
Customer perception towards electric two-wheeler innovation

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Abstract: The research paper titled a study on customer's perception towards electric two-wheeler. The objective of the study is to identify the factors that influence electric bikes purchase. Explanatory research is applied using convenience method of sampling with 145 respondents. The tools used of the study is frequency analysis, independent T-test, one-way ANOVA, regression analysis. It is found that factors related to customer perception are charging time, a smaller number of models, distance travelled for one full charge and environmental concern.

Keywords:customer perception,two-wheeler

INTRODUCTION

The innovation of internal combustion engine is one of the best creations of humankind. The vehicles that we use nowadays may give us a good performance but are the major cause for poor efficiency and environmental pollution across the country.

The basic objectives of the study are to analyse consumer perception towards Electric two wheelers and for improving B2B sales of Electric Two wheelers and to identify the means to enhance the consumer awareness level towards electric vehicles. An Exploratory research was conducted with a sample of 50 respondents conveniently selected from Chennai City. A structured questionnaire was administered to capture the primary data from the selected respondents.

Even though in each Bharat Stage (BS) level they try to decrease the fuel consumption and carbon emissions they cannot completely get rid of that. So, decreasing the fuel consumption and carbon emissions are the most important goal among the present-day plan across the globe.

For the future of the country, an efficient and eco-friendly electric two wheelers are designed and manufactured. This study is based on customer's perception towards electric bikes in Chennai city with a sample of 145 respondents. The study concludes that that people's perception about the product is negative but with the support coming forward from the Central govt. and ever-increasing prices of petrol, sooner or later the electric bike industry is going to grow drastically.

While the market's abounds in motorbikes, electric bikes will soon be the mode of commutation for almost every household. Electric bikes are like ordinary bikes just that they run on chargeable batteries instead of fuel. These bikes have a motor that is activated by a throttle. These bikes are struggling to stand in the market, despite their popularity. Electric bikes usually have different kinds of batteries, these vary according to the total charge, capacity, voltage, etc. The charging takes about 8 hours for full charge, but people are working on this. The noise of these electric bikes is almost negligible and when turned to high speed it sounds like a spaceship.

Electric bikes and bicycles alike serve many purposes in our world. Some are considered a tool with which the rider makes a living or a mode of transportation with roots in a cleaner technology. For others, it simply serves a recreational or leisurely purpose or as a way to experience the world around them. With over one billion bicycles in the world and 40 million of them expected to be electric bikes by 2023, it is incredible to see how far electric bikes have come and just how far they can take us.

Today, worldwide production and usage of electric bicycles is steadily rising with riders new and old integrating ebikes into their lives. With the assistance of an electric motor, biking is now considered more accessible to riders of all ages and backgrounds. Even mountain biking is growing in popularity due to the addition of ebikes and fat tire bikes, making it possible for more people to participate in the sport. Commutes by bike that would be too far, too long, or too slow are made possible with an ebike. Many other modern ebikes are designed with city riding and commuting use in mind. With the benefits, comfort, and efficiency of ebikes, combined with the componentry and infrastructure designed to get people from point-A to point-B, many riders have adopted an electric bike for day-to-day city riding.

In addition to people's day to day transportation, electric bikes offer a cleaner alternative of transport for commerce and products. With cargo bikes and commercial trikes revolutionizing the way commerce flows, no

longer are racks on bikes just for a change of clothes or a personal bag. Electric bikes allow their riders to leverage efficiency and manoeuvrability of a bicycle but harness the power of their motor to greatly enhance the capacity for transporting heavy cargo and goods both near and far.

With electric bikes, people can ride for pleasure, they can ride to work, or they can ride for work. But even more powerful is the fact they have the ability to change the way people live their lives and have shown time and time again to do so. A history and a legacy of trial-and-error, countless designs, and a multitude of models, styles, and applications, electric bikes have come a long way in a hundred and twenty years. Even more exciting than the history is the future of ebikes and where they will be able take us.

