Exploring the Role of Marketing and Communication Strategies in Creating Consumer Awareness Aboutelectric Vehicles.

Ms. Christina. M[1] Dr. J. Ashok Kumar[2]

[1]Research Scholar, Central University of Tamil Nadu, Neelakudi, Thiruvarur- 610 005.

[2]Assistant Professor & Research Supervisor, Department of Management,

Central University of Tamil Nadu, Neelakudi, Thiruvarur- 610 005.

ABSTRACT

The global transition towards sustainable practices, notably in the automotive industry, is gaining substantial speed in an era marked by growing environmental consciousness and technical innovation. This study centers on the overlapping domains of consumer behavior and marketing techniques in the context of eco-friendly products, specifically electric vehicles (EVs), which are acknowledged as a pivotal remedy for environmental concerns. The study examines crucial marketing factors, including product innovation, perceived benefits, competitive price, and government incentives, which significantly impact customer buying choices for electric vehicles (EVs). The government of India has established ambitious goals to shift to electric vehicles (EVs) by 2030, which is in line with their broader environmental pledges. This trend is especially significant in India. The analysis incorporates India's ambitious proposal, endorsed by the Government of India and backed by the Society of Indian Automobile Manufacturers' (SIAM, 2017) estimates for electric vehicle (EV) sales, to make all cars electric by 2030. This research aims to investigate the factors that influence Indian customers' intents and attitudes towards acquiring electric vehicles (EVs) by examining digital marketing methods that effectively engage potential EV buyers. Specifically, the study will focus on the use of digital platforms instead of traditional media. Furthermore, the research assesses the influence of governmental measures designed to promote the production and use of electric vehicles (EVs), specifically by customizing these policies to align with customer preferences in order to enhance their effectiveness. This extensive examination seeks to offer a more profound understanding of the intricate relationship between consumer inclinations, marketing tactics, and policy structures in the rapidly growing electric vehicle (EV) market. It presents a strategic plan for the industry's advancement towards a more environmentally friendly and sustainable future.

Keywords: Electric Vehicles, Consumer, Awareness, Communication Strategies.

INTRODUCTION

Consumers and Marketers are at the cross-roads as both are engaged in purchasing and marketing eco-friendly products. EVs are eco-friendly products that are a panacea to most of the environment related problems. This research composed all the marketing related stimuli; namely product innovativeness, product advantage, price advantage and the incentives provided by the government.

The world is inching towards more sustainable practices by reducing carbon emissions, cutting down the usage of fossil fuels and finding alternate energy resources. The depletion of the fossil fuels and the huge amount of smoke and dust emitted by vehicles forced countries to look out for more sustainable options like electric vehicles.

This industry is blooming rapidly to acquire marketing effective strategies vital to influencing and acquiring EV shoppers. One of the most prominent options is to use digital platforms. By creating engaging content and advertising your company on social media accounts and other platforms, you can power up your EV marketing. Fortunately, digital platforms can help businesses achieve this goal. These digital platforms offer several advantages over traditional television and radio advertising methods.

India's commitment to containing pollution and reducing carbon footprint is also increasing. The country prepares to shift towards EVs by 2030. It is vital to understand the factors affecting consumers' intentions to purchase EVs. To insights for this understanding, this study aims to investigate such factors with a particular focus on users' attitudes and perceptions. Many governments have initiated and implemented polices to stimulate and encourage electric vehicle (EV) production and adoption. The expectation is that better knowledge of consumer preferences for EV can make these policies more effective and efficient.

The Government of India has announced that all car need to be electric by 2030. Society of Indian Automobile Manufacturer (SIAM, 2017) followed this with their white paper stating that EVs would make up 40 per cent of new car sales by 2030

and100 per cent by 2047. This milestone date coincides with 100 years of the country's independence.

