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A Study on Customer's Adoption Intention towards Electric Vehicles.

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ABSTRACT

We aspire to do the research in EVs sector. We wanted to know the factors which is influence the People to buy Electric Vehicles. For that we did primary research on People from different background. We collected data from people using questioner. Questioner was circulated to them with the help of social media like Facebook, Instagram, and WhatsApp. From the responses we have observed that charging station is most crucial factor which is affecting the buying behavior of the people.

***Keywords*:** Electric Vehicle, Consumer Behavior, Vehicles, Psychometric test, Market Potential

1. Introduction

Electric vehicles (EVs) are an inventive impetus technology that can assist with diminishing greenhouse gas emanations from the transport area as well as nearby outflows (Chan et al. 2007, Bradley et al. 2009 and Frank et al. 2009). Legislatures and foundations overall accordingly target encouraging the market presentation and market dissemination of electric traveller vehicles. Monetary support is accessible both for innovative work too as sponsorships. Proficient and viable utilization of citizen cash requires an itemized comprehension of the possible first buyers of industrially accessible EVs. Essentially, a new and enormous market opens for vehicle makers and their advertising strategies are bound to find actual success when they are tailor-made for likely clients. Accordingly, solid evaluations of the characteristics of future customers are subsequently of extraordinary interest to strategy creators and vehicle producers the same. In any case, since the market is in the beginning phase of its development, still little is known about these "early adopters"(Lieven and Anable,2011). Despite the fact that vehicles in view of the gas-powered motor are well known to our general public, EVs have additionally been imagined in the beginning phase of car history. Notwithstanding, vehicles introduced with gas-powered motors have ruled the market, essentially against a foundation of generally accessible oil at low costs. Since the 1990s, with the expanded interest in ecological issues, including GHG emanations, various countries and makers definitely stand out enough to be noticed to EVs and half of hybrid EVs (lee et al. Madanat et al. 2017, Fernandez et al. 2018). By and large, EVs are alluded to as battery-electric vehicles. Battery-electric vehicles are controlled by enormous battery packs that are re-energized through the power supply (Zheng et al.; Dong et al.; Meng et al.; Zhao et al.,2014). Albeit the far and wide conveyance of battery-electric vehicles might be the most encouraging answer for future transportation frameworks, the mass dispersion of battery-electric vehicles is more troublesome than that of different vehicles, counting customary ones, as a result of a few impediments and mechanical contrasts (Proost and Van, 2010). Public perspectives toward EVs and public readiness to utilize them ought to consider in advance the utilization of these vehicles in the transportation area. Not exclusively should the specialized constraints of EVs, including battery limit and weight, be improved, yet additionally drivers' individual and social issues ought to be examined to improve financially fruitful appropriations. Earlier investigations have detailed that clients' reception and inclinations are significant variables for fruitful upkeep in the transportation area (Ozaki and Sevastyanova,2011).

With expanded social interest in the climate, more consideration is being paid to the transportation area, which is viewed as a vital supporter of ozone-depleting substance (GHG) outflows. The Global Energy Organization (2017) showed that around 14% of GHGs were produced universally by the transportation area and this rate is assessed to increment to half of all GHG emanations by 2030. Hence, a few countries are endeavouring to lessen GHG outflows and ecological contamination in the transportation area by diminishing the utilization of petroleum derivatives. Among a few other options, electric vehicles (EVs) are viewed as quite possibly of the most encouraging methodology in the transportation area (Egbue and Long,2012). The U.S. Public Assets Protection Board (2007) found that EVs can contribute toward taking care of a few natural issues. Considering this constructive outcome, most of vehicle fabricating organizations are creating, presenting, and selling EVs (Mom.G,2012). The energy interest of the world keeps on developing [International Energy Agency,2017), and presently, in excess of 25 billion tons of CO2 emerging from human exercises are yearly delivered overall into the climate. Presently, it is a world issue to lessen the discharges of ozone depleting substances and air poisons like CO, HC, also, NOx by street transportations for city administration, as featured by past examinations (Iodice and Senatore,2015). Meanwhile, South Korea, which has positioned eleventh overall concerning total national output (Gross domestic product) in 2017 and is the world's third quickest developing country in CO2 outflows, has marked the Paris Settlement on 2016, and its Planned Broadly Resolved Commitment (INDC) proposes a broad objective to decrease GHG emanations

by 37% by 2030 compared with the same old thing level (United Nation Climate Change,2018). the degree of GHG outflows in South Korea has been 0.69 billion tons of CO2 in 2015, while a sum of 49 billion tons of CO2 has been discharged universally in 2015(Oliver et al.; Janssens et al.; Muntean et al.; Peters et al.,2018). Besides, South Korea has laid out a GHG decrease focus of 34.3% to transportation as energy utilization by nonindustrial areas, for example, transportation is supposed to consistently increment (Hong et al.; Chung et al.; Kim et al.; Chun et al.,2016), furthermore, the South Korean Government is pushing the take-up of EVs with an objective of having 250,000 EVs on the street by 2020 (Harris. B, 2018).