REVIEW OF LITERATURE

(Nagendran and Senthil Kumar, 2010) performed experimental studies on Electric Bike which has an alternative source of Battery-operated cycle. They found that the design of E-bike was more efficient than normal Bicycle. Electric bike was the hybrid one so it was electrically operated and also pedal operated.

(Devshete et al., 2019) introduce the concept of electric bike. He converted the normal bicycle in to electrical one with an innovative approach. Charging of Battery was provided by three ways i.e. by means of wall charging, solar charging and by mechanical pedal. Main focus of concept was on System Architecture, operational Concept and Battery Management. Use of PIC15F72 controller was used for over current protection and under current protection which is helpful.

(Paladini et al., 2008) introduce an alternative powertrain in which electric vehicle was powered by fuel cell. Power train behaviour was developed on MATLAB/SIMULINK. As per the powertrain during acceleration power is demanded from battery, during deceleration battery is being charged. Powertrain was selected on certain parameters such as varying for input parameter, fuel cell efficiency, battery minimum state of charge, number of fuel cell active area, from this they obtain good fuel economy and final battery state of charge.

(Evtimov et al., 2015) they studied consideration of energy efficiency on an experimental bicycle. the bicycle was fitted with board computer to store information about motion and energy consumption. Experiment was carried for three types of city routes. Without regeneration of energy the electric bicycle could go up to 35 km studies show that use of electric bicycle could reduce the pollution up to 10 time compared to conventional vehicles.

(Halvorson and Hungate, 2002) it is advisable to create a sustainable program for reaching a wide range of prospective customers, such programs with a wide range and right target can create a positive perception in electric vehicle potential customers

(Kurani et al., 1996) suggested that to assess the effectiveness, efficiency, and feasibility of electric vehicles awareness program it is important to work in proper Local context and resources.

(Ramachandra and Shwetmala, 2009) This paper focuses on the statewide road transport emissions (CO₂, CH₄, CO, NO_x, N₂O, SO₂, PM and HC), using region specific mass emission factors for each type of vehicles. The country level emissions (CO₂, CH₄, CO, NO_x, N₂O, SO₂ and NMVOC) are calculated for railways, shipping and airway, based on fuel types. In India, transport sector emits an estimated 258.10 Tg of CO₂, of which 94.5% was contributed by road transport (2003–2004). Among all the states and Union Territories, Maharashtra's contribution is the largest, 28.85 Tg (11.8%) of CO₂, followed by Tamil Nadu 26.41 Tg (10.8%), Gujarat 23.31 Tg (9.6%), Uttar Pradesh 17.42 Tg (7.1%), Rajasthan 15.17 Tg (6.22%) and, Karnataka 15.09 Tg (6.19%). These six states account for 51.8% of the CO₂ emissions from road transport.

(Saxena et al., 2014) This study uses detailed vehicle powertrain models to estimate per kilometer electrical consumption for electric scooters, 3-wheelers and different types of 4-wheelers in India. The powertrain modeling methodology is validated against experimental measurements of electrical consumption for a Nissan Leaf. The model is then used to predict electrical consumption for several types of vehicles in different driving conditions. The results show that in city driving conditions, the average electrical consumption is: 33 Wh/km for the scooter, 61 Wh/km for the 3-wheeler, 84 Wh/km for the low power 4-wheeler, and 123 Wh/km for the high power 4-wheeler. For highway driving conditions, the average electrical consumption is: 133 Wh/km for the low power 4-wheeler, and 165 Wh/km for the high power 4-wheeler. The impact of variations in several parameters are modeled, including the impact of different driving conditions, different levels of loading by air conditions and other ancillary components, different total vehicle masses, and different levels of motor operating efficiency.

(Majumdar et al., 2016) This study discusses the performance of the electric two-wheeled vehicles on the basis of their running conditions in present day traffic in the urban regions. In this study, survey based results and experimental outcomes were compared with that of the conventional IC engine counterpart for the road conditions in the city of Kolkata. The specific energy consumption of the electric variants were found to be 155.64kJ/km and 114.5kJ/km from the experimental and survey results, respectively, compared to 810kJ/km of the conventional two-wheelers. The specific energy cost and the specific CO₂ emission were also obtained by this study.

