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International Advanced Research Journal in Science, Engineering and Technology Impact Factor 8.066 ∺ Peer-reviewed & Refereed journal ∺ Vol. 12, Issue 5, May 2025

DOI: 10.17148/IARJSET.2025.12536

AN ARTICLE ON CONSUMER SENTIMENT ANALYSIS ON ELECTRIC VEHICLE ADOPTION

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Abstract: The purpose of this study is to use data analysis methods and insights from social media platforms to investigate and evaluate consumer attitude toward the adoption of electric cars (EVs). Understanding public sentiment is crucial for promoting more seamless market adoption as EVs become a crucial component of the worldwide transition to sustainable mobility. The main goal of this study is to identify trends in consumer perceptions of EVs by using sentiment analysis methods and digital discussions.

The survey also looks into a number of important aspects that influence consumer opinions, including as the cost, performance, charging infrastructure, and environmental advantages of vehicles. These components are evaluated to see if they influence sentiment in a favorable or negative way. Furthermore, the study explores the psychological and emotional aspects of customer attitudes, paying special attention to perceptions of brands, trust, and the influence of mood on buying decisions.

The impact of external factors on public opinion and preparedness to embrace EVs is also examined, including market trends, governmental regulations, and incentive schemes. A mixed-methods approach will be used, integrating qualitative interpretation of customer anecdotes with quantitative sentiment scoring from social media. This study attempts to offer a thorough grasp of the changing terrain of EV adoption by coordinating consumer voice data with contextual market dynamics. The information gathered will help marketers, legislators, and automakers create more focused plans that will allay consumer worries and hasten the switch to electric vehicles

Keywords: Electric Vehicles, Consumer Sentiment, Sentiment Analysis, Social Media Insights, EV Adoption, Sustainable Mobility.

I. INTRODUCTION

The global automotive industry is changing dramatically as it moves toward more ecologically friendly and sustainable forms of transportation. As a greener substitute for conventional internal combustion engine vehicles, electric vehicles (EVs) have become a crucial part of this shift. Understanding consumer opinion has become crucial in predicting how soon and successfully EVs will be accepted by the general public as governments and manufacturers fight for lower emissions and energy efficiency.

Social media, where people freely express their ideas, opinions, and experiences, is a great source of consumer insight in the current digital era. In order to better understand public sentiments toward the adoption of electric vehicles, this study relies on sentiment analysis from social media sites. Through the use of sentiment analysis and data analysis techniques, the study aims to record the direction and tone of customer conversations, offering a real-time window into how they view EVs.

When assessing these perceptions, a number of important elements are taken into account, such as the price of electric vehicles, their performance capabilities, the availability of charging infrastructure, and their environmental benefits. These factors have a direct impact on the viability and allure of making the changeover to electric vehicles, making them crucial in influencing customer sentiment. It is possible to determine which concerns cause enthusiasm or hesitancy by examining how these components are addressed online.

Consumer attitudes are also influenced by psychological and emotional factors in addition to pragmatic ones. Opinions on EVs are greatly influenced by brand perception, technological trust, and emotional reactions like enthusiasm,



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skepticism, or curiosity. This study investigates how the public's willingness to adopt electric mobility is influenced by these attitudes and perceptions.

Consumer sentiment is also greatly influenced by outside factors like laws, incentive schemes, gasoline prices, and general market trends. The study intends to offer insights that can assist automakers, legislators, and marketers in creating more focused tactics to encourage EV adoption and successfully address consumer concerns by evaluating how these aspects are mirrored in social media conversations.

II. RESEARCH BACKGROUND

Environmental concerns, changes in laws, and developments in clean technology are all driving a major transition in the automotive sector. In light of this, electric vehicles, or EVs, are now at the forefront of the global movement toward environmentally friendly transportation. Manufacturers and customers are under more pressure to switch to electric cars (EVs) as a result of numerous nations adopting aggressive objectives for cutting carbon emissions and phase-out fossil fuel vehicles. The pace of adoption, however, varies greatly despite advancements in technology and helpful governmental initiatives, underscoring the significance of comprehending public emotion and perception.