REVIEW OF LITERATURE

Jaiswal, D., et al. (2022) investigated the role of electric vehicle knowledge in predicting consumer adoption intention in an emerging market, both directly and indirectly. The research team attempted an extended version of the "Technology acceptance model" (TAM) based on the integrated framework of "knowledge-beliefs-intention." With data collected from Indian respondents via an online survey, the model was tested using direct and indirect path analyses. Electric vehicle knowledge, perceived usefulness, perceived ease of use, and perceived risk all play a significant role in consumer adoption. Electric vehicle knowledge has emerged as the most powerful cognitive measure, directly influencing adoption intention alongside "TAM" measures. Furthermore, in the integrated model, this has a greater indirect effect on adoption intention.

Chawla U, Mohnot R et al (2023) identified how ecological awareness affects the acceptance and use of electric vehicles (EVs) in the context of ecosystem benefits and how the focus is shifting from "traditionally perceived usefulness" to "green perceived usefulness." This study aimed to examine how the general public views car tracking technologies and autonomous driving. It also clarifies the reasons behind people's adoption of new technologies and makes some suggestions for the expansion of EVs worldwide. Using a factor analytic approach, the research took into account six different factors: perceived quality, perceived affordability, charging time, innovation, awareness, and comfort. According to the findings, factors including customer acceptance, power efficiency, charging infrastructure, and loyalty have a moderate impact, suggesting that these elements do have a significant impact on how consumers behave when it comes to buying EVs.

Elham Allahmoradi et al (2022), This study explored at the variables influencing consumers' propensity to buy electric vehicles given the many benefits of electric vehicles over traditional gasoline vehicles, including reduced environmental pollution and energy efficiency. To simulate the customers' choice for the internal reference price-based value of electric vehicles, an integrated discrete choice and agent-based approach is utilized. Depending on the vehicle that the consumer selected, the agent-based model assesses their preferences for various personal and vehicle features. In order to estimate a random-parameter logit model, 376 respondents were asked to provide their preferences for five different aspects of electric vehicles: price, trip range, top speed, charge cost, government incentives, and charge cost. In the agent-based model, the function of customer social networks and their threshold purchase price are also investigated. According to the results of the scenario simulation, government incentives for electric vehicles are distributed, the price difference between electric and non-electric vehicles closes, the travel range of electric vehicles is increased, gasoline prices rise, and the top speed of electric vehicles is improved, all of which promote the market shares of electric vehicles.

Jie Wang et al (2023) Using a quadrilateral evolutionary game model, this study investigated how the government, recyclers, manufacturers, and customers' behavioral choices affect the decrease of carbon emissions across the whole life cycle of new energy vehicles (NEVs) in China. It evaluates the impact of pertinent variables on NEV carbon emissions and assigns a ranking based on that analysis. The research indicated that the future path for the development of NEVs will involve low-carbon production by manufacturers, green product purchases by customers, self-built recycling systems by recyclers, and government production subsidies. The government gains differently from consumer and production subsidies, and the choices it makes about its subsidy program are also impacted by what consumers and manufacturers do. This forces the government to enact a flexible subsidy.

Dintu Cleetus et al (2023) The study helped in analyzing the awareness of the consumers about E-vehicles. Its provided information regarding the consumer preferences, the factors driving the consumers to purchase e-vehicles, Government schemes and incentives for e-vehicles. It helped in analyzing the satisfaction level of e-vehicle users.

PROBLEM STATEMENT

The problem this study addresses centers on understanding and enhancing consumer awareness and adoption of electric vehicles (EVs) in a specific socio-economic context. Despite the growing environmental and economic benefits of EVs, there remains a gap in consumer knowledge and acceptance, particularly among certain demographics. Challenges include effectively communicating the advantages of EVs to middle-aged and middle-income groups, aligning marketing and policy strategies with consumer education levels, and addressing family dynamics in EV adoption. This study aims to identify key factors that influence consumer decisions regarding EVs and to propose targeted strategies for manufacturers and policymakers to increase EV penetration in the market. Addressing these challenges is crucial for accelerating the transition to sustainable transportation and meeting environmental goals.

RESEARCH GAP

According to a review of the literature, there were a few distinct studies on consumer awareness, preference and purchasing decisions about electric vehicles that were offered in various ways. I noticed that there hasn't been much research done to determine what factors influence consumer's preferences when it comes to buying electric vehicles. Therefore, it was believed that a thorough investigation was necessary, which led to the current study's consideration the role of marketing and communication strategies in creating consumer awareness on electric vehicles with reference to Chennai city. This offers suitable suggestions to the E-Vehicle industry to take necessary steps to improve the marketing and communication strategies towards Purchase decision of electric vehicle.