As announced by the Worldwide Association of Engine Vehicle Producers (OICA), the creation of vehicles is developing all around the world over the long run, which mirrors that the interest in this mode of transport has never wilted. Thusly, vehicle creators need to embrace cleaner powertrain frameworks as a practical reaction to the difficulties of relieving fuel ignition outflows. To this end, the sending of crossbreed vehicles is seen as a promising approach to tending to the previously mentioned conditions to accomplish an energy-productive transportation framework (Alzahrani et al; Phillips et al; Zeng et al., 2019). Cross-breed vehicles are unique in relation to regular vehicles, for the most part concerning the level of fossil fuel by-products, with mixture vehicles promising lower fossil fuel by-products (Adnan et al.; Nordin et al.; Amini et al.; Langove et al.,2018). Subsequently, cross-breed vehicles appear to be one of the practical options for diminishing reliance on energy-escalated transport and working on the proficiency of transport energy. However, the point of working on the effectiveness of transport energy is unhesitatingly considered to be reasonable, it actually still needs to be accomplished, as the measurement of crossover vehicles' reception is still a long way behind the reception of ordinary vehicles universally. This can be demonstrated by the insights created by the IEA, which show the portion of the overall industry of climate well-disposed vehicles is still nearly little, analyzed with regular vehicles (International Energy Agency,2020). Despite the fact that there are as yet numerous nations with a low degree of reception of half-breed vehicles, the piece of the pie of those green vehicles is consistently showing a positive extension. European nations stay the world's most noteworthy in a piece of the pie of half-breed vehicles, while China is the main country addressing Asia with a sizeable piece of the pie of half-breed vehicles and is one of the vital participants in mixture vehicle reception worldwide (International Energy Agency, 2015). According to the viewpoint of Malaysia's car market, the reception of energy-proficient vehicles is currently at a moderately low rate, in accordance with the green pattern in Malaysia, which is still in the beginning stage (Chekima et al.; Wafa et al.; Igau et al.,2015). While BEVs guarantee a greener natural effect than half-breed electric vehicles (HEVs) what's more, module half-breed vehicles (PHEVs), the limited capacity to focus BEVs' battery duration might possibly cause illogical driving experience inferable from the immature charging frameworks and offices in the nation (Sang.Y. N and Bekhet.H. A,2015).

In this research paper we have analyse the consumer intention towards adoption of electric vehicles. The primary research gap that we intend to bridge through this research is to put focus on consumer intention on adoption of E-Vehicle.

2. Literature Review

1. **Salari (2022)** stated that the nature of the product makes this an extremely difficult assignment for the sector and the government. It is a revolutionary breakthrough; therefore, it forces significant changes in driving behavior. The rate of adoption. Meanwhile, is gradually expanding globally. Previous research has shown the mechanism by which customerss express their desire to buy EVs, primarily from the perspectives of instrumental qualities (the EVs' allegedly useful features) and environmental values. The Technology Readiness Index (TRI) and the Desire for Unique Consumer Products are two behavioral attributes that this study uses as potential drivers of EV purchases (DUCP). These characteristics were combined with the instrumental characteristics and environmental values to present a comprehensive understanding of what motivates consumers to make purchases of EVs.

2. **Shalender et al. (2020)** explained India is under tremendous pressure to cut its energy consumption because it is a large consumer. Greenhouse gas emissions and requirements. Electric vehicles (EVs), a sustainable mode of transportation for cars, can significantly reduce the nation's reliance on gasoline. Lowering its environmental footprints. To forecast the adoption intention of 326 customerss toward the purchase of EVs, the study employs an enhanced TPB model. The sample of responders was drawn from 57 dealerships of four different car manufacturers. The study's empirical analysis demonstrates a favorable relationship between the adoption intention of buyers and attitude, subjective norm, perceived behavioral control, moral norm, and environmental concern. The study's findings also indicate that the extended TPB model is suitable for predicting customerss' desire to adopt EVs. The paper addresses the implications for the uptake of EVs in India considers the findings and makes recommendations for further investigation.

3. **Mairesse (2020)** explained Electric vehicles (EVs) are the subject of a lot of discussions today. Their market entry, however, is not without difficulty. This report shows the findings of a comprehensive data collection conducted in Flanders (survey with 1196 respondents) (Belgium). The findings cover opinions on battery electric vehicles (BEVs) benefits and drawbacks, acceptable driving distances, acceptable charging times (both slow and fast), acceptable top speeds, the government's role in the introduction of BEVs, the preferred governmental tools to increase sales, and consumers' willingness to pay (WTP). To examine the effects of the consumers' degree of expertise, a second survey was conducted. The findings of this second poll (n = 585) show that knowledge has no bearing on the degree of approving the driving range. But consumers who are more informed choose vehicles with higher top speeds and quicker recharge times.

4. **Tanwir etal. (2020)** explained the likelihood of environmental degradation could increase with increased reliance on energy-intensive transportation systems. The adoption of environment-friendly automobiles is still relatively low globally, making it important to investigate. However, switching from conventional to energy-efficient vehicles is a practical technique of reducing the rate of carbon emissions. Through the development of a research model based on the Theory of Planned Behavior and integrated with environmental knowledge as an additional variable, this study intends to analyze the factors that determine people's intention to acquire hybrid automobiles. 256 car owners in Malaysia's major

metropolis contributed the data. By include environmental information as an additional variable in evaluating people's behavior in the sustainable development context, the findings add to the rich theoretical foundation of the Theory of Planned Behavior. This study's novelty value is in the transportation sector. The findings suggest that to boost the adoption rate of environmentally friendly vehicles, governments and practitioners must implement effective strategies for fostering the public's motivation to purchase energy-efficient vehicles. Overall, this study suggests that the adoption of hybrid vehicles is feasible if people are given enough information and education, which in turn fosters people's trust, sense of empowerment, and confidence in driving these vehicles.

5. **Khurana etal. (2020)** explained Environmental pollution is currently a major concern on a global scale. One of the main sources of air pollution are internal combustion engines' toxic emissions. Electric vehicles (EVs) are extensively marketed all over the world to reduce the effects of fossil fuel emissions and solve environmental concerns (ECs). Several governments are motivating people to switch to electric vehicles by providing the changeover. According to earlier research, barriers to consumer acceptance of electric vehicles include their high price, lack of infrastructure for charging, and concern related to time and range. By 2030, the Indian government wants "only electric vehicles" on Indian roads. This article, which is current, looks at the various aspects that influence a consumer's adoption of an EV. The study's respondents are Indians who now own cars. With the aid of structured equation modelling, the data were examined (SEM). A potent mediator, Attitude (ATT), emerges in the uptake of electric vehicles.

