Understanding consumer perception towards e-bike with reference to Mumbra city

Dr. Aarti Vyas Varma
Assistant Professor
Smt. P. N. Doshi Women's College, Ghatkopar
E-mail: aarti.varma@spndoshi.com

Abstract: *Globally, the transportation sector is one of the major sectors that consume fossil fuels and its products. Conventional vehicles are a major cause of global warming and pollution. Diminution of fossil fuels and its price hike is also a crucial issue. The automobile companies R&D had led to innovate electric vehicle that would provide viable solution to the environment and society at large. The study aims to understand consumer perceptions towards E-bike with reference to Mumbra city. Through this paper consumer awareness, general opinion, benefits and problems related to E-bike will be analysed and consumer perception for same will be studied.*

Keywords: *Electric vehicles, E- bike, Consumer perception, Awareness, Conventional vehicle, Government policies.*

1. INTRODUCTION:

India is a country with the third-largest road network in the world. Road travel seemed to be a preferred choice of people to commute in personal or by shared vehicles. In today's competitive era and fast-moving world, automobile stages key role in any individual's life. Managing of livelihood, output or productivity, vehicle plays a substantial role in saving time and efforts and aiding as a bridge between commuting points. Majority people depend on two wheelers to cater their mobility needs. Niti Ayog, has suggested that electric vehicles should ply on the Indian roads by 2025 which would cut down the large spending on the oil imports and aid in reduction of air pollution. Thus, realizing the importance of the electric vehicles, consumers preferences and attitudes are deviating to a certain extent towards the usage of the E-vehicle.

2. REVIEW OF LITERATURE:

Review of literature is based on the title of study to analyse the research gap.

Akanksha Upadhyaya; Shikha Dua (2019) in paper titled Consumer Awareness and Perception towards Hybrid Cars is a leap towards the Sustainable development which is the need of hour, marking for wellbeing of today's generation along with the consideration for future generation. The study attempts to understand and analyze the awareness level and perception of individuals about the hybrid cars which reveals that transport segment is stirring towards green vehicles viz. E- vehicles or hybrid vehicle which will contribute to lessen harmful emanations and pollutants in the ecosystem.

Ashish Aggarwal (2014) in his research stated that there is robust possibility of growth in the E- vehicle sector, but it will take some time in India to outset since the customers here are not prepared to pay the high price. Likewise, they are worried about the Safety and quality facet.

Kenneth (2013) in his study on "Consumer attitudes towards battery electric vehicles" a large-scale survey conducted highlights the results of data collection held in Flanders (Belgium). The results comprise perceptions on the pros and cons of Electric Vehicles, the adequate driving range, the suitable charging time (both slow and fast), the satisfactory speed and the the role of the government in the introduction of E-Vehicles,

Lingzhi Jin (2017), The growth of electric vehicles is still at nascent phase. Numerous hindrances such as the new technology, cost, speed, recharge periods, and consumer ignorance are dealt with in the study. Customer awareness too is considered as very significant. to evaluate the efficacy, competence, and viability of electric vehicles

Masurali.A, (2018) in his study has put forth that Electric Vehicle is one of the foremost feasible alternative solutions to beat the crises. Numerous automobile firms are introducing E-Vehicles and are escalating their portfolio.

Encouraging E-Vehicles can assist to cut fuel dependency and lessen pollution. The awareness level of educated people on Electric Vehicles is significantly high. It was highlighted that Government should also try hard to spread awareness about the Electric Vehicle among potential customers.

Pretty Bhalla (2018), studied about electric vehicle, its producers and the policy of Government to pay more heed to social acceptance of the electric vehicle, the population is cognizant of the ecological benefits. Likewise, the accountability lies on the Government and producers to invest in the research and development of vehicles the study also highlighted on the perception of customers towards the use of electric vehicles.

Ranjan et. al. (2013) in his study has emphasized on numerous aspects that induce the customer purchasing behavior and buying intent towards electric vehicle. Main aspects swaying customer buying behavior were recognized that E-scooters has been more suitable to the younger age group. High income group people and educated persons showed more promising intents for buying e-bikes.

