

# Analysing Factors Influencing Consumer Perception and Purchase Intentions for Electric Vehicles in the Indian Emerging Market

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**Abstract** - This research paper delves into the critical examination of factors that influence consumer perception and purchase intentions regarding electric vehicles (EVs) in the rapidly emerging Indian market. The study focuses on understanding the dynamic interplay of variables impacting consumer decisions in a market poised for significant growth. Drawing on data from extensive surveys and comprehensive analysis, this research highlights the pivotal role of social image and performance expectancy as primary influencers of consumer perception towards EV adoption. It also sheds light on the negligible impact of technological enthusiasm, facilitating circumstances, performance expectations, and perceived benefits on anxiety levels. Moreover, the study underscores the substantial influence of social factors on the development of a positive social image associated with EV ownership. The findings underscore the importance of enhancing both EV performance and the social identity associated with EV users to foster adoption. Given India's increasing young population and middle-class income, the study presents insights into the potential growth of the EV market and its transformation into a shared mobility leader by 2030. This research paper serves as a valuable resource for industry stakeholders, policymakers, and environmental enthusiasts seeking a deeper understanding of the electric vehicle market in India and strategies to promote its sustainable growth.

**Keywords** – *Electric vehicles (EVs), Emerging Indian market, Sustainable transportation, Automobile industry, Consumers*

## INTRODUCTION

We all recognize the rights of the Earth to exist without pollution, stressing that humans are dependent on the planet, but the Earth can thrive without humans. Pollution and climate change are global issues that affect people worldwide, leading to severe consequences such as extreme weather events, droughts, floods, and more. Environmental pollution, including air pollution, noise pollution, and water pollution, is causing significant harm to the planet's delicate balance. Human activities also deplete the ozone layer, increase global temperatures, and raise sea levels. The degradation of the environment due to pollution and climate change poses a severe threat to life on Earth, highlighting the urgent need for global efforts to address these pressing issues and protect the planet for future generations. With the escalating levels of pollution and the looming threat of global warming, transitioning away from conventional energy sources has become an imperative necessity. Our heavy reliance on oil has led to the relentless exploitation of our planet. It is high time we break free from this addiction to oil, a major contributor to pollution through the emission of harmful and toxic gases detrimental to our environment, flora, and fauna. Embracing non-conventional energy sources like electricity for our vehicles presents a promising solution to curbing harmful emissions. Electric vehicles offer a significantly cleaner alternative, with energy generation and propulsion being 97 percent cleaner in

terms of noxious pollutants, as reported by *howstuffworks.com*. These electric cars not only promise a smooth and comfortable ride but also hold the potential to rejuvenate our environment and enhance air quality. As we grapple with the pressing issues of pollution, global warming, and the depletion of natural resources, electric vehicles, powered by electric motors instead of internal-combustion engines, emerge as a viable replacement for traditional automobiles. Their resurgence in the 21st century, driven by technological advancements and a growing emphasis on renewable energy, reflects their potential to mitigate the impact of transportation on climate change and environmental concerns. Government incentives and increasing public awareness have fuelled the electric vehicle market, with projections indicating a substantial growth trajectory, particularly in regions like North America, Europe, and China.

This study seeks to gauge consumer attitudes towards electric vehicles with the overarching goal of reducing vehicular pollution by promoting the adoption of these eco-friendly alternatives. The objectives of this study are to examine how customer adoption intentions for electric vehicles are affected by environmental excitement, technological enthusiasm, anxiety, social image, social influence, perceived benefits, performance expectancy, and enabling conditions, to investigate how technical zeal, perceived rewards, performance expectations, and enabling circumstances affect anxiety, to study the impact of social influence on social image, to formulate strategies to raise awareness level among potential customers for the promotion of electric vehicles.

#### Paper Organization

The rest of the paper is organized as follows: Section 2 presents the literature review of existing studies on the adoption of electric vehicles in Indian emerging market, Section 3 outlines the methodology, including the sampling, data collection, and analysis techniques employed in the study is included in section 4. Section 5 discusses the findings related to the key determinants of the adoption of electric vehicles in Jammu city. Finally, future scope of the proposed work is presented in Section 5.

