

# A Survey on Consumer Awareness Towards Electric Bikes with Special Reference To Tirunelveli District

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**Abstract-** An investigation into consumer awareness of electric bikes in Tamil Nadu's Tirunelveli District. From the days of walking to the numerous modes of modern transportation in the globalization era, travel has gone a long way. In the past, people used to walk wherever they went. Back then, people used to travel by using natural resources without harming the environment. The world's modes of transportation have completely changed with the march of time. Technological advancements are heavily utilized in the transportation industry's base of production to improve vehicle performance. Many different makes and models of cars have been utilized for transportation in the nation. The study employed percentage analysis and weighted average analysis as statistical methods. The research challenge can be solved methodically with the help of this design. It consists of the general research design, sample techniques, data-gathering strategy, and analytic technique. In this study, an empirical research methodology is employed to pinpoint the purchasing patterns of consumers in the Tirunelveli area between the ages of 18 and 31. This study examined and assessed how consumers felt about various aspects of electric bikes. According to the study's findings, that aspect has both a good and a negative impact on consumer contentment. Since the majority of the respondents in this study take into account price and mileage when buying a new bike, there is a large market for electric bikes in the two-wheeler sector. However, one of the things that have an impact on the sales of electric bikes is their battery. The majority of customers are drawn in by the advertising produced by electric bike dealers and businesses.

**Keywords-** natural resources, manufacturing, electric bike, industries, dealers

## I. INTRODUCTION

BEVs are electric vehicles that run only on batteries; they lack the conventional internal combustion engine (ICE) and must be hooked to an external source of energy to recharge their batteries. The BEV's range is directly impacted by the battery's capacity. A BEV may typically travel 100–250 kilometers on a single charge. High-range BEV variants are also available, but their cost is a trade-off because they are regarded as luxury vehicles and typically come with a heavy

price tag. To slow down the vehicle using the engine and recover some power that is then converted to heat, BEVs, like all other electric cars, may recharge their batteries using regenerative braking. BEV benefits include easy operation, straightforward construction, and zero noise emissions. Aside from being environmentally beneficial, it doesn't emit any greenhouse gases. Given its advantages and its one drawback, which is a shorter range per charge, it is the ideal solution for urban households.

Regular recharges are required for electric vehicles, which can be done at home, at work, while out shopping, or at other sorts of travel pauses. The lengthy charging time required for EVs—up to eight hours on average for a full charge when utilizing Level 1 "slow" chargers—has been an ongoing problem. Given that everyday driving is frequently within the range of the majority of EV models and all PHEV models, there might not be a great demand for accessible fast-charging stations. However, faster charging is desired but not always necessary. Fast charging also worsens battery stress and deterioration.

EVs can use discharging and charging to communicate with the grid. The first mode, known as G2V, relates to charging a vehicle from the grid, whereas V2G describes power discharge from a vehicle to the grid. The V2G mode can alternatively be thought of as bidirectional charging, allowing an EV to periodically charge from and unload to the grid. Other charging methods include regulated charging and car-to-building (V2B). While regulated charging collects grid data to optimize charging time and speed depending on grid congestion, V2B relates to a home capacity battery usage without any input to the grid. Bi-directional charging is currently only used in a small number of charging systems worldwide, but numerous testing initiatives are under progress. By 2030, 160 million EVs are expected to be in use worldwide, resulting in a considerable increase in EV energy storage capacity, according to REmap.

## II. LITERATURE REVIEW

Rakesh Kumar et.al 2019 Global pollution is increasing, and every attempt is being made to reduce CO2 emissions and rescue the planet. The introduction of EVs is

one such initiative. Since the transportation industry is one of the biggest emitters of CO<sub>2</sub>, it's crucial to cut back. The government has developed ambitious plans to introduce electric vehicles (EVs) to the Indian market and keep up with the global adoption of EVs. An extensive report on EVs is part of the National Electric Mobility Mission Plan 2020. India faces a significant obstacle in its transition to EVs from internal combustion engines (ICE). Along with extensive planning, this requires R&D. Range anxiety should be effectively managed via charging infrastructure.