(Greaves et al., 2014) This paper assesses the extent to which current car travel needs could be met by BEVs for a sample of motorists in Sydney assuming a home-based charging set-up, which is likely to be the primary option for early adopters of the technology. The approach uses five weeks of driving data recorded by GPS technology and builds up home-home tours to assess the distances between charging possibilities. An energy consumption model based on characteristics of the vehicle, and the speeds recorded by the GPS is adapted to determine the charge used, while a battery recharge function is used to determine charging times based on the current battery level. Among the most pertinent findings are that over the five weeks, (i) BEVs with a range as low as 60 km and a simple home-charge set-up would be able to accommodate well over 90% of day-to-day driving, (ii) however the incidence of tours requiring out-of-home charging increases markedly for vehicles below 24 kWh (170 km range), (iii) recharge time in itself has little impact on the feasibility of BEVs because vehicles spend the majority of their time parked and (iv) effective range can be dramatically impacted by both how a vehicle is driven and use of electrical auxiliaries, and (v) while unsuitable for long, high-speed journeys without some external re-charging options, BEVs appear particularly suited for the majority of day-to-day city driving in big cities where average journey speeds of 34 km/h are close to optimal in terms of maximising vehicle range.

(Bishop et al., 2011) This work presents the findings of a small-scale electric scooter trial in Oxford, United Kingdom. The trial scooters were instrumented with global positioning satellite data loggers and energy meters to record their time of day usage and charging regimes. The scooters were most likely driving at 09:00, 12:45 and 17:15 and charging at 10:15–10:40. The electric scooter normalized mains-to-wheel energy use was 0.10 kWh km⁻¹. The electric scooter total operating costs (electricity and battery replacement) of £0.045 km⁻¹ is 24% greater than the best selling equivalent petrol motorcycle and 1.7 times lower than the best selling car. The electric scooter uses 0.45 MJ km⁻¹, or 2.9 times and 6.1 times less than the petrol motorcycle and car, respectively. Further, the electric scooter can achieve zero carbon dioxide equivalent (greenhouse gas, GHG) emissions when electricity from renewable energy sources is used. In 2008, there were 247 000 motorcycles in the UK vehicle fleet of equivalent size to the trial scooter. Scaling up the electric vehicle fleet size accordingly would avoid 0.60 billion car or motorcycle kilometres and 54–110 kt associated GHG. The fleet would require 59 GWh, or 0.015% of total annual generation with a time-shifted, peak demand of 250 MW, or 0.44% of the 58 GW maximum national demand.

RESEARCH METHODOLOGY AND DATA ANALYSIS

The research design used here was the causal design of the research. This type of research is used to measure the impact of a specific change on existing standards and assumptions. Most social scientists are seeking causal explanations that reflect the test of hypotheses. Our research idea is based on the rich knowledge acquired by our peer teams across the university. (A.C.Gomathi, S.R.Xavier Rajarathinam, A.Mohammed Sadiq, Rajeshkumar, 2020; Danda et al., 2009; Danda and Ravi, 2011; David et al., 2020; Dua et al., 2019; Ezhilarasan et al., 2019; Krishnan and Chary, 2015; Manivannan, I., Ranganathan, S., Gopalakannan, S. et al., 2018; Narayanan et al., 2012, 2009; Neelakantan et al., 2013, 2011; Neelakantan and Sharma, 2015; Panchal et al., 2019; Prasanna et al., 2011; Priya S et al., 2009; Rajeshkumar et al., 2019; Ramadurai et al., 2019; Ramakrishnan et al., 2019; Ramesh et al., 2016; Venugopalan et al., 2014)

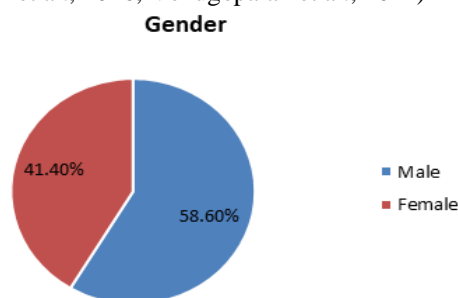


Fig.1: The above pie chart indicates the gender of the respondents. It is clear that majority of the respondents are male (58.6%) and minority of the respondents are female (41.4%).

