

Consumer perception towards electric two wheeler vehicles in Southern Karnataka

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Abstract - Growing population in developing countries, around the globe facing the “energy challenge” especially in context to fuel. This laid a new foundation for the raise of certain incredible technologies which has now been offering significant opportunities to kick start the phase of the automobile business. India owns 17.69 percent of the global population and reserves huge market potential for automobile manufacturers around the world. Being the majority market providers, it is a major concern to evaluate the consumer’s acceptability towards electrified vehicles. Our present research investigation aims towards evaluating the consumer’s satisfaction towards acceptance of electrified vehicles and the barriers within in context to their selection, economical affordability, acceptance, societal status, brand loyalty, and so on. This study amid to evaluate the consumer’s opinion around the selected districts of Karnataka. The outcome of this present investigation is through the limelight on understanding the willingness and dissatisfaction in consumers to develop the business and consumer’s friendly policies in encouraging the public participation in transforming the carbon-emitting INDIA to zero-emission INDIA.

Keywords: EV Electrical vehicle ;IEA, International energy agency

I. INTRODUCTION

Reliance of country’s development and economic health on the infrastructure is inevitable of any country. Designing and development of sustainable technology which ease the travel between the two destinations has always offers new boost to the economy. In the late eighties for the journey of 3366.7 kilometers between the east and west coast of USA it took six months using road transportation system. this founds astonished, to cover the same distance within six days toady [1], thanks for innovation. India stands on global standers in context to the land and road development [2], this led to increased connectivity between the urban, suburban and metropolitan cities in India [3] [4][5] thus, on the transportation especially on persona-l vehicles. In addition, the covid 19 pandemic increased the concern on the personnel safety that intensifies the interest of global population on personnel vehicles than ever before.[6] IEA (International Energy Agency) statistics, over 1 million electric vehicles were sold in 2017, representing a 54 percent increase over 2016. Furthermore, after exceeding 1 million in 2015 and 2 million in 2016, the global stock of electric vehicles in 2017 exceeded 300 million, representing a 56 percent growth from 2016, Figure 1 [7]. The challenge entails increasing global ownership of electric vehicles, developing related battery production technology and material requirements, deploying electric vehicle charging stations, energy and fuel conservation, greenhouse gas

emissions reduction, and other measures that are beneficial to sustainability.

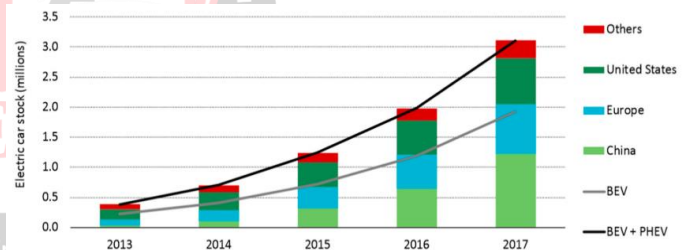


Figure:1. Evolution of global electric vehicle stock, 2013–2017 (IEA, 2018).

In light of this, more governments are setting development targets for electric vehicles, delivering clearer signals to vehicle manufacturers and other stakeholders and boosting their confidence in the future policy framework. In addition, as shown in Figure 2 [8], several nations have stated plans to ban internal combustion engine vehicles, which is a significant step forward in the development of electric vehicles.

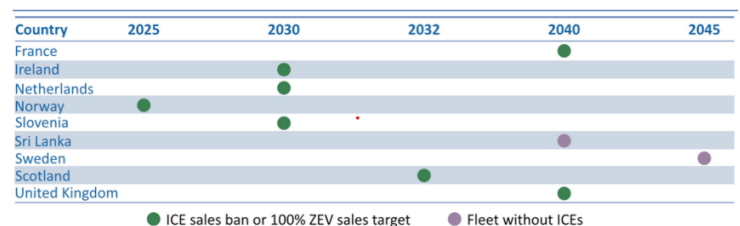


Figure:2. Announced sales bans for internal combustion engine (ICE) vehicles (Source: [7]).