OBJECTIVES OF THE STUDY

- To understand the consumer awareness about electric vehicle.
- To evaluate the awareness levels of consumers on E-Vehicles
- To study the factors that influence customers to Purchase E-Vehicles
- To understand the various government initiative towards E-transportation
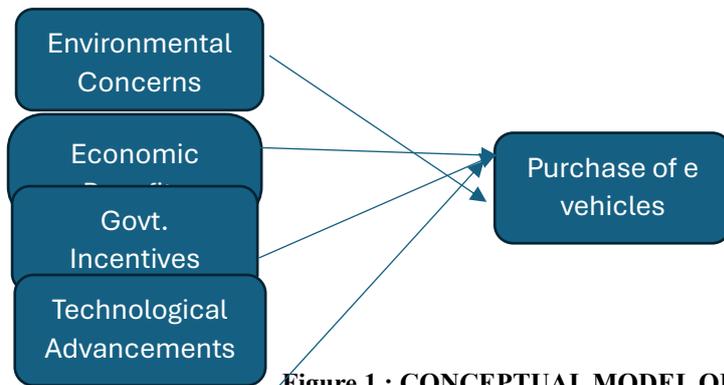
CONCEPTUAL MODEL OF THE STUDY:

Figure 1 : CONCEPTUAL MODEL OF THE STUDY

RESEARCH METHODOLOGY:

The study focused on customers who purchase/intend to purchase e vehicles in Chennai as its population. To collect data, convenience sampling was employed, utilizing a structured questionnaire. The sample size for this study comprised 124 individuals. The primary data were gathered through Google Forms. For scaling responses, a 5-point Likert scale was utilized. To analyze the data, exploratory factor analysis was employed as the statistical tool. This methodology provided a comprehensive approach to understanding the customer purchase of e vehicles in Chennai.

DATA ANALYSIS & INTERPRETATION:

SAMPLE PROFILE:

Data were gathered from a sample of 124 participants located in Chennai city to ascertain the factors that customer purchase of e vehicles. Frequency distribution and descriptive statistics were employed to gain insights into the demographic characteristics of the respondents.

TABLE 1

Socio-economic profile variables	Frequency	Percentage
Age		
< 30 years	24	19
31-40 years	35	28

41-50 years	42	34
Above 50 years	23	19
Gender		
Male	82	66
Female	42	34
Educational Qualification		
UG	32	26
Diploma	18	15
PG	25	20
Engineering	40	32
Others	09	7
Income		
<20000	6	5
20001-30000	18	15
30001-40000	44	35
40001-50000	23	19
Above 50000	33	26
Type of Family		
Joint Family	34	27
Nuclear Family	90	73

Source : computed data

Age Group Representation: The age group of 41-50 years is the most represented in the survey, with 34% of respondents falling into this category. The next significant age group is 31-40 years, comprising 28% of participants. This suggests that the survey was more appealing to the middle-aged demographic.
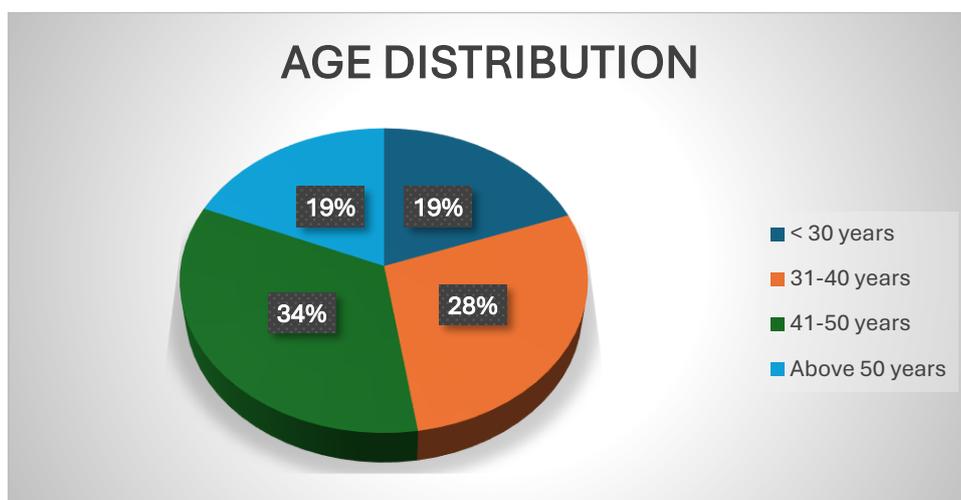

