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 ijirset@gmail.com

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Exploring the Impact of the Environmental Sustainability of the Electric Vehicle on Consumer Purchase Intentions: A Study on EVs in Selected Areas in Noida

Akshat Mishra

Department of Marketing, School of Business, Galgotias University, Greater Noida, India

ABSTRACT: Due to their lack of harmful and greenhouse gas emissions, many people believe that electric cars (EVs) are ecologically friendly. Few people have questioned whether the electric power needed to power these cars is sustainable. In-depth research presented in this article suggests that the rapid adoption of EVs in our society will likely result in a large increase in the demand for new electric power generation that will far exceed the current capacity of the US electric power generation sector. Also, if the existing method of producing electric power using dominant fossil fuels continues, such demand would have very negative environmental effects. The significant amount of electric energy needed to create the batteries that power EVs and the negative effects associated with recycling used batteries are additional infrequently discussed facts about the environmental effects of EVs.

KEYWORDS: emissions, greenhouse gasses, sustainable development, energy for EV, HEV, and batteries for electric and hybrid cars.

I. INTRODUCTION

The book "Our Common Future" was released in 1987 by the Global Commission on Environment and Development. In their efforts to do so, the significance of sustainability was emphasized, along with the necessity of balancing social and economic progress. There are currently 13,34,853 registered electric vehicles (EVs) on Indian roads. They also thought that when governments made choices, they need to consider the environment [1]. As a result, nations started establishing laws that supported sustainability, increasing its relevance and institutionalizing it [2].

At the same time, consumers started paying closer attention to sustainability, especially from an economic and environmental standpoint [3]. Transportation has also been impacted, creating serious environmental, social, and economic issues [4]. However, as transportation employs about 11 million people and contributes close to 5% of the EU's GDP, it is important from an economic perspective [5]. However, transport accounted for about 24% of total greenhouse gas emissions in the EU. As a result, it makes a sizable contribution to greenhouse gas (GHG) emissions that result in air pollution and climate change [6].

Introducing innovative technology like electric vehicles (EV) in place of internal combustion cars might be a step towards more environmentally friendly transportation [6]. Considering only the usage phase, all EVs instantly reduce pollutant emissions when driving since they enable zero-emission driving [7].

Nevertheless, utilizing EVs is also seen as having a negative impact because the power used for charging might come from sources that are questionable in terms of the environment, such as fossil fuels [8]. Once more, the EV life cycle's production phase and end have an impact on the environment and people's health, particularly through the generation of particulate matter. Additionally, the production of EVs has a bigger environmental impact than the production of gasoline-powered cars due to the substantial use of metals, chemicals, and energy necessary for a number of electric powertrain components, such as high-voltage batteries [9]. EVs have an influence on both the social and environmental spheres [10]. Make the case that further research should be done to establish efficient, sustainable transportation methods by examining the societal consequences of alternative vehicle technology. Also, because the social and environmental perspectives are intertwined, it is critical to incorporate both while examining the effects of electric cars



[11]. Also, by focusing just on the environmental aspect, significant-good or negative social implications of electric vehicles may be missed. Positive benefits include a potential reduction in noise pollution [12], while negative ones include the possibility of child labor exploitation [13]. Social costs, social consequences, and other byproducts of some EV effects might have an impact on societal welfare as well as EV acceptability and perception. User experience is not just tied to technological concerns; some writers also list it as a social factor. Additionally, the 17 Sustainable Development Goals (SDGs) of the UN should be the focus of future research and industry, including automakers and e-mobility in general [14].

RESEARCH OBJECTIVES

- 1.To understand the relationship between the environmental sustainability of EVs on consumer purchase intention influencing.
- 2.To study the impact of individual purchase intentions.
- 3.A study of environmental consciousness on consumer purchase intentions.

II. RESEARCH METHODOLOGY

A standardized questionnaire was used to collect the study's "primary data." 120 surveys were distributed to potential customers, and 100 valid questions were collected. Seven items make up the questionnaire, which is divided into six categories and linked to each variable individually.

Which began with demographic factors, buying intention, perceived financial advantages, perceived cost, perceived risk, and perceived environmental benefit were all employed in this study.

III. LITERATURE REVIEW

The factors that affect customers' buying behavior toward EVs have been the subject of several research, especially in the context of sustainable development. Consumer attitudes and perceptions towards the environment are among the most crucial variables. For instance, research by De Gennaro et al. (2020) showed that customers were more inclined to contemplate buying an EV if they were more ecologically sensitive. Similar findings were discovered by Leong and Wang (2019), who showed that customers were more willing to buy EVs when they believed they were more ecologically beneficial.

