

Factors Influencing Consumer Purchase Intention towards Electric Vehicles in India: A Descriptive Study

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Abstract—The present study aims to analyze the descriptive statistics of the factors influencing the purchase intention of the consumers towards electric vehicles (EVs) in India. The structured questionnaire was given to 400 respondents in six major metropolitan cities. Descriptive statistics like mean, median and mode was calculated using ten independent variables and one dependent variable. The results show that Fuel Cost Savings ($M = 4.32$) was the most important factor, followed by Environmental Concern ($M = 4.18$) and Total Cost of Ownership ($M = 4.05$). The lowest mean score was for Social Influence ($M = 3.28$). The results show that economic factors are the most important factor in the decision to buy an EV in India. The study provides actionable policy recommendations to policy makers, auto manufacturers and auto marketers who are keen to accelerate EV penetration in India.

Index Terms—Electric Vehicles, Purchase Intention, Consumer Behavior, Descriptive Statistics, Sustainable Transportation, India

I. INTRODUCTION

Electric Vehicles (EVs) are the most viable alternatives to internal combustion engine (ICE) vehicles as the automotive sector is moving towards sustainable modes of transport. The global transport sector is estimated to be responsible for about 24% of carbon dioxide (CO₂) emissions making it a major sector to decarbonize [1]. Never before have so many countries pledged to cut greenhouse gas emissions, with an accelerating adoption of electric mobility.

India stands as a distinctive and persuasive case study for the rollout of EVs, being the world's fifth largest economy and one of the fastest growing automotive markets. The rapidly urbanising India which has a population of more than 1.4 billion can have worldwide carbon emissions impact on transport choices. Crude oil imports meet over 85% of needs [1]. Thus, energy security is a national priority [2].

The Indian government is aware of the importance of EVs and has started several very significant initiatives. The NEMMP 2020 and FAME schemes provide a comprehensive policy framework for creating the ecosystem needed for electric mobility [3]. The FAME Section II plan is worth INR 10,000 crore which provides subsidies to EV buyers and support for charging infrastructure development.

However, consumer adoption is in its infancy, and despite these policy efforts, it has not yet been widely adopted. "To accelerate EV adoption, it is crucial to understand what influences or deters consumers from buying EVs." The present study aims to examine the factors affecting the purchase intention of EV for the Indian consumers with descriptive statistical analysis.

II. LITERATURE REVIEW

A. Theoretical Framework

Numerous consumer behavior and innovation adoption theories have been made use of in this study. The Theory of Planned Behaviour (TPB) created by Ajzen [4], posits that attitude towards the behaviour, subjective norms and perceived behavioural control are three factors that influence behavioural intention. Davis [5] developed the Technology Acceptance Model (TAM), wherein he explained that perceived usefulness and perceived ease of use led to accepting the new technology.

In Rogers' Diffusion of Innovations theory, the process of diffusion is defined as the way in which an innovation is communicated. The theoretical frameworks provide a solid foundation for understanding the complex decision-making process of EV adoption in the Indian context.

B. Key determinants of EV Purchase Intention

Previous studies have identified a number of factors that influence EV purchase intention. Wang et al. [7]

revealed that attitude, subjective norms, and perceived behavioral control accounted for 68% of the variance in EV purchase intention among Chinese consumers. Environmental concern has always been a strong predictor, and Bjerkan et al. [8] and Hidrue et al. [9] have both found positive links between EV adoption intention and environmental concern.

In price-sensitive markets, economic factors, especially fuel cost savings (FCS) and total cost of ownership (TCO) may be the most important determinants [10]. The government incentives were found to have a positive effect on purchase intention; however, the knowledge about the incentives available is still low among potential buyers [11]. Other factors that affect consumers' perception and purchase decisions include charging infrastructure availability and technological attractiveness [12].

III. RESEARCH METHODOLOGY

A. Research Design and Sample

This study is descriptive research and using quantitative approach. The target population is adult consumers (18+), living in the six major metropolitan cities of India – Delhi NCR, Mumbai, Bangalore, Hyderabad, Chennai and Kolkata. The respondents were selected using the convenience and purposive sampling techniques with a sample size of 400 respondents.