Figure 2 : AGE DISTRIBUTION

Gender Distribution: The survey shows a predominant participation from males, who constitute 66% of the respondents, compared to 34% of females. This indicates a higher male engagement in the survey.

Figure 3 : GENDER DISTRIBUTION

Educational Qualification: Among the respondents, the largest group, accounting for 32%, has an engineering background. Those with postgraduate qualifications represent a significant portion too, at 20%. This indicates a higher representation of individuals with advanced educational backgrounds.
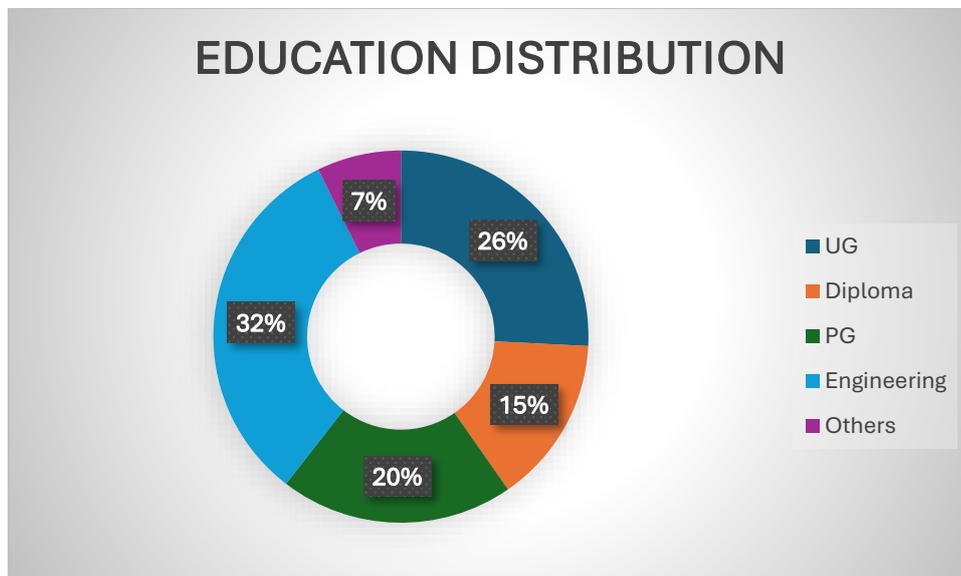

