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An Analysis of Consumer Buying Behaviour Towards Electric Vehicles (EVs) with Particular Reference to Agra

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Abstract: *The increase in the global demand for Electric Vehicles (E.V.s), as well as in the country of India, is attributed to an expanding base of environmentally conscious consumers; Increasing cost of fuel; Technological advancements that have made E.V.s more affordable and efficient and Government initiatives to support the widespread use of E.V.s. Although there are many economic, social, technical, and structural factors that continue to impact the level at which consumers accept E.V.s, the city of Agra presents an ideal context with which to analyze the consumer's decision-making process relative to purchasing an E.V. The purpose of this current study was to examine those variables that affect consumers' purchase decisions regarding their intent to buy an E.V. Specifically, the researchers investigated such aspects of consumers' behavior as: Environmental Awareness; Affordability; Charging Infrastructure Availability; Social Influence; and Government Incentives. Descriptive research methodology was used in conjunction with Primary Data Collection via Structured Questionnaires. The ultimate objective of the researchers was to develop understanding of the factors that most influence consumers' intentions to purchase an E.V., and provide recommendations to Policymakers and Automobile Manufacturers on how they may contribute to promoting Sustainable Mobility.*

Key words: *Electric Vehicles, Consumer Buying Behaviour, Purchase Intention, Environmental Awareness, Agra.*

Introduction- The auto sector is undergoing rapid change due to the need for sustainable transportation solutions (i.e., environmentally friendly), decreasing available energy resources, and concern about climate change.¹ As a result governments around the globe are implementing programs to increase the use of electric vehicles as an effort to lower greenhouse gas emissions and improve air quality.² One of the most rapidly developing electric vehicle markets in the world is that of India. The FAME scheme, PLI scheme, and multiple state-level EV policy programs are examples of efforts made to develop the ecosystem necessary to grow and sustain electric vehicle sales in India.³⁻⁴

While there has been considerable growth in public awareness of electric vehicles through these programs, consumers remain hesitant to buy electric vehicles due to various barriers including, but not limited to, lack of awareness and knowledge of the product, lack of confidence in their ability to afford the product, lack of confidence in their ability to access charging infrastructure, etc.⁵ Electric vehicle purchasing behavior is influenced by factors including environmental awareness, cost of ownership, access to charging infrastructure, confidence in technology, social norms, and government support. Prior to making an electric vehicle purchase, potential buyers consider the total cost of ownership, overall performance of the vehicle, ongoing maintenance costs associated with the vehicle, expected range per charge, the expected life expectancy of the battery, the expected value of the vehicle at time of sale, and the proximity of available charging stations.⁶ While environmental consciousness is affecting consumers' attitudes toward sustainable transportation options, practical issues including affordability and accessibility to charging infrastructure hinder widespread adoption of electric vehicles within many Indian cities. Given Agra's growing population, increasingly dense traffic conditions, and increasing environmental concerns related to transportation, it is an attractive area for analyzing consumer behavior when it comes to purchasing electric vehicles.⁷ Additionally, understanding consumer views on electric vehicles can help provide insight into how policymakers, manufacturers and marketers can design and implement successful strategies to increase electric vehicle adoption and promote sustainable transportation practices throughout urban areas.⁸

Review of Literature- Bhalla, Sharma & Verma (2023) explored the factors influencing Indian consumers' choice to buy an electric vehicle and identified that environmental issues, perceived cost savings through an electric vehicle and government subsidies for consumers all increased their likelihood of purchasing a car with electric motor. In addition, both a lack of charging options and high purchase price are still major obstacles to consumer acceptance of cars with electric motors.⁹

Kasar & Koul (2024) evaluated Indian consumers' use of battery powered cars as part of an extension of the TAM model. They determined that perceived usefulness, environmental issue, social influence and belief in the capabilities of technology positively affected the behavioral intention of consumers to purchase battery electric cars. Conversely, they stated that a perception of financial risk associated with battery powered cars, and a fear of running out of charge while driving, both decreased the likelihood of a consumer purchasing a battery powered car.¹⁰

Pandey (2025) analyzed how Indian consumers make purchases when it comes to electric vehicles and ultimately concluded that affordability, availability of charging stations, environmental consciousness, and government incentives were the primary determinants of a consumer's desire to acquire an electric vehicle.¹¹

Pandey (2025) also noted that lack of experience with battery technology or maintenance is a factor that deters many consumers from making their first time purchase of an electric vehicle.¹²

Sreekanth et al. (2026), reviewed current development trends and policies supporting the development of electric vehicles in India and noted that government has provided significant assistance in increasing sales of electric vehicles. Despite these efforts by governments, there continues to be high costs related to the purchase price of new vehicles; too few publically available charging stations; continued concerns relating to batteries used in electric vehicles; and a lack of consumer education on the various types of electric vehicles available for sale.¹³