In addition to government policies, global automakers have also supported the development of the electric vehicle industry with practical actions. By 2018, almost all the major automakers around the world had expressed their ambitions or plans to develop electric vehicles. In February 2017, Daimler AG declared that in the future, the Smart will focus on electric vehicles in the United States and Canada markets. In July 2017, VOLVO declared that it will only produce pure electric vehicles and hybrid electric vehicles from 2019. In 2016, HONDA declared that by 2030, 2/3 of the company's vehicle sales will be electric vehicles. Toyota also declared that it will stop selling diesel vehicles in Europe by the end of 2018. Due to the booming development of the electric vehicle industry, in recent years, researchers in India and abroad have paid more attention to purchase behaviors and intentions related to electric vehicles. In the fourth quarter of 2011, the German RWE Group surveyed 6421 consumers from 12 global auto markets. Although the studies highlight on role of government subsidies can stimulate consumers concern towards buying electric vehicles, understanding the other aspects like the influence of annual household income, and other social and economic aspects with respect to individual market area is very essential which may give more obvious effect.

With this background, as there is no significant studies were made to understand the consumer interest and their concerns over the buying electrified vehicles in southern Karnataka, we propose to focus our present research on evaluating the consumers, understanding, perception and interest towards buying electrified vehicles especially in context to two wheelers as the states holds the marginal and middle-class consumers at the larger ratio and thus significantly dines their affordability for four wheelers in terms of increased cost in regard to electrified vehicles.

1. STATEMENT OF THE PROBLEM

The electric vehicles in two wheeler industry is developed in the country. The public needs to be made aware of the developments to make more successful. The purpose of the study is to understand consumer awareness and the factors important for the purchase of EV's in two wheeler sector in southern Karnataka.

2. RESEARCH OBJECTIVES

- To determine the various factors influencing purchase of electric vehicles two wheeler.
- To understand the public willingness towards buying electric vehicles two wheeler in southern Karnataka.
- Evaluating the influence of government's encouragement on electric vehicles two wheeler affordability in public despite of their economic status

3. REVIEW OF LITERATURE

(M Pierre, C Jemelin, N Louvet - Energy Efficiency, 2011) [9] Comparable cases have occurred during the last decades-probably more modest but full of learning: some local authorities have promoted innovations based on electric

vehicles in the 1990s, and some people have chosen this kind of cars for their daily travels. Reporting studies carried out in 2006 and 2008, we intend to identify the reasons of this innovative modal choice, to show the difficulties that electric vehicle drivers then encountered and to analyse the patterns of use that governed their mobility and their use of electric vehicles.

(Rezvani, Jansson, and Bodin 2015) [9] Give an overview of EV adoption studies; however, they only focus on individual-specific psychological factors which influence people's intention for Electric vehicle adoption and only select some representative studies. Our review complements it in the following ways: first, we review a wider range of influential factors in Electric Vehicle adoption other than psychological constructs only; second, we present a comprehensive picture of current research by collecting all the available academic Electric vehicle preference studies.

(Ghasri et al., 2019; Sierzchula et al., 2014) [10] Demand studies have explored the financial, technical, essential and political concepts of EVs to help governments and car manufacturers evaluate consumer preferences (Liao et al., 2017). Driving range, refilling time and owning costs have been identified as some of the factors influencing EV purchasing decisions Some studies have used stated preference techniques to explore heterogeneity in consumer preferences when deciding to purchase an Electric vehicle.

[11] K. Kapera signifies the opportunities offered by the up gradation of Indian transport system and road network as it slots largest in the world. In addition to this the demographic capital and the increased demand for personalized vehicles raised a major concern globally as India accounts for 17.07 percent of world's population.

[12] S. Das in collaboration with industrial giant like reliance studied consumer interest especially on four wheelers and reports the people's interest on consuming the electrified vehicles, and also highlights the extreme importance of EV usage than ever before.

[13] Government of Karnataka economic survey of GOK, 2021 summarizes that the Southern part of Karnataka has now been experiencing the high economic push after the governments interest to scatter the special economic zones, industrial setups out from the Bengaluru. Thus, the economic growth around cities like Mysuru, Hassan, Mandya and other districts of Karnataka has increased ever before.

4. RESEARCH METHODOLOGY

4.1. Research and sampling methods

The study adopted descriptive research and convenience sampling technique

4.2. Sampling size

Primary data of a sample population of 275 is collected using online questionnaire.

5.3. Statistical Tools used

Chi square test is used to test the hypothesis.

