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Factors Influencing Purchasing Behaviour of Consumers towards E-Vehicles

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Abstract- The objective of this study project is to examine the factors that influence consumers' decisions to buy electric vehicles (EVs). The need to transition to sustainable energy sources and lower greenhouse gas emissions has increased interest in electric vehicles (EVs). However, a number of issues, including expensive initial expenses, a short driving range, and a lack luster infrastructure for charging EVs, have contributed to the delayed consumer acceptance of EVs. As such, it is vital to ascertain the pivotal elements that impact consumer inclination towards electric vehicle purchases. To better understand and predict consumers' intention to buy electric vehicles, the study aims to operationalize and assess the extended Technological Acceptance Model (TAM) with perceived risk and financial incentives policy based on the integrative approach of "Beliefs-attitude-intention" (EVs). Using structural equation modelling (SEM), it is possible to determine how adoption intention for EVs is influenced both directly and indirectly by the predictor variables attitude, perceived utility, perceived ease of use, and perceived danger, with the policy of financial incentives acting as a moderator. The study also reveals that consumer education, awareness, and understanding are critical determinants of EV adoption. The main factors influencing consumers' purchases of electric vehicles not only apply to the design and development of vehicles that better satisfy consumer demands, but they also provide a theoretical framework for the popularization of electric vehicles and act as a guide for consumers' purchasing decisions. Expanding the public awareness of electric vehicles and offering more attractive battery and charging plans are two strategies that the government and relevant manufacturers should consider in order to attract consumers and support the auto industry's sustainable growth. Globalization and technology have brought about significant advances in human civilization, but they have also had a negative impact on the planet's biological ecology. As a result, many are thinking deeply about sustainable development and the environment. Vehicles powered by new energy are one way to address environmental problems.

Index Terms- Purchasing Behaviour, TAM, SEM, EVs, Energy Concern, Environmental Concern, EV adoption.

I. INTRODUCTION

Environmental and climate change criteria are posing a challenge to the transport sector, since major cities account for 60% of CO2 emissions from vehicle traffic. The switch from diesel and gasoline-powered cars to electric vehicles (EVs) is piquing the interest of researchers in an effort to address environmental concerns, increase energy efficiency, and meet customer demands. Three countries account for about 90% of worldwide EV sales: China, Europe, and the US. A thorough analysis of the primary variables influencing customers' adoption of electric vehicles is necessary. Since transport is predicted to have a considerable impact on greenhouse gas emissions and air pollution, it is a major barrier to sustainable economies. Environmental concerns are driving the demand for alternative fuel sources like electricity. Policies are required to adjust and enhance infrastructure needs, car technology, and alternative fuel acceptance and awareness. Customers' acceptance of electric vehicles can be influenced by costs and technological issues, and governments everywhere are thinking about enacting laws to promote environmentally friendly autos. Electric cars are thought to be the innovations that will drive the auto industry in the future and solve environmental issues. By 2030, India is predicted to rise from its current position as the world's fifth-largest vehicle market to the third rank. To better understand consumer attitudes regarding EV adoption, researchers have modified the Technology Acceptance Model (TAM). However, TAM primarily takes into account positive or favourable asp8ects of cognitive beliefs, ignoring users' negative views of resistance or loss. The literature on EV preference has not explored the relationship between perceived risk and attitude formation, which could be a latent barrier to the adoption of EVs or the diffusion of new technology vehicles. It has been discovered that policies pertaining to subsidies and financial incentives have a direct and favourable impact on EV usage patterns. Nevertheless, there is a dearth of research on this significant external stimulus measure's role as

a moderator in fostering the dissemination of EV adoption in India. In the context of the Indian zero emission mobility sector, no study has looked at TAM and its extensions to understand and anticipate customer intention to use electric vehicles.

II. NEED FOR STUDY

1. Increasing the Adoption of EVs
Automakers and legislators can create strategies to increase the adoption of EVs by having a better understanding of the elements that affect consumer behaviour towards EVs. They can develop marketing efforts and policies that persuade people to think about and buy EVs by taking into account their preferences and concerns.