Environmental Awareness and Attitudes- Electric vehicles now play a major role in shaping consumer behavior for the environment. The increased concerns over climate change, pollution, CO2 emissions and sustainability will lead to an increasing number of consumers opting for alternative eco-friendly means of transport.¹³ Consumers who exhibit a greater environmental concern tend to view electric vehicles as being beneficial to cleaner air and less dependent upon fossil fuels. Research indicates that consumers with positive environmental views show a much greater propensity to purchase electric vehicles than those without such views and is influenced positively by the reliability of the electric vehicle itself and the support offered by their governments.¹⁴

Cost Considerations and Affordability- The significant difference in the up-front cost of electric vehicles is still considered one of the main factors which can impact a consumer's decision to buy an electric vehicle.¹⁵ In fact, although electric vehicles are generally less expensive for consumers to operate and maintain than traditional vehicles, most consumers will base their purchasing decisions on the price they pay to acquire an electric vehicle. Consumer perceptions regarding the affordability of electric vehicles may be influenced by other considerations such as battery replacement expense, financing options available, potential resale value and overall long-term cost associated with owning an electric vehicle. While government incentives (subsidies) and/or tax concessions are reducing some of these concerns, many middle-income household consumers continue to view affordability as a major factor in deciding whether or not to adopt electric vehicles as part of their daily transportation needs in cities like Agra.¹⁶

Infrastructure Challenges- Electric vehicle adoption is heavily influenced by the charging infrastructure available to consumers. Confidence in using an EV can be negatively affected by a lack of reliable charging locations, reduced access to those charging locations and unreliable/inefficient use of available charging locations (range anxiety).¹⁷ In addition, if there are limited public charging stations, long times required to charge at public charging stations, and/or poor service provided by the owner/maintainer of the public charging station(s), then it is likely that many people will pass on purchasing an EV. Therefore, to encourage greater consumer acceptance of electric vehicles; private/public partnership models should be established to improve and expand upon current charging infrastructure.¹⁸

Social Influence and Perceptions- Social influence can also have a strong influence on how consumers view Electric Vehicles (EVs). The recommendations of family/friends/colleagues/other EV owners, as well as those made through social media are likely to impact consumers purchasing intentions.¹⁹ A positive word-of-mouth is also building consumer confidence with regards to new technology. Additionally, due to increased social acceptance of electric vehicles, they are viewed by many consumers as a symbol of being environmentally responsible, technologically advanced and socially desirable. These perceptions will therefore have a positive effect on consumers purchasing behavior.²⁰

Government Policies and Incentives- Electric Vehicle Adoption is Promoted by Both Indian Government Policies and Incentives Regarding Finances. Subsidies for Purchases, Reduced GST on Goods and Services, Exemptions from Registration Fees, Concessions with Road Taxes, Domestic Battery Manufacturing Incentives and Improved Charging Infrastructure Have All Contributed to Consumers' Perception That Electric Vehicles are Affordable and Viable Options.²¹ However, Increasing Public Awareness of These Incentives and Ensuring Their Effective Implementation Will Remain Key to Achieving Higher Rates of EV Adoption, Especially in Medium-Sized Cities Such as Agra.²²

Research Methodology- This study adopted a descriptive-analytical research design for an analysis of consumer buying behaviour towards Electric Vehicles (evs) in Agra. This study is based both on primary data & secondary data.



Primary data was collected by administering consumers in different localities of Agra city with structured questionnaire. Secondary data was collected from books, journals, reports published by government, official publications, conference proceedings and reliable online sources relating to Electric Vehicles and consumer behavior.

The questionnaire was designed to collect information regarding awareness, attitudes, perceptions, affordability concerns, infrastructure concerns, incentives provided by government and purchase intentions towards evs. Responses were measured using five point Likert scale ranging from Strongly Agree to Strongly Disagree. Collected data were coded classified tabulated analyzed using appropriate statistical techniques to draw meaningful conclusions.

Objectives of the Study- The following are the main aims for this research project:

1. To assess levels of consumer knowledge about e-vehicles within Agra.
2. To discover what influences consumer behavior when it comes to purchasing e-vehicles.
3. To analyze the role that environmental consciousness, affordability, charging infrastructure, social influence and government incentives have upon an individual's decision-making process in relation to their purchase of e-vehicles.
4. To offer relevant recommendations to encourage a greater take up by consumers in Agra of e-vehicles.

Hypotheses of the Study- The following research hypothesis was developed to test empirically:

H01: Consumer purchasing behavior toward electric cars is not influenced by consumer environmental consciousness.