6. **Thilina et.al. (2019)** explained Due to their significant market penetration, which includes Sri Lanka, electric vehicles will dominate the transportation sector in the future. Since it involves several interconnected factors, the purchasing process that motivates clients to make purchasing decisions is an important concept to explore. As a result, this study examines how perceived risk factor affects purchase intention in Sri Lanka about electric automobiles. The review is supported by relevant empirical data and a theoretical justification. While empirical data is offered to bolster the claims, a descriptive statistical evaluation is presented to show why Sri Lanka is thought of as a context to be explored. The study finishes with research hypotheses to investigate how perceived risk affects the purchase process of electric automobiles, whereas buying intention is referred to as a main notion within.

3. Objective of the study

1. To identify the contributing factor affecting the adoption of consumer towards E-Vehicles.
2. To assess the most significant factor affecting the adoption of consumer towards E-Vehicles.

Transforming India’s Automobile industry into Renewable E-vehicle by 2030 can be achievable or not due to lack of infrastructure.

4. Research Methodology

Type of Study

Descriptive research has been taken to study the behaviour of customers as descriptive method of research describe the characteristic of population and phenomenon. This study helped us to find the behaviour of customers towards the adoption of E- vehicles**.**

Sampling Technique

In this research paper simple random sampling technique has been used to whom closed ended questionnaire was shared to get the behaviour of customers.

Data Collection Process

Data was collected from the open questionnaire approaching people from different online sites like Instagram, Facebook and WhatsApp. We did this survey for the different section of the society which would improve the generalisability of the data. Online mode was selected to collect the data because of the convenience to approach people. Participants completed the questionnaire, with an option to withdraw from the survey at any time. We ask them to genuinely fill the forms as we must do a correct data analysis. We Specially Focuses on Youth. We focus on the youth because they are going to be the future of the world. They are the new market for the auto mobile industry. So, the companies who are going to be in the EV market should know the perspective of the youth regarding the EV vehicles. The total sample size used in this study is 268.

Tool used for the analysis

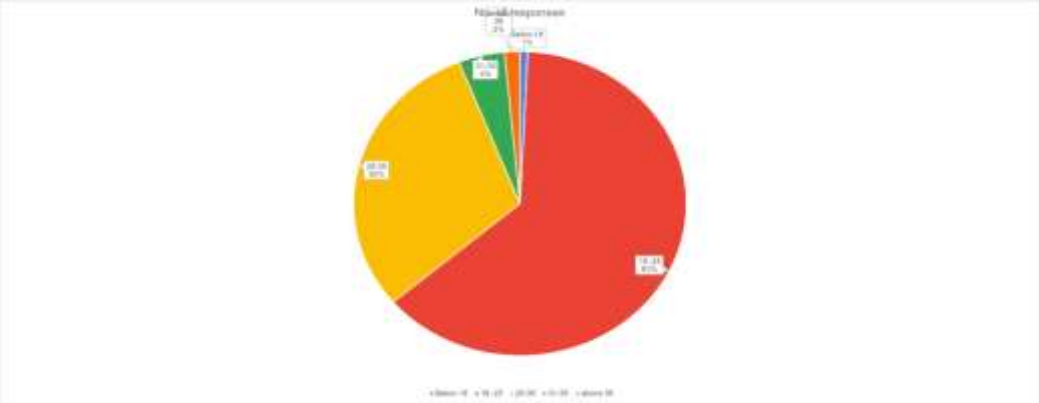
We use the Excel for the analysis. We use because of its ease of use. As we were already familiar with the process of using the excel file so used this tool. We use the dashboard, table, pivot table to do the analysis.

Data analysis Tool

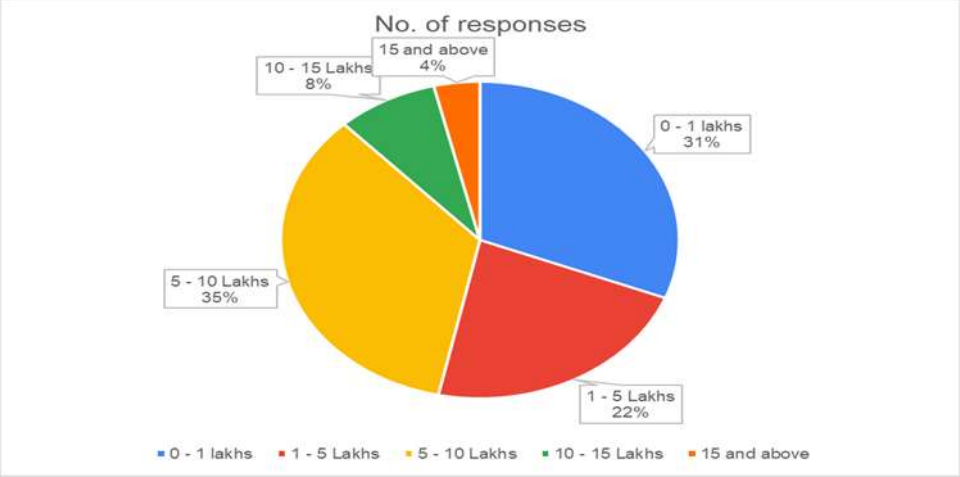
Demographic profile of respondent Age: -

Responses	No. of responses	% Of responses
Below 18	2	1
19 -25	169	63

25-30	81	30
31-35	12	4
above 36	4	1
Total	268	100



Interpretation- we have tried to get the responses from people of different age group. Here we have divided the people in different age group like under 18, 19-25, 26-30, 31-35 and above 36. From the table we can see that for under 18 category we got 1% responses out of 100. For 19-25 category 63%, 25- 30 category 30%, for 31 to 35 category 4%, and for above 35 category we have got 1% responses out of 100%.