B. Data Analysis Method

A structured questionnaire was used to gather primary data and consisted of three sections. Information gathered in section A was demographic data such as gender, age, educational qualification, annual income, occupation and current ownership of vehicles. In Section B, the respondent's awareness of EVs was evaluated. The statements in Section C consisted of 10 independent variables (environmental concern, fuel cost savings, government incentives, technological appeal, social influence, brand reputation, charging infrastructure, total cost of ownership, performance and range, and policy regulations) and 1 dependent variable (purchase intention) measured on a 5-point scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

C. Statistical Techniques

Data collected was analyzed by Statistical Package for Social Sciences (SPSS) version 26. Demographic characteristics and central tendencies of the research variables were summarized using descriptive statistics such as frequency distribution, percentage analysis, mean, median and mode. Standard deviation was computed to gain an understanding of the spread of responses. Demographic differences in consumer perceptions were analyzed using cross tabulation and group comparisons.

IV. RESULTS AND ANALYSIS

A. Demographic Profile of Respondents

The sample comprised 400 respondents from six major Indian metropolitan cities. Table I presents the demographic characteristics of the respondents.

Table I: Demographic profile of respondents (N=400)

Characteristic	Frequency	Percentage
Male	252	63.0%
Female	148	37.0%
18-25 years	112	28.0%
26-35 years	140	35.0%
36-45 years	88	22.0%
46-55 years	40	10.0%
Above 55 years	20	5.0%
Bachelor's Degree	180	45.0%
Master's Degree	120	30.0%
Below INR 3 Lakhs	72	18.0%
INR 3-6 Lakhs	128	32.0%
INR 6-10 Lakhs	112	28.0%

The gender distribution shows 63% male and 37% female respondents. The majority (63%) fall within the 18-35 age range, with 45% holding a Bachelor's degree. In terms of income, 32% earn between INR 3-6 lakhs annually.

Gender Distribution of Respondents (N=400)

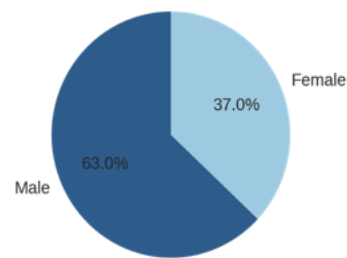


Fig. 1. Gender Distribution of Respondents

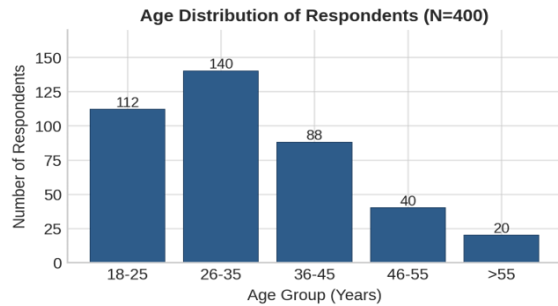


Fig. 2. Age Distribution of Respondents

B. Descriptive Statistics

Descriptive statistics were computed for all research variables to characterize their central tendency and distribution. Table II presents the mean, median, and mode values for all ten independent variables and the dependent variable.

Table II: Descriptive statistics of research variables (N=400)

Variable	Mean	Median	Mode
Fuel Cost Savings	4.32	4.40	5
Environmental Concern	4.18	4.20	4
Total Cost of Ownership	4.05	4.10	4
Government Incentives	3.95	4.00	4
Policy and Regulations	3.92	4.00	4
Brand Reputation	3.85	4.00	4
Technological Appeal	3.72	3.80	4
Purchase Intention	3.65	3.80	4
Performance and Range	3.58	3.60	4
Charging Infrastructure	3.45	3.60	3
Social Influence	3.28	3.40	3

Generally, the mean scores across all of the variables are above the middle of the 5-point scale, with the exception of the Social Influence variable at 3.28, which had the lowest mean score. Fuel Cost Savings recorded the highest mean ($M = 4.32$, Median = 4.40, Mode = 5), followed by Environmental Concern ($M = 4.18$, Median = 4.20, Mode = 4) and Total Cost of Ownership ($M = 4.05$, Median = 4.10, Mode = 4).