3. SIGNIFICANCE OF THE STUDY:

The E-vehicle industry is in the initial growth stage in our realm. It can take the nation to a new era if the customers recognize its worth and start using only E-vehicles. The rationale behind the study is to comprehend the end user's awareness and preference about electric bikes. E-bikes have the latent to endorse environmentally friendly transportation, and the current study would explore the workable suggestion to encourage the usage and adoption of E-bike, that would contribute to the growth of E- vehicle industry.

4. OBJECTIVES OF THE STUDY:
- To understand the awareness level of consumers about the E- bike in select area of the study
- To analysis the general opinion of respondents towards E- bike, reasons to opt for and problems that sidesteps in choosing E- bike.
- 3.To find out the relation between age, gender and education with respect to Reason that influences to opt for e bike
- To provide for suggestion to stakeholders.

4.1. RESEARCH HYPOTHESES:
H_{01} – There is no significant relationship between gender and Reason that influences to opt for e bike.
H_{02} - There is no significant relationship between age and Reason that influences to opt for e bike.
H_{03} – There is no significant relationship between education and Reason that influences to opt for e bike.

4.2. OVERVIEW OF MUMBRA REGION:

Mumbra is as fast-growing town & suburb of Thane district. A town 50km north of Mumbai on the outskirts of the financial capital that have seen explosive population growth. Since last ten years the population of Mumbra has doubled. The population comprises of small businessman, NRI, salaried person, daily wage earner etc. Reality sectors has roared during last few years. The extended outskirt of Mumbai, i.e., Mumbra offers a new outlook for employment and livelihood to people and also huge number of people commute daily to their workplace thus, Mumbra is experiencing huge growth in number of vehicles and E- bike has also gained popularity due to its innovative features and environment friendliness.

4.3. SCOPE OF THE STUDY:

The study titled Understanding consumer perceptions towards E-bike with reference to Mumbra city aims to acquaint general opinion on E-bike. The study mainly aims to understand reasons to opt for E-bike and problems that sidesteps in choosing E- bike and various factors that influence the customers to support the same. The study emphasis to find out the relation between age, gender and education with respect to Reason that influences to opt for e-bike.

4.4. LIMITATIONS OF THE STUDY:
Time was the limitation.
The sampling size used for study is small, the larger size could have generated more accurate results.
There is a possibility of sample bias.
Respondents were reluctant to answer.

5. RESEARCH METHODOLOGY :
5.1. DATA COLLECTION:

Primary data - Data collection tools include both quantitative and qualitative instruments. A well-structured questionnaire was designed (pre-tested and validated) in a way to satisfy the requirement of study. Personal interviews and discussions have also been adhered to.

Secondary data - The secondary data was collected from reports, books, journals, bulletins, and other sources like online articles and newspapers, interviews on different national news channels, various published and unpublished literature and websites.

Statistical tools used - The data was analysed using MS-Excel, sorting, merging, and aggregating. Statistical tools such as tables, bar graphs, pie charts, averages, percentages, etc. have been used to analyse the collected data. Hypothesis was tested using chi-square test.