The price of EVs is a significant issue that affects customer purchasing decisions. The high price of EVs, according to several research, is a major obstacle to their uptake (Fetene and Alemu, 2019; Kester and Appelhof, 2019). But, several studies have also demonstrated that people would pay more for EVs if they believe they will improve the environment (Burger et al., 2018).

DATA ANALYSIS AND INTERPRETATION

1	SR NO.	MEASURE	ITEM	FREQUENCY	%
2	1	GENDER	MALE	60	60
3			FEMALE	40	40
4	2	REGION	SEC -110	25	25
5			SEC-104	27	27
6			SEC-62	35	35
7			SEC-51	13	13
8	3	INCOME	LESS THAN 25000	55	55
9			25000-50000	30	30
10			MORE THAN 50000	15	15

GENDER

60 male replies out of the 100 total respondents, or 60%, were male.

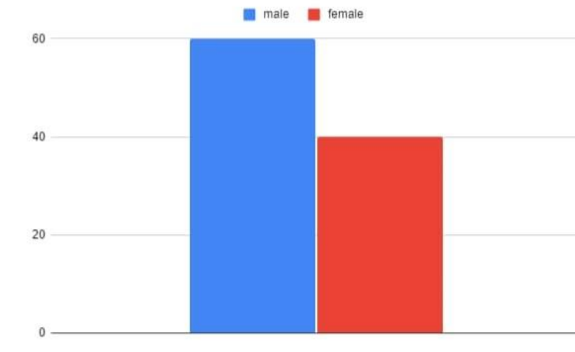
of respondents, with 40 female respondents making up 40% of the total. There is hardly any variation in the proportion of male and female responses.

As a result, nearly equal numbers of men and women participated in the data gathering.



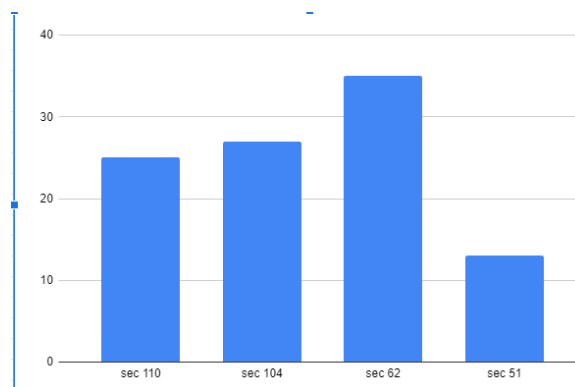
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REGION

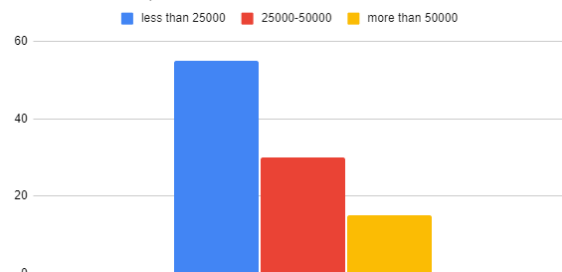
Sec 110, Sec 104, Sec 62, and Sec 51 were the four distinct geographic areas covered by this parameter. Responders from Sec 110 are 25 %. The next group, with a proportion of 27%, is those from Sec 104. From Sec 62, it is 35% and from Sec 51, it is 13%.



INCOME

Under this parameter 3 categories were included, the majority of respondents are income groups of less than 25000 which includes 55 E.V owners with a percentage of 55%.

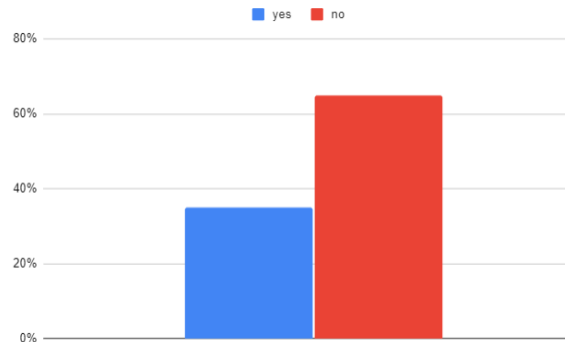
The second category includes an income group of 25000- 50000 having 30 respondents with a percentage of 30%. The third category includes an income group of more than 50000 having 15 respondents with a percentage of 15%.



QUESTIONNAIRE

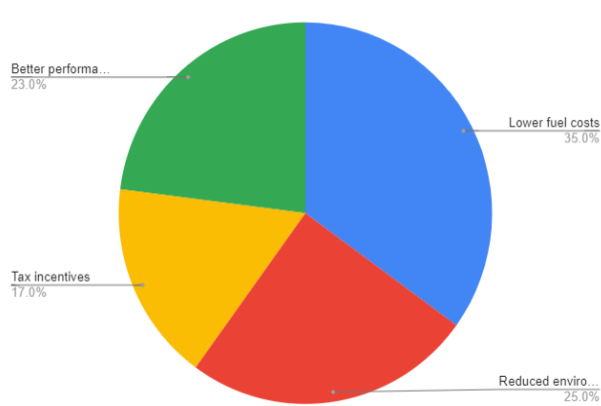
QUES 1. Are you currently considering purchasing an electric vehicle?