#### REVIEW OF LITERATURE

Electric vehicles have the potential to mitigate the severity of significant issues such as environmental pollution. (Greg Hladik et al., 2024). Through an analysis of the literature, we aim to shed light on the complex interplay of these factors and their relative significance in the Indian context. By synthesizing prior research findings, we will set the stage for our empirical investigation, offering valuable insights into the dynamics of EV adoption in India and informing strategies for sustainable market growth in the emerging Indian electric vehicle sector.

The literature on the factors influencing the adoption of electric vehicles (EVs) reveals a multifaceted landscape shaped by various economic, social, and environmental variables. (Ali and Mohammad, 2022) identified price as the primary determinant in EV adoption, with other factors like environmental concerns, social reinforcement, incentives, and charging infrastructure playing lesser roles. In contrast, (Malagi, 2022) found that environmental consciousness was the dominant factor driving purchase decisions, underscoring the population's awareness of the environmental benefits of EVs. Similarly, (Cyriac et al., 2022) highlighted environmental sensitivity, particularly the reduction of air pollution, as a significant motivator for consumers switching to EVs. (Singh and Dixit, 2022) expanded on these findings by developing a machine learning model that identified multiple predictors, including age, gender, income, and environmental concerns, as crucial in determining EV purchase decisions. (Joshi et al., 2022) emphasized the mediating role of government policies between factors like cost, EV knowledge, and infrastructure requirements in influencing adoption intentions.

Further, (Sarkar et al., 2021) pointed out that education, employment status, and technological advancements positively impacted EV purchases, while infrastructure and maintenance costs remained significant adoption barriers. (Lokare et al., 2021) supported these findings, noting that climate awareness and cost considerations were critical factors for Indian consumers contemplating EV purchases. Similarly, (Kushwah and Tomer,

2021) identified infrastructure, range anxiety, and cost as significant determinants in the adoption of EVs, alongside environmental consciousness and government policies. (Shah et al., 2021) specifically addressed range anxiety, recommending a well-designed network of charging stations as a solution. (Pandey et al., 2021) explored the role of personal innovativeness and perceived financial rewards, finding these factors more influential than perceived cost and risk in EV purchase decisions. (Ninh et al., 2021) focused on the psychological aspects, revealing that resistance to change and perceived value significantly impacted purchase intention and willingness to pay for EVs. Additionally, (Vashisth and Gupta, 2021) and (Mahamuni and Subramanian, 2021) both highlighted infrastructure as a major obstacle, with the latter also noting the influence of personal moral standards and perceived behavioral control on EV purchase decisions, guided by the theory of planned behavior. Collectively, these studies provide a comprehensive understanding of the diverse factors influencing EV adoption, ranging from economic and infrastructural challenges to environmental consciousness and psychological barriers.

## METHODOLOGY

The study's sample area of this study encompasses 16 locations of Jammu west, with a sample size comprising 137 respondents. The chosen sampling technique is area sampling, justified by the research's focus on comprehending consumer perceptions of electric vehicles among individuals above 20 years of age, as they represent potential customers. Data for this study were sourced from two avenues: primary data collected via structured questionnaires from respondents and secondary data collected from journals and books.

### Hypotheses Formulation:

H1: There is a significant difference in the perception of respondents related to adoption of electric vehicles based on their age.

H2: There is a significant difference in the perception of respondents related to adoption of electric vehicles based on their income.

H3: Environmental enthusiasm, technological enthusiasm, anxiety, social image, social influence, perceived advantages, performance expectancy, and conducive factors all have a significant effect on adoption intention.