2. Environmental Benefits
The move to a low-carbon economy depends in large part on the adoption of electric vehicles, which can lower greenhouse gas emissions and enhance air quality. We can determine the obstacles to adoption and create plans to get around them by researching the variables that affect customer behaviour towards electric vehicles.

3. Economic Benefits
EVs can provide economic benefits such as reduced fuel costs and lower maintenance expenses. Understanding the factors that influence consumer behavior towards EVs can help policymakers and automakers develop incentives and programs to make EVs more accessible and affordable to consumers.

4. Technological Innovation
The adoption of EVs is driving technological innovation, such as improvements in battery technology, charging infrastructure, and smart grid systems. Understanding the factors that influence consumer behavior towards EVs can help identify opportunities for further technological innovation and research.

5. Promoting Sustainable Transportation
In order to promote sustainable mobility and lower greenhouse gas emissions, EVs are an essential piece of technology. Policymakers and manufacturers can create effective strategies to encourage the adoption of electric vehicles (EVs) and lessen the environmental impact of transportation by having a better understanding of the elements that influence customer behaviour.

6. Market Demand
As the automotive sector makes the switch to electric vehicles, producers must comprehend consumer behaviour and preferences in order to develop and sell EVs that satisfy those needs. Manufacturers can increase their chances of success in the market by creating EVs that are more enticing to consumers by comprehending the aspects that impact consumer behaviour.

7. Economic Ramifications
The automobile industry and society at large will be significantly impacted by the widespread use of electric vehicles. Policymakers and business executives may create plans to encourage the expansion of the EV market and guarantee that the financial advantages of EVs are realised by having a better understanding of the elements that affect consumer behaviour.

In general, researching the variables that affect consumers' attitudes towards electric cars (EVs) can offer insightful information on the uptake of these cars and facilitate the shift to a low carbon, sustainable economy.

III. RESEARCH OBJECTIVES

In order to serve as a guide for the design and development of electric vehicles as well as provide recommendations for businesses regarding future consumer purchases, the purpose of this study is to examine the elements that influence consumers' decisions to purchase electric vehicles. It conducts a literature review, builds a theoretical framework, puts forth statistical hypotheses, creates surveys and questionnaires, evaluates the reliability of the surveys and questionnaires, performs project analysis, creates a structural equation model, performs confirmatory factor analysis, and evaluates the model's discriminant validity and convergence validity.

IV. LITERATURE REVIEW

S.Silvana, C.Davide, L.Federico, F.Alberto (2022), stated in the research paper entitled as “Electric vehicles’ consumer behaviours: Mapping the field and providing a research agenda”. The present literature review employs biblio metric and thematic analytic methodologies to investigate consumer behaviour in the electric car industry. It reveals significant global research hubs, important networks of cross-citation between journals and authors, five major arguments, and theoretical underpinnings for purchasing electric vehicles. The study expands on the concept of planned conduct and gives practitioners a helpful consumer identification tool. The results provide a range of valuable research questions to stimulate the academic discourse.

V.Meghna, V.Ashish & K.Mahim (2020) stated in the research paper entitled as, “Factors Influencing the Adoption of Electric Vehicles in Bengaluru”. This study aims to understand Indian consumers' attitudes and perceptions regarding electric vehicles (EVs). A questionnaire was developed based on the innovation diffusion concept, and potential benefits and obstacles were found through multiple answer analysis. Cross-tabulation was used to identify significant correlations between a number of parameters impacting the choice to purchase an EV. The adoption of EVs is mostly driven by perceived environmental

benefits and financial incentives. Policymakers would be better equipped to comprehend consumer preferences and create policies that will support and encourage the adoption of EVs in India as a consequence of this study.

P.Vishal Singh, K. Ravi, K. Shiksha (2021) stated in the research paper entitled as, "Modeling barriers to the adoption of electric vehicles: An Indian perspective". The aim of this research is to identify and examine the relationships among the barriers impeding the uptake of electric cars (EVs) in India. Thirteen obstacles to EV adoption are found in the literature, and they are subsequently verified by professionals in academia and business. MICMAC and ISM are used to construct models of them. The detected hurdles were categorised as "dependent barriers" and "driving barriers" after the study examined their relationships. The research findings would help legislators create a sustainable energy and transportation legislation and encourage EV manufacturers to take these restrictions into account during the EVs' design phase.