Sampling procedure: Random sampling
Area of sampling: E-bike users of Mumbra.
Sample size: 75 respondents surveyed through questionnaire
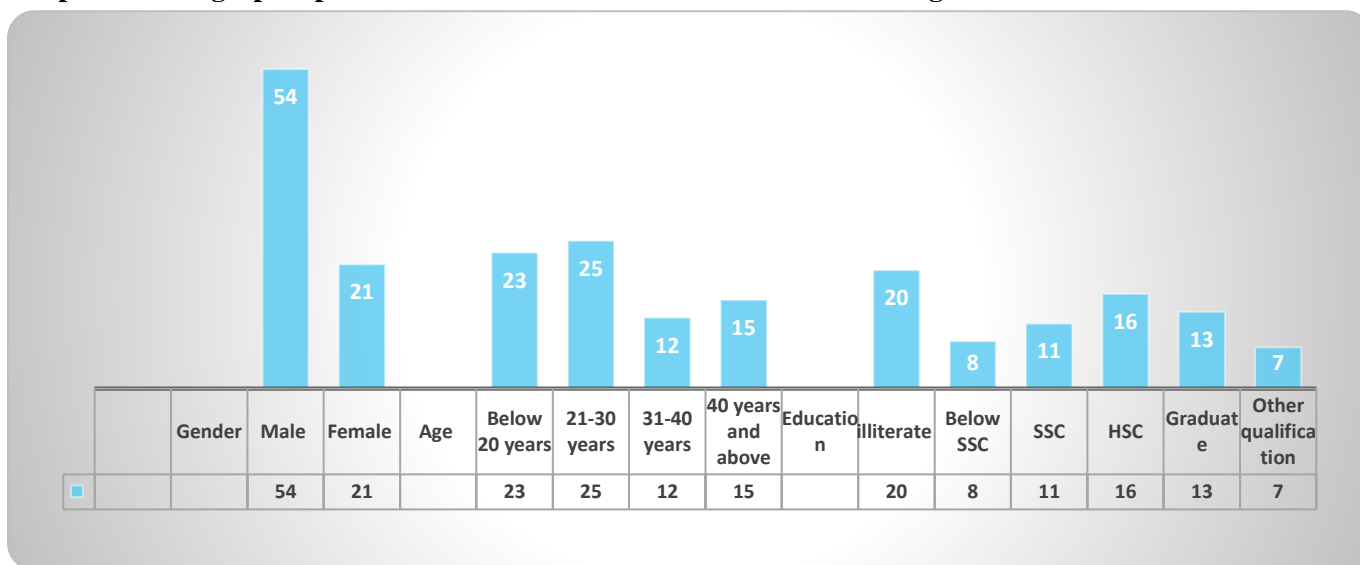**The Survey area:**
The survey area covers whole of Mumbra city.

6. DATA ANALYSIS AND INTERPRETATION:
DEMOGRAPHIC PROFILE:

The demographic profile aids to gauge the general characteristics of population i.e., gender, age and education taken into consideration.

Graph. 1- Demographic profile of the selected E-bike users of Mumbra region

|		Gender	Male	Female	Age	Below 20 years	21-30 years	31-40 years	40 years and above	Education	illiterate	Below SSC	SSC	HSC	Graduate	Other qualification
■			54	21		23	25	12	15		20	8	11	16	13	7

Source: Primary data

In the above graph, it was observed that, majority i.e., 54 respondents were males, while the remaining 21 respondents were female. It was observed that a majority counts i.e., 25 respondents belong to the age group of 21-30 years, 23 respondents belong to age group below 20 years, while 12 respondents were aged 31-40 years. The remaining 15 respondents belong to the age group of 40 years & above. The educational levels of e-bike users revealed that, 20 respondents were illiterate, 8 respondents have studied below SSC, 11 have completed SSC. Closely followed by 16 respondents having completed HSC, while graduation and other technical qualifications have been done by 13 and 7 respondents respectively.

GENERAL OPINION TOWARDS E- BIKE :
It revealed the general opinion of E-bike users related to source of awareness, period of holding E-bike, charging time and Recommendation to friends and relatives for E-bike

