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AN ANALYSIS OF THE SOCIO-ECONOMIC FACTORS AFFECTING THE ACCEPTANCE OF ELECTRIC VEHICLES IN KERALA WITH SPECIAL REFERENCE TO TRIVANDRUM

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I. Abstract

This research paper analyses the socio-economic factors affecting the appeal and adoption of electric vehicles among the residents of Thiruvananthapuram district in Kerala. The study is conducted among 120 respondents with equal representation of both the genders. A well-structured questionnaire was circulated using google forms to collect the data. The major factors that positively influenced people's decision to buy electric vehicles are the positive environmental effects and the rising fuel prices.

The major factors that pushed people away from buying electric vehicles were observed to be technical in nature- limited infrastructure, long charging times and limited range.

Keyword: Electric vehicles

II. Introduction

Electric vehicles (EVs) are getting attention across the globe as a remedy for environmental pollution. This research paper studies the behavioural and social factors affecting the appeal and adoption of electric vehicles among the residents of Thiruvananthapuram district, Kerala.

III. Objectives of the Study

1. To examine the factors that affect electric vehicle purchase positively and negatively.
2. To analyse the social acceptance of electric vehicles with respect to gender, income-level and nature of area of residence in Thiruvananthapuram, Kerala.

IV. Methodology

The analysis was conducted through the use of both primary and secondary data sources. Primary data was collected through the sample survey method from which the general opinions and views of the 120 respondents consisting of 60 males and 60 females were gathered after providing them a well- structured questionnaire through google forms. Before the full scale roll out of the questionnaire, a pilot study was conducted among 10 people. The flaws identified through the pilot survey were resolved and this led to a successful primary data collection exercise.

V. Review of literature

(Perdiguero & Jimenez, 2012) opined that an upward trend in fuel prices and the desire to reduce pollution levels mean that electric vehicle has become an increasingly attractive alternative in recent years. The aim of this study is to examine the main barriers that the electric vehicle must overcome if it is to become a successful mode of transport and to review the main public policies that governments might implement to help in overcoming these obstacles.

(Obrecht, Fale, Muneer, & Knez, 2018) explained about the review of policies and their possible effects of promoting the use of electric vehicles suggestions on faster implementation of electric vehicle can also be identified within best practices abroad. Various countries have adopted different policies to promote the use of electric vehicles which include fiscal or other forms of incentives that would persuade people into buying electric vehicles.

(Bhalla, Ali, & Nazneen, 2018) investigated the factors influencing the consumer acceptance of electric vehicles. They studied the various factors that influence the purchasing decision of car buyers and found that environmental concerns and consumer trust on technology are antecedent factors for positive perception about electric vehicle purchase, while cost, infrastructure and social acceptance influences the preference negatively.

(Jena, 2020) explored the sentiments of Indian consumers towards acceptance of EVs using deep learning algorithms. The study was done using data collected from different social media platforms for over two years and used prices, maintenance and safety as the features for analysis.

VI. Profile of the respondents

Out of the 120 respondents, 60 were males (50%) and 60 were females (50%), hence there was equal participation from both genders. 77 of our respondents were form urban area (64.2%) while 43 were from rural area (35.8%). 116 respondents belonged to the age bracket 25 or younger (96.7%), 1 respondent to the bracket of 26-30 (0.8%) and 3 to the bracket of 31-40 (0.8%). Hence, a major part of the responses was from youngsters under the age of 25. Similarly, 112 of our respondents were students (93.3%), 5 were Private employees (4.2%), 1 was a daily wage worker (0.8%), 1 was a contract worker (0.8%), and 1 was unemployed (0.8%). 39 of our respondents fell into the approximate monthly income bracket of less than 25000 (32.5%), 28 into 25000-50000 (23.3%), 29 into 50000-100000 (24.2%), 13 into 100000-150000(10.8%) and 11 fell into the income bracket of 150000 or above (9.2%). 60 of the respondents had a total of 4 family members (50%), 30 had 5 family members (25%), 14 had 6 or above family members (11.7%), 16 had 3 (13.3%) while none of the respondents has number of family members 2 or below.

