

ISSN 2063-5346



## An empirical study of consumer buying behavior towards electric vehicles in Goa.

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Article History: Received: 10.05.2023

Revised: 29.05.2023

Accepted: 09.06.2023

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### Abstract

The world is rapidly moving towards electric mobility. Under the Clean Energy Ministerial, a high-level forum to promote clean energy policies and programs, eight countries have committed to the 'EV 30@30' campaign. As part of this campaign, India aims to achieve a 30 per cent electric vehicle penetration by 2030. There are many positive and negative aspects to accelerating electric vehicle mobility. This paper focuses on the reasons for switching from petrol to electric vehicles, to find out the impact of electric vehicles on the environment and to study the agegroup which prefers electric vehicles. Some of the features of Electric vehicles are low maintenance cost, low running cost, convenience, no noise and environment friendly. The progress of the electric vehicle industry is highly necessary to reduce environmental pollution, reduction in oil imports and better economy and better utilization of renewable resources.

Keywords: Electric vehicles, Environmental pollution, Smooth drive, Charging infrastructure.

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DOI:10.48047/ecb/2023.12.9.137

## Introduction

Environmental pollution has reached critical levels in India. It ranked in the top five countries in the Climate Risk Index 2020, indicating it is vulnerable to climate change. Therefore, there are no other options than to adopt e-mobility. To address environmental concerns, the Indian government has chosen to promote the use of electric vehicles to minimise pollution.

Electric vehicles can play a vital role in combating climate change across the globe by helping to cut down emissions and reduce dependence on fossil fuels. The origin of Electric vehicles can be traced back to the mid-nineteenth century. Initially, the speed of electric battery-powered cars was far less than that of internal combustion engine vehicles. Now, the situation had altered. People began to be concerned about the pollution caused by hydrocarbon-fueled automobiles. Electric vehicles must be the future means of transport. Pollution, growing demand for fuel, global warming and promoting eco-friendly means of transportation are some of the reasons for promoting electric vehicles.

Electric vehicles may be powered through a collector system by electricity from off-vehicle sources or built with a battery, solar panels, fuel cells, or an electric generator to convert fuel to electricity. Electric bikes, electric cars, and electric rickshaws are some examples of electric vehicles. Most trains including metros are ready running worldwide through electricity. Electric vehicles researcher refers here to Battery Electric Vehicle, Hybrid Electric Vehicles, Plug in Hybrid Electric Vehicle and Fuel Cell Electric Vehicles.

## Objectives of the study

1. To study the reasons for switching from petrol to electric vehicles.
2. To study the impact of electric vehicles on the environment

3. To study the age preference in terms of buying electric vehicles.

## Review of Literature

Shrivastava (2018 ) In their study, they found that Electric vehicles reduce pollution only if a high percentage of the electricity mix comes from renewable sources and if the battery manufacturing takes place at a site far from the vehicle use region. Industries developed due to increased electric vehicle adoption may also cause additional air pollution. The Indian government has committed to solving New Delhi's air pollution issues through an ambitious policy of switching 100% of the light-duty consumer vehicles to electric vehicles by 2030. This policy is based on vehicle grid interaction and relies on shared mobility through the electric vehicle fleet. There are several human behavioral changes necessary to achieve 100% adoption of electric vehicles.

Mathew, (2019) The study of the paper focuses on the future of Electric Vehicles in India. It says that Electric mobility is gaining traction around the world. Environmental pollution will be reduced, oil imports will be reduced, national security will be improved, the economy will improve, and renewable resources will be better utilized by adopting EVs. Furthermore, the charging and switching of electric vehicle batteries would provide a vast number of jobs across the country.

Sesha S, (2020) made an attempt to study electric vehicles and how to get them to the general public at reasonable pricing. This article examines the many types of electric vehicles already available and under investigation, as well as recent developments and developing technologies that may define the electric vehicle industry's future and the impact

Energy Policy, (2021) Elsevier- Adopting electric vehicles (EVs) is regarded as one of the leading solutions to environmental issues. However, recent research on the

promotion of electric vehicle adoption focuses on perceptions and attitudes toward EVs and neglects the importance of different human needs in consumers' purchase decision-making processes.

Rathore (2021) in their study found out that electric vehicles are a viable solution for lowering greenhouse gas emissions. Electric vehicles not only reduce fossil fuel dependency, but they also minimize ozone-damaging compounds and support large-scale renewable deployment. The study addresses the numerous modelling approaches and optimization strategies used in studies of Electric Vehicles, Hybrid Electric Vehicle, Plug-in-Hybrid Electric Vehicle, and Battery Electric Vehicle penetration rates in the market.

Table no 1 Profile of the respondents

Age of respondents	Frequency	%	Occupation	Frequency	%
20-30	93	31	Students	83	28
31-40	88	29	Employee	78	26
41-50	57	19	Business	67	22
51-60	49	16	Taxi driver	46	15
61-70	14	05	Housewife	26	09
Total	300	100	Total	300	100
Gender of the respondents	Frequency	%	Preferences to buy EV	Frequency	%
Male	125	42	Yes	234	78
Female	175	58	No	66	22
Total	300	100	Total	300	100

Source: Primary data

The above table depicts the age of the respondents and it is found that 60% of respondents are from the age group 20-40 age group. As the age group increases fewer respondents use electric vehicles. It means young respondents are using more electric vehicles. It is also seen that 58% of female respondents are using electric vehicles. It is also seen that 28% of respondents are students, 26% of

## Research Methodology

The data is descriptive in nature and it is based on primary as well as secondary data. The self-developed questionnaire is developed and circulated to 300 consumers from all over Goa to collect primary. Secondary data is collected through various sources like the Internet and newspapers.