**Graph. 2- General opinion towards E- bike users of Mumbra Region**
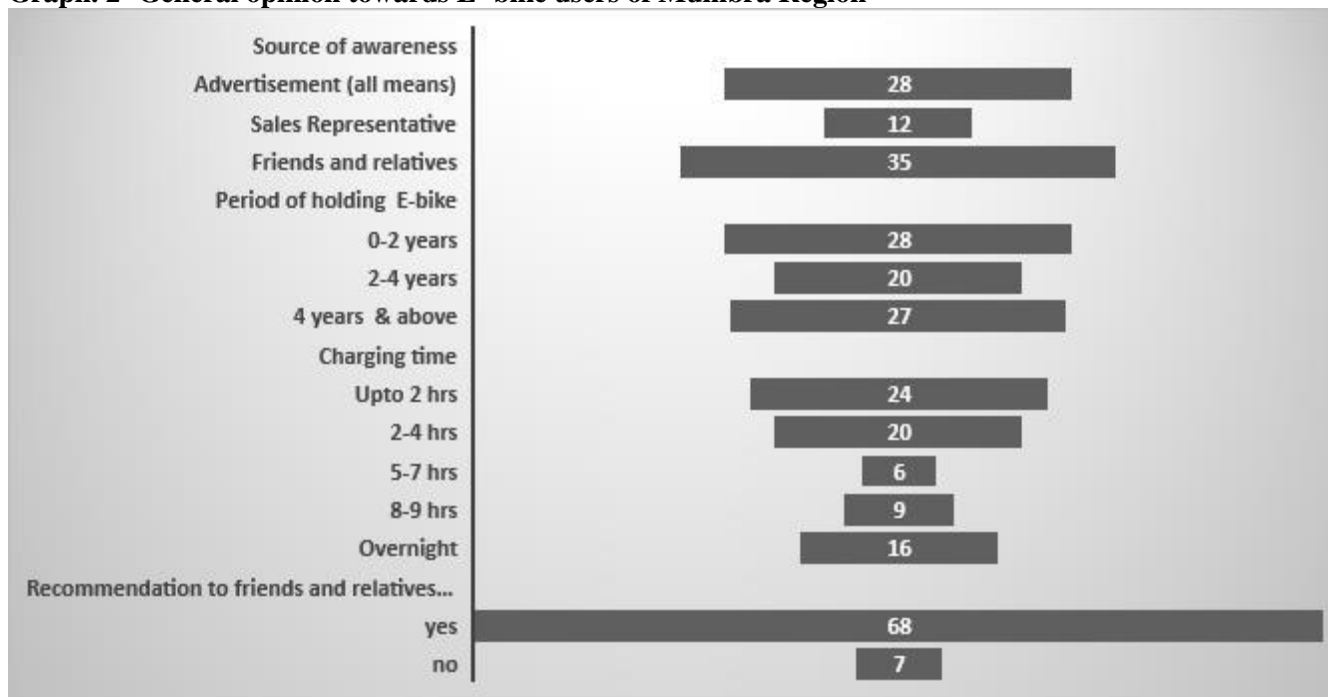
Source: Primary data

It was observed that 12 respondents are aware about E-bike through sales representative, followed by 28 and 35 respondents are aware by Advertisement (all means) and friends and relatives respectively. With respect Period of holding E-bike, it was observed that 20 respondents have held for period of 2-4 years, while 27 respondents have held for more than 4 years and above and 28 respondents have held for period of 0-2 years. It was observed that majority of 24 respondents said for charging time upto 2 hours followed by 2-4 hours by 20 respondents, 5-7 hours by 6 respondents, 8-9 hours by 9 respondents and overnight by 16 respondents. 68 respondents revealed yes and rest responded no for recommendation to friends and relatives for E-bike.

REASON THAT INFLUENCES TO OPT FOR E-BIKE:
It reveals various factors that influences respondents to opt for E-bike.