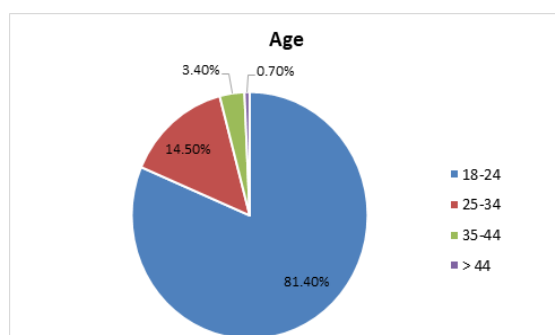


Fig.2: The above pie chart indicates the age group of the respondents. It is clear that majority of the respondents are those whose age group lies between 18-24 years old(81.4%) followed by the age group which lies between 25-34 years old(14.5%) and followed by the age group which lies between 35-44 years old(3.4%) and followed by the age group which lies above 44 years old(0.7%).

REGRESSION TEST

DEPENDENT VARIABLE: People’s Purchase Perception

INDEPENDENT VARIABLE:Charging Time, Number of Models, Distance Travelled, Environmental Concern.

Table 1: Model Summary

INFERENCE:

The above tables provide the R and R² values. The R value represents the simple correlation and is 0.426 (“R” column), which indicates the degree of correlation. The R² value (the “R square” column) indicates how much of the total variation in the dependent variable can be explained by the independent variable. In this case 18.1% can be explained, which is average.

Model	R	R Square	Adjusted R Square	Significance
1	.426 ^a	.181	.158	0.00

Table 2: Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.513	.407		3.719	.000
	Charge	.199	.093	.201	2.141	.034
	Models	.166	.091	.175	1.823	.070
	Distance	.074	.083	.081	.900	.370
	Env.concern	.183	.091	.159	2.025	.045

INFERENCE

The above table indicates regression analysis with B & Beta value for the independent and dependent variable which are assumed. From the analysis it is found that charging time (0.201) is having strong positive linear relationship with respect to people’s purchase perception followed by environmental concern (0.159). Number of models and distance travelled are not having significant impact on people perception about electric bikes as the P value found insignificant.

DISCUSSION

It is found that charging time (0.201) is having strong positive linear relationship with respect to people’s purchase perception. It is found that if charging time is reduced people will come forward to buy electric bikes, followed by number of models (0.175), yes electric bikes have very low no. of models which leads in not buying e-bikes, followed by environmental concern (0.159) and distance travelled (0.081).

CONCLUSION

In India, two-wheelers occupy around 76% of the vehicle population, consuming more petroleum fuels (mainly gasoline) and emitting a lot of pollutants. The best way to improve the efficiency and to reduce pollution is to eliminate the idling losses and inefficient engine operation.

The adoption of plug-in hybrid technology for two-wheelers in India would result in a substantial reduction of greenhouse gas emissions and dependency on petroleum oil to a large extent.

Electric Bike industry is in nascent stage still in India, with lots of apprehension about its durability and quality being offered. While doing this study it became more and more clear that lack of awareness, regulatory authority, quality issues are some of the biggest challenges in front of the industry. But with ever increasing Petrol prices and high pollution, sooner Electric Bikes are going to put a serious challenge to the Petrol Bikes. At this stage the primary focus of the company shall lie on R&D, improving quality and educating people. So with Government support in the form of developing the necessary infrastructure and subsidy to the end customer, there is possibility of Electric Bike Industry is getting ready for a golden future.

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