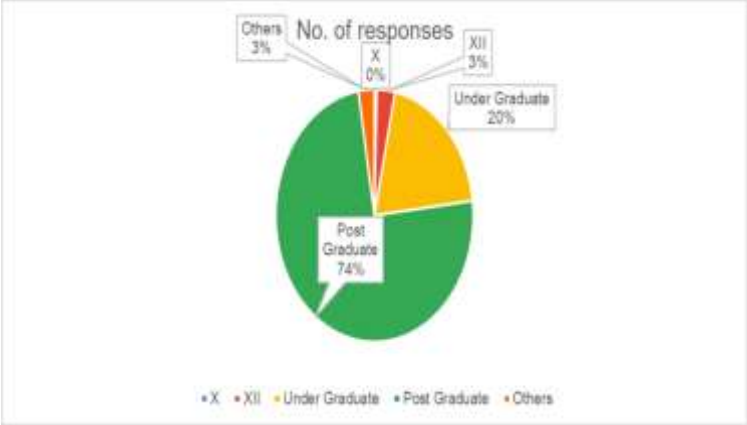
Income

Responses	No. of responses	% Of responses
0 - 1 lakhs	83	31
1 - 5 Lakhs	60	22
5 - 10 Lakhs	93	35
10 - 15 Lakhs	22	8
15 and above	10	4
Total	268	100

Interpretation- Here we have tried to get the responses from the people of different income categories. For that we have segmented the people in five different income categories. Category like people earn 0-1 lakhs, 1-5 lakhs, 5-10 lakhs, 10-15 lakhs, 15 and above. We got the responses from then is 31%, 22%, 35%, 8% and 4% respectively.

Education: -

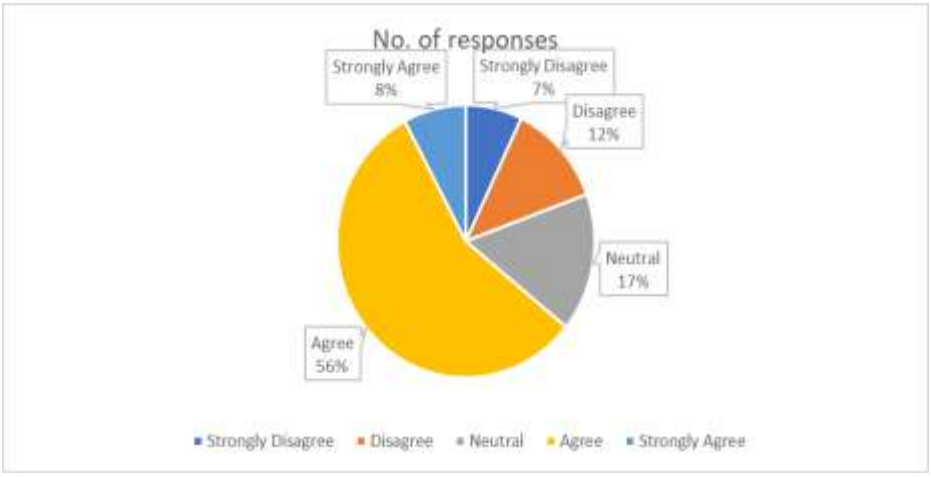
Responses	No. of responses	% Of responses
X	1	0
XII	8	3
Under Graduate	53	20
Post Graduate	199	74
Others	7	3
Total	268	100



Interpretation- Here we have taken the responses of the people of different education backgrounds. We have tried to cover the people from different level of intellect so we can under stand their acceptance level of EVs. We have segmented them on level of education they have received like X, XII, Under Graduate, Post Graduate and others. The responses we got is 0%, 3%, 20%, 74% and 3% respectively.

1. **Consumer attitude towards E-Vehicle**

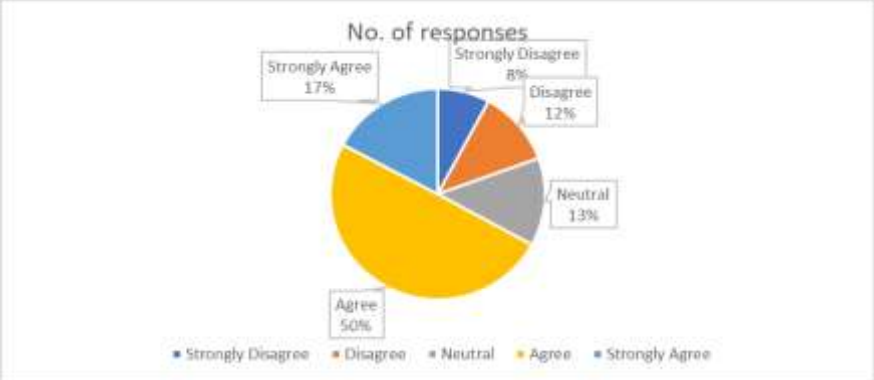
Responses	**No. of responses**	**% Of responses**
Strongly Agree	21	8
Agree	151	56
Neutral	44	16
Disagree	33	12
Strongly Disagree	19	7
Total	268	100



Interpretation: - Above analysis reveals that 56% of people go for the agree while 16% of people wants to go with neutral, 12% of people wants to go with disagree, while 8% of people opted strongly agree and the 7% of people wants to go with strongly disagree. The question was asking to know about the consumers attitude towards Electric Vehicles.