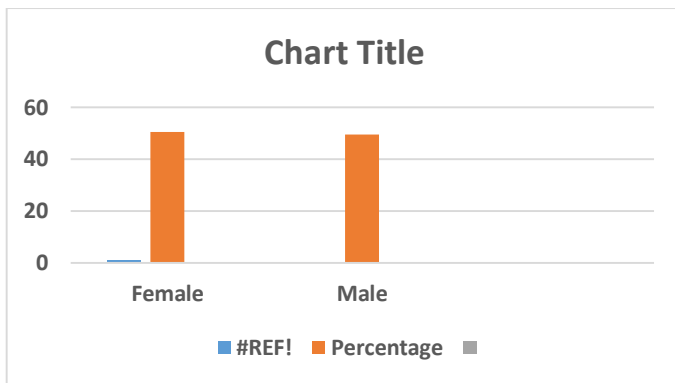
5. DATA ANALYSIS AND INTERPRETATION

6.1 Descriptive statistics

6.1 Representing the gender of the sample

Gender	Frequency	Percentage
Female	139	50.5
Male	136	49.5
Total	275	100.0

Figure:3

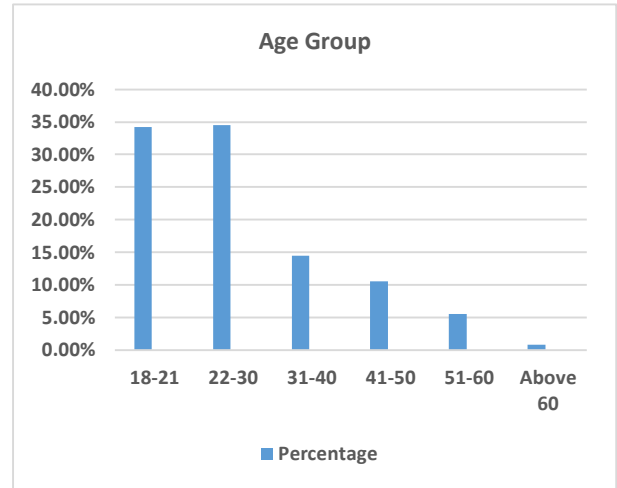


The table and bar chart show that 50.5% of the people are female and 49.5% of the people are male who have answered the questionnaire based on their perception of Electric vehicle two wheeler.

6.2 Representing the Age Group of the sample

Age Group	Frequency	Percentage
18-21	94	34.2%
22-30	95	34.5%
31-40	40	14.5%
41-50	29	10.5%
51-60	15	5.5%
Above 60	2	0.8%
Total	275	100%

Figure:4

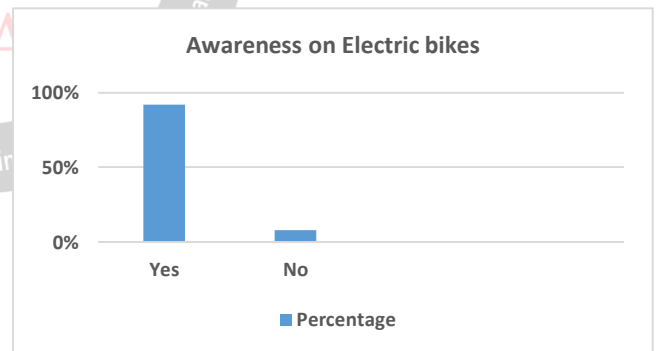


The table and chart show that 34.2% of the people are from the group of 18-21, 34.5% of the people are from the age group of 22-30.14.5% of the people are from the age group of 31-40 and 10.5% of the people are from the age group of 41-50 & 5.5% of the people are from the age group of 51-60 & rest 0.8% of the people from the age group of 61 & above have answered the questionnaire based on their perception of Electric vehicle two wheeler.

6.3 Awareness on Electric Bike

Awareness	Frequency	Percentage
Yes	253	92%
No	22	8%
Total	275	100%

Figure:5



The table and chart indicates the number of responses and percentage of people aware of Electric vehicle two wheeler. Around 92 % of the respondents agreed that they are aware about the Electric vehicle two wheeler & 8% of the people are not aware of Electric vehicle two wheeler.