Graph. 3- Reason that influences to opt for E-bike
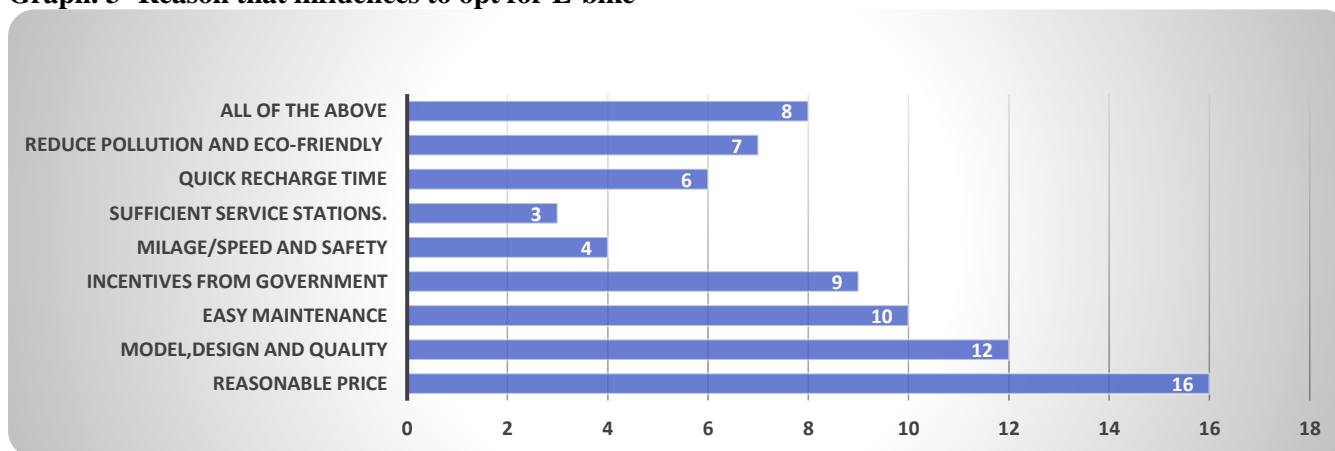
Source: Primary data

While taking into consideration reasons that influences to opt for E-bike it was observed that maximum i.e., 16 respondents have favored to reasonable price, 12 respondents opined to Model, design and quality, 10 respondents agreed to Easy maintenance, 9 respondents stated as Incentives from government as reason to opt for E-bike. 8 respondents agreed to all of the above factors, whereas, reduce pollution and Eco-friendly, Quick recharge time, Milage

/ Speed and safety, Sufficient service stations are the other reasons as specified by 7, 6, 4, 3 respondents respectively as reason that influence to opt for E-bike

REASONS/ PROBLEMS FACED DUE TO OPTING AN E-BIKE:
It represents the problems and difficulties faced by the respondents while opting for an E-bike.

Graph. 4- Reasons/ problems that evades you in opting an electric bike.
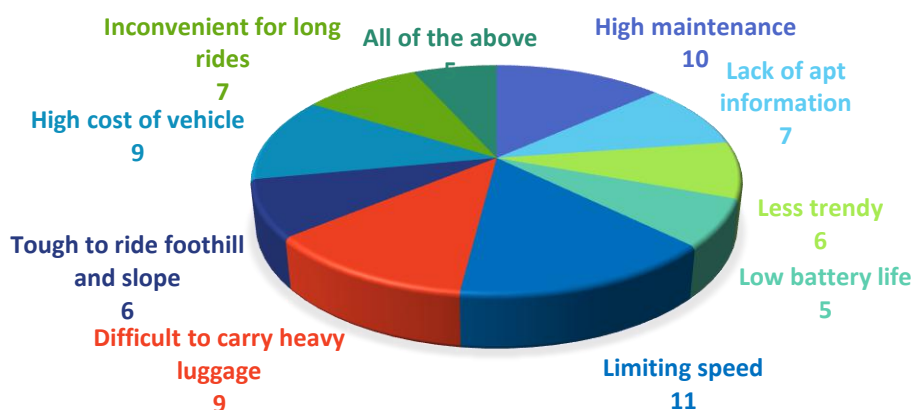
Source; Primary data

With respect to challenges, reasons/ problems that evades in opting for an electric bike, it was observed that, majority i.e., 11 respondents have faced the issue of limiting speed, 10 respondents had to bear high maintenance cost, whereas 9 respondents had difficulty to carry heavy luggage and high cost of vehicle, 7 respondents were of the opinion that they lack to apt information and is inconvenient for long rides, 6 respondents revealed as less trendy and tough to ride foothill and slope whereas 5 respondents alleged to low battery life and all of the above

7. HYPOTHESES TESTING:
Hypothesis of study was validated with the help of chi- square

1. GENDER AND REASON THAT INFLUENCES TO OPT FOR E-BIKE:
In order to examine the relationship between gender and reason that influences to opt for E-bike the following hypothesis is proposed:
H_{01} – There is no significant relationship between gender and reason that influences to opt for E-bike.
H_{A1} – There is significant relationship between gender and reason that influences to opt for E-bike.