Masurali et.al 2018 India makes up over 18% of global carbon emissions from the transportation sector alone. One of the most practical alternative options to overcome problems is the electric vehicle (EV). Many automakers are introducing EVs and diversifying their product lines. Promoting EVs may help lessen the nation's reliance on fossil fuels and pollution, which is good for both customers and the economy. People's level of awareness of EVs is substantially more influenced by their education. Government should work hard to raise awareness and shape favorable attitudes among prospective customers in addition to manufacturers.

Pritam et.al 2018 Indian Scenario differs because EV/PHEVs now have a share of the market of less than 1%. Almost all cars nowadays consider using fossil fuels for propulsion. These contribute to global warming by polluting the atmosphere by releasing greenhouse gases. Domestic petroleum output and consumption are diverging at an increasing rate. India imports over 70% of its annual oil needs. Therefore, there is a pressing need to look into the factors.

Mohamad et.al 2018 Electric engines will replace internal combustion engines (ICE) in a way that greatly reduces pollution and benefits consumers. This technology has been adopted by numerous nations, which is helping the environment. The study observed the opportunities and difficulties associated with deploying EVs in India. Government initiatives, batteries, industries, and the environment have all been taken into consideration. With these difficulties, factors including the price of EVs, their effectiveness in India, and demand for EVs were taken into account. India's adoption of EVs is primarily intended to reduce greenhouse gas emissions and oil costs. The government must make the most of the chances at hand and develop effective solutions to the problems.

Lingzhi Jin et.al 2017 The early market growth for electric vehicles is still present, but a variety of obstacles are keeping them from becoming widely used. These obstacles include the new technology's higher price, relative annoyance as compared to range and recharge durations, and consumer

ignorance of the technology's practicality and availability. This final point—often referred to as "customer awareness"—is extremely important.

Fanchao Liao et.al 2017 The widespread use of EVs could help reduce issues like environmental pollution, global warming, and dependence on oil. Even though governments have significant promotional policies in place, EV penetration is still relatively low. They presented a thorough analysis of studies on consumer choices for EVs to inform policy-makers and provide guidance for future studies. They examined the psychological and economic perspectives on why people prefer electric vehicles. According to most studies, an EV's purchase and running costs, charging time, vehicle performance, and brand diversity on the market all have a substantial impact on how useful they are. The usefulness and promotion of EVs are also positively impacted by the number of charging points. Tax reductions and incentive schemes have a significant impact.

Phillipe Leabeau et.al 2015 Urban movement is significantly impacted by freight transit. The potential use of electric cars in urban logistical operations was investigated by researchers. The opportunity exists to lower last-mile expenses by using a fleet with a variety of technologies. A fleet size and mix vehicle routing problem with time windows for EVs was provided by the researcher. The authors' primary contribution was taking into account the range fluctuation of EVs. Electric vehicles are frequently the most competitive tech in the compact van categories. In the market for large vans, diesel has emerged as the most lucrative option because electric cars would need to go further to be cost-competitive.

Rezvani et.al 2015 Provide an overview of EV adoption research, but they only concentrate on psychological aspects that are unique to each person and that affect people's intentions to embrace electric vehicles, and they only pick a few sample studies. It is complemented by our overview in the following ways: First, we examine more than only psychological dimensions that influence EV adoption; second, we give a thorough overview of current studies by compiling all scientific research on electric vehicle choices that are currently available.

Ghasri et al. 2019 Consumer study desire have looked at the financial, technological, fundamental, and political aspects of EVs to assist governments and automakers in assessing consumer choices. Several factors impacting EV purchasing decisions were discovered, including driving range, recharge time, and ownership expenses. Some researchers have examined the variation in consumer

preferences while selecting to buy an electric vehicle by utilizing expressed preference approaches.