- a) Yes – 35%
- b) No - 65%



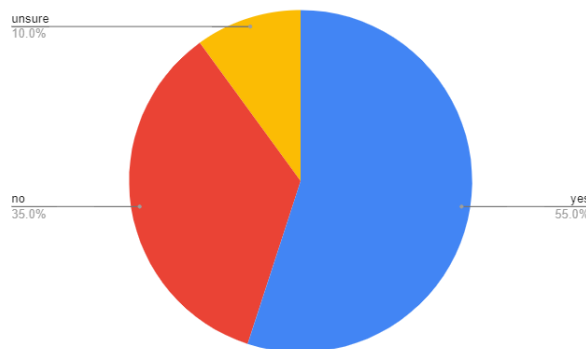
QUES 2. -What are the main reasons for considering an electric vehicle?

- a) Lower fuel costs-35%
- b) Reduced environmental impact-25%
- c) Tax incentives-17%
- d) Better performance-23%



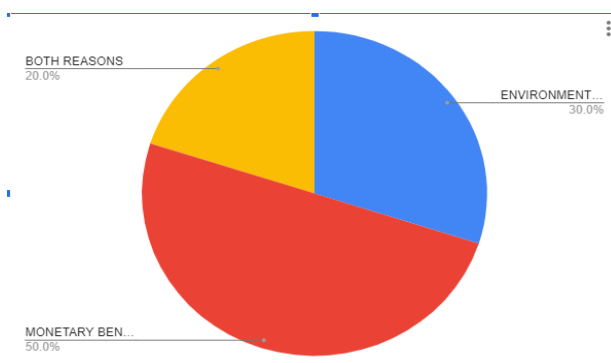
QUES 3- Do you believe that electric vehicles are a key component in reducing greenhouse gas emissions and combating climate change?

- a) Yes-55%
- b) No-35%
- c) Unsure-10%



RESULT AND FINDINGS

1. It is found that only 30% of consumers were concerned about the environmental benefit.
2. 50% of consumers were concerned about personal benefits such as monetary benefits, perceived benefits, and other factors.
3. 20% of consumers are concerned about both environmental as well as personal benefits.



Cost: Although the initial price of EVs is often greater than that of ICEs, due to lower fuel and maintenance expenses, the overall cost of ownership over the course of the vehicle's lifetime may be lower. Especially in areas with high petrol prices and supporting regulations, EVs are more cost-competitive with ICE cars as battery costs continue to fall.

Charging infrastructure: The availability of a charging infrastructure has a significant impact on consumer adoption of EVs. Governments and commercial companies are investing in the creation of public charging infrastructure to increase consumer trust and convenience in EV use.

IV. CONCLUSION

In the context of sustainable development, the research on consumer EV purchasing behavior emphasizes the significance of environmental attitudes and beliefs, pricing, charging infrastructure, social norms, and peer behavior. In order to encourage the broad use of EVs and realize their potential benefits for sustainable development, governments, the business community, and civil society will need to collaborate to address these concerns. By developing effective laws and addressing these worries, which may help remove barriers to their usage, the adoption of EVs may be accelerated.

By switching as soon as possible from ICE to EV cars, India stands to gain significantly. The main benefits are a decrease in pollution to the environment, a decrease in oil imports, an increase in national security, a stronger economy, and better use of renewable resources. Almost two-thirds of air pollution is caused by emissions from ICE-powered automobiles. The present prohibition on older fuel-powered vehicles in several Indian cities already has a good impact on the quality of the air, and this situation will only get better with the widespread adoption of EVs. ICE three-wheelers are now the main mode of transportation for communities, carrying citizens to bus stops along roads or train stations. These may be simply converted to electricity, offering towns clean transportation.

EVs will open up prospects in a variety of industries, including storage, strong and lightweight thermoplastics, and increased power consumption. Also, the charging and changing of EV batteries would create a significant number of jobs nationwide. The Indian government is committed to fostering an environment that is conducive to electric mobility, and as part of the 2019 Union Budget, the government has made several significant announcements to advance electric mobility in India. To encourage the sale of EVs throughout the nation, it has been suggested to lower the GST rate on them from the current 12 percent to 5 percent. In addition, the interest paid on loans acquired to buy electric vehicles would be eligible for a 1.5 lakh rupee income tax exemption. The transition to electric mobility will be steady and easy thanks to the development of EV technology, tougher environmental legislation, and time-bound initiatives by the government and the car industry.

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