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# EDUCATING CONSUMERS THROUGH COMPARATIVE ANALYSIS BETWEEN EVs AND Gvs IN MUMBAI

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**ABSTRACT:**
Due to rising worries about climate change and energy sustainability, the automobile industry is undergoing a global transition in the adoption of EVs over GVs. As a result, it's becoming increasingly important for automakers and researchers to understand customers' views and interest in EVs. So, this research aims to explore individual knowledge and perception of EVs and their adoption to investigate their understanding, requirements, and attitude toward EVs. It also investigates the benefits, concerns, drawbacks, and financial capabilities that influences the consumers interest in EVs. In this study we have found that the majority of respondents who responded to the study said they would consider buying an EV in the near future, agree that EVs have a smaller environmental effect than gasoline automobiles and also government incentives and subsidies for EVs are critical to expanding their adoption. This study of consumer choices and sustainable mobility will contribute to a more sustainable automotive industry in the near future.

**Keywords:** ***EVs, Automobile Industry, Gvs.***

## INTRODUCTION

The first small-scale electric automobile was produced in the late 1820s by Porsche, and the first fully powered electric car was created a half-decade later, in the early 1830s. Because the batteries in the first EVs could not be recharged, the automobile industry's research and development focus shifted to vehicles powered by crude oil. With Tesla's Roadster entering the market, EVs have gained a lot of attraction over traditional automobiles powered by crude oil during the last two decades. Because of expanding public awareness of the environmental pollution caused by GV automobiles, along with increased exploitation of the limited conventional sources, a gradual shift to EVs may be noticed. Many firms, including General Motors, Tata, Honda, Tesla, and Toyota, began mass manufacturing of electric and hybrid vehicles in order to alleviate the problems associated with fully powered gasoline engine automobiles. In reaction to air pollution, the worldwide automobile industry is quickly shifting from gasoline and diesel fuel internal combustion engine vehicles (ICEVs) to eco-friendly electric cars (EVs). The primary advantage of an electric car is how much more environmentally friendly they are in comparison to petroleum or diesel-powered automo biles. EVs run entirely on electricity, with no use of petroleum derivatives, therefore eliminating your fuel bills.

## LITERATURE REVIEW

Matteo Muratori, Marcus Alexander, Doug Arent, Morgan Bazilian, Pierpaolo Cazzola, Ercan M Dede, John Farrell, Chris Gearhart, David Greene, Alan Jenn, Matthew Keyser, Timothy Lipman, Sreekant Narumanchi, Ahmad Pesaran, Ramteen Sioshansi, Emilia Suomalainen, Gil Tal, Kevin Walkowicz and Jacob Ward - "The rise of EVs—2020 status and future expectat ions"[4]:The paper provides a recent and thorough summary of scientific findings on many aspects of EVs, including (a) a summary of the state of the light-duty-EV market and current forecasts for future adoption; (b) market insights beyond light-duty EVs; (c) an examination of the cost and performa nce evolution of batteries, power electronics, and EVs, all of which are critical components of EV success; (d) charging-infrastructure status, with a focus on modelling and studies used to project charging-infrastructure require ments and the economics of public charging; (e) an overview of the impact of EV charging on power systems at multiple scales, ranging from bulk power systems to distribution networks; (f) insights into EV-specific life-cycle cost and emissions studies; and (g) future expectations and synergies between EV charging and other modes of transportation

Milad Ghasri, Ali Ardeshiri, Taha Rashid - "Perception towards EVs and the impact on consumers' preference" [5]: An integrated choice and latent variable model is used in this study to explicitly quantify the perceived benefits of EVs over traditional internal combustion engine autos. The information came from an expressed preference poll of 1076 New South

Wales people. The model's latent component, according to the data, disentangles perceived advantages across three dimensions of vehicle design, environmental impact, and safety. These latent factors interact with price, driving range, and body type, in that order, to describe the effect of perception on desire. The model created is then used to evaluate the effectiveness of various assistance programmes on Millennials (Gen Y), the generation before them (Gen X), and the generation after them (Gen Z). According to the study, Gen Y is more inclined than Gen X and Z to purchase EVs.