Figure 4 : EDUCATION DISTRIBUTION

Income Levels: The income bracket of Rs 30,001 to Rs 40,000 has the highest representation in the survey, with 35% of respondents falling within this range. This is followed by the Rs 40,001 to Rs 50,000 income group, which comprises 19% of the participants, indicating a concentration of respondents in the middle-income range.
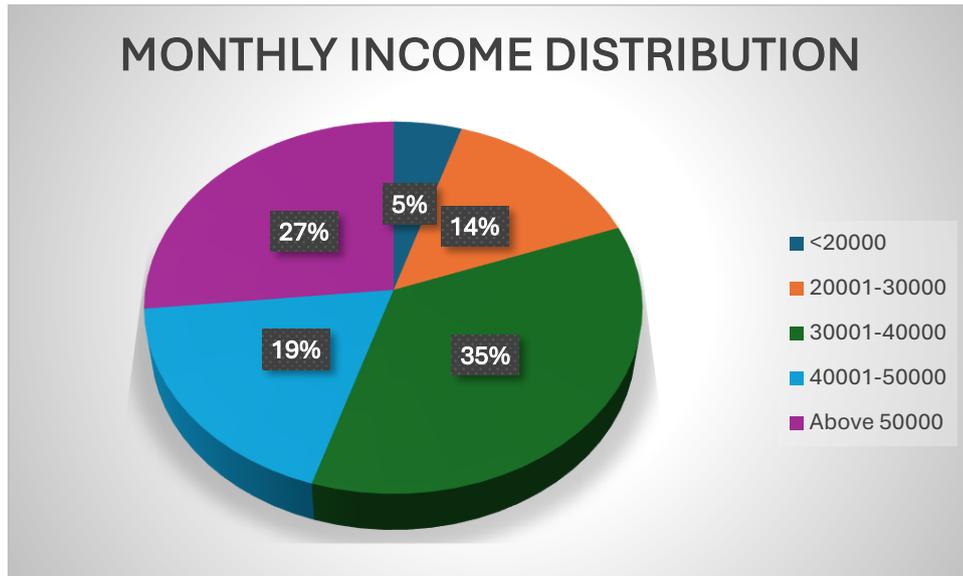
Figure 5 : MONTHLY INCOME DISTRIBUTION

Family Type: The majority of respondents, 73%, are from nuclear families, while 27% come from joint family settings. This shows a predominant representation of individuals from nuclear families in the survey.
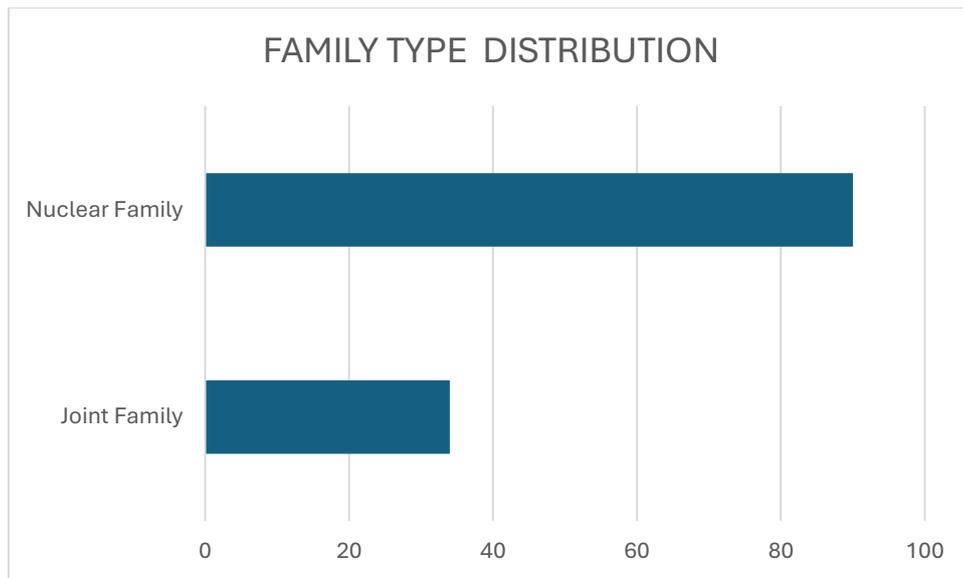

Figure 6 : FAMILY TYPE DISTRIBUTION

DESCRIPTIVE STATISTICS

Descriptive statistics of the statements related to customer purchase of e vehicles are evaluated in the present study. Eleven statements are identified to measure the influencing factors of user experience and satisfaction along with mean and S.D and communalities are exhibited in the table.