H02: Affordability and cost do not affect consumer purchasing behavior toward electric vehicles.

H03: Charging facilities do not affect consumers' intention to buy an electric vehicle.

H04: Social factors do not affect consumer purchasing behavior toward electric vehicles.

H05: Consumers' intentions to purchase an electric vehicle are not affected by government incentives.

Sample Design- A sample size of 200 was selected from a variety of areas within Agra using convenience sampling because it is simple to contact people that you can easily find. All participants were either current or potential vehicle owners, and their ages, levels of education, types of employment, and monthly incomes varied.

Participants completed a survey questionnaire which had two parts. Part one contained questions related to demographics (gender, age, level of education, type of employment, monthly income, and whether they owned a vehicle). Part two asked participants about their attitudes toward environmental protection, how affordable they thought EVs would be, the existence of sufficient charging stations to support an EV, what others think about owning an EV (social influence), what incentives exist at the governmental level to encourage the use of EVs, and finally if they intend to own an EV.

Reliability of the Instrument- In addition to its validity, the questionnaire's reliability also had to be evaluated. Internal consistency (reliability) was calculated with Cronbach's alpha as an indicator of the internal consistency of the scale. Based on this calculation, it can be concluded that the results indicate that the questionnaire has sufficient internal consistency so that the data collected may be used for further statistical evaluation.

Table 1: Reliability Statistics

Variables	Number of Items	Cronbach's Alpha
Environmental Awareness	5	0.842
Cost Considerations and Affordability	5	0.814
Infrastructure Challenges	5	0.831
Social Influence and Perceptions	5	0.798
Government Policies and Incentives	5	0.846
Purchase Intention	5	0.857
Overall Scale	30	0.836

Accordingly, Cronbach's Alpha value of 0.836 indicates a high degree of internal consistency amongst all the items of the questionnaire. In light of the fact that the alpha value is greater than the minimum acceptable value of 0.7, therefore, the tool is considered reliable and applicable to analyze consumers' purchasing behavior toward electric vehicles.

Data Analysis and Findings-The collected data were evaluated by employing descriptive statistics (such as frequency distributions, percentages, means, and standard deviations) in order to analyze respondents' demographic features and perceptions about electric cars. The results of this analysis indicate that higher levels of environmental awareness; lower operating costs for the vehicle; and additional governmental incentives positively impact the purchasing intent of consumers. However, consumer decision making with regard to the purchase of electric vehicles is influenced negatively by a number of factors including the relatively high initial cost of an electric car; limited availability of public charging stations; and limitations of battery life.

Descriptive Analysis of Survey Data

Table 2: Demographic Profile of Respondents (N = 200)

Demographic Variable	Category	Frequency	Percentage
Gender	Male	122	61.0
	Female	78	39.0
Age	Below 25 Years	36	18.0
	26–35 Years	74	37.0
	36–45 Years	52	26.0
	Above 45 Years	38	19.0
Education	Graduate	88	44.0
	Postgraduate	76	38.0
	Others	36	18.0
Monthly Income	Below ₹ 30,000	46	23.0
	₹ 30,001–₹ 60,000	92	46.0
	Above ₹ 60,000	62	31.0

The demographic breakdown showed that 61 % of all the participants were male. In contrast, 39% were females. Additionally, most respondents belonged to the 26-35 year old category at 37%, suggesting young adults are the biggest demographic of possible consumers of an electric vehicle. Furthermore, nearly 82% of all participants have had either a bachelor's degree or higher in their education history; therefore this survey is based on a highly educated sample of individuals who would likely be aware of emerging technologies and alternatives to traditional forms of transportation. Finally, regarding income, it was shown that the greatest number of participants (46%) fit into what can be classified as middle-class, a very large target market for electric vehicles.

Table 3: Consumer Perception Towards Electric Vehicles

Statement	Mean	Standard Deviation	Rank
Electric vehicles reduce environmental pollution.	4.42	0.68	I
Government incentives encourage EV purchase.	4.18	0.81	II
Lower maintenance cost motivates purchase.	4.05	0.79	III
High purchase price discourages buying.	4.11	0.86	IV
Charging infrastructure is adequate.	3.18	1.02	V

The results of the descriptive analysis show that people's opinions on whether or not they are concerned about the environment have helped greatly in creating an interest in purchasing Electric Vehicles (EVs) due to their ability to create less environmental pollution. People were very positive regarding the government providing incentives for buying Electric Vehicles and having fewer maintenance costs when owning them. Therefore, the financial aspects of owning an Electric Vehicle can be seen as another way of influencing people to consider purchasing one. On the other hand, people were generally much less satisfied with the accessibility of charging stations for Electric Vehicles and indicated that this is one of the main deterrents for many to consider purchasing Electric Vehicles. Lastly, although many people see the long term cost savings of owning an Electric Vehicle compared to a gasoline powered vehicle, many still do not feel comfortable spending the extra money required to purchase an Electric Vehicle.