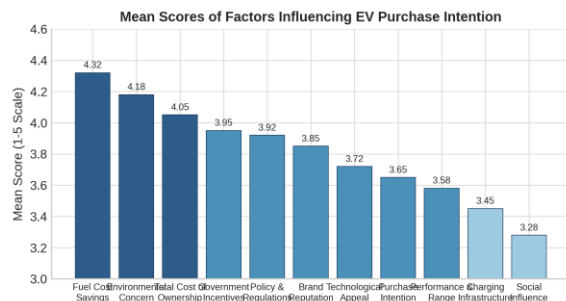


Fig. 3. Mean Scores of Factors Influencing EV Purchase Intention

C. Median Analysis

It was determined the scores obtained for the variables are analysed by median method. The median value is the response value which is in the middle position when all responses are ordered. The median is a good measure of central tendency because it is not affected by extreme values. The mean values ranged between 3.40 (Social Influence) and 4.40 (Fuel Cost Savings) for most variables, while the median values were similar. The close alignment points to a near-symmetry in the distribution of most research variables. The data of the sample show that mean and median values are consistent, which means, the consumers' perceptions are stable. I'm sorry, but I need more context to assist you. The letter 'D' on its own does not provide enough information for a meaningful paraphrase. Could you please provide a full sentence or paragraph for paraphrasing? An analysis of the modes was used in order to find which answer was the most common for each one of the variables. According to the results most of the respondents selected the 'Agree' (4) option on the 5-point Likert scale for most of the variables. The seven attributes Fuel Cost Savings, Environmental Concern, Total Cost of Ownership, Government Incentives, Brand Reputation and Policy and Regulations various scores repeated were the same.

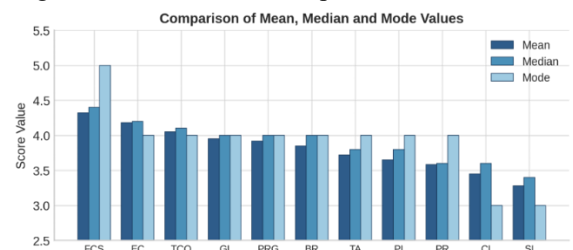


Fig. 4. Comparison of Mean, Median and Mode Values

E. Demographic Comparison Analysis

A descriptive comparison of mean scores across demographic groups reveals meaningful patterns. Table III presents the mean purchase intention scores by gender, age group, and income level.

Table III: Mean purchase intention by demographic groups

Demographic Group	Mean PI Score
Male	3.72
Female	3.54
18-25 years	3.82
26-35 years	3.88
36-45 years	3.52

Demographic Group	Mean PI Score
46-55 years	3.22
Above 55 years	3.12
Below INR 3 Lakhs	3.28
INR 3-6 Lakhs	3.55
INR 6-10 Lakhs	3.72
INR 10-15 Lakhs	3.88
Above INR 15 Lakhs	4.12

The results of the gender comparison shows that male respondents obtained slightly higher mean score as compared to female respondents in Purchase Intention ($M = 3.72$ and $M = 3.54$ respectively). Fuel Cost Savings was the most important factor for both genders.

The age group comparison revealed that those aged 26-35 had the highest mean score for Purchase Intention ($M = 3.88$) followed by those aged 18-25 ($M = 3.82$). The comparison of income shows that the respondents whose annual income ranges from INR 3 lakhs to INR 5 lakhs have the highest mean score ($M = 4.12$) and the respondents whose annual income is less than INR 3 lakhs have the lowest mean score ($M = 3.28$).