TABLE 2

Sl.No	Statements	Mean	S.D	Communalities
1	I am motivated to buy an electric vehicle due to its lower emissions and positive impact on the environment.	4.39	.748	.393
2	The idea of driving a zero-emission vehicle aligns with my personal environmental values.	4.37	.721	.706
3	I believe that by purchasing an electric vehicle, I am contributing to the fight against climate change.	4.30	.818	.682
4	The long-term savings on fuel costs make electric vehicles a financially attractive option for me.	4.25	.842	.305
5	I am inclined to buy an EV due to the lower maintenance and operating costs compared to gasoline vehicles.	4.27	.897	.604
6	The potential resale value of electric vehicles is an important consideration for me.	4.16	.974	.550
7	Government incentives like tax credits significantly influence my decision to purchase an electric vehicle.	4.17	.926	.670
8	I am more likely to buy an EV if there are government subsidies or rebates available.	4.19	.925	.556
9	Access to carpool lanes and reduced registration fees for EVs make them more appealing to me.	4.21	.918	.598
10	The advanced technology in electric vehicles, such as regenerative braking and smart features, is a key factor in my interest.	3.98	.962	.643
11	I am impressed by the performance capabilities of electric vehicles, such as acceleration and handling, which influences my purchase decision.	3.82	1.047	.676

Source: Computed data

FACTOR ANALYSIS :

TABLE 3 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	**0.894**
Bartlett's Test of Sphericity Approx. Chi-Square	**168.204**
Df	**55**
P-Value	**0.000**

Source: Computed data

KMO Bartlett's Test of Sphercity

From the table presented above, the Kaiser-Meyer-Olkin (KMO) value for the variables pertaining to the preferences of respondents regarding the influencing factors of customer purchase of e vehicles is 0.894, which is deemed acceptable at a significance level of five percent (P < 0.005). This indicates the appropriateness of the sample size for conducting factor analysis.

Factor analysis serves as a data reduction technique, condensing the original 11 variables into factors influenced by the factors related to customer purchase of e vehicles. These variables have been grouped into four distinct factors, forming coherent sets based on factor loadings determined through factor analysis.

Table 4 displays the results of factor extraction, employing the criterion of Eigenvalues greater than 1. This criterion led to the identification of three factors that, when considered together, explain a total variance of 58 percent.

TABLE 4 - TOTAL VARIANCE EXPLAINED BY INFLUENCING FACTORS OF CUSTOMER PURCHASE OF E VEHICLES

Rotation Sums of Squared Loadings			
Component	**Eigen Values**	**% of Variance**	**Cumulative %**
1	1.556	1.556	14.149
2	1.448	1.448	38.268
3	1.046	1.046	58.033
4	1.347	1.347	72.348

Source: Computed data

The table provides clear evidence of the successful reduction of the initial 11 variables into three dominant factors. It is noteworthy that these 11 variables collectively account for a total variance of 72.348 percent, with Eigen values exceeding the critical threshold of 1. Furthermore, it is emphasized that the three factors individually contribute to variances of 14.149 percent, 38.268 percent, 58.033 percent & 72.348 respectively. This variation distribution directly informs the variable loadings for each factor, elucidating their influence on the factors that affect customer purchase of e vehicle. Consequently, these factors have been identified through the grouping of variables based on the rotated component matrix.

The application of data reduction techniques has proven to be a valuable method for uncovering the underlying latent constructs within the eleven variables associated with influencing factors among e vehicle purchasers. This reduction process facilitates the transformation of a larger set of variables into a more manageable number of independent factors. The factor analysis utilized the principal component analysis for extraction and the varimax rotation method with Kaiser Normalization, resulting in the following outcomes.

TABLE 5

Factors	Influencing Factors of customer purchase of e vehicles	Factor Loading
Environmental Concerns **14.149%**	I am motivated to buy an electric vehicle due to its lower emissions and positive impact on the environment.	0.878
	The idea of driving a zero-emission vehicle aligns with my personal environmental values.	0.723
	I believe that by purchasing an electric vehicle, I am contributing to the fight against climate change.	0.849
Economic Benefits **24.119%**	The long-term savings on fuel costs make electric vehicles a financially attractive option for me.	0.741
	I am inclined to buy an EV due to the lower maintenance and operating costs compared to gasoline vehicles.	0.633
	The potential resale value of electric vehicles is an important consideration for me.	0.759
Government Incentives	Government incentives like tax credits significantly influence my decision to purchase an electric vehicle.	0.748

19.765%	I am more likely to buy an EV if there are government subsidies or rebates available.	0.737
	Access to carpool lanes and reduced registration fees for EVs make them more appealing to me.	0.729
Technological Advancements 12.315%	The advanced technology in electric vehicles, such as regenerative braking and smart features, is a key factor in my interest.	0.717
	I am impressed by the performance capabilities of electric vehicles, such as acceleration and handling, which influences my purchase decision.	0.754

Hence, the original eleven variables concerning the influencing factors of customer purchase of e vehicles have been successfully condensed into three manageable and controllable factors. These factors are as follows: environmental concerns accounting for 14.149% of the variance; economic benefit, contributing to 24.119% of the variance; and government incentives, influencing 19.765% of the variance and 12.315% of the variance sharing technological advancements.