## DATA ANALYSIS AND INTERPRETATION

*H1: There is a significant difference in the perception of respondents related to adoption of electric vehicles based on their age.*

The result of ANOVA shows that there is no significant difference in the perception of respondents related to adoption of electric vehicles due to age because the significance value is more than 0.05 ( $p > 0.05$ ). Thus, it shows that adoption of electric vehicles is not affected by age. The results of ANOVA are presented in Table 1 as given below:

TABLE I. AGE-WISE ANOVA RESULTS

Construct	20-30 yrs		30-40 yrs		40-50 yrs		50-60 yrs		Above 60 yr		ANOVA	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	F	Sig.(p)
Environmental Enthusiasm	1.42	0.32	1.38	0.28	1.52	0.30	1.38	0.41	1.23	0.24	2.83	0.03
Technological Enthusiasm	2.27	0.68	2.47	0.87	2.50	0.61	2.62	0.88	2.48	0.93	0.53	0.71
Anxiety	2.42	0.78	2.40	0.64	2.33	0.56	2.50	0.66	2.47	0.59	0.36	0.84
Social Image	1.81	0.60	1.58	0.42	2.07	0.65	1.72	0.63	1.71	0.61	3.04	0.02
Social Influence	2.11	0.76	2.21	0.75	2.64	0.66	2.41	0.81	2.12	0.39	2.90	0.02

Perceived Benefits	1.39	0.53	1.38	0.46	1.78	0.52	1.55	0.53	1.50	0.50	3.21	0.02
Performance Expectancy	2.54	0.76	2.53	0.90	2.55	0.58	2.53	0.70	2.47	0.65	0.03	0.98
Facilitating Conditions	1.84	0.65	1.64	0.45	2.25	0.80	1.98	0.55	1.84	0.61	3.86	0.01
Adoption Intention	2.17	0.66	1.98	0.64	2.22	0.59	2.09	0.63	2.13	0.69	0.62	0.65

*H2: There is a significant difference in the perception of respondents related to adoption of electric vehicles based on their income.*

The results of ANOVA shows that there is no significant difference in the perception of respondents related to adoption of electric vehicles due to income because the significance value is more than 0.05 ( $p > 0.05$ ). The results of ANOVA are presented in Table 2 as given below:

TABLE II. INCOME-WISE ANOVA RESULTS

Construct	50000-75000		75000-100000		100000-125000		Above 125000		ANOVA	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	F	Sig.(p)
Environmental Enthusiasm	1.43	0.34	1.43	0.28	1.44	0.33	1.23	0.36	1.27	0.28
Technological Enthusiasm	2.43	0.71	2.56	0.85	2.71	1.06	2.55	0.79	0.71	0.54
Anxiety	2.42	0.61	2.20	0.78	2.65	0.64	2.45	0.37	1.57	0.21
Social Image	1.79	0.63	1.90	0.68	1.73	0.45	1.88	0.67	0.32	0.82
Social Influence	2.28	0.75	2.57	0.70	2.33	0.77	2.70	0.53	1.80	0.14
Perceived Benefits	1.53	0.53	1.55	0.57	1.67	0.56	1.59	0.44	0.36	0.77
Performance Expectancy	2.55	0.71	2.40	0.71	2.43	0.78	2.76	0.49	0.72	0.53
Facilitating Conditions	1.94	0.69	1.97	0.69	1.98	0.69	2.13	0.38	0.29	0.84
Adoption Intention	2.05	0.62	2.23	0.59	2.26	0.68	2.36	0.55	1.49	0.23

*H3: Environmental enthusiasm, technological enthusiasm, anxiety, social image, social influence, perceived advantages, performance expectancy, and conducive factors all have a significant effect on adoption intention.*

The results of the regression analysis reveal that F value=8.519 ( $p < 0.05$ ),  $R = 0.589$  and  $R^2$  value=0.347. The analysis of the data indicates that several factors, including anxiety, social image, social influence, perceived benefits, performance expectancy, and enabling factors, collectively account for 34.7% of the variance in adoption intention. Moreover, the  $\beta$  coefficient for environmental enthusiasm, technological enthusiasm, anxiety, social image, social influence, perceived benefits, performance expectancy, and facilitating conditions were found to be 0.04 ( $p > 0.05$ ), 0.03 ( $p > 0.03$ ), -0.18 ( $p < 0.05$ ), 0.34 ( $p < 0.05$ ), 0.08 ( $p > 0.05$ ), -0.00 ( $p > 0.05$ ), 0.24 ( $p < 0.05$ ), and -0.00 ( $p < 0.05$ ) respectively. The result of multiple regression is presented in Table 3 as given below:

TABLE III. MULTIPLE REGRESSION ANALYSIS

Predictor	B	Beta( $\beta$ )	Sig.	R	$R^2$
Constant	1.07		0.00	0.58	0.36
Environmental enthusiasm	0.09	0.04	0.58		
Technological enthusiasm	0.02	0.03	0.79		

Anxiety	-0.19	-0.18	0.02
Social image	0.35	0.34	0.00
Social influence	0.07	0.08	0.35
Perceived benefits	-0.00	-0.00	0.98
Performance expectancy	0.21	0.24	0.01
Facilitating conditions	-0.00	-0.00	0.96

## MAJOR FINDINGS

According to the findings, the factors that most significantly affect respondents' perceptions based on their age are environmental enthusiasm, social image, social influence, perceived benefits, and enabling conditions. As a result, electric vehicle manufacturers should promote the idea of environmental protection and living a green lifestyle to raise consumers' awareness of and preference for electric vehicles, which will ultimately improve their social standing. Additionally, the government should implement a variety of programs, such as subsidies for electric car purchases, reduced registration fees and road taxes for electric vehicles, and toll fee exemptions, among others.

The findings also show that there is no significant effect on perception of respondents based on their income, however, the electric vehicle manufacturers should still consider manufacturing vehicles for different income groups along with focussing on other important factors such as adequate charging stations, better mileage, physical infrastructure, lower fuel cost etc.

The findings indicate that adoption intention is positively influenced by technical enthusiasm, environmental passion, social image, and social influence. Therefore, to enhance the self-image and social identity of electric car users, marketing and advertising campaigns should keep stressing the original, cutting-edge, and innovative aspects of electric vehicles. The sharing of this knowledge ought to prove essential for customers who consider themselves tech enthusiasts. Making consumers aware of the advantages of adopting electric vehicles should be a key component of the marketing plan. In order to convince environmental enthusiasts to purchase electric vehicles, promotion and awareness efforts should emphasize the green and eco-friendly attributes of these vehicles.

## FUTURE SCOPE OF THE STUDY

This study emphasizes that social image and performance expectations are the main factors influencing consumers' perceptions of the adoption of electric automobiles. Notably, anxiety levels are unaffected by characteristics including technical enthusiasm, anticipated benefits, performance expectations, and conducive situations. Furthermore, societal influence has a big impact on how people see electric cars. Consequently, it is advisable for electric vehicle manufacturers to allocate resources towards enhancing both vehicle performance and the social identity linked to their users. The research advocates for a gradual transition from conventional fuel-powered vehicles to eco-friendly alternatives, given the escalating crude oil prices, the detrimental impact of carbon emissions on human health, dwindling fossil fuel reserves, and growing environmental concerns. This global trend is particularly pronounced in developed nations and progressively spreading to developing countries like India, where a youthful population and rising middle-class income could fuel the automotive industry's growth. Stakeholders, including manufacturers, government bodies, and environmental advocates, should collaboratively foster a conducive environment for electric vehicle development in India. Notably, the study anticipates that by 2030, India has the potential to lead in shared mobility through electric vehicles. With numerous global market leaders entering India's electric vehicle market, it is imperative to gauge purchase intentions accurately. This research offers valuable insights for automobile manufacturers and marketers seeking a deeper understanding of consumer

perceptions regarding electric vehicles. Future scope emphasis that there must be campaigns and awareness raising efforts to highlight how serious the current state of the ecosystem is. This might increase environmental awareness among car customers and encourage them to switch to electric vehicles. It is suggested that the Government and the firms that make electric vehicles need to lessen the unfavourable impressions about electric vehicles among prospective consumers since research shows that anxiety connected to driving range and charging length has a negative impact on the adoption intention. To achieve this, adequate funds must be allocated to research and development in order to advance technology and lessen consumers' perceptions of the negative utility of electric vehicles. To dispel misconceptions about the driving range and charging time, the advertising suggestions should highlight the key aspects of these cars.

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