The below table represents data of age and reason that influences to opt for E-bike

Table no.1- Gender and reason that influences to opt for E-bike

Gender	Reason able price	Model, design and quality	Easy mainte nance	Incentive s from governme nt	Milage, Speed and safety	Sufficient service stations	Quick recharg e time	Reduce pollution and Eco-friendly	All of the above	Total
Male	6	11	9	6	3	3	4	5	7	54
Female	10	1	1	3	1	0	2	2	1	21
Total	16	12	10	9	4	3	6	7	8	75

Source- primary data

Interpretation
Independence (Association), using χ^2 distribution (DF=8) (right-tailed)
1. Since p-value < α, H_{01} is rejected. The statistical model does not fit the observations
A significant association was found between gender and reason that influences to opt for E-bike

---

2. The p-value equals **0.04678**, $(p(x \leq \chi^2) = 0.9532)$. It means that the chance of type I error (rejecting a correct H_{01}) is small: 0.04678 (4.68%). The smaller the p-value the more it supports H_{A1}.

3. The test statistic χ^2 equals **15.71**, which is not in the 95% region of acceptance: $[-\infty : 15.51]$.

4. The observed effect size phi is large, 0.46. Cramer's V effect size is 0.46. This indicates that the magnitude of the difference between the observed data and the expected data is large.

2. AGE AND REASON THAT INFLUENCES TO OPT FOR E-BIKE:

In order to examine relationship between age and reasons to migrate the following hypothesis is proposed:

H_{02} –There is no significant relationship between age and reason that influences to opt for E-bike.

H_{A2}– There is significant association relationship age and reason that influences to opt for E-bike.

The table below represents the data of age and reason that influences to opt for E-bike.

Table no.2 - Age and reason that influences to opt for E-bike

Age	Reasonable price	Model, design and quality	Easy maintenance	Incentives from government	Milage, Speed and safety	Sufficient service stations	Quick recharge time	Reduce pollution and Eco-friendly	All of the above	Total
Below 20 years	2	7	1	3	2	1	2	1	4	23
21-30 years	10	0	1	3	1	1	2	4	3	25
31-40 years	2	4	1	2	0	1	1	0	1	12
40 years and above	2	1	7	1	1	0	1	2	0	15
Total	16	12	10	9	4	3	6	7	8	75

Source- primary data

Interpretation:

Independence (Association), using χ^2 distribution (DF=24) (right-tailed)

1. Since p-value $< \alpha$, H_{02} is rejected. The statistical model does not fit the observations

A significant association was found between Age and reason that influences to opt for E-bike

2. The p-value equals **0.01613**, $(p(x \leq \chi^2) = 0.9839)$. It means that the chance of type I error (rejecting a correct H_{02}) is small: 0.01613 (1.61%). The smaller the p-value the more it supports H_{A2}.

3. The test statistic χ^2 equals **41.13**, which is not in the 95% region of acceptance: $[-\infty : 36.42]$.

4. The observed effect size phi is large, 0.74. Cramer's V effect size is 0.43. This indicates that the magnitude of the difference between the observed data and the expected data is large.

3. EDUCATION AND REASON THAT INFLUENCES TO OPT FOR E-BIKE:

In order to examine the relationship between education and reason that influences to opt for E-bike the following hypothesis is proposed and tested.

H_{03} – There is no significant relationship between education and reason that influences to opt for E-bike.

H_{A3}– There is significant relationship between education and reason that influences to opt for E-bike.