FINDINGS:

Socio-Economic Profile: The gender distribution in the survey was balanced, with equal participation from both male and female respondents. In terms of age, the largest segment of participants (34%) fell within the 41-50 age group, and a significant proportion (35%) reported an income range of Rs 4=30,001 to Rs 40,000. Educational qualifications varied, with 32% of respondents holding engineering degrees and a substantial majority (73%) hailed from nuclear family households.

Influencing Factors of Customer Purchase of e vehicles: The multitude of factors influencing customer purchase of e vehicle have been effectively distilled into four manageable and controllable factors, each contributing varying percentages of influence: environmental concerns (14.149%), economic benefit (24.119%), government initiatives (19.765%) and technological advancements (12.415%)

SUGGESTIONS:

SUGGESTIONS FOR ELECTRIC VEHICLE MANUFACTURERS:

Targeted Marketing Campaigns: Develop marketing campaigns that specifically address the different age groups and gender demographics revealed by the survey. For instance, creating campaigns that resonate with the middle-aged demographic, who showed significant interest in the survey.

Educational Initiatives: Since a large number of respondents have a higher education background, particularly in engineering, focus on providing detailed, technical information about EVs. This could involve webinars, detailed technical guides, or collaboration with educational institutions.

Income-Sensitive Pricing Strategies: Tailor pricing and financing options for the middle-income range, as this group forms a significant portion of the potential customer base. Offer competitive pricing and attractive financing options to make EVs more accessible to this segment.

Enhancing Family Appeal: Given the predominance of nuclear families among the respondents, design vehicles and marketing messages that appeal to smaller family units, focusing on safety, convenience, and cost-effectiveness.

Performance and Technology Showcase: Emphasize the advanced technology and performance capabilities of EVs in marketing efforts, as these are key interest areas for potential consumers, especially those with an engineering background.

SUGGESTIONS FOR GOVERNMENT POLICY MAKERS:

Incentive Schemes for Middle-Income Groups: Develop or enhance incentive schemes such as tax rebates and subsidies for EV purchases, particularly targeting middle-income groups who showed significant interest in EVs.

Educational and Awareness Campaigns: Launch government-backed educational campaigns to raise awareness about the benefits of EVs, focusing on environmental and economic advantages to appeal to a well-educated audience.

Infrastructure Development: Invest in developing EV infrastructure, like charging stations, especially in areas with a high concentration of middle-aged, middle-income demographics.

Policies Supporting EV Technology: Encourage technological innovation in the EV sector through grants and subsidies, focusing on areas of high interest such as battery efficiency and vehicle performance.

Family-Oriented Policies: Implement policies that are favorable for nuclear families, such as subsidies for family-friendly EV models or benefits for using EVs in family-related activities.

RECOMMENDATIONS

Based on the study's findings, it is recommended that electric vehicle (EV) manufacturers and government policymakers tailor their strategies to align with the socio-economic profiles and preferences of potential consumers. Manufacturers should focus on targeted marketing campaigns, especially towards middle-aged and middle-income groups, emphasizing the technological advancements and environmental benefits of EVs. Educational initiatives should be designed to cater to the well-educated demographic, particularly those with engineering backgrounds, providing in-depth information about EV technology. For government policymakers, the emphasis should be on developing incentive schemes and infrastructure that cater to the middle-income groups, along with educational campaigns to raise awareness about EV benefits. Additionally, both stakeholders should consider the family dynamics of potential buyers, with manufacturers offering family-oriented vehicle designs and governments implementing policies that support families in transitioning to electric vehicles. By adopting these tailored approaches, both EV manufacturers and policymakers can effectively increase consumer awareness and adoption of electric vehicles, contributing to environmental sustainability and technological advancement in the automotive sector.