Pradeep Kumar Tarei, Pushpendu Chand, Himanshu Gupta – "Barriers to the adoption of EVs: Evidence from India" [6]: This research was conducted in the Indian EV context, with a focus on technological, infrastructural, financial, behavioural, and external restrictions. The study's findings indicate that EV barriers like as performance and range, total cost of ownership, a lack of charging infrastructure, and a lack of customer understanding about EV technology are all major variables in driving EV adoption. Their research assists policymakers and decision-makers in better understanding the multifaceted nature of EV hurdles and their interrelation.

Sarmad Zaman Rajper, Johan Albrecht – "Prospects of EVs in the Developing Countries: A Literature Review" [7]: For this study, A systematic review of the electronic databases Google Scholar and Web of Science for the years 2010-2020 was undertaken for this work, using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) criteria. Electric four-wheelers, hybrid electric autos, and electric twowheelers were among the EVs found in the databases. In the beginning, 35 studies matching the criteria were found in Web of Science. Using Google Scholar, 105 more relevant papers and publications regarding barriers and opportunities were located and examined. According to the findings, electric four-wheelers are not a realistic option in developing countries due to their high purchasing price. Electric two-wheelers, on the other hand, may be advantageous due to their lower purchase price

Björn Nykvist, Frances Sprei, Måns Nilsson – "Assessing the progress toward lower priced long-range battery EVs" [8]: The goal of this research is to show how battery EVs (BEV) features and price have advanced, as well as to look at which market sectors long-range BEVs may be made at comparable costs to conventional vehicles. We assess 48 models that have been available to consumers since 1997, compiling data on features, weight, and vehicle costs. We also examine recent advancements in battery pack prices. Based on this information, the portion of the BEV vehicle price connected to the battery pack is estimated. We forecast when it will be able to construct a BEV with a 200-mile range at a given price percentile to illustrate future develop ment. When battery pack costs fall below $200-250 USD/kWh, the price percentile at which a BEV's pricing is comparable to that of a conventional vehicle change nonline arly. Furthermore, we show that at battery pack costs of $150 USD/kWh, the manufacturing costs of a BEV with a 200-mile range may be cost competitive for nearly half of the US vehicle market segments by 2020. Finally, the most critical conditions for this evolution are investigated and assessed using sensitivity analysis using conservative values applied to our model.

## RESEARCH METHODOLOGY

### RESEARCH GAP

The study on consumer interest in EVs vs petrol vehicles takes into account a variety of criteria, including environm ental effect, government incentives, and charging infrastructure. However, there are significant research gaps that need to be filled. To begin, a more in-depth examination of the factors influencing consumer interest, such as brand reputation, driving range, vehicle performance, and maintenance costs, might yield significant information. Second, looking outside Mumbai, India, for regional and cultural diversity may show diverse ideas and behaviours. A long-term study of consumer behaviour would also provide informa tion into emerging patterns and persistent interest in EVs. Examining the effects of marketing techniques on consumer interest might give inform ation on successful EV communication and promotion approaches.

### OBJECTIVES OF THE STUDY

- To determine the trends and variables impacting the purchase of Evs.
- To learn about the public's attitudes about electric automobiles.

### HYPOTHESIS & VARIABLES

**H0 :** In comparison research, there is no major difference in customer interest between EVs and Gvs.

**H1 :** In comparison research, there is a major difference in customer interest between EVs and Gvs.

**Independent Variable:** Type of Vehicle (EVs or Gvs).

**Dependent Variable:** Consumer Interest.

## DATA COLLECTION AND SAMPLING

A structured questionnaire was distributed to Mumbai residents aged 21 and above in order to collect data that would serve as the source of primary data.

A simple random sample approach was used to acquire primary data for the study. The respondents were given explanations of the questions, and the data was collected obviously.

Secondary data was obtained from publically available sources such as books, journals, and websites.

## SCOPE OF THE STUDY

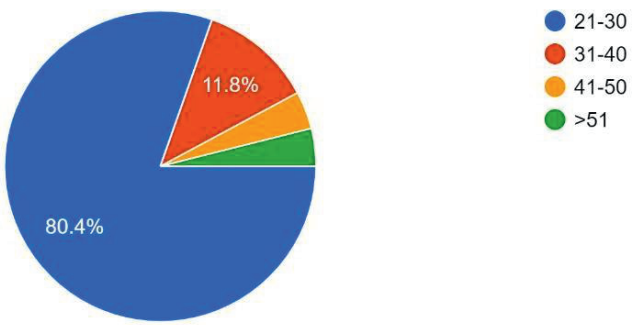
The study will concentrate on a sample of 51 citizens from different parts of Mumbai. To ensure representation from an array of population backgrounds, the sample will be chosen using criteria such as age, acquaintance with the idea, and desire to work towards its acceptance being considered.