The table below represents the data of Education and reason that influences to opt for E-bike.

Table no.3-Education and reason that influences to opt for E-bike

Education	Reasonable price	Model, design and quality	Easy maintenance	Incentives from government	Milage, Speed and safety	Sufficient service stations	Quick recharge time	Reduce pollution and Eco-friendly	All of the above	Total
Illiterate	5	2	1	4	2	0	2	3	1	20
Below SSC	1	1	1	1	0	1	1	0	2	8
Ssc	3	3	0	2	0	0	1	1	1	11
Hsc	3	5	1	1	1	0	1	2	2	16
Graduate	1	1	6	1	1	1	0	1	1	13

Other qualification	3	0	1	0	0	1	1	0	1	7
Total	16	12	10	9	4	3	6	7	8	75

Source- primary data

Interpretation

Independence (Association), using χ^2 distribution (DF=40) (right-tailed)

1. Since p-value > α, H_{03} is accepted. The statistical model fits the observations. There is not enough evidence to suggest an association between Education and reason that influences to opt for E-bike

2. The p-value equals **0.4846**, $(p(x \leq \chi^2) = 0.5154)$. It means that the chance of type I error, rejecting a correct H_{03}, is too high: 0.4846 (48.46%). The larger the p-value the more it supports H_{03}.

3. The test statistic χ^2 equals **39.678**, which is in the 95% region of acceptance: $[-\infty: 55.758]$.

4. The observed effect size phi is large, 0.73. Cramer's V effect size is 0.33. This indicates that the magnitude of the difference between the observed data and the expected data is large.

Table no. -Summary of outcomes of Hypothesis test

Hypothesis	Null Hypothesis Accepted/Rejected	Outcome
H_{01}	Rejected	There is a significant relationship between gender and reason that influences to opt for E-bike
H_{02}	Rejected	There is a significant relationship between age and reason that influences to opt for E-bike
H_{03}	Accepted	There is no significant relationship between education and reason that influences to opt for E-bike

8. FINDINGS:
- A well-structured survey has been done to achieve the objectives of research.
- Based on the data collected and validated, it is opined that, majority of the respondents were males, maximum respondents belong to the age group of 21-30 years. The educational levels of e-bike users revealed that maximum respondents were illiterate.
- With respect to general opinion of E-bike users related to source of awareness, majority of respondents were aware about E-bike through Advertisement (all means), While analyzing period of holding of E-bike, it was observed that maximum respondents have held E-bike for period of 0-2 years, most of respondents are of opinion that E-bike takes charging time of max 2 hours, whereas 91% of respondents stated that they would recommend E-bike to friends and relatives.
- While taking into consideration reasons that influences to opt for E-bike, majority respondents have favored to reasonable price followed by Model, design and quality, Easy maintenance, incentives from government as reason to opt for E-bike, reduce pollution and Eco-friendly, Quick recharge time, Milage / Speed and safety and Sufficient service stations.
- With respect to challenges, reasons/ problems that evades in picking an electric bike, it was observed that, majority respondents have faced the issue of limiting speed followed by high maintenance, difficulty to carry heavy luggage.
- On the basis of Hypothesis test it is proved that there is a significant relationship between gender and reasons that influences to opt for E-bike, age and reasons that influences to opt for E-bike, whereas there is no significant relationship between education and reason that influences to opt for E-bike.

9. SCOPE FOR FURTHER STUDY:
The scope of study can be extended outside Mumbra city.
A bigger sample including diverse aspect of E-vehicle can be studied.

10. SUGGESTIONS :
      It is essential is to take tangible steps to upsurge the level of awareness on the aids of E- vehicles among the individuals. Therefore, the E-bike producer and manufacturers must pledge to awareness drive by highlighting the

economic feasibility of the product against the mounting fuel price. In order to reach a wider potential customer base, Companies must tie-up with environmentalists to make one understand environment-friendly living and pollution free option of electric vehicles, provide for freebies to test ride and rewards and recognition for referral marketing. The E-bike producer and manufacturer should ensure for better finance options and EMI to customers by teaming up with bank and financial Institution.