6.4. Table representing factors influencing purchase of electric two wheeler

Factors	No of Response	Percentage
Environmental Friendly	148	53.8%
No Fuel cost	72	26.2%
Easy to drive	15	5.5%

Reduce the dependency on fossil fuel	40	14.5%
Total	275	100 %

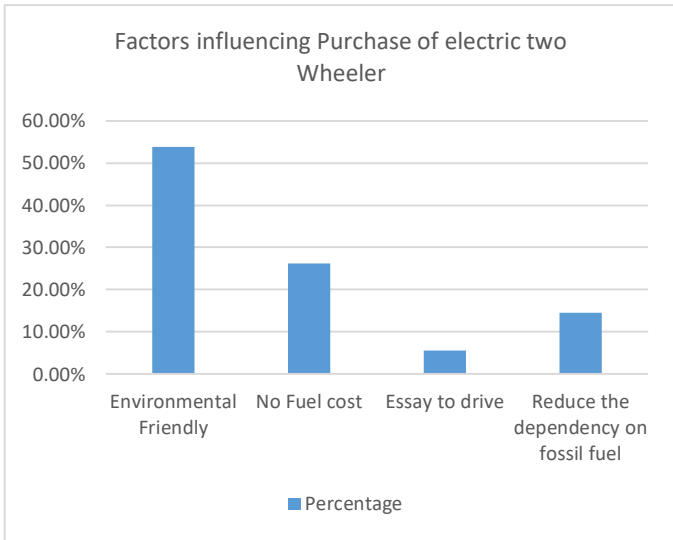


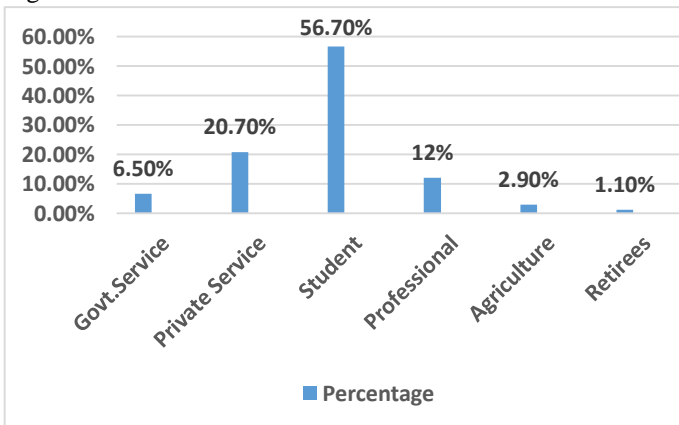
Figure: 6

The above table discover the factors which influence the people to buy electric vehicle two wheeler. 53.8% of the respondents influenced with electric vehicle is environmental friendly, 26.2% of the people prefer to buy electric vehicle because the cost of fuel is very high compared to EV.5.5% of the respondents says it's easy to drive and 14.5% of the respondents agree that it will reduce the dependency on fossil fuel.

6.5 Table representing occupation of the people

Factors	Number of Response	Percentage
Govt. Service	18	6.5%
Private Service	57	20.7%
Student	156	56.7%
Professional/Business	33	12%
Agriculture	8	2.9%
Retirees	3	1.1%
Total	275	100%

Figure:7

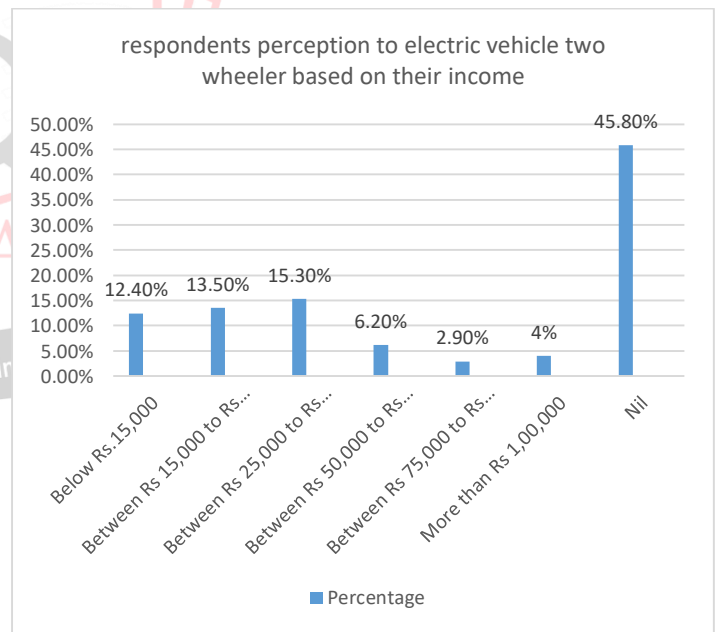


The table and bar chart show that 56.7 % of the people responded are students, 20.7% of the respondents are private service employees.12% of the people responded are professionals, 6.5% of the people responded are from government employee. 2.9% of the people are agriculturalist & 1.1% of the people responded are retirees have answered the questionnaire based on their perception on electric vehicle two wheeler.