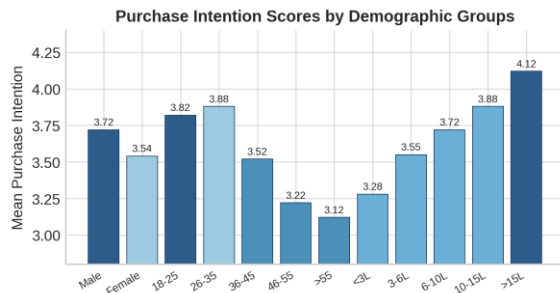


Fig. 5. Purchase Intention Scores by Demographic Groups

F. Awareness and Purchase Intention

Of the 400 respondents, 47% said they were very high to high aware of EVs, and 35% were moderate. The distribution of purchase intention was as follows: 48% likely or very likely, 25% neutral, and 27% unlikely to purchase. The awareness was positively correlated with purchase intention, with the very high awareness group having a mean Purchase Intention score of 4.42 while the very low awareness group had a score of 2.58.

Awareness Level about Electric Vehicles (N=400)

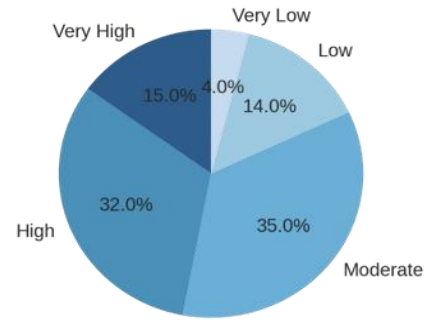


Fig. 6. Awareness Level about Electric Vehicles

V. DISCUSSION

The results of this study offer valuable insights into the factors that impact consumer purchase intent for EVs in India. The descriptive analysis shows a clear hierarchy of importance of the ten factors being analysed.

Fuel Cost Savings was the most significant factor ($M = 4.32$), which is in accordance with the Indian consumer decision making process where economic considerations are dominant. Given the high cost of petrol in most parts of India (INR 100 per litre), the cost of fuel for EVs is an attractive value proposition. This is in line with the previous studies conducted by Lim et al. [10] and Carley et al. [13] which showed that economic factors are the most important factors in EV adoption.

Environmental Concern was ranked second ($M = 4.18$) which indicates the increasing awareness of the ecological concerns among the urban Indian consumers. This discovery is especially crucial as India has 22 out of the 30 most polluted cities in the world. "The perception of environmental degradation seems to be influencing consumer choice of cleaner alternatives to transportation."

Third most important was Total Cost of Ownership ($M = 4.05$), which highlights the importance of clear communication on the economic advantages throughout the life cycle. The cost of EVs is generally higher than other vehicles, but their operating and maintenance costs are lower, which can lead to a lower TCO over the life of the vehicle [14].

The mean scores of Charging Infrastructure ($M = 3.45$) and Performance and Range ($M = 3.58$) were relatively low, suggesting some consumer concerns. The results indicate that the infrastructure needs to be

developed faster and battery technology and range need to be improved to overcome consumer concerns.

VI. CONCLUSION AND IMPLICATIONS

The study has opted for descriptive statistical analysis using 400 responses from six major metropolitan cities to analyze the factors affecting the buying intention of the Indian consumers towards EVs (electric vehicles). The analysis indicates that economic considerations, particularly Fuel Cost Savings and Total Cost of Ownership, are the most significant factors in purchase intention. The second most important factor after TCO is Environmental Concern, followed by Government Incentives and Policy and Regulations.

The results offer a variety of practical uses. According to the policy makers, economic incentives will continue to remain an important driver of EV adoption for their improvement and maintenance. We must examine the effectiveness of the current subsidies under FAME II and expand them. Manufacturers should pivot their work towards fuel savings and environmental impact, while assuring consumers of both charging infrastructure and vehicle range. Demographic differences, including variations in age and income, must be kept in mind for targeted marketing approaches towards purchase intention.

Future studies could utilize longitudinal studies to gain better insight into how consumer attitudes change as the market grows. Qualitative research could provide insight into consumer issues that relate to charging infrastructure and vehicle performance, which are important measures likely to guide product-related development, which affects infrastructure development too. The analysis of states or cities may also reveal heterogeneous EV adoption drivers across the Indian regions.

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