2. Concern towards E-vehicle

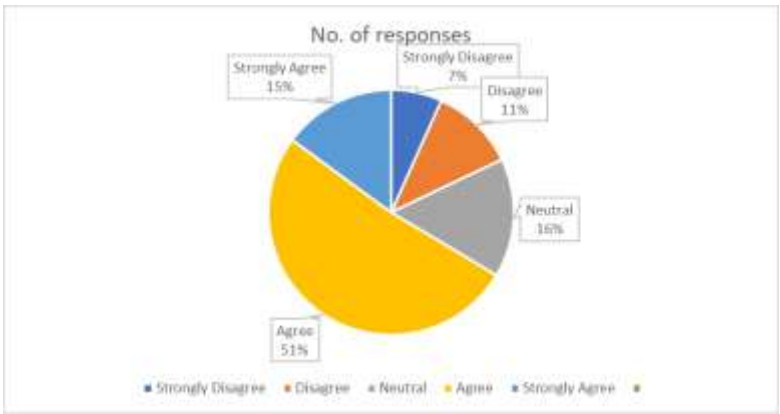
Responses	**No. of responses**	**% Of responses**
Strongly Agree	46	17
Agree	133	50
Neutral	36	13
Disagree	31	12
Strongly Disagree	21	8
Total	268	100



Interpretation: - Above analysis reveals that 50% of people go for the agree while 17% of people wants to go with strongly agree, 13% of people wants to go with neutral, while 12% of people opted disagree and the 8% of people wants to go with strongly disagree. The question was asking to know about the consumers concern towards Electric Vehicles.

3. Is E-vehicle cost efficient.

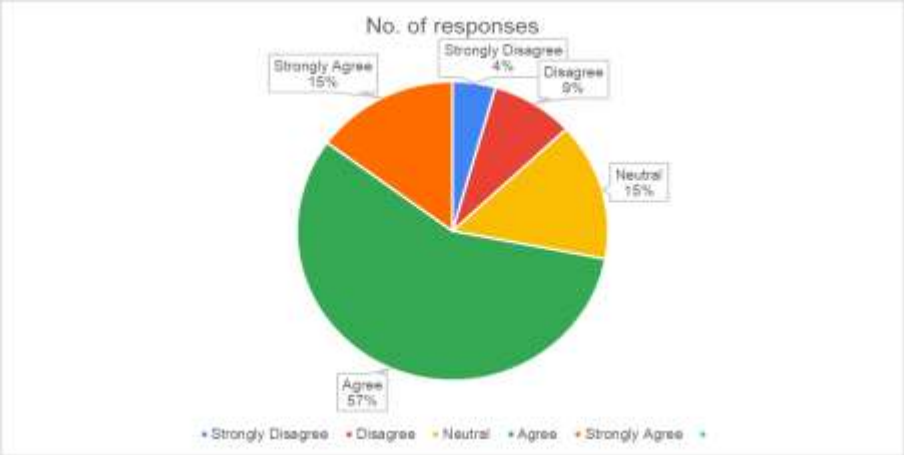
Responses	**No. of responses**	**% Of responses**
Strongly Agree	40	15
Agree	138	51
Neutral	42	16
Disagree	30	11
Strongly Disagree	18	7
Total	268	100



Interpretation: - Above analysis reveals that 51% of people go for the agree while 16% of people wants to go with neutral, 11% of people wants to go with disagree, while 15% of people opted strongly agree and the 7% of people wants to go with strongly disagree. The question was asking to know about whether consumers think that Electric Vehicles is cost efficient.

4. **Do customers recommend E-vehicle?**

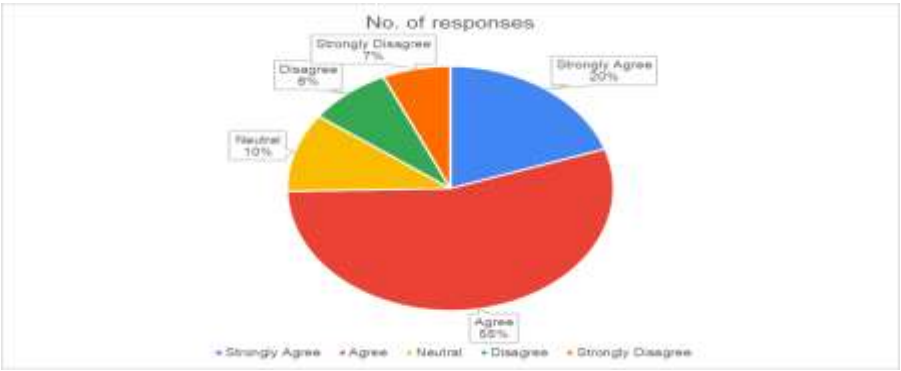
Responses	**No. of responses**	**% Of responses**
Strongly Agree	40	15
Agree	153	57
Neutral	40	15
Disagree	23	9
Strongly Disagree	12	4
Total	268	100



Interpretation: - Above analysis reveals that 57% of people go for the agree while 15% of people wants to go with neutral, 15% of people wants to go with strongly agree, while 9% of people opted disagree and the 4% of people wants to go with strongly disagree. The question was asking to know about will consumers recommend Electric Vehicles.

5. **Is there any positive effect of E-vehicle.**

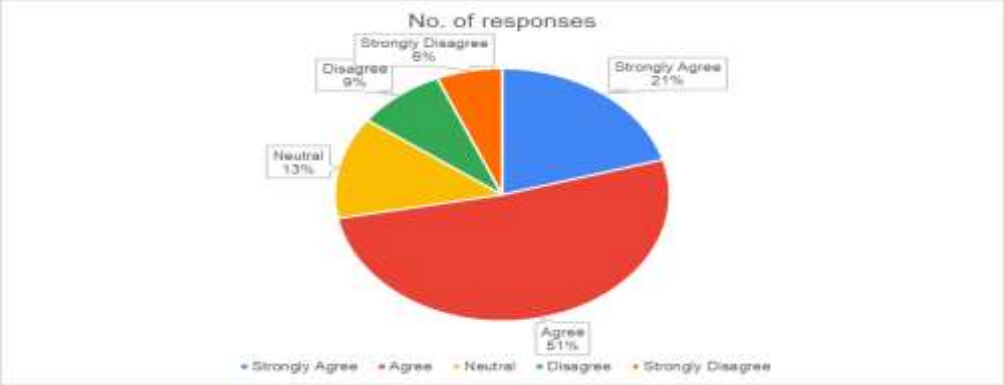
Responses	**No. of responses**	**% Of responses**
Strongly Agree	53	20
Agree	147	55
Neutral	28	10
Disagree	22	8
Strongly Disagree	18	7
Total	268	100



Interpretation: - Above analysis reveals that 55% of people go for the agree while 20% of people wants to go with strongly agree, 10% of people wants to go with neutral, while 8% of people opted disagree and the 7% of people wants to go with strongly disagree. The question was asking to know about the people have seen positive effect of Electric vehicle.