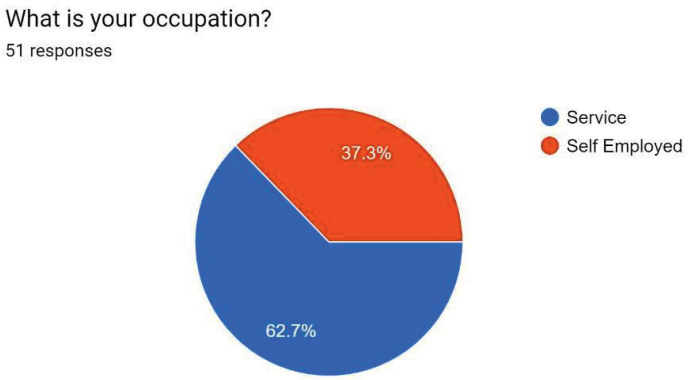
The study will utilise a quantitative methods of data collection to collect information on Mumbai customers and their opinions on EVs. The question naire will evaluate participants knowle dge, perception, attitude, and their opinions on EVs adoption.

## DATA ANALYSIS AND INTERPRETATION

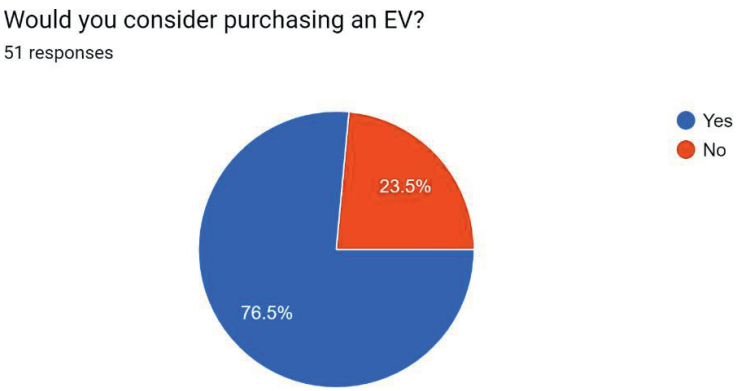
**Table 1 · Demographic Distribution**

| Sr. No. | Particulars | Numbers | Percentage |
|---|---|---|---|
| 1. | 21-30 | 41 | 80.4% |
| 2. | 31-40 | 6 | 11.8% |
| 3. | 41-50 | 2 | 3.9% |
| 4 | 50 & above | 2 | 3.9% |

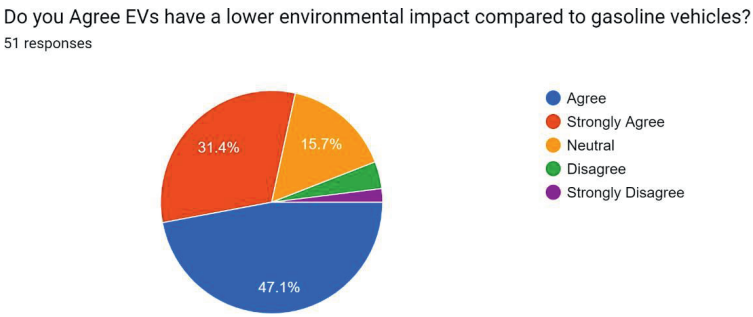



According to the study, 37.3% of respondents identified as self-employed, while 62.7% claimed that they work in the service industry.