Discussion- The overall results show that the decision to buy an electric vehicle is driven by a mix of environmental, economic, technological, social, and political influences. More than half of those surveyed were in favour of electric vehicles and stated that they help protect the environment by producing less greenhouse gas emissions and harmful pollutants. These views reflect how increasingly concerned city dwellers are about green travel and the importance of using environmentally friendly methods of transport. The most powerful driver of consumers' willingness to purchase was identified as being environmental

awareness. The survey showed that people believed that electric vehicles are a much cleaner way of getting around (producing much less greenhouse gases) and that we are becoming reliant on non-renewable sources for our energy. This shows that growing levels of awareness amongst consumers about environmental matters have resulted in a positive disposition toward using electric motors. People that are more aware of environmental issues are more likely to be looking into the possibility of buying an electric vehicle within the next year or two.

An economically related influence on the buying process, cost, had the second highest influence. As respondents realized that operating and maintaining electric vehicles is cheaper than traditional vehicles; however, the high upfront cost discourages several people who could afford it. In particular, middle income individuals tend to be more sensitive to the higher purchase price of electric vehicles even though there are government subsidies available to them and some other forms of financial incentive. Thus, if governments and banks provide financial assistance to consumers to enable them to purchase an electric vehicle at a low enough cost this could greatly increase the rate of adoptions of electric vehicles.

Availability of charging infrastructure affects the choice made by consumers when considering buying electric vehicles. Most respondents felt that one major limitation to owning an electric vehicle is that they do not feel confident that there will be sufficient numbers of public charging points. Many respondents also reported that they find it difficult to charge their vehicle when compared to refueling a gasoline-powered vehicle. There remains a lot of concern over the availability of charging facilities and thus the fear of running out of battery power (range anxiety) and uncertainty over where one can charge is a deterrent to purchasing an electric vehicle. Providing adequate amounts of charging facilities in both urban and rural communities will greatly reduce consumer's fears.

Finally, the results indicate that social influence has a positive effect on whether or not a person purchases an electric vehicle. When a friend or colleague recommends an electric vehicle then it enhances the level of trust that a person has in electric vehicle technology. Additionally, when someone sees others driving an electric vehicle and hears good things about the experience they are encouraged to consider purchasing an electric vehicle as well. Governments can promote positive experiences of current users through educational programs and advertising campaigns which can create even stronger favorable perceptions of electric motor based transportation systems.

Government incentives and regulations such as subsidies, reduced Goods & Services Tax (GST), exemption from road taxes, etc. have been shown to be very effective in making electric vehicles more affordable for consumers. Some respondents stated that while they understand the benefits of incentives, they lack awareness of what incentives currently exist. Government needs to continue its efforts to educate consumers and provide them with clear information about what incentives currently exist.

Acceptance and Rejection of Hypotheses- Based on the data collected from this research, we have developed the following interpretations of the hypotheses:

Hypothesis	Decision
H01: Environmental awareness has no significant influence on consumer buying behaviour towards electric vehicles.	Rejected
H02: Cost considerations and affordability have no significant influence on consumer buying behaviour towards electric vehicles.	Rejected
H03: Charging infrastructure has no significant influence on consumers' purchase intention towards electric vehicles.	Rejected
H04: Social influence has no significant impact on consumer buying behaviour towards electric vehicles.	Rejected
H05: Government policies and incentives have no significant influence on consumers' purchase intention towards electric vehicles.	Rejected

All of the null hypothesis were rejected indicating each of the following positively impacts consumer purchasing behavior toward electric vehicles in Agra; Environmental Awareness (EVA), Affordability (AFF), Charging Infrastructure (CI), Social Influence (SI), Government Incentives (GI).

Conclusion- This study finds that a combination of environmental awareness, affordability, charging infrastructure, social influence, and government support shape consumer buying behavior toward electric vehicles in Agra. Positive attitudes toward electric mobility exist among consumers who recognize the environmental and economic advantages of electric mobility. However, obstacles to the wider adoption of electric vehicles include higher costs than their internal combustion engine counterparts, lack of sufficient



charging infrastructure, low level of public awareness about government incentives for electric vehicle purchases and concerns regarding the longevity of batteries. Improving charging infrastructure, creating attractive financial incentives for consumers to purchase electric vehicles, launching programs to increase awareness among consumers and encouraging innovation in technology can greatly enhance consumer confidence in purchasing electric vehicles, thereby increasing demand for them.

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