6. Are customers aware about E-vehicle?

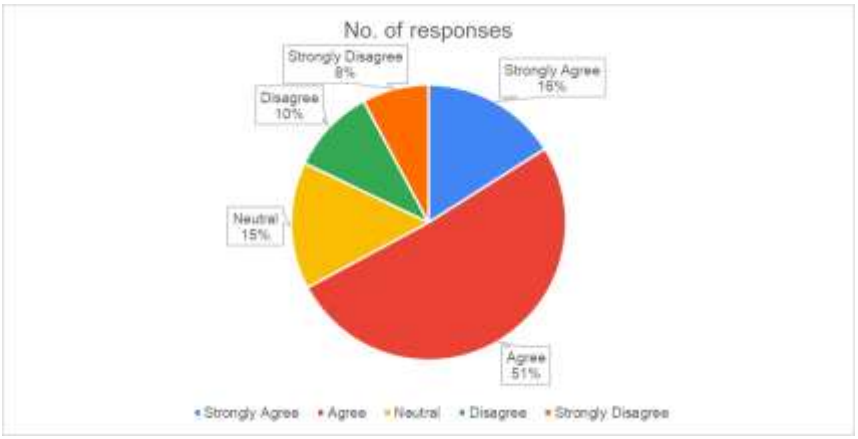
Responses	No. of responses	% Of responses
Strongly Agree	55	21
Agree	138	51
Neutral	35	13
Disagree	23	9
Strongly Disagree	17	6
Total	268	100



Interpretation: - Above analysis reveals that 51% of people go for the agree while 21% of people wants to go with strongly agree, 13% of people wants to go with neutral, while 9% of people opted disagree and the 6% of people wants to go with strongly disagree. The question was asking to know about are customers aware about Electric vehicle.

7. Are customers aware about the government initiatives?

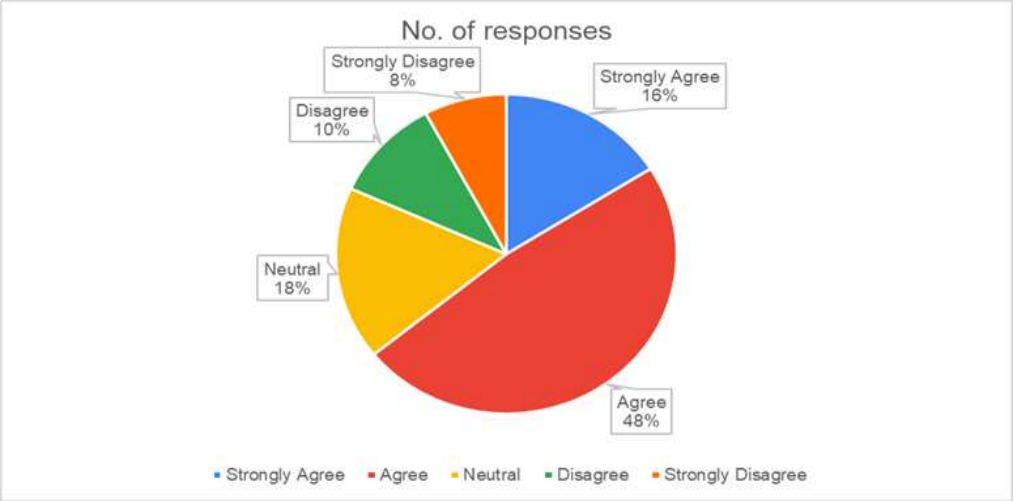
Responses	No. of responses	% Of responses
Strongly Agree	43	16
Agree	137	51
Neutral	40	15
Disagree	27	10
Strongly Disagree	21	8
Total	268	100



Interpretation: - Above analysis reveals that 51% of people go for the agree while 16% of people wants to go with strongly agree, 15% of people wants to go with neutral, while 10% of people opted disagree and the 8% of people wants to go with strongly disagree. The question was asking to know about are customers aware about the government initiatives.

8. Expense on petroleum will be less by using E-Vehicles.

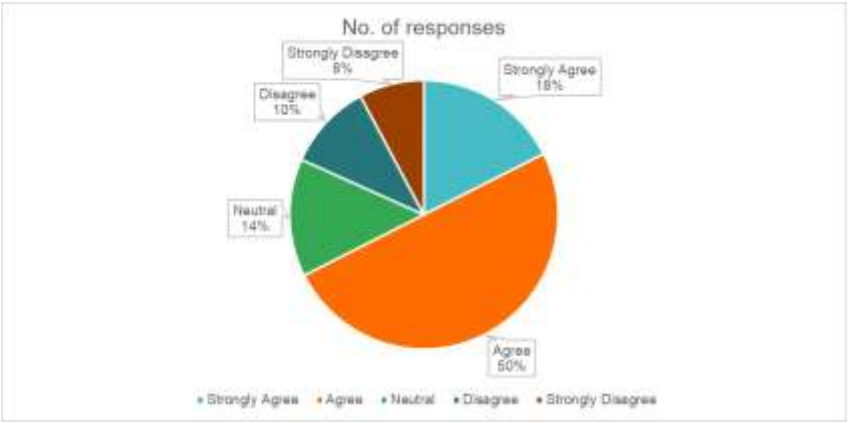
Responses	No. of responses	% Of responses
Strongly Agree	43	16
Agree	129	48
Neutral	47	18
Disagree	28	10
Strongly Disagree	21	8
Total	268	100