VII. Motivating and demotivating factors of electric vehicle purchase

A. Factors that affect EV purchasing decisions positively

The respondents were asked to list the incentives and disincentives that are either pushing them towards buying an EV or pulling them further away. Several options were provided for both questions, with the additional option to provide their own curated response. The respondents could choose multiple options. The various options given were, (a) rising fuel prices (b) positive environmental effect (c) beneficial financial and insurance options (d) price of the vehicle (e) new trend and (f) promotion.

Out of the 120 respondents, 83.3 percent cited rising fuel prices and 72 percent cited positive environmental effect as the major factors that encourage them to consider buying an electric vehicle. It was followed by beneficial financial and insurance options which was chosen by 22.5 percent of the respondents, price of vehicle opted by 21.7 percent respondents, new trend by 10.8 percent and promotion as a reason by 4.2 percent.

B. Factors that affect EV purchasing decisions negatively

Lack of Infrastructure (72.5%) is the major factor discouraging people from buying electric vehicles by a very strong margin, followed by Long Charging Times (45%), Limited Range (42.5%), Price of Vehicles (41.7%), Lack of Trust in new technology (16.7%) and Unwillingness to change (6.7%).

C. Analysis of the social acceptance of electric vehicles with respect to gender, income-level and nature of area of residence

The respondents were asked two questions to gauge their level of acceptance towards EVs. The first question was - how likely would it be that their next vehicle will be an EV – and the second question was – **if** they were to own an EV, whether they would treat it as their primary or their secondary mode of transportation.

D. Acceptance of EVs on the basis of gender

Of the 120 respondents, there was an exact 50% split in gender, with 60 females and 60 males attempting the survey.

Out of 60 males, 43 (71%) are likely or highly likely to buy an EV as soon as possible or within the next 5 years, 14 (23.33%) only preferred to buy within the next 10 years while 3 (0.05%) are not likely at all. Out of 60 females, 33 (55%) are likely or highly likely to buy an EV as soon as possible or within the next 5 years, 23 (38.33%) only

preferred to buy within the next 10 years while 4 (0.066%) are not likely at all. There exists a 16 percentage-point difference seen in the preference of buying the electric vehicles on the basis of gender. As for whether the respondents would choose EVs as their primary vehicles, a very uniform trend emerged as 42 out of 60 males and 40 out of 60 females preferred EVs to be their primary mode of transportation.

E. Acceptance of EVs on the basis of Nature of Area of Residence

Amongst the 120 respondents, there were 77 urban and 43 rural respondents. Due to the variation in distribution, the percentage values were taken, instead of the absolute values, to facilitate convenient comparison.

Out of 77 urban respondents, 62.33 percent were likely or highly likely to buy an EV as soon as possible or within the next 5 years, 33.76 percent only preferred to buy within the next 10 years while 3.89 percent were not likely at all. Out of 43 rural respondents, 65.1 percent were likely or highly likely to buy an EV as soon as possible or within the next 5 years, 25.8 percent only preferred to buy within the next 10 years while 9.3 percent were not likely at all. There did not seem to be a very clear variation in the preference of buying electric vehicles on the basis of nature of area of residence.

As for whether the respondents would choose EVs as their primary vehicles or not, a similar uniform trend emerged as 71.42 percent of urban respondents and 69.76 percent of rural respondents preferred EVs to be their primary mode of transportation. With the data collected, there was negligible variation between rural and urban respondents and so, perhaps, nature of area of residence was not a significant factor in acceptance of EVs.

VIII. Acceptance of EVs on the basis of income Level

Respondents were classified into five income groups on the basis of their monthly household income, i.e., less than 25000 (39 respondents), between 25000 and 50000 (28 respondents), between 50000 and 100000 (29 respondents), between 100000 and 150000 (13 respondents), and greater than 150000 (11 respondents).