J. Deepak, K. Vikrant, K. Rishi, S. Pankaj Kumar (2021) stated in the research paper entitled as, "Consumer adoption intention for electric vehicles: Insights and evidence from Indian sustainable transportation", In order to understand and anticipate customers' intention to adopt electric vehicles (EVs), this study intends to operationalize and evaluate the enhanced "Technology Acceptance Model" (TAM) with perceived risk and financial incentives policies. In the framework of a developing sustainable transportation market, it also looks at the moderating effect of attitudes towards EVs and the moderation of financial incentive policies. The results show that attitude, perceived utility, perceived ease of use, and perceived danger are the predictor variables that have the greatest direct and indirect effects on adoption intention for EVs. Nevertheless, there is little evidence that attitude mediates the relationship between risk and adoption intention. Policymakers and marketers can gain more insight into promoting electric vehicles (EVs) in the future from the discussion and its consequences.

T. Jui-Che and Y. Chun (2019) stated in the research paper entitled as, "Key Factors Influencing Consumers Purchase of Electric Vehicles". Utilising the Technology Accept Model (TAM), Innovation Diffusion Theory (IDT), and Theory of Planning Behaviour (TPB), researchers investigated the variables influencing customers' purchases of electric vehicles. The key factor model may be applied to consumers' behavioural intention, according to the results, with the greatest influence coming from consumers' control over the resources needed to buy electric automobiles. The most important aspects impacting behavioural intention are intention, environmental awareness, acceptance of technological items, and attitude towards behaviour. The government and related manufacturers should think about promoting more inexpensive cars and introducing more alluring battery and charging programmes in order to increase the popularity of electric vehicles. Individual inventiveness has a detrimental effect since people are less interested in traditional automobiles and don't prioritise electric vehicles.

S. Kumar and S. Naman (2020) stated in the research paper entitled as, "Using extended theory of planned behaviour (TPB) to predict adoption intention of electric vehicles in India". In order to forecast 326 customers' adoption intention towards the purchase of electric vehicles (EVs), this study employs an enhanced TPB model. The sample of responders was drawn from 57 dealerships owned by various automakers. The study's empirical research demonstrates that adoption intention of customers is positively correlated with attitude, subjective norm, perceived behavioural control, moral norm, and environmental concern. The report offers recommendations for additional research and addresses the consequences for the adoption of EVs in India.

B. Pretty, A. Inass Salamah, N. Afroze (2018) stated in the research paper entitled as, "A Study of Consumer Perception and Purchase Intention of Electric Vehicles". Environmental concerns, coupled with India's enormous customer base, qualified and semiskilled labour pool, and relatively lower production and labour costs, are driving the country's electric car production and sales. It is necessary to research the elements influencing customer acceptability of these vehicles in order to understand the commercial success and purchase intention of electric vehicles among Indian consumers. The findings demonstrate that customer faith in technology and environmental concerns play a significant role in how consumers perceive buying electric vehicles. The Indian government needs to build infrastructure, subsidise the cost of cars, and cut bank interest rates in order to encourage the sale of power. The government needs to make investments to increase societal acceptance of the vehicle by building more infrastructure and offering more thrust on technology to create trust in vehicles.

L. Kenneth, M. Joeri Van, L. Philippe, M. Olivier, M. Cathy (2013) stated in the research paper entitled as, "Consumer attitudes towards battery electric vehicles: a large-scale survey". The benefits and drawbacks of battery-electric vehicles (BEVs), acceptable driving range, acceptable charging time, acceptable maximum speed, the role of government in BEV introduction, preferred government tools to maximise sales, and consumers' willingness to pay (WTP) are all covered in this paper, which is based on a large-scale survey conducted in Flanders, Belgium. Consumers with more knowledge prefer faster charging times and a higher maximum speed, but knowledge has no effect on how acceptable a driving range is.