## Data Analysis and Interpretation

To understand the intention of customers towards electric vehicles, the survey was done of 300 respondents from all over Goa. The output of the survey was as below.

respondents are employees and 22% of respondents are businessmen.

Table no 2 Reasons to switch from petrol to electric vehicles

Reasons to switch	Frequency	%
Protect environment	147	49
Increase in petrol price	104	35
Mileage limit	14	05
Charging facility	35	11
Total	300	100

Source: Primary data

The above table indicates the reasons for switching from petrol to electric vehicles. 49% of respondents switched to electric vehicles to protect the environment, whereas 35% of respondents switched to electric vehicles because there is an increase in petrol prices. 11% of respondents want to go for an electric vehicle as easily as they can charge the vehicle at home. So, it is observed that the majority of respondents are keen on protecting the environment and therefore, they purchased an electric vehicle.

Table no 3 Features that attract the most Electric vehicle

Attraction	Frequency	%
Smooth drive	231	77
Intelligent functions	54	18
Multimedia facilities	15	5
Total	300	100

Source: Primary data

The above table highlights the features that attract the majority of respondents to electric vehicles. It can be noted that 77% of respondents like smooth drive, followed by intelligent functions. Negligible people also attract due to multimedia facilities. When respondents are asked about the brand majority of them said that they prefer the TVs brand, some of them like Tesla, Tata and Harley Davidson brand.

Table no 4 Type of electric vehicles held by respondents.

Type	Frequency	%
Car	54	18
Scooty	148	49
Bike	82	27
Bicycle	16	6
Total	300	100

Source: Primary data

The above table highlights the type of electric vehicle held by the respondents. It can be seen that 49% of respondents prefer Scooty, 27% of respondents prefer bikes and 18% prefer Cars. It is seen that electric vehicles are well-promoted to the public, but still, people do not come forward to buy electric vehicles.

Table no 5 Factors that discourage buying an electric vehicle

Factors	Frequency	%
High Price	121	40
Recharging time	85	28
Lack of trust in new technology	67	23
No charging station facilities	27	9
Total	300	100

Source: Primary data

The above table highlights the reasons which discourage buying electric vehicles, 40% of respondents feel that high price is the discouraging factor, 28% of respondents feel that recharging time is more, whereas 23% of respondents do not trust new technology. They have a fear that any time these electric vehicles may stop or they will not get repaired. Some of them also feel that in-between charging stations are not yet available.

Table no 6 Electric vehicles prevents Global warming

Protect	Frequency	%
Strongly agree	75	25
Agree	156	52
Neutral	34	12
Disagree	22	7
Strongly disagree	12	4
Total	300	100

Source: Primary data

The above table shows that 77% of respondents said that they strongly agree & agree that electric vehicles help to protect against global warming, the remaining respondents either remained neutral or disagreed with the statement. Therefore, many respondents replace regular vehicles with electric vehicles.

Table no 7 Factors that are considered before buying an electric vehicle

Factors	Frequency	%
Mileage and battery life	126	42
Charging station	82	27
Service centres	58	20
Model	34	11
Total	300	100

Source: Primary data

The above table shows that the majority of the respondents prefer to buy an electric vehicle from the showroom by physically checking the features of a vehicle rather than online booking. Table 7 depicts the factors to consider before buying an electric vehicle. 42% of respondents consider mileage and battery life before buying the vehicle and 27% consider a charging station, followed by 20% considering nearby service centres before buying the vehicle.

Table 8 Influence of society on the buying behaviour of electric vehicles

	Frequency	%
Agree	157	53
Neutral	49	16
Disagree	94	31
Total	300	100

Source: Primary data

From the above table it is evident that there is huge influence of society on buying behavior of electric vehicles. Consumers feel that buying electric vehicles will save a lot of money in the long run and most importantly it will protect the earth from global warming. Some reasons respondents quoted that, low maintenance cost, low running cost, more convenience, no noise, and environment friendly.

### Findings of the study

Majority of respondents like electric vehicle as it is environmentally friendly & smooth to drive.

An electric vehicle is the necessity of an hour as fossil fuels will be exhausted in the future.

Electric vehicles have good features and less maintenance.

Electric vehicles are eco-friendly, reducing air & noise pollution and helping to save on automotive costs.

Some respondents are interested in Electric vehicles but it is costly.

Limited mileage and limited power stations are there to charge the EV batteries.

Electric vehicles are fragile and require a protection circuit to maintain safe operation.

TVS brand electric vehicle is more liked by people compared to other brand.

Consumers strongly agree that the cost to charge an electric vehicle is much less than the fuel costs for a petrol or diesel vehicle and hence they are willing to switch on an electric vehicle.

### Conclusion

The progress of the electric vehicle industry is highly necessary in light of the increasing global greenhouse gas levels. As per economic, social, and environmental analysis, the benefit of Electric vehicles surpasses the costs. The biggest obstacle to the widespread adoption of electric-powered transportation is cost related, as gasoline and the vehicles they run on it are readily available, convenient, and less costly. Technological advancement and policy changes will help ease the transition from traditional fuel-powered vehicles. The success of electric vehicles relies heavily on the global population and it is expected that through mass marketing and environmental education programs people will feel incentivized and empowered to drive an electric-powered vehicle and make a difference.

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