Interpretation: - Above analysis reveals that 48% of people go for the agree while 18% of people wants to go with neutral 16% of people wants to go with strongly agree, while 10% of people opted disagree and the 8% of people wants to go with strongly disagree. The question was asking to know about the expense on petroleum will be less by using electric vehicles

9. Are customers preferring E-Vehicle?

Responses	No. of responses	% Of responses
Strongly Agree	47	18
Agree	134	50
Neutral	38	14
Disagree	28	10
Strongly Disagree	21	8
Total	268	100

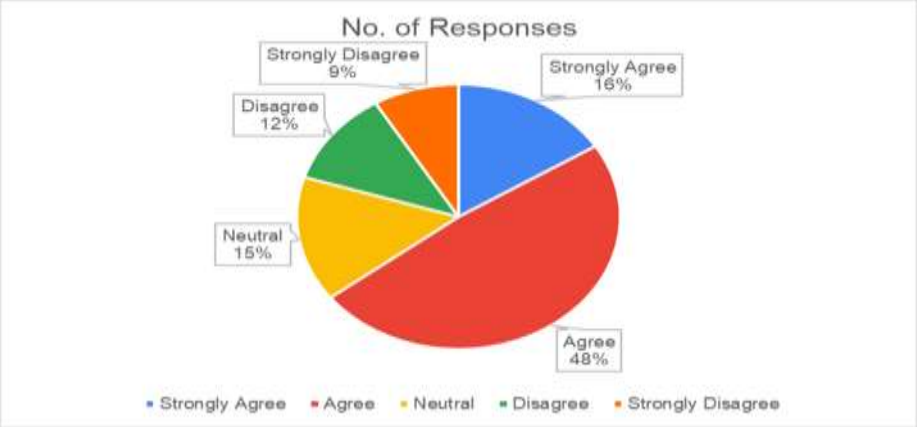


Interpretation: - Above analysis reveals that 50% of people go for the agree while 18% of people wants to go with strongly agree, 14% of people wants to go with neutral, while 10% of people opted disagree and the 8% of people wants to go with strongly disagree. The question was asking to know about are customers preferring Electrical vehicles.

10. Does using E-vehicle build the status?

Responses	No. of responses	% Of responses
Strongly Agree	43	16

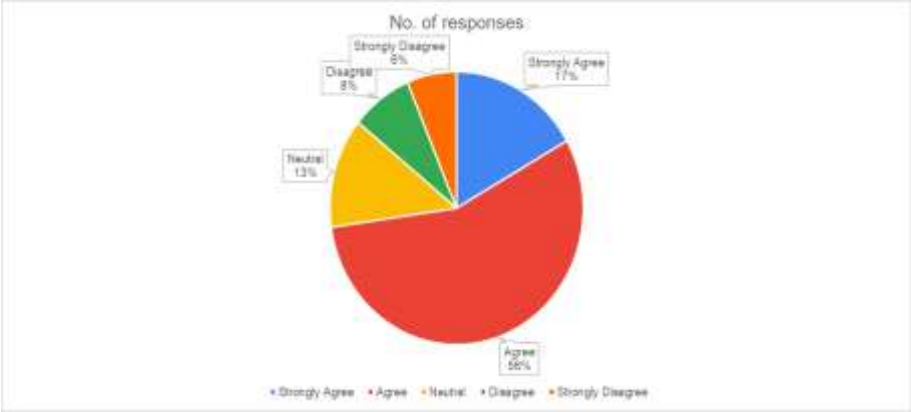
Agree	130	49
Neutral	41	15
Disagree	31	12
Strongly Disagree	23	9
Total	268	100



Interpretation: - Above analysis reveals that 49% of people go for the agree while 16% of people wants to go with strongly agree, 15% of people wants to go with neutral, while 12% of people opted disagree and the 9% of people wants to go with strongly disagree. The question was asking to know about Does using E-vehicle build the status.

11. Are Customers aware about the financial advantage of E-Vehicle?

Responses	**No. of responses**	**% Of responses**
Strongly Agree	45	17
Agree	150	56
Neutral	35	13
Disagree	21	8
Strongly Disagree	17	6
Total	268	100

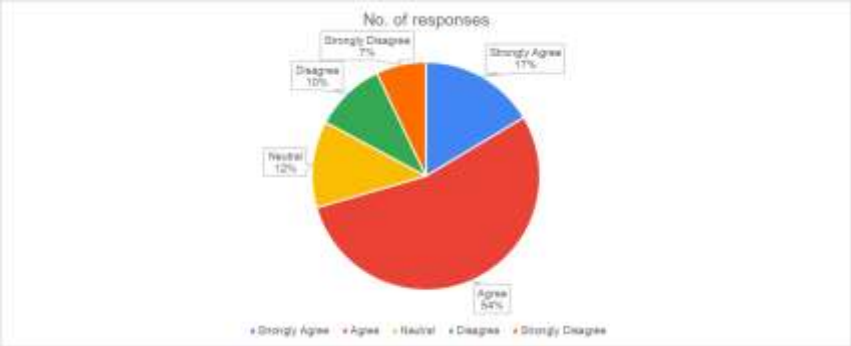


Interpretation: - Above analysis reveals that 56% of people go for the agree while 17% of people wants to go with strongly agree, 13% of people wants to go with neutral, while 8% of people opted disagree and the 6% of people wants to go with strongly disagree. The question was asking to know about are Customers aware about the financial advantage of E-Vehicle

12. Are Customers influenced by the faciality of charging system in E-Vehicle?

Responses	**No. of responses**	**% Of responses**
Strongly Agree	44	16
Agree	145	54