M Pierre et.al 2011: Comparable situations have happened throughout the past few decades; they were undoubtedly more modest but full of learning. For example, in the 1990s, certain local governments pushed innovations based on electric vehicles, and some individuals decided to use these cars for their everyday commutes. We plan to present research from studies done in 2006 and 2008 to explain the drivers' creative modal choice, highlight the challenges they faced at the time, and analyze the usage patterns that influenced their mobility and use of electric cars.

Seref 2011 Hybrid electric vehicles generate their power from two or more primary movers. The powertrain design and level of hybridization can be used to categorize hybrid electric vehicles. The use, degree of hybridization, and energy management strategy all affect the benefits and drawbacks of various varieties. Different architectures, including series hybrid, parallel hybrid, series-parallel hybrid, and complex hybrid, are created by the various ways in which hybridization can take place.

Franke et.al 2010 The introduction of electric vehicles can be seen as a security precaution and a guarantee of future security from an environmental standpoint, given the rise in high CO<sub>2</sub> emissions and the degradation of fossil fuel reserves. The technology that will be used in the future EV is quite advanced and on the upswing, allowing for efficient and comfortable long-distance travel.

### III. METHODS

#### 3.1 Manufacturing analysis:

An electric bike is abbreviated as E-Bike. In the year 1980, Switzerland created the electric bicycle. It is a battery-powered vehicle with little maintenance requirements and is also very cost-effective. The use of this vehicle virtually eliminates emissions. It functions primarily by transforming electrical energy into mechanical energy. An electric battery is crucial in this situation. It is simple to use a power connection to easily charge the car's battery. There are many different sorts of automobiles available today, each with its technology. Depending on the technologies a particular car uses, the price will vary from one to the next. Almost any pedal cycle can be equipped with an electric power-assist system employing a chain drive, belt drive, hub motor, or friction drive. The legal classifications that are accessible have an impact on the power levels of motors used, which are frequently restricted to under 700 watts..

#### 3.2 Rechargeable batteries for E-Bikes:

Lead acid, NiCd, NiMH, and Li-ion rechargeable batteries are used in electric bikes. Power-on-demand electric bikes, where the motor is engaged by a handlebar-mounted throttle, and pedal-assisted bikes, also referred to as electric-assist bikes, where the electric engine is controlled by pedaling, are two types of electric motorized bikes. These have a detector that can measure either the force or the pace of the pedaling. As a result of the sensor signals, the speed of the vehicle, and the required power, an electric controller offers help. The majority of controllers also allow for manual adjusting. The range or pick-up of electric bikes is a crucial factor. It is influenced by several variables, including the mass of the bike and rider, engine efficiency, battery capacity, drive electronics effectiveness, and aerodynamics. Depending on whether the bike is evaluated on level roads or hills, the capacity of this bike is typically said to range from 7 km to 70 km. Regenerative braking is an option offered by several manufacturers, including the Canadian BionX and the American E+. In this method, the motor functions as a converter to slow the bike down before the brake pads engaging. This helps brake discs and wheel rims last longer and operate more effectively.

#### 3.3 Historical analysis of E-Bikes:

The term "electric vehicle" can be applied to any vehicle using electric propulsion. Because electric motors are a key component of vehicle propulsion, different types of electric vehicles fall under the categories of battery-operated electric vehicles (BEV) and fuel cell-operated electric vehicles (FLEV). These electric propulsions were initially intended mainly for massive locomotive operations in the early eighteenth century. These motors' ability to generate high torque and their smooth speed control systems led to their applications being classed as having high thrust power needs. In England, a patent for driving locomotives on tracks with current throughout them was granted in the middle of the 18th century. Electric cars for transport became a reality with the appropriate use of electric engines on tiny passenger cars in the 18th century.

