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# A STUDY ON AWARENESS AND INSIGHTS TOWARDS ELECTRIC CARS: WITH REFERENCE TO SAURASHTRA REGION

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**ABSTRACT**

*In the last few decades, the environmental impact of peak-based oil-based transport infrastructure has stimulated renewed interest in electrified transport infrastructure. The automotive industry has been preparing for transformation for more than a century. The increase in fossil fuel prices and the impact of emissions on the environment have necessitated a change in individual transport habits. The government wants car manufacturers to switch to electronic vehicle production, which will reduce the oil bill by $ 60 billion, reduce emissions by 37 percent and reduce dependence on fuel imports. It acts as a shield against vulnerability to oil prices and currency fluctuations. However, the main unresolved issue remains the easy availability of charging points at various locations in the city. The switch to electronic vehicle is mandatory in India in the near future, if not in the near future. An attempt is made to examine the different factors that affect a consumers' adoption of an electric vehicle. This paper aims to know perceptions of individuals in the Saurashtra region towards electric cars and the potential perception and expectations of alternative technologies in the automotive industry such as electric vehicles.*

***KEYWORDS***: *Electric Vehicles, Electric Cars, Government, Environment.*

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## Introduction

The auto industry for more than a century is preparing for transformation. The spike in fossil fuel prices and the impact of emissions on the environment have called for a change in individual transportation habits. The field of internal combustion engines is gradually moving towards electric vehicles.

Pollution of the environment is mainly a global concern. Toxic emission from internal combustion engines is one of the primary air pollutants. In order to reduce the effects of fossil fuel emission and address environmental concerns, electric vehicles are being promoted aggressively all over the world. Various governments are encouraging people to switch to electric vehicles by incentivizing the transition.

Various studies indicate that the high cost of the electric car, non-availability of charging infrastructure, time and range anxiety act as impediments to consumer adoption. But the rational consumer will always focus on major benefits of electric vehicles viz, they are energy efficient, produce less greenhouse gas emissions and reduce noise.

The Government of India has given a call for 'only Electric Vehicles' on Road by 2030.

The transport sector contributes to about a quarter of greenhouse gas emissions. Automobiles are the primary source of greenhouse gas emissions worldwide with China 25.9 percent, the USA 13.87 percent followed by India 7.45 percent.

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India is highly committed to control pollution and reduce carbon footprint. The government wants automakers to switch to electric vehicle production, which will cut the oil bill by US$60 billion, cut emissions by 37 percent and reduce reliance on fuel imports. It acts as a shield against vulnerability to crude prices and currency fluctuations.

The government is examining the battery replacement option model to overcome challenges in electric vehicle adoption. The transition to electric vehicles in India is mandatory in the near future, if not the immediate future. Many cities are victims of unplanned urbanization and high pollution. They are subject to unqualified degradation with vehicle emissions as a primary source.

The Indian Automobile Manufacturer Association is determined that electric vehicles will account for 40 percent of new car sales by 2030 and 100 percent by 2047. The milestone date coincides with the 100th anniversary of the country's independence.

**Review of Literature**

**Ismail, N. A.-A. (2020).** ***Factors Influencing Consumers Buying Intentions Towards Electric Cars: The Arab Customers' Perspective.*** **Amman.**

They found that price, brand image and fuel economy have significant influence on the Arab consumer intention to purchase electric cars. According to these results, the study recommended that the marketer of the car agents in Arab countries should implement effective feedback systems to make sure that they meet their buyer's attitude and perception.

**Jain, D. (2021).** ***Viability assessment of electric cars for personal use in India***

Conducted study on urgent need to address the increasing energy demand and emissions contributed by the transportation sector. Electric mobility is identified as one of the potential strategies to address the challenges. The existing policies in India like NEMMP and FAME provide incentives and benefits to the public transit system providers to convert their conventional vehicles to electric. As per the analysis, the expected average travel demand of 65 to 102 kilometers per day per car can be met by the existing ECs. However, the existing multicar ownership is low that shall restrict the acceptability of EC for personal use in India. In addition to this, in the average car growth and average EV scenario, the additional electricity demand shall range between 6.29 TWh and 12.49 TWh to charge vehicles depending on the varying usage of different power train models. Therefore, a comprehensive package of policies and strategies at the national, state and local levels is required to address the identified challenges and therefore achieve sustainability using EVs in the long-term. The study assesses the viability of EC for personal use based on the alternative scenarios.

TWh: A terawatt-hour is a unit of energy equal to outputting one trillion watts for one hour.