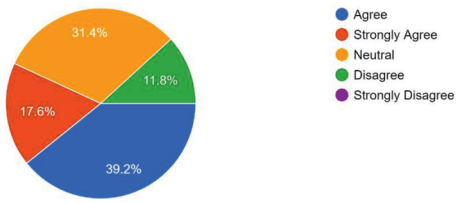

Based on the data majority of the respondents (76.5%) are interested in purchasing an EVs (EV). It indicates a favourable attitude towards EV adoption among those polled. While rest 23.5% of all respondents said they would not consider acquiring an EVs (EV). The reasons for their unfavourable attitude might range from fears to hurdles that prevent them from embracing Evs




Among those polled, 31.4% firmly believe in the environmental benefits of EVs over petrol vehicles GVs. They are certain that EVs greatly cut greenhouse gas emissions and air pollution. Another 47.1% agree with the idea of EVs' favourable environmental impact but may not voice their opinions as forcefully as the "Strongly Agree" group. Meanwhile, 15.7% of respondents indicated ambiguity or an equal amount of

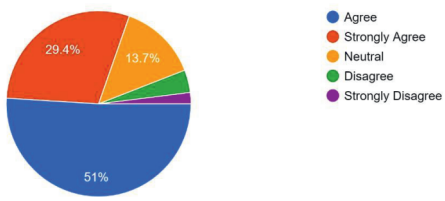
agreement and disagreement by selecting the neutral option. Those who disagree 3.9% express uncertainty or scepticism about EVs having a lower environmental impact. Finally, the 2% who strongly disagree are vehemently opposed to the concept of EVs being ecologically friendly.

Cost of owning & maintaining an EV is more affordable in the long run compared to a gasoline vehicles?
51 responses



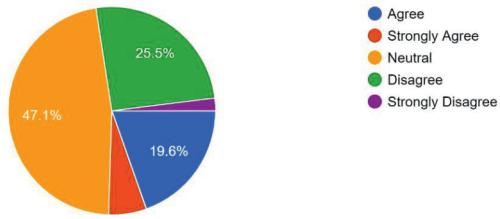

Owning and maintaining an EVs is more cost-effective in the long term than owning and maintaining a GVs, according to 17.6% of respondents. They are sure that the lower operating and maintenance expenses of EVs would save them money. The majority of respondents, 39.2%, agree with this statement, but not as strongly as the "Strongly Agree" group. 31.4% of respondents are undecided, suggesting that they do not have a definite view on the long-term cost comparison between EVs and GVs. Furthermore, 11.8% believe that EVs are cost-effective, whereas none strongly disagree.

Do you agree the availability of charging infrastructure is a major concern for potential EV buyers?
51 responses



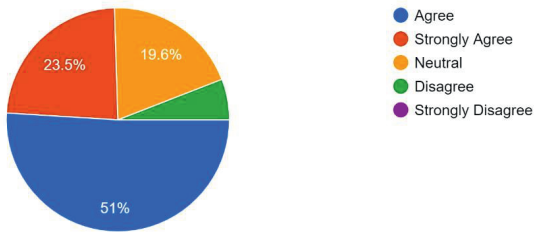

So, according to the respondents, the availability of charging infrastructure is a key problem for potential EVs customers, with 29.4% strongly agreeing. Around 19.7% are neutral, implying they do not consider it a major worry. Only 3.9% disagree, demonstrating that other variables exceed the importance of charging infrastructure in the judgements of potential EV customers. A 2% minority strongly disagrees with the assertion, claiming that charging infrastructure is not a key worry for prospective EV consumers.

Do you agree EVs perform in the same manner they perform in normal conditions as compared to extreme weather conditions?
51 responses



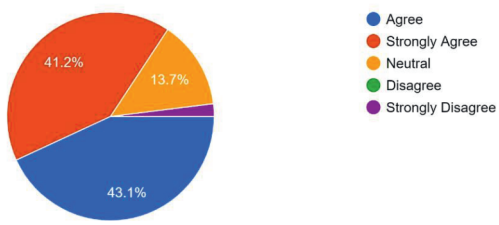

According to 19.6% of respondents, EVs function equally under harsh weather situations as they do in regular ones. About 5.9% firmly believe this, demonstrating more certainty. 47.1% of respondents are undecided, 25.5% disagree, and 2% strongly disagree, indicating concerns about EVs functioning well in harsh weather compared to typical circumstances.