6.6 Table showing the respondents perception to electric vehicle two wheeler based on their income.

Factors	Number of Response	Percentage
Below Rs.15,000	34	12.4%
Between Rs 15,000 to Rs 25,000	37	13.5%
Between Rs 25,000 to Rs 50,000	42	15.3%
Between Rs 50,000 to Rs 75,000	17	6.2%
Between Rs 75,000 to Rs 1,00,000	8	2.9%
More than Rs 1,00,000	11	4%
Nil	126	45.8%
Total	275	100%

Figure:8



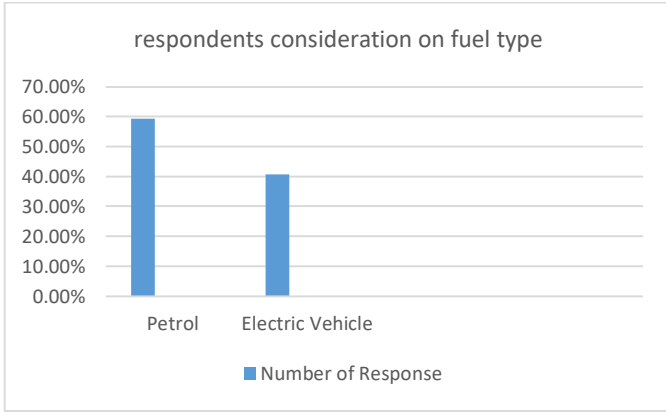
The table above presents the respondents perception to buy EV two wheeler based on their income. Here the group lies between Rs.25, 000 to Rs.50, 000 have more interest in electric vehicle. 45.80% of the people are belongs to no income.

6.7 Table represents respondents consideration on fuel type

Factors	Number of Response	Percentage
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Petrol	163	59.3%
Electric Vehicle	112	40.7%
Total	275	100%

Figure:9

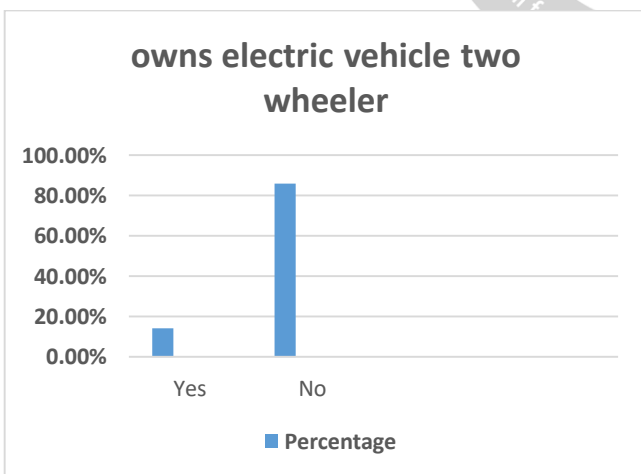


The table shows 59.3% of the respondents considers petrol as their choice of vehicle.40.7% of the respondent likes to switch to electric vehicle two wheeler.

6.7 Table shows whether the respondents owns electric vehicle two wheeler

Factors	Number Response of	Percentage
Yes	39	14.2%
No	236	85.8%
Total	275	100%

Figure:10

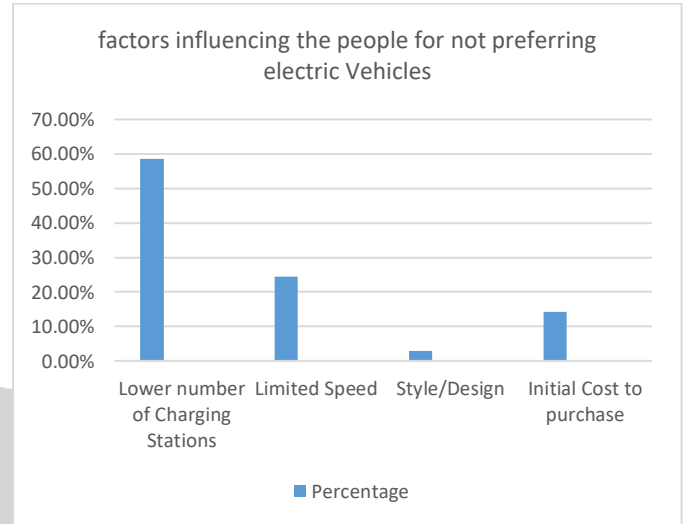


As reflected in the table, 14.2% of the respondents owns electric vehicle two wheeler and 85.8% of the respondents are not the owners of electric vehicle two wheeler.