J. Beatriz, M. Blanca, A. Roberto (2016) stated in the research paper entitled as, "Analysing consumer attitudes towards electric vehicle purchasing intentions in Spain: Technological

limitations and vehicle confidence". This study aims to determine the extent to which specific aspects play a pivotal role in elucidating the inclination of Spanish consumers to get electric vehicles. It focuses on how customers see a number of technical features of electric cars, including as pricing, range, charging times, and driver ages. A logistic regression analysis reveals that as consumers' perceptions of the cost and charging times rise, so does their likelihood of buying a new electric vehicle. The results are useful in identifying key elements of the ideal industrial policy that supports companies in their promotion of electric vehicles. Logistic regression was used to examine the inclination of 1245 respondents to buy an electric vehicle based on their judgements of price, age, battery lifetime, charge times, and range.

K. W. Lai, Yide Liu, Xinbo Sun , Hao Zhang, Weiwei Xu (2015) stated in the research paper entitled as "Factors Influencing the Behavioural Intention towards Full Electric Vehicles: An Empirical Study in Macau". This study looked into the factors influencing Macau residents' desire to purchase entirely electric vehicles. It was discovered that a person's behavioural intention to purchase a completely electric vehicle is influenced by their perception of environmental issues and environmental policies, which are antecedent variables of that perception. There is a positive correlation between the perception of environmental policies and the perception of the financial benefits of completely electric vehicles, indicating that environmental concern has a psychological impact on four distinct types of perceptions, both directly and indirectly. The results of Kang and Park's study demonstrate that public policy affects the perception of hydrogen fuel cell vehicles directly and indirectly.

Z. Xiang, B. Xue, S. Jennifer (2018) stated in the research paper entitled as "Is subsidized electric vehicles adoption sustainable: Consumers perceptions and motivation toward incentive policies, environmental benefits, and risks". This study elucidates the process by which consumer attitudes and incentives impact their likelihood of purchasing an electric vehicle. It indicates that regulatory focus significantly affects perceptions and TPB constructs, and that perceived risks, perceived environmental benefits, and perceived economic advantages are all related to one another. The findings can help managers better understand how to pique consumers' desire to buy, and legislators can craft more successful adoption regulations. It also suggests that in the post-subsidy era, adoption of EVs may be aided by the perception of environmental benefits.

S. Debjani, H. Siddhartha, K. Sanjay, S. Sreejay (2022) stated in the research paper entitled as "An empirical study on consumer motives and attitude towards adoption of electric vehicles in India: Policy implications for stakeholders" This study looked into the factors influencing users' word-of-mouth, behavioural intention, and attitude formation towards electric automobiles. It was discovered that while negative motives discourage and have a detrimental impact on adoption, positive and social reasons have an influence on positive attitudes. Through strategic action and governmental policy, stakeholders can influence the motivations.

K. Rupesh, J. Ajay, D. Akhil, B. Deepak, D. Ashish (2020) stated in the research paper entitled as "Addressing the challenges to electric vehicle adoption via sharing economy: an Indian perspective".

The research looks at India's obstacles to the adoption of electric vehicles (EVs) by 2030. It examines the steps the Indian government (GOI) has done to support research and development, the contribution of public utilities and the sharing economy to the adoption of EVs, and the function of shared formats in advancing EV technology. The focus group study pinpointed important issues, like battery cost, pricing multiples, and power grid challenges, on which EV stakeholders should concentrate. To encourage the use of electric vehicles, the government must take the initiative and act on multiple fronts.

S. Vedant, S. Virendar, S. Vaibhav (2020) stated in the research paper entitled as "A review and simple meta-analysis of factors influencing adoption of electric vehicles". This study looks at the variables that affect a consumer's decision to purchase an electric vehicle (EV). In order to classify relevant aspects into four primary categories— demographic, situational, contextual, and psychological—211 peer-reviewed research articles were chosen.

The results indicate that while psychological and socio demographic characteristics might help predict customers' acceptance of electric vehicles, environmental factors like charging infrastructure and regulation are the most important in influencing the rate of EV adoption. Age, gender, and education are more important factors in predicting a consumer's propensity to buy, although the majority of data is based on surveys taken from early adopters and people with lower levels of EV knowledge. The most often used data procedures for assessing the reliability and validity of the variables influencing the adoption of EVs were RA, SEM, and FA, whereas the most prevalent theories in EV research were TPB, DOI, and VBN.