11. CONCLUSION:

Electric vehicle can unravel universal problem of petroleum /fuel availability and increasing pollution. The world can move ahead to new era if customers comprehend the worth of E- vehicle considering the positive environmental effect, price and set new trends for buying E-vehicle. Validated results of Chi-square test directed to conclude that reasonable price, model, design and quality, easy maintenance, incentives from government, reduced pollution and eco-friendly, quick recharge time, milage / speed and safety and sufficient service stations are some of the reasons for the consumers to opt for E-bike, whereas, the challenges, reasons/ problems that evades to opt an electric bike, was limiting speed followed by high maintenance, and difficulty to carry heavy luggage etc. Overall, it is clinched that yet most of the people prefer another vehicle over E-bike due to consternation about its durability and quality.

REFERENCES:

1. Bansal P, Kumar RR, Raj A, Dubey S, Graham DJ. Willingness to Pay and Attitudinal Preferences of Indian Consumers for Electric Vehicles. Energy Econ. 2021; 100:105340.
2. Bhalla et.al. (2018). A Study of Consumer Perception and Purchase Intention of Electric Vehicles. European Journal of Scientific Research ISSN 1450-216X / 1450-202X Vol. 149 No 4 July 2018, pp. 362-368.
3. Bhalla, R. K. (2013). *Advanced Educational Methodology*, New Delhi: Kanishka Publications distributors.
4. Ghasri, M., Ardeshiri, A., & Rashidi, T. (2019, Dec). Perception towards electric vehicles and the impact on consumers' preference. Transportation Research: Part D., 77, 271-291. doi:10.1016/j. trd.2019.11.003
5. Kavitha S, (2016), A study in customer perception towards electric two-wheeler vehicles in Vellore City: A study on go green battery-operated vehicles; (Vol. 2; Issue 5)
6. Kumar, M., & Prakash, S. (2020). Bumps and humps in electric two-wheeler adoption. Retrieved from Deccan Herald:https://www.deccanherald.com/opinion/panorama/bumps-and-humps-in-electric-two-wheeleradoption-795308.html
7. Kishore S, Tupe O. (2020), Consumer perception of electric vehicles in India. European J Mol Clin Med.; 7(8):4861–9.
8. Kothari, C. R. (2014) *Research methodology: Methods and techniques*. New Delhi: New Age International (P) Ltd., Publishers.
9. Nagpal A. (2021), Consumers' Perception towards Electric Vehicles in India;57(1):4043–50.
10. NITI Aayog & World Energy Council. (2018). Zero Emission Vehicles (ZEVs): Towards a Policy Framework. Niti Ayog. Retrieved from http://niti.gov.in/writereaddata/files/document_ publication/EV_report.pdf
11. Pretty Bhalla, (2018), A study of consumer perception and purchase Intention of Electric vehicles, pp-362-368;(Vol.149)
12. Parmar A, Pradhan T. (2021) A study on consumer perception towards vehicle in Vadodara city. International Journal of Creative Research Thoughts; 9(5):2320–882.
13. Ranjan, P., Bhatnagar, Y., & Sehdev, R. (2013, June). Assessment of Consumer Buying Behaviour Towards Electric Scooters in Punjab. CLEAR International Journal of Research in Commerce & Management., 4(6).
14. Selvi, (2017) a study in customer satisfaction towards electric bike with special reference to Coimbatore city, International Journal of Applied Research 2017; 3(5): 355-359
15. Sharma and Maheshwari (2014). A Study on The Customer's Awareness and Perception Level Towards Green Cars. International Journal of Technology Enhancements and Emerging Engineering Research, Vol 2, Issue 5.
16. Varghese AT, Abhilash VS, Pillai SV. (2021) A Study on Consumer Perception and Purchase Intention of Electric Vehicles in India. Asian J Econ.;4(2):13–25.