#### 3.4 Models of Hero Electric Bikes and its innovation:

Electric bikes made by Hero are one example of this ideology. the way of thinking that fosters dedication, cooperation, and foresight. The adventure of the heroes colossal began after independence. The persons behind the expedition are the four Munjal brothers, who are from the little hamlet of Kamalia, which is currently located in Pakistan. Apart from their shared kinship, the guys were united by their

abundance of willpower, integrity, ambition, and tenacity. Hero Electric Bikes now produces more than 500 electric bikes each day, the greatest rate in the world, from a small beginning of more than 50 electric bikes in 2000. With a 48% market share in India, Hero entered the Guinness Book of World Records in 2005 and has sustained its lead over other international brands. In addition to the Hero Electric Maxi, Hero Electric E-Sprint, Hero Electric Wave, Hero Electric Optima, Hero Electric Advantage, Hero Electric Zippy, Hero Electric Hi-Moto, Hero Electric Eazy, Hero Electric Dash, Hero Electric Flash, and Hero Electric Extra, Hero Electric Company also manufactures and markets several other bikes.

**IV. RESULTS AND DISCUSSION**

The data analysis and interpretation related to consumer satisfaction with electronic bikes are covered in this section. Based on primary research, it has been discovered that many respondents chose electronic bikes. The information gathered from the questionnaire is presented in the form of figures, interpretations, and tables to help the readers get the idea.

**Percentage Analysis:**

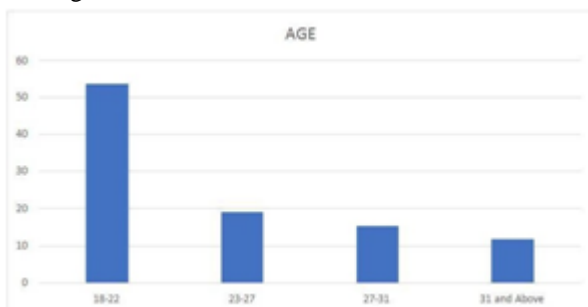
**Table.1 the respondents' age:**

Sl.No	AGE	NO. OF RESPONDENTS	PERCENTAGE
1	18-22 Age	59	53.64%
2	23-27 Age	21	19.09%
3	27-31 Age	17	15.45%
4	31 and Above Age	13	11.82%
	<b>TOTAL</b>	<b>110</b>	<b>100</b>

\*Source: Primary data

**INTERPRETATION:**

Table 1 and figure 1 shows the respondents' age. According to the aforementioned table, out of the total responses gathered, 53.64% of respondents are between the ages of 18 and 22; 19.09% are between the ages of 23 and 27; 15.45% are between the ages of 27 and 31, and 11.82% are over the age of 31.



**Figure.1 the respondents' age:**

**INFERENCE:**

The majority of responses (53.64%) fall within the 18 to 22 age range.

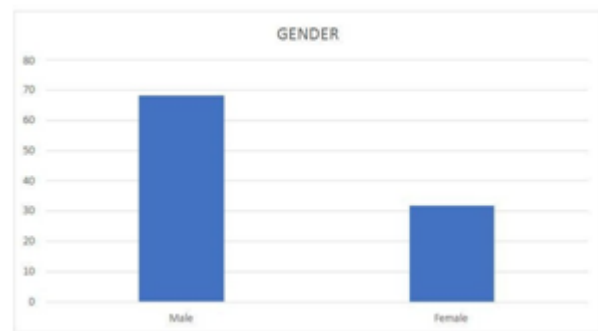
**Table 2 The respondents' gender**

SLNO	GENDER	NO. OF RESPONDENTS	PERCENTAGE
1	Male	75	68.18%
2	Female	35	31.82%
	<b>TOTAL</b>	<b>110</b>	<b>100</b>

\*Source: Primary data

**INTERPRETATION:**

Table 2 and figure 2 shows the respondents' age. According to the aforementioned table, 31.82% of respondents are women and 68.18% of respondents are men overall.