B.Prateek, K.Rajeev Ranjan, R.Alok, D.Subodh, G.Daniel J (2021) stated in the research paper entitled as "Willingness to pay and attitudinal preferences of Indian consumers for electric vehicles". This study examines EV characteristics and customer attitudes, contributing to the body of knowledge on EV demand in India. Additionally, it determines how much Indian customers are ready to pay (WTP) for EVs with better features and how reference dependence influences WTP estimations. According to the research, Indian customers are prepared to pay an extra $10–34 for slower fast charging.

V. SECONDARY RESEARCH METHODOLOGY

One popular method for obtaining data and information to comprehend consumer attitudes towards electric vehicles is secondary research. It entails going over previously written works, reports, and studies that have been released by various academics, researchers, and organisations.

The current study's foundation is a methodical evaluation of the literature, in which the researchers searched the Scopus index generals using terms like "EV adoption," "energy concern," "environmental concern," and "purchasing behaviour."

Scholars have conducted a keyword search of the article spanning the years 2015 through 2022.Only 45 papers that adequately address the goal of the research project have been found using the keywords. The research publications were further categorised by keyword.

The precise study goal, which is to comprehend the variables influencing consumer behaviour towards electric automobiles, has been stated rather explicitly. This will guarantee that the study is pertinent and focused, and it will also aid to direct the entire research process.

From the secondary study, pertinent sources have been located and chosen. Academic journals, business reports, market research reports, government publications, and other trustworthy sources are some examples of these. To find pertinent material, use keywords associated with electric vehicles, customer behaviour, and pertinent considerations.

We have thoroughly examined the corpus of research on the topic. It is possible to gain an understanding of the current state of research about the factors influencing consumer attitudes towards electric vehicles by reading academic papers, studies, and other relevant publications.

The calibre of the literature we have gathered has been evaluated. Think about things like the writers' standing and trustworthiness, the validity of the research findings, the rigour of the research methodologies employed, and the research's applicability to your particular research goal.

We have taken pertinent information directly related to the elements influencing customer behaviour towards electric vehicles and extracted it from the literature. This could contain theoretical models or conceptual frameworks that explain consumer behaviour, as well as quantitative data like statistical findings and qualitative data like quotes or tales.

We've got compiled and analysed the research from the literature to detect recurring themes, developments, and new information on the variables affecting how consumers behave with regard to electric cars.

We have made conclusions on the elements influencing consumer behaviour towards electric vehicles based on the synthesised findings. Provide a succinct synopsis of the main conclusions and the condition of the field's present understanding.

Drawing from the conclusions of the literature study, we offer suggestions for further research or practical implications for policymakers, industry practitioners, and other relevant stakeholders. Point out any gaps in the current body of knowledge and recommend topics for more research.

VI. CONCLUSION

In summary, there are a wide range of intricate aspects that affect how consumers behave when it comes to electric vehicles (EVs). Consumer decision-making can be influenced by a number of significant elements, including availability and accessibility, innovation and technology, social influence, cost savings, and environmental concerns.

Customers seeking more environmentally friendly options than conventional gasoline powered automobiles are finding electric vehicles (EVs) to be more appealing due to increased concerns about sustainability and the environment. In terms of cost savings, EVs may potentially be more alluring due to their lower fuel prices and less maintenance requirements.

Additionally, worries about range anxiety have been lessened by developments in battery technology and the growth of the infrastructure for charging EVs, making them more widely available and useful for daily use. Consequently, there is now greater accessibility and availability of EVs, increasing the likelihood that people may think about buying an EV as a practical form of transportation.

In addition, friends, family, and other reliable social influences have a big impact on what consumers decide to buy. Good experiences and word-of-mouth referrals can influence buyers to think about an electric vehicle as a practical choice.

Furthermore, it is critical for manufacturers and legislators to comprehend the variables influencing consumer attitudes towards electric vehicles. By addressing these obstacles and publicising the benefits of EVs, manufacturers and politicians can stimulate the adoption of this technology and promote a cleaner, greener, and more sustainable future.

It is probable that the variables impacting consumer behaviour towards EVs will also continue to develop and evolve as EV-related technology advances and advances.

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