**Ramu, M., & Tarun. (2021).** ***The Future of Electric Cars In India.***

Conducted study on the shift to complete EV. EV comes with a price which nations cannot afford at the moment of such massive revolution. To enable sustainable development, the shift is inevitable but far away in the future for a nation like India. The technology is borrowed from other nations to use in India. Thus there exists a barrier in the process of change. It shall be a burden with additional societal issues India faces at the moment. The Legislatives ought to take the environmental effects of conventional sources of fuel and consider the shift somewhere near future to enjoy the sustainable use of renewable resources and ensure that the future generations do not live and suffer for the mistakes of the past ones.

**Secinaro, S., Brescia, V., Calandra, D., & Biancone, P. (2020).** ***Employing bibliometric analysis to identify suitable business models for electric cars.*** **Turin, Italy.**

Conducted study on to provide a bibliometric analysis of the publications on the business models for electric cars. Although there is a considerable amount of literature on this subject, they observed that the literature lacked a bibliometric analysis. Besides, researchers could benefit from that analysis and integration of multidisciplinary fields. Additionally, the study also highlights unexplored topics that can be studied further by researchers and dealt from policymaking and managerial perspectives. Furthermore, only 10% of the results were considered to analyse the application of business models for electric vehicles. A higher identification of cases can be useful to identify the endogenous and exogenous variables of countries and their way of influencing purchasing choices, laws, procurement systems, technologies, and market type.

**Sobol, Ł., & Dyjakon, A. (2020).** ***The Influence of Power Sources for Charging the Batteries of Electric Cars on CO2 Emissions during Daily Driving: A Case Study from Poland.*** **Poland.**

Conducted study on the comparison of the direct and indirect carbon dioxide emissions related only to the daily driving of the EV and different car classes with internal combustion engines (ICEs) was evaluated. The increase in the share of renewable energy sources in electricity production will have a positive impact on the environmental performance of the EV in Poland. However, the increase in electrification in the transport sector will result in increased demand for electricity in the country. The air quality is improved locally, and the noise level is reduced, undoubtedly improving the comfort and quality of life of their inhabitants. Unfortunately, however, the emission concentration changes only the location. To achieve a measurable reduction potential of carbon dioxide emissions into the atmosphere, electricity used to charge the EV batteries should be produced from renewable sources.

**Objectives of the Study**

- To study the current threats that cause slow growth of electric cars.
- To identify the factors considered for purchasing electric cars.
- To know the opinion of respondents regarding benefits of electric cars.
- To assess the knowledge of respondents regarding various models of electric cars.
- To study the willingness of respondents for considering electric cars as a practical commuting option.

**Research Methodology**

| | | |
|---|---|---|
| Research Design | : | Descriptive Research Design |
| Sources of Data | : | Primary |
| Data Collection Method | : | Survey Method |
| Population | : | All users of cars of Saurashtra region |
| Sampling Method | : | Non probability Convenience Sampling |
| Date Collection Instrument | : | Structured Questionnaire |
| Sample size | : | 153 users of cars of Saurashtra region |
| Type of Questions | : | Closed ended Questions |

**Table 1: Factors that Encourage buying Electric Car**

| Factor | No. of Respondents |
|---|---|
| Price | 60 |
| Favorable effect on environment | 81 |
| New trend | 51 |
| Low cost per km | 24 |
| Low noise level | 87 |
| Better finance and insurance options | 87 |
| Total | 390 |

Respondents were given the choice to select multiple options for the above question. As a result of this total of above table is more (390) than total number of respondents (153).

**Table 2: Factors that Discourage buying Electric Car**

| Factor | No. of Respondents |
|---|---|
| Long charging time | 66 |
| Charging infrastructure | 54 |
| Limited options for choice | 47 |
| Poor after sales service | 42 |
| Lack of trust on new technologies | 33 |
| Resistance to change | 15 |
| Total | 257 |

Respondents were given the choice to select multiple options for the above question. As a result of this total of above table is more (257) than total number of respondents (153).

