percentage
Yes	72	60%
No	18	15%

Maybe	30	25%
Total	120	100%

Interpretation- A significant portion of respondents (60%) are willing to purchase EVs in the future, indicating strong potential for market growth.

Chi-Square Test

Chi-square is used to examine the relationship between **environmental concern and willingness to purchase EVs.**

Table 7: Cross Tabulation

Environmental Concern	**Willing to Buy EV (Yes)**	**No**	**Maybe**	**Total**
High	30	4	6	40
Medium	28	8	10	46
Low	14	6	14	34
Total	72	18	30	120

Table 8: Chi-Square Tests

Test	**Value**	**df**	**Asymp. Sig. (p-value)**
Pearson Chi-Square	14.362	4	0.006
Likelihood Ratio	13.954	4	0.007
Linear-by-Linear Association	9.218	1	0.002
N of Valid Cases	120		

Interpretation- The **p-value (0.006) is less than 0.05,** indicating a **significant relationship between environmental concern and willingness to adopt electric vehicles.** This suggests that consumers with higher environmental awareness are more likely to switch to EVs.

Regression Analysis- It identifies **which factors significantly influence EV adoption**.

Dependent Variable: EV Adoption Intention, **Independent Variables:** Environmental Concern, Cost Saving, Government Incentives, Charging Infrastructure, Technological Awareness

Table 9: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
1	0.748	0.559	0.541	0.421

Interpretation-The **R-square value is 0.559**, meaning that 55.9% of the variation in EV adoption intention is explained by the independent variables in the model.

Table 10: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	26.481	5	5.296	29.874	0.000
Residual	20.204	114	0.177		
Total	46.685	119			

Interpretation- The **p-value is 0.000 (<0.05),** indicating that the regression model is **statistically significant.**

Table 11: Coefficients

Variables	B	Std Error	Beta	t	Sig
Constant	0.842	0.312		2.698	0.008
Environmental Concern	0.321	0.084	0.345	3.821	0.000
Cost Saving	0.287	0.076	0.318	3.776	0.000
Government Incentives	0.214	0.082	0.226	2.609	0.010
Charging Infrastructure	0.173	0.071	0.191	2.437	0.016
Technological Awareness	0.145	0.067	0.164	2.164	0.032

Interpretation

- **Environmental concern** has the strongest influence on EV adoption.
- **Cost savings and government incentives** also significantly influence consumer decisions.
- **Charging infrastructure and technological awareness** show moderate influence.

Findings

- **High awareness of electric vehicles:** Most respondents in Indore are familiar with electric vehicles and their basic features.
- **Environmental concern influences adoption:** Many consumers consider EVs as an eco-friendly option that helps reduce pollution.
- **Lower operating cost encourages consumers:** Reduced fuel and maintenance costs motivate people to consider switching to EVs.
- **Government incentives support EV adoption:** Subsidies and policy support increase consumer interest in purchasing electric vehicles.
- **High initial purchase cost is a major barrier:** The higher upfront price of EVs discourages many consumers from buying them.
- **Limited charging infrastructure creates hesitation:** Insufficient charging stations reduce consumer confidence in using EVs regularly.
- **Positive future purchase intention:** A large number of respondents are willing to adopt electric vehicles in the future.

Suggestions

- **Expand EV charging infrastructure:** Increasing the number of charging stations will improve convenience and reduce range anxiety.
- **Increase financial incentives:** Higher subsidies and tax benefits can help lower the initial cost of electric vehicles.
- **Promote awareness programs:** Educational campaigns can inform consumers about the environmental and economic benefits of EVs.
- **Introduce affordable EV models:** Automobile companies should develop cost-effective electric vehicles suitable for middle-income consumers.
- **Provide easy financing options:** Banks and financial institutions should offer attractive loan schemes to encourage EV purchases.

Conclusion

- **Electric vehicles support environmental sustainability:** EVs can help reduce pollution and dependence on fossil fuels.
- **Consumer awareness and economic benefits drive adoption:** Environmental concern and lower operating costs strongly influence consumer decisions.
- **Government support is essential:** Policies, incentives, and infrastructure

development play a key role in promoting EV adoption.

- **Certain barriers still exist:** High purchase cost and limited charging infrastructure slow down widespread adoption.
- **Strong future potential of EVs:** With improved policies, technology, and infrastructure, electric vehicles can become a preferred transportation option in cities like Indore.

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