6.8 Table representing factors influencing the people for not preferring electric Vehicles

Factors	Number Response	Percentage
Lower number of Charging Stations	161	58.5%
Limited Speed	67	24.4%
Style/Design	8	2.9%
Initial Cost to purchase	39	14.2%

Figure:11

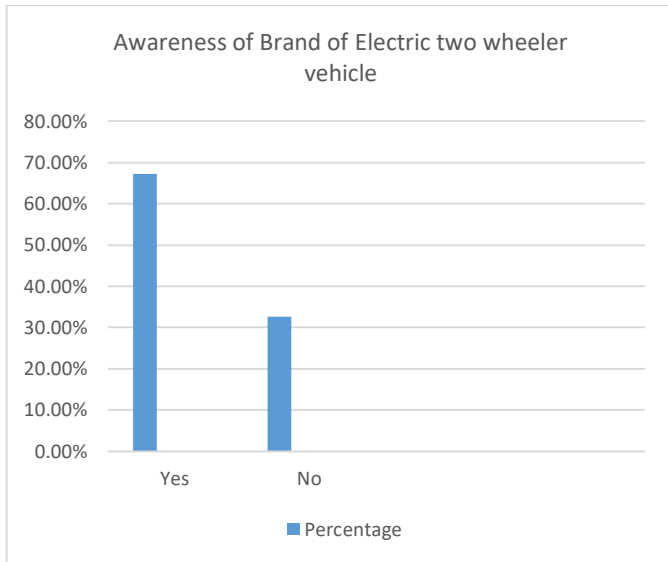


The illustrative graph shows reason why the people not prefer electric vehicle.58.5% of the respondents says lower number of charging stations, 24.4% of the respondents not preferring due to limited speed.14.2% of the respondents worried about initial cost of purchase and 2.9% of the respondents are not preferred because of style and design.

6.9 Awareness of Brand of Two wheeler Electric vehicle

Factors	Number Response of	Percentage
Yes	185	67.3%
No	90	32.7%
Total	275	100%

Figure:12



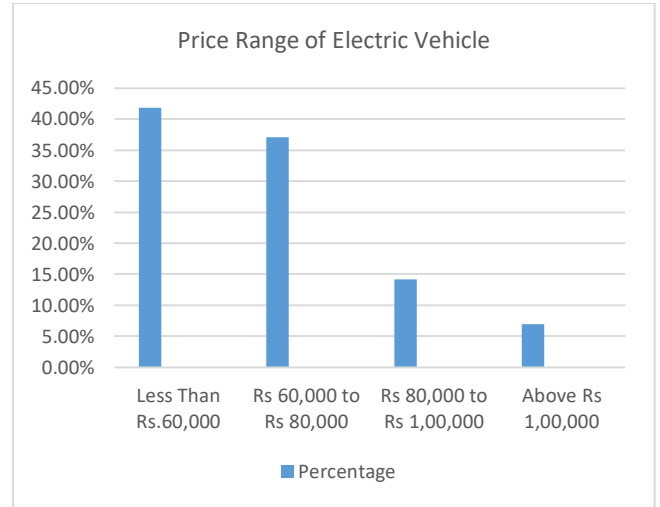
As reflected in the table 67.3% of the people are aware of the brand related to EV two wheeler and 32.7% not aware of brands of EV two wheelers.

6.10 Price Range of Electric vehicle

Factors	No of Response	Percentage
Less Than Rs.60,000	115	41.8%
Rs 60,000 to Rs 80,000	102	37.1%
Rs 80,000 to Rs 1,00,000	39	14.2%

Above Rs 1,00,000	19	6.9%
Total	275	100%

Figure:13



The above table presents the respondents showing much interest in purchasing EV two wheeler price range less than Rs.60,000 and 37% respondents looking for EV having price range between Rs.60,000 to Rs.80000.14.2% of the respondents expecting price range between Rs.80000 to Rs.100000 and 6.9% of respondents looking above Rs.100000.