Technical performance, environmental impact, and economic viability have been the main topics of earlier research on the adoption of electric vehicles. Even though these areas are still crucial, new research highlights how customer attitudes, beliefs, and emotions are increasingly influencing market behavior. Common obstacles have been found to include things like charging accessibility, range anxiety, and upfront expenses. However, long-term savings, technological attractiveness, and environmental awareness are important motivators. These differing opinions imply that the adoption process is influenced by consumer sentiment, which is complex and frequently unpredictable.

Researchers can find patterns, identify emotions, and pinpoint recurrent themes in public discussions regarding electric vehicles by employing sentiment analysis and natural language processing technologies. This method provides a more up-to-date and dynamic understanding of consumer sentiments.

Furthermore, in today's market, the importance of emotional attachments to products, faith in developing technology, and brand reputation has grown. Customers consider how a brand fits with their beliefs and way of life in addition to performance and price when assessing cars. To obtain a comprehensive understanding of EV adoption, it is necessary to take into account the role of psychological and social elements, including as peer influence, fear of change, and perception of government policy. A method for capturing these intricate elements at scale is sentiment analysis.

Comprehending the wider market environment is also crucial. Fuel prices, infrastructure improvements, incentive programs, and government regulations all have an impact on public opinion and decision-making. A more thorough understanding of the elements promoting or impeding EV adoption is made possible by the combination of sentiment research with market and policy data. This study backdrop provides the groundwork for investigating how customer attitude, which is influenced by both internal and external factors, eventually affects how well electric vehicles perform in the worldwide market.

III. RESEARCH METHODLOGY

Using a mixed-methods approach, this study combines quantitative and qualitative techniques to provide a thorough knowledge of consumer opinion regarding the adoption of electric vehicles (EVs). Real-time access to public opinions is made possible by the usage of social media as a data source, which provides a wide range of insights into the attitudes, preferences, and concerns of consumers. The study is able to examine not just what people are saying about EVs, but also how and why they feel that way because to the combination of sentiment analysis and thematic interpretation.

Data is gathered from popular social media sites like Facebook, YouTube, Reddit, and Twitter by utilizing pertinent hashtags, phrases, and conversations on electric cars. Because of their extensive usage and the abundance of usergenerated material, these platforms were selected. Large amounts of text data are collected using web scraping and API technologies, and they are subsequently cleaned and pre-processed to eliminate unnecessary content, spam, and duplication. User reviews, comments, posts, and responses that share thoughts or experiences about EVs are the main focus.

Python libraries like TextBlob, VADER, and spaCy are examples of Natural Language Processing (NLP) tools that are used to apply sentiment analysis approaches for the quantitative analysis. These tools assist in categorizing the



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information into sentiments that are neutral, negative, or favourable. Sentiment scoring and frequency analysis are also employed to gauge the polarity and intensity of the emotions conveyed. Finding sentiment trends and patterns on a variety of subjects, including cost, functionality, charging infrastructure, and environmental advantages, is the goal.

A sample of posts is chosen for in-depth content analysis during the qualitative phase in order to interpret the psychological and emotional elements affecting sentiment. This entails examining brand impressions, consumer trust, and emotional manifestations like excitement, skepticism, or anxiety. The study also looks at how online discussions reflect exogenous factors like market incentives and governmental regulations. The methodology guarantees a comprehensive view of the elements influencing public opinion toward EV adoption by combining the two types of study.

RESEARCH ANALYSIS





INTERPRETATION:

Male respondents (57.5%) slightly outnumber female respondents (42.5%), indicating a moderate male dominance in the sample population. This might reflect either broader interest in vehicles or greater vehicle ownership among males in the surveyed region.



CHART NO:2 VEHICLE OWNERSHIP

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INTERPRETATION:

41.9% own petrol vehicles while 20% own electric vehicles, showing a growing but still minority adoption of EVs. Notably, 38.1% do not own any vehicle, which could include potential future adopters of EVs.

