

Preparedness and adoption for Alternative fuel cars by Indians

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Abstract

Climate change is a biggest threat to the globe. The policymakers worldwide are encouraging the usage of electric and CNG vehicles at the faster pace. India is the third largest emitter of CO₂ in the world. As per the report published by The Economic Times, more than 40% of the car buyers are looking for other means of fuel than petrol and diesel. As per the 2022 Global Automotive Consumer Study by Deloitte, the demand for electric vehicles remains low in the market, as more consumers prefer options like hybrids and CNG. The global market for alternate fuel is estimated to surpass \$892.57 billion mark by 2026 growing at an estimated CAGR of more than 12.9% during the forecast period 2021 to 2026.

The research paper mainly concentrates on the factors that influence the decision of the consumers to adopt for alternative fuel vehicles in India. It also highlights the preparedness of the consumers for the adoption of these vehicles. The study will be useful for the policy makers and for the car manufacturers as it gives them the direction to understand the psychology of the consumers.

Keywords:

Alternative fuel vehicles, Adoption, Preparedness, CNG and Electric vehicles

Introduction:

As per the Alternative Fuel Vehicle Forecasts final report published by Texas A&M Transportation Institute in 2016, there are currently five major types of alternative fuels used that affects the revenues of the government significantly. These include electricity, natural gas, ethanol, hydrogen fuel cells and propane. (Richard “Trey” Baker, Lauren Cochran, Nick Norboge, Maarit Moran, Jason Wagner, Beverly Storey). The report also identified various factors that affect adoption of alternative fuel vehicles like refuelling infrastructure, the cost to the consumers, state and local regulations on air quality, incentives and grants to the people. Hence, these factors become very critical in any country for the adoption of alternative fuel vehicles.

John K, Dagsvik, Dag G Wetterwald, and Rolf Aaberge (1996) in their working paper mentioned that alternative fuel vehicles are highly competitive compared to the conventional fuel vehicles. Men are more reserved towards the technology used by the electric vehicles than women. The hybrid alternative was considered the most preferred technology between both the genders below the age group of 30. It was also observed that people above 30 were indifferent between

hybrid and liquid petroleum gas alternatives. The study was restricted to the population of Norway.

Johan Jansson, Thomas Pettersson, Andrea Mannberg, Runar Brannlund, Urban Lindgren (2017) summarised in their research paper that adoption for alternative fuel vehicles is influenced by the factors like neighbours, family and co-workers. The importance of social system plays a crucial role in the decision to go for alternative fuel vehicles. The interpersonal influence has a major impact in the decisions made by the people. The neighbours are usually perceived to have weak ties in the decision making process of the individual. The study revealed that they are the major influencers in the decisions. Policy makers can direct their efforts towards social marketing campaigns as this has a significant impact on the people.

Background:

Petrol and diesel vehicles predominantly rule Indian passenger vehicle market. With the advent of skyrocketing fuel prices and the government initiatives, the consumers are shifting towards the alternative fuel vehicles as it is environment friendly and keeps pollution under control. However, the shift to the new segment has lot of challenges. The study concentrates on understanding the consumer

psychology and preparedness for alternative fuel vehicles.

Method:

The secondary data was collected through the articles, journals and reports available online. The primary data was collected through the survey from the people residing in different parts of the country. The questionnaire was designed and the data was collected from 83 respondents. The questionnaire was administered with the following variables.

1. Place of residence
2. Age
3. Gender
4. Current brand of car owned
5. Fuel Used
6. CNG/Electric car ownership in the past
7. Reasons for buying alternative fuel cars

8. Reasons for not buying alternative fuel cars
9. Monthly Savings due to the usage of alternative fuel cars
10. Awareness about CNG Brands
11. Perception on best range under CNG
12. Preparedness for alternate fuel vehicles
13. Preference of alternative fuel
14. Perception on electric cars for the future
15. Reasons for low demand of electric vehicles
16. Perception of best electric car range
17. Percentage chances of electric car ownership in the future.