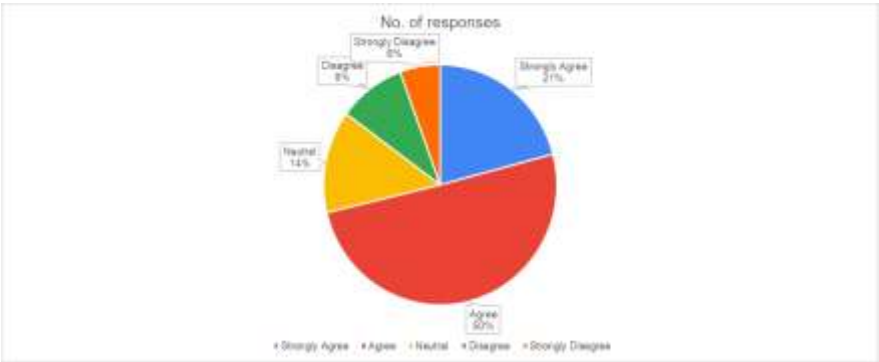
Neutral	33	12
Disagree	27	10
Strongly Disagree	19	7
Total	268	100



Interpretation: - Above analysis reveals that 54% of people go for the agree while 16% of people wants to go with strongly agree, 12% of people wants to go with neutral, while 10% of people opted disagree and the 7% of people wants to go with strongly disagree. The question was asking to know about are customers influenced by the faciality of charging system in E- vehicles.

13. Will make choice of E-Vehicle on availability of Charging Station.

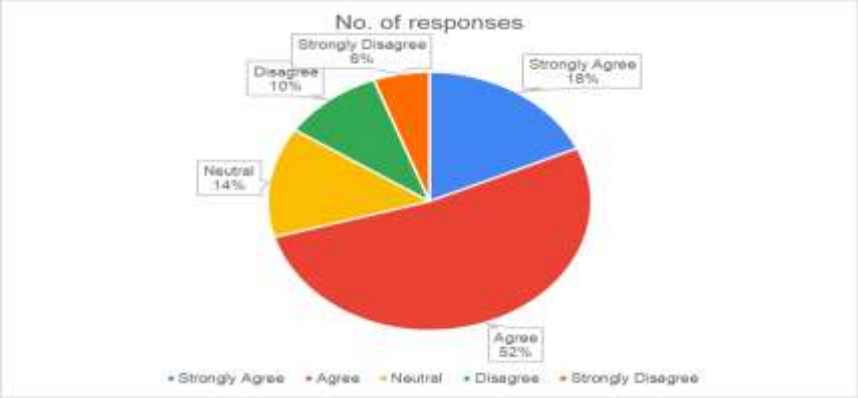
Responses	**No. of responses**	**% Of responses**
Strongly Agree	56	21
Agree	135	50
Neutral	37	14
Disagree	25	9
Strongly Disagree	15	6
Total	268	100



Interpretation: - Above analysis reveals that 50% of people go for the agree while 21% of people wants to go with strongly agree, 14% of people wants to go with neutral, while 9% of people opted disagree and the 6% of people wants to go with strongly disagree. The question was asking to know people will make choice of E-vehicles on availability of charging station.

14. Prefer E-Vehicle because of charging facility.

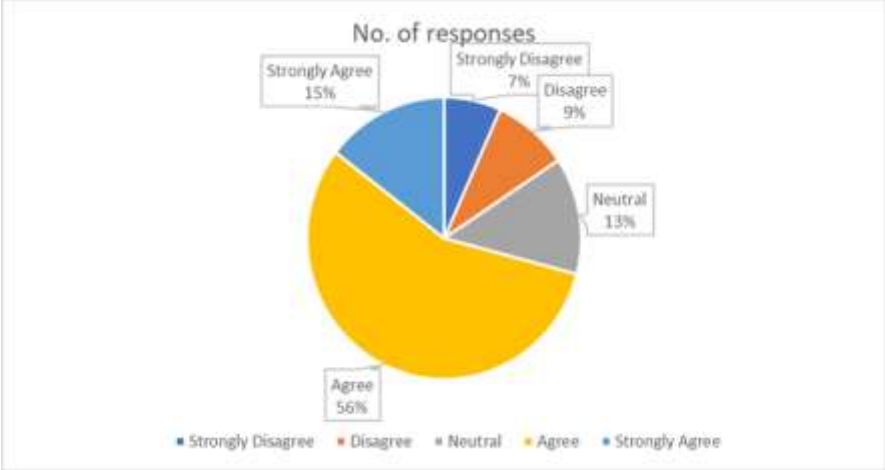
Responses	**No. of responses**	**% Of responses**
Strongly Agree	49	18
Agree	140	52
Neutral	37	14
Disagree	27	10
Strongly Disagree	15	6
Total	268	100



Interpretation: - Above analysis reveals that 52% of people go for the agree while 18% of people wants to go with strongly agree, 14% of people wants to go with neutral, while 10% of people opted disagree and the 6% of people wants to go with strongly disagree. The question was asking to know about Does customers prefer E-vehicles because of charging facilities.

15. Will not buy E-vehicle if there is no facility of charging station.

Responses	**No. of responses**	**% Of responses**
Strongly Agree	39	15
Agree	151	56
Neutral	36	13
Disagree	24	9
Strongly Disagree	18	7
Total	268	100



Interpretation: - Above analysis reveals that 56% of people go for the agree while 15% of people wants to go with strongly agree, 13% of people wants to go with neutral, while 9% of people opted disagree and the 7% of people wants to go with strongly disagree. The question was asking to know about whether people prefer E-vehicles because of charging facilities.

Findings

From the above table and different types of data analysis we saw that 56% of people responded agree on if there is no electric vehicles they won't buy it. Hence we come to know that people will buy EVs only if there is charging stations are there. People are curious about the EV vehicle. In the beginning they were quite afraid of buying the vehicles, although they accepted the innovation for the environment. But now they must buy this as their regular car or accept them as their regular car.

From the analysis we saw that people were willing to buy the car only if there is infrastructure for charging is available. People will value environment second but the most important for them is to have proper well established charging station.

If Indian Government want to make Indian automobile industry into EV Hub, they have to first establish an electric vehicle charging station.

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