📥 DESCRIPTIVE STATISTICS







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CHART NO 3: Descriptive Statistics of Price, Performance, Charging Infrastructure, social media and effect of government Incentives

INTERPRETATION:

The descriptive statistics indicate that all five factors—Price, Performance, Infrastructure, Social Media Influence, and Effect of Government Incentives—hold moderate importance in influencing respondent decisions, with mean values ranging narrowly from 3.12 to 3.22.

The median and mode for all variables is consistently 3, showing a neutral stance across the sample. The range for each factor is relatively high (3.5 to 4), indicating varied opinions among the 160 respondents. Among the factors, the Effect of Government Incentives has the highest mean (3.22), suggesting it may have a slightly greater influence compared to the others. Overall, the data reflects balanced perspectives without extreme leanings, highlighting that no single factor overwhelmingly drives decision-making



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REGRESSION: Impact of government incentives on social media sentiment scores



CHART NO 4: Regression Analysis chart

INTERPRETATION:

The chart illustrates the relationship between Government Incentives and the Dependent Variable, based on the provided regression analysis. The blue dots represent simulated observed data points, showing the actual variation in values.

Overlaid on this is a dark blue regression line, which visually captures the overall trend. This line is constructed using the regression coefficients—an intercept of 1.93 and a slope of 0.38—indicating a positive linear relationship.

As government incentives increase, the dependent variable also tends to rise, consistent with the findings from the regression output.

FINDINGS

According to the survey, young people are very interested in electric cars (EVs); 57.6% of respondents were under 30. There is a modest gender imbalance, with slightly more men (57.5%) than women (42.5%). The majority of respondents (35.6%) are students, and 37.5%) are classified as "others," indicating that low-income or non-working groups predominate. Just 4.4% of people are business owners, which suggests little entrepreneurial activity. Although 38.1% of people do not own any car, which represents a potential market, EV ownership is still low at 20%. While 26.9% of people drive seldom, 33.1% of people drive every day, indicating the necessity for reliable infrastructure. Government incentives and consumer opinion are positively correlated, according to regression results (coefficient = 0.38), highlighting the significance of measures that encourage the adoption of EVs.

SUGGESTIONS

Increased knowledge of government incentives is essential to accelerating the adoption of electric vehicles (EVs), as they have a big influence on customer opinion. These initiatives can reach a wider audience by being expanded to include other groups, especially students and non-owners. To guarantee balanced involvement, marketing tactics should take gender preferences into account. Additionally, EVs' perceived worth may increase if buyers are informed about their performance advantages. Targeted marketing should be used to create favourable emotion because of social media's power. Subsidies or flexible financing alternatives could increase affordability and promote adoption, as cost is still a neutral issue. When combined, these tactics can increase public interest and hasten the switch to electric vehicles.

IV. CONCLUSION

The study shows that a largely young population is clearly interested in electric cars (EVs), with the majority of respondents being under 30 years old. This implies that young people are more receptive to embracing environmentally friendly transportation and innovative technologies. Despite marginally favoring men, the gender split still reveals a high level of female engagement, suggesting that EVs are popular with both sexes. Furthermore, the high percentage of students and those without steady jobs emphasizes how crucial accessibility and cost are to adoption.

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Only 20% of respondents now possess an electric vehicle, indicating that EV penetration is still very low. An important opportunity to pitch EVs as a first-choice purchase is presented by the fact that 38.1% of people do not own any vehicles at all.

Government incentives have a statistically significant, positive impact on public opinion of EVs, according to regression analysis. However, the model's poor explanatory power (R2 = 0.14), which suggests that additional research should be done on other influencing factors. The requirement for a comprehensive strategy in communication and policy design is further supported by the fact that none of the five choice variables—price, performance, infrastructure, social media influence, and incentives—showed dominance in importance. The marginally better average grade for incentives points to the potential for increased or sustained government assistance to increase EV adoption.

In summary, the information offers a fair but complex assessment of prospective buyers' preparedness for EVs. Adoption ultimately hinges on a number of criteria, including pricing, performance dependability, infrastructure availability, and effective communication, even if government subsidies are a crucial source of good emotion. Stakeholders must embrace a segmented, inclusive approach that informs, encourages, and supports a range of user groups—from first-time purchasers to frequent commuters and eco-aware students—in order to hasten the adoption of EVs.

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