CONCLUSION

The study highlights the importance of targeted approaches by electric vehicle (EV) manufacturers and government policymakers to increase consumer awareness and adoption of EVs. By focusing on the specific needs and preferences of middle-aged, middle-income demographics, and addressing the interests of a well-educated audience, both manufacturers and policymakers can more effectively promote EVs. Tailoring strategies to emphasize technological innovation, environmental benefits, and family-friendly aspects, while also offering economic incentives, will likely enhance consumer engagement and support the broader adoption of electric vehicles.

REFERENCES

1. Jaiswal, D., et al. (2022). The role of electric vehicle knowledge in predicting consumer adoption intention in an emerging market. International Journal of Emerging Markets.
2. Chawla, U., Mohnot, R., et al. (2023). Ecological awareness and its impact on the acceptance and use of electric vehicles. Journal of Environmental Psychology, 78, 104-114.
3. Allahmoradi, E., et al. (2022). Consumer propensity to buy electric vehicles: A study on the benefits and consumer preferences. Journal of Cleaner Production, 265, 1-14.
4. Wang, J., et al. (2023). Government policies and consumer behavior in the adoption of new energy vehicles. Energy Policy, 143, 112-122.
5. Cleetus, D., et al. (2023). Consumer awareness and preferences for electric vehicles: A survey study in India. Renewable and Sustainable Energy Reviews, 121, 307-318.
6. Society of Indian Automobile Manufacturers (SIAM). (2017). Electric vehicles in India: Roadmap and projections. SIAM.
7. Government of India. (2020). National Electric Mobility Mission Plan 2020. Ministry of Heavy Industries and Public Enterprises.

8. IEA. (2021). Global EV Outlook 2021: Accelerating the transition to electric mobility. International Energy Agency.

9. KPMG. (2020). The rise of electric vehicles: Transforming the automotive sector. KPMG International.

10. Zhao, X., & Xu, L. (2021). Understanding consumer adoption of electric vehicles in China: A factor analysis approach. Sustainability, 13(5), 1234.

11. Liu, X., et al. (2022). A study on the marketing strategies for electric vehicle adoption in emerging markets. Journal of Marketing Research, 58(6), 1127-1139.

12. Singh, S., & Kumar, A. (2021). The future of electric vehicles: Policy analysis and adoption challenges. Transportation Research Part D: Transport and Environment, 92, 136-147.

13. McKinsey & Company. (2020). The future of mobility: The case for electric vehicles. McKinsey & Company.

14. U.S. Department of Energy. (2021). Electric vehicle benefits and considerations. U.S. Department of Energy.

15. Bansal, M., & Yadav, S. (2021). Consumer preferences for electric vehicles in urban India: A study of awareness and willingness to adopt. Environmental Economics and Policy Studies, 23(4), 537-552.

16. Jain, R., & Singh, P. (2021). The impact of government incentives on the adoption of electric vehicles: Evidence from India. Energy Reports, 7, 278-284.

17. Dube, L., & Sharma, R. (2020). Analysis of barriers to the adoption of electric vehicles in India: A survey study. Transportation Research Part A, 138, 16-29.

18. Saha, S., & Banerjee, A. (2021). The role of marketing in increasing the adoption of electric vehicles. Journal of Business Research, 128, 317-324.

19. Kumar, V., & Soni, R. (2022). Analyzing consumer preferences for electric vehicles in India. Global Journal of Management and Business Research, 22(3), 39-47.

20. Ghosh, A., & Sharma, V. (2020). Electric vehicle adoption in India: Challenges and policy implications. Economic and Political Weekly, 55(22), 58-62.

21. World Bank. (2020). Accelerating the adoption of electric vehicles in India: A policy perspective. World Bank.

22. United Nations Environment Programme. (2020). Electric vehicles and the environment: A global overview. UNEP.

23. NITI Aayog & Rocky Mountain Institute. (2017). India's transition to electric mobility. NITI Aayog.