**Table 3: Opinion for the Benefits of Electric Vehicles**

| Statement | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree | Total |
|---|---|---|---|---|---|---|
| Electric vehicles protect from global warming | 48 | 87 | 8 | 6 | 4 | 153 |
| Electric vehicles can replace regular cars in terms of satisfying consumer needs | 40 | 88 | 12 | 5 | 8 | 153 |
| Electric vehicles have lower maintenance cost | 19 | 59 | 34 | 18 | 23 | 153 |
| Electric vehicles provide more tax and financial benefits | 18 | 66 | 28 | 24 | 17 | 153 |
| Electric vehicles are easy to drive and quiet | 54 | 60 | 20 | 6 | 13 | 153 |
| Electric vehicles have more convenience (charging at home) | 36 | 78 | 12 | 21 | 6 | 153 |
| Electric vehicles provide better performance | 10 | 78 | 39 | 18 | 8 | 153 |

**Table 4: Knowledge about Various Models of Electric Cars**

| Name of the Car | Deep Knowledge | Somewhat Aware | Sounds Familiar | Never Heard | Total |
|---|---|---|---|---|---|
| Tata Nexon EV | 48 | 60 | 39 | 6 | 153 |
| Tata Tigor EV | 30 | 51 | 54 | 18 | 153 |
| MG ZS EV | 15 | 45 | 42 | 51 | 153 |
| Hyundai Kona | 18 | 48 | 36 | 51 | 153 |
| Tesla | 57 | 54 | 33 | 9 | 153 |
| BMW i-series | 24 | 30 | 42 | 57 | 153 |
| Audi E-tron GT | 24 | 45 | 36 | 48 | 153 |
| Mercedes Benx EQC | 27 | 54 | 36 | 36 | 153 |

**Table 5: Willingness to Purchase Electric Car**

| Likelihood of buying Electric Car | No. of Respondents |
|---|---|
| I want to buy as soon as possible | 33 |
| I want to buy by next two years | 48 |
| I want to buy by next five years | 57 |
| I never want to but | 15 |
| Total | 153 |

**Hypothesis of the Study**

**$H_0$:** The response for willingness to purchase an electric car is uniformly distributed among all respondents.

**$H_1$:** The response for willingness to purchase an electric car is not uniformly distributed among all respondents.

| $fo$ | $fe$ | $fo - fe$ | $(fo - fe)^2$ | $\chi^2 = \sum \frac{(f_0 - f_e)^2}{f_e}$ |
|---|---|---|---|---|
| 33 | 38.25 | -5.25 | 27.56 | 0.72 |
| 48 | 38.25 | 9.75 | 95.06 | 2.48 |
| 57 | 38.25 | 18.75 | 351.56 | 9.97 |
| 15 | 38.25 | -23.25 | 540.56 | 14.13 |
| $\sum$ = 153 | | | | $\sum \chi^2$ = 27.3 |

Degree of freedom = (r-1)

= (4-1)

= (3)

So, table value at 5% significance level is 7.815

27.3 > 7.815

So, Ho is rejected

So, we can say that the response for willingness to purchase an electric car is not uniformly distributed among all respondents.

**Findings of the Study**

- The most favorable factors considered for purchasing electric car are low noise level, better finance & insurance options and favorable effect on environment.
- Most of the respondents do not wish to buy electric cars because of long charging time and lack of proper charging infrastructure.
- Most of the respondents agree that electric vehicles help to protect from global warming as well as they can replace regular cars in terms of satisfying consumer needs.
- Approximately half of the respondents do not believe that electric vehicles have lower maintenance cost and they provide more tax & financial benefits.
- 87% respondents agree that electric vehicles are easy drive and they provide more convenience.
- 57% respondents agree that electric vehicles provide better performance.
- While talking about knowledge of various models of cars, Tesla seems to be more popular as 57 respondents are having deep t knowledge about the car and only 9 respondents have never heard about it.
- Majority of the respondents have shown keenness to purchase electric cars by next two to five years. This may contribute to the target by GOI 'only Electric Vehicles' on road by 2030.

**Further Scope of the Study**

The current study is performed in Saurashtra region of Gujarat state. This study can also be performed for the other regions or states of India or other countries. Moreover, comparative analysis between two states or two countries can also be performed as well.

Research can be conducted to study the awareness and perception toward hybrid cars also.

One can conduct further research on awareness and perception of electric/hybrid cars by comparative analysis of urban and rural area of the Saurashtra region.

**Conclusion of the Study**

The government initiatives taken for the promotion of electric vehicles are still in the development stage. Although various agencies have been formed and various plans have been made by them, but their implementation is still not up to the mark. People's perception towards electric vehicles is not satisfactory because a large part of our society is still unaware of the various alternative technologies used in automobiles and its benefits as well. Consumers will only prefer electric cars if they are comparable to existing vehicles in all the aspects. The replacement of the existing cars with the electric cars is possible only when consumer become increasingly conscious of the use of cleaner technologies.

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