6.2 Inferential statistics

6.2.1 Chi Square Test

Age and features of electrical vehicle

Null Hypothesis (H₀): There is no significant association between age of the respondents and feature of EV

Alternative Hypothesis (H₁): There is a significant association between age of the respondents and feature of EV

Table of Observed Values

Age	Which feature do you think will influence to purchase electric vehicle				TOTAL
	Environmental Friendly	No Fuel cost	Essay to drive	Reduce the dependency on fossil fuel	
18-21	47	26	9	12	94
22-30	49	27	4	15	95
31-40	26	8	0	6	40
41-50	16	7	2	4	29
51-60	9	3	0	3	15
Above 60	31	1	0	0	2
Total	148	72	15	40	275

Table of expected value

	Environmental Friendly	No Fuel cost	Essay to drive	Reduce the dependency on fossil fuel
18-21	50.58	24.61	5.13	13.67
22-30	51.12	24.87	5.18	13.81
31-40	21.53	10.47	2.18	5.81

41-50	15.6	7.59	1.58	4.22
51-60	8.07	3.93	0.82	2.18
Above 60	1.08	0.52	0.1	0.29

Chi square calculation

OV	EV	(O - E)	(O - E) ²	$\frac{(O - E)^2}{E}$
47	5058	-3.58	12.81	0.2533
49	51.12	-2.12	4.49	0.0879
26	21.53	4.47	19.98	0.9280
16	15.61	0.39	0.1521	0.0097
9	8.07	0.93	0.8649	0.1071
1	1.08	-0.08	0.0064	0.0059
26	24.61	1.39	1.9321	0.0785
27	24.87	2.13	4.5369	0.5824
8	10.47	-2.47	6.1009	0.5827
7	7.89	-0.59	0.3481	0.0458
3	3.93	-0.93	0.8649	0.2200
1	0.52	0.48	0.2304	0.4430
9	5.13	3.87	14.977	2.9194
4	5.18	-1.18	1.3924	0.2688
0	2.18	-2.18	4.7524	2.18
2	1.58	0.42	0.1764	0.1116
0	0.82	-0.87	0.7569	0.87
0	0.11	-0.11	0.0121	0.11
12	13.67	-1.67	2.7889	0.2019
15	13.81	1.19	-5.62	0.967
6	5.81	0.19	-5.62	0.967
4	4.22	-0.22	0.0484	0.0114
3	2.18	0.82	0.6724	0.3084
0	0.29	-0.29	0.0841	0.29
Chi square				11.6853

Degree of freedom	$(C-1)(R-1)$ $(4-1)(6-1)= 15$
α	5% or 0.05
χ^2	11.6853
Table value 5%	24.996
p value	0.702848

Inference: there is association between age of group and feature of electric vehicle.

Interpretation: since p value is greater than 0.05 we do not reject H_0

6. DISCUSSIONS

6.1. FINDINGS

- 53.8% of the respondents are influenced by environmental friendly aspect of electric vehicle.
- 58.5% of the respondents are agree that lower number of charging stations.
- Around 36.7% of respondents are aware of government subsidy for purchasing electric vehicle

- 14.2% of the respondents owns electric two wheeler vehicle.
- Around 41.8% of the respondents are expecting price range of electric vehicle below Rs.60,000.

6.2 SUGGESTIONS AND CONCLUSIONS

On combating the issues like environmental pressure due to pollution, harnessing the potentials of newer technologies has found to offer the sustainable solutions. Electrification of two-wheelers is one such option which may solve biggest global issues like oil availability and damage due to pollution.

Understanding the consumers' perception to increase the purchase willingness in public towards electrified vehicles. Our data highlights the public concern over the pollution control including their purchase interest among all the age categories. Despite, few comments negatively on style, speed and high cost of the vehicles. However, reaching the public through the media especially social and visual media has significant role in bringing positive change is only if electric two-wheeler companies and marketers can educate potential customers is the right way with the marketable solutions? It is also important to increase the extent of marketing efforts for creating more awareness and creating positive customer perception in the Indian market by encouraging the environmentalists for campaigns. It is a good idea for electric two-wheeler companies to join hands with them in their campaign, and providing freebies for promising customers, this might help to develop a positive perception. In addition to all these, it also important advertise through an eco-friendly and creative image with the choice of electric two-wheelers.

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