From the data collected, it could be observed that out of the 39 respondents in the “<25,000” income group, 56.4 percent were likely or highly likely to buy an EV as soon as possible or within the next 5 years, 30.76 percent only preferred to buy within the next 10 years while 12.82 percent were not likely at all. With the 28

respondents in the “25,000 to 50,000” income group, 57.13 percent were likely or highly likely to buy an EV as soon as possible or within the next 5 years, 35.71 percent only preferred to buy within the next 10 years while 7.14 percent were not likely at all. With the 29 respondents in the “50,000 to 1,00,000” income group, 79.3 percent were likely or highly likely to buy an EV as soon as possible or within the next 5 years, and 20.686 percent only preferred to buy within the next 10 years.

Out of the 13 respondents in the “1,00,000 to 1,50,000” income group, 61.53 percent were likely or highly likely to buy an EV as soon as possible or within the next 5 years, 38.46 percent only preferred to buy within the next 10 years while 0% were not likely at all. Finally, with the 11 respondents in the “> 1,50,000” income group, 63.63% are likely or highly likely to buy an EV as soon as possible or within the next 5 years, 36.36% only preferred to buy within the next 10 years while 0% are not likely at all.

As for whether the respondents would choose EVs as their primary vehicles or not, a fairly uniform trend was observed, with 69.23% of respondents from the “<25,000” income group, 64.28% from the “25,000 to 50,000” group, 75.86% from the “50,000 to 1,00,000” group, 69.23% from the “1,00,000 to 1,50,000” group and 81.81% from the “>1,50,000” group preferred EVs to be their primary mode of transportation.

With the given data, clear variations can be seen that divides the sample into two income groups – below 50,000 and above 50,000 – as the various groups within these divisions behaved similarly. Between these two divisions, the latter preferred to have EVs as their next vehicles or within the next 5 years more than the former. A noteworthy observation was that there were absolutely no respondents from the latter division, consisting of the highest three income groups, who chose to not have an EV at all. The only responses that indicated this option were from the lowest two income groups and, within those – primarily from the lowest group (<25.000). Another rather interesting observation is that there were no respondents from the “1,00,000” to “1,50,000” income group who preferred to have EVs immediately as their next vehicle. And the reason for this was observed to be the lack of infrastructure available.

IX. Major findings

- The major factors that positively influenced people decision to buy Electric Vehicles are the positive environmental effects and the rising fuel prices.
- The major factors that pushed people away from buying Electric Vehicles were observed to be technical in nature- limited infrastructure, long charging times and limited range.
- On the basis of gender, there exists a 16-percentage point difference in the preference of buying Electric Vehicle and a uniform trend on the matter of preferring EV as their primary mode of transportation.
- There was no noticeable variation on the preferring of buying Electric Vehicle on the basis of area of residence as both showed positive trends and this was the case with the preference of EV as a primary mode of transportation too.
- People in the income bracket of above 50000 showed a slightly more positive sentiment towards the idea of adopting Electric Vehicles at the earliest than those under 50000. A uniform positive trend emerged as all income groups preferred to have EV's as their primary mode of transportation.

X. Suggestions

- More affordable electric vehicles should be introduced in the market so that people across all income sectors can afford them.
- Awareness campaigns and advertisements about the various incentives and benefits associated with electric vehicles should be popularized through all media platforms.
- Government should partner up with the private sector and contribute men, material and financial resources for promoting the production and research& development associated with electric vehicles.

XI. Conclusion

Kerala is a fertile ground that seems all the more ready for a change towards green mobility. Given the right push, the future where all consumer vehicles in the roads of Kerala are Electric is not far away.

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Table 1:

Incentives	No. of Responses	Percentage of Respondents
Price of the Vehicle	26	21.7%
Positive Environmental Effect	87	72.5%
Rising Fuel Prices	100	83.3%
Beneficial Financial/Insurance Options	27	22.5%
New Trend	13	10.8%
Promotion	5	4.2%

Source: Primary Data

Unwillingness to change (6.7%).

Table 2:

Disincentives	No. of Responses	Percentage of Respondents
Lack of Infrastructure	87	72.5 %
Limited Range	51	42.5 %
Long Charging Times	54	45 %
Lack of trust in new technology	20	16.7 %
Unwillingness to change	8	6.7 %
Price of Vehicle	50	41.7 %

Source: Primary Data