Concerns over battery life & degradation discourages potential buyers from choosing EVs.
51 responses

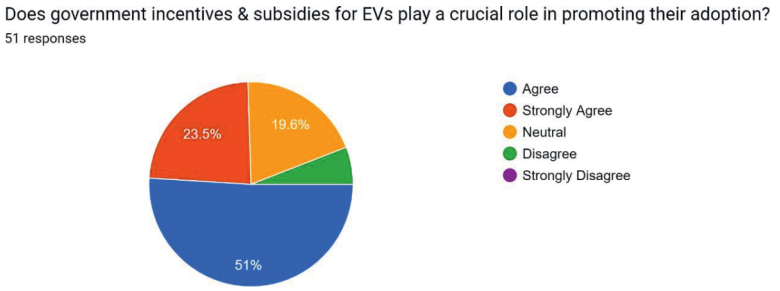



Concerns over battery life and deterioration is a major concern according to 51% of respondents, dissuade potential consumers from purchasing EVs. 23.5% of them strongly believe that these worries are substantial deterrents. Approximately 19.6% are undecided, neither agreeing nor disagreeing. Only 5.9% of respondents disagreed, and no respondents strongly disagreed, demonstrating that these issues have an influence on potential EV customers' judgements.

The range limitations in the EVs is the significant drawback when compared to gasoline vehicles.
51 responses




Range limits in EVs are viewed as a significant disadvantage as compared to petrol vehicles by 43.1% of respondents. An even greater number, 41.2%, strongly agree with this assessment, demonstrating that a sizable majority of respondents are concerned about this issue. 13.7% stay indifferent, while just 2% strongly disagree, implying that the great majority either sees range restrictions as a negative or is unsure.

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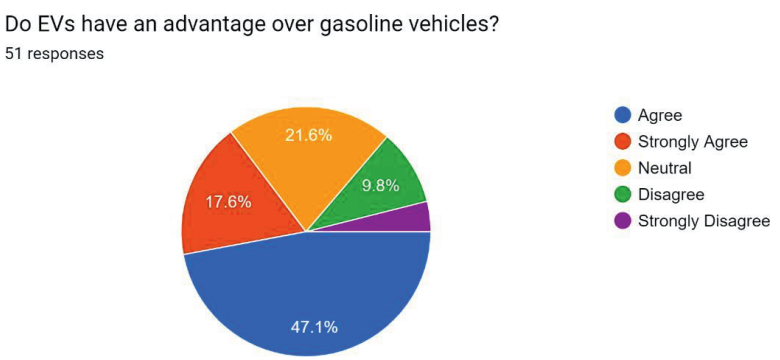


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## CONCLUSION

A comparison of customer interest in EVs against petrol vehicles shows that EVs have gained significant momentum and are becoming increasingly desirable to consumers. Environmentally friendly solutions are growing increasingly popular among consumers, who are becoming more conscious of them. Incentives and subsidies have been provided by the government to encourage the adoption of EVs, making them more financially desirable to customers. Consumer interest in EVs as a viable option to GVs has grown as EV technology has improved, notably in battery range, charging infrastructure, and performance. However, despite increased interest in EVs, GVs continue to have a sizable market share because to reasons including as established infrastructure, customer preferences, and the limited range of some EV models. Consumer interest in EVs and GVs will continue to be shaped by continuous improvements in technology, infrastructure, and government policy as the automobile industry matures.

## LIMITATIONS

The survey or study sample of customers is not representative of the total target population. It is only limited to Mumbai region only.

Consumer preferences fluctuate over time owing to a variety of variables such as new product releases technological breakthroughs, and changes in economic situations. The study may miss real-time changes in preferences.

A social preference bias, which happens when respondents give replies that they believe are socially acceptable or expected, may have an influence on survey findings.

The study does not consider all of the factors that influence consumer interest, such as brand reputation, car attributes, driving habits, and charging station accessibility

## FINDINGS

The majority of respondents who responded to the study said they would consider buying an EV in the near future

The majority of respondents agree that EVs have a smaller environmental effect than gasoline automobiles.

Government incentives and subsidies for EVs are critical to expanding their adoption.

## SUGGESTIONS

Encourage government subsidies and incentives for EVs in order to improve the future. Encourage business to provide EVs with the necessary charging infrastructure.

Conducting public awareness campaigns regarding the environmental effect of petrol automobiles and the potential benefits of switching to Evs.

Encourage large-scale collaborations between enterprises, governments, and communitiesto construct EV infrastructure.

Getting the community involved in fostering ownership and involvement in EV projects.

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