The data was the representation of the population of the country. The data was analysed in SPSS software.

Representation of the Sample:

| Place of residence | | | | | |
|--------------------|---------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | South | 19 | 16.1 | 22.9 | 22.9 |
| | Central | 2 | 1.7 | 2.4 | 25.3 |
| | West | 51 | 43.2 | 61.4 | 86.7 |
| | East | 6 | 5.1 | 7.2 | 94 |
| | North | 5 | 4.2 | 6 | 100 |
| | Total | 83 | 70.3 | 100 | |

43.2% of the sample represents west India followed by 16% from south, 5% from east and 4% from north.

| Reliability Statistics | |
|------------------------|------------|
| Cronbach's Alpha | N of Items |
| 0.817 | 12 |

The reliability of the questionnaire was .817, which indicates that the questionnaire is reliable.

Place of residence * Brand of car owned Crosstabulation

| | | Brand of car owned | | | | | | | Total |
|--------------------|---------|--------------------|--------|--------|-------|---------|------|--------------|-------|
| | | | Maruti | Toyota | Honda | Hyundai | Tata | Volkes wagen | |
| Place of residence | | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 35 |
| | South | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 19 |
| | Central | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| | West | 0 | 15 | 5 | 12 | 16 | 1 | 2 | 51 |
| | East | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 6 |
| | North | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 5 |
| Total | | 35 | 47 | 5 | 12 | 16 | 1 | 2 | 118 |

Maruti Suzuki is the market leader for the cars followed by Hyundai and Honda. Tata was the least preferred brand.

| Descriptive Statistics | | | | | | |
|--|----|---------|---------|------|----------------|--|
| | N | Minimum | Maximum | Mean | Std. Deviation | |
| Car ownership in the past | 83 | 1 | 2 | 1.72 | 0.45 | |
| Reasons for buying EVs | 83 | 1 | 5 | 2.78 | 1.344 | |
| Reasons for not buying AFV | 83 | 1 | 4 | 2.33 | 0.951 | |
| Savings | 83 | 1 | 5 | 3.57 | 1.74 | |
| Awareness on CNG | 83 | 1 | 10 | 3.72 | 3.538 | |
| Perception on best range | 83 | 1 | 6 | 2.41 | 1.137 | |
| Preparedness | 83 | 1 | 2 | 1.14 | 0.354 | |
| Choice of alternate fuel | 83 | 1 | 2 | 1.77 | 0.423 | |
| Perception on future | 83 | 1 | 5 | 1.78 | 0.87 | |
| Reasons for low demand EVs | 83 | 1 | 4 | 1.77 | 0.77 | |
| Best range for cars | 83 | 1 | 5 | 2.07 | 1.091 | |
| Percentage Chances of Alternate fuel car ownership | 83 | 1 | 5 | 3.25 | 1.114 | |

The mean value is maximum for awareness on CNG which indicates that awareness on CNG

vehicles is high among people. The consumers are able to make enough savings due to the

usage of the alternate fuel, Percentage chances of alternative fuel car ownership in the future is also high.

Regression Analysis:

| ANOVA ^a | | | | | | |
|--------------------|------------|----------------|----|-------------|--------|--------------------|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 16.266 | 6 | 2.711 | 19.456 | <.001 ^b |
| | Residual | 5.713 | 41 | 0.139 | | |
| | Total | 21.979 | 47 | | | |

a. Dependent Variable: Chances of Electric car ownership in the future

b. Predictors: (Constant), Awareness on CNG, Gender, Age, Place of residence, Fuel used, Brand of car owned

Significance level is 0.0005, which is less than 0.05, and indicates that overall the regression model statistically significantly predicts the outcome variable.

| Coefficients ^a | | | | | | |
|---------------------------|--------------------|-----------------------------|------------|---------------------------|--------|-------|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 0.459 | 0.662 | | 0.693 | 0.492 |
| | Place of residence | 0.006 | 0.133 | 0.006 | 0.046 | 0.963 |
| | Age | 0.01 | 0.161 | 0.006 | 0.065 | 0.949 |
| | Gender | -0.042 | 0.122 | -0.03 | -0.347 | 0.73 |
| | Brand of car owned | 0.226 | 0.061 | 0.472 | 3.732 | <.001 |
| | Fuel used | 0.786 | 0.098 | 0.966 | 8.027 | <.001 |
| | Awareness on CNG | -0.045 | 0.051 | -0.085 | -0.885 | 0.382 |

a. Dependent Variable: Chances of Electric car ownership in the future

The coefficient table guides to develop models based on the results.

The regression equation would be:

Chances of owning the electric car in the future= .459+.006(Place of residence)

Chances of owning the electric car in the future= .459+.010(Age)

Chances of owning the electric car in the future= .459-.042(Gender)

Chances of owning the electric car in the future= .459+.226(Brand of car owned)

Chances of owning the electric car in the future= .459+.786(Fuel used)

Chances of owning the electric car in the future= .459-.045(Awareness on CNG)

| Model Summary | | | | |
|---------------|-------------------|----------|-------------------|----------------------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .860 ^a | 0.74 | 0.702 | 0.373 |

a. Predictors: (Constant), Awareness on CNG, Gender, Age, Electric car ownership in the future) and other Place of residence, Fuel used, Brand of car owned independent variables like Place of residence, age, brand of car owned, fuel used and awareness on CNG Vehicles.

There is a high degree of correlation (.860) between the dependent variable (chances of

| Reasons for buying EVs | | | | | |
|------------------------|-----------------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Upsurge in petrol prices | 20 | 16.9 | 24.1 | 24.1 |
| | CNG is environment friendly | 20 | 16.9 | 24.1 | 48.2 |
| | Feasibility in purchase | 6 | 5.1 | 7.2 | 55.4 |
| | Efficiency | 32 | 27.1 | 38.6 | 94 |
| | Safety | 5 | 4.2 | 6 | 100 |
| | Total | 83 | 70.3 | 100 | |

The above table indicates that 27% of the sample size would like to buy Alternate fuel vehicles, as they are more efficient. The other major reasons for the decision are upsurge in

petrol and diesel prices and environmental friendly impact of these vehicles.

| Reasons for not buying CNG/Electric Vehicles | | | | | |
|--|-------------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | High Initial Investment | 16 | 13.6 | 19.3 | 19.3 |
| | Limited charging points | 36 | 30.5 | 43.4 | 62.7 |
| | Reduced storage space | 19 | 16.1 | 22.9 | 85.5 |
| | Less driving speed | 12 | 10.2 | 14.5 | 100 |
| | Total | 83 | 70.3 | 100 | |

The major reason pointed out by the sample for not buying the alternate fuel vehicles are

limited charging stations, reduced storage space and high initial investments.

Conclusion:

It can be concluded that CNG and Electric vehicles are the future of India. Hence, it becomes imperative for the car manufacturers and policy makers to understand and bridge the gap between the consumers and themselves. Consumers are well aware about the benefits offered by the alternative fuel vehicles. Certain infrastructural developments like charging points, more incentives and discounts on these cars would facilitate the usage of these vehicles to the great extent. The study proves that age, gender, place of residence, awareness on CNG vehicles and fuel used for the car has high correlation to the decision on future purchase of electric vehicles. Hence, it becomes very significant for the car manufactures to develop their products keeping these variables in mind. It was also found that majority of the consumers currently owned Maruti Suzuki cars but the best car perception of Electric cars was more skewed towards Tata brands (Tata Tigor and Nexon) and Mahindra Verito. The most preferred alternate fuel car was the electric car as compared to CNG cars. Hence, there will be a good demand for electric cars in the near future. The car manufacturers need to explore more on this segment. The preferred price range of CNG cars is between 5 to 7 lakhs.

Limitations of the study:

The majority of the respondents were from western part of India, which might be a limitation in deriving the results.

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