**Figure 2 The respondents' gender**

**INFERENCE:**

The majority of respondents (68.18%) are men.

**Table:3 Awareness of the E-Bike:**

SLNO	AWARENESS ABOUT E-BIKE	NO. OF RESPONDENTS	PERCENTAGE
1	Yes	99	90%
2	No	11	10%
	<b>TOTAL</b>	<b>110</b>	<b>100</b>

\*Source: Primary data

**INTERPRETATION:**

Table 3 and figure 3 show the awareness of the e-bike. According to the aforementioned table, out of the 110 total respondents, 90% were aware of electric bikes, while the remaining 10% were not.

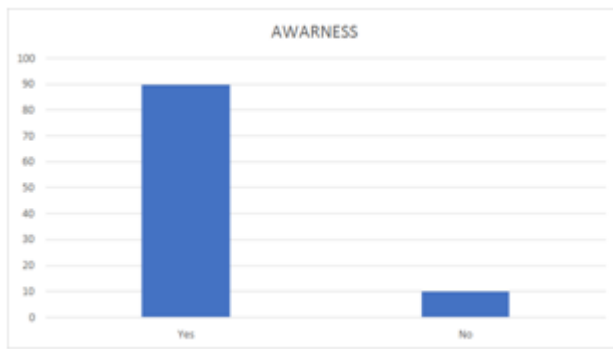


Figure: 3 Awareness of the E-Bike

**INFERENCE:**

The majority of E-bikes are known to 90% of survey respondents.

Table 4 respondents' Satisfaction

SLNO	SATISFACTION OF THE RESPONDENTS	NO. OF RESPONDENTS	PERCENTAGE
1	Satisfied	81	73.64%
2	Not Satisfied	29	26.36%
	<b>TOTAL</b>	<b>110</b>	<b>100</b>

\*Source: Primary data

**INTERPRETATION:**

Table 4 and figure 4 show the respondents' satisfaction. According to the aforementioned table, out of all the respondents gathered, 73.64% of them are satisfied with e-bikes, while the remaining 26.36% are not.

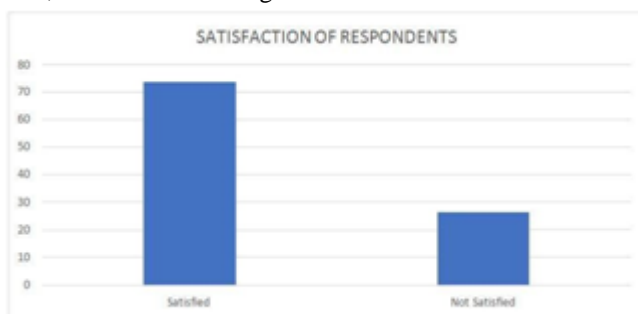


Figure 4 respondents' Satisfaction

**INFERENCE:**

The majority of responders (73.64%) are happy with the e-bike.

Table. 5 respondents' level of satisfaction

SLNO	Satisfaction Level	Highly Satisfied	Moderate Satisfied	Dissatisfied	Highly Dissatisfied	Total	Weighted Average	Rank
1	Price	156	147	36	4	343	3.12	2
2	Speed	84	183	48	4	319	2.90	4
3	Maintenance	172	138	32	5	347	3.15	1
4	Comfortance	108	177	36	6	327	2.97	5
5	Cost Efficient	152	153	28	7	340	3.09	3

\*Source: Primary data

**INTERPRETATION:**

Table 5 shows the respondents' level of satisfaction. According to the above table, the maintenance of the electric bike is ranked first out of all the respondents, followed by price, cost-effectiveness, speed, and comfort. Maintenance of the electric bike is ranked first.

**INFERENCE:**

The majority of respondents say they are happy with maintenance.

**V. CONCLUSION**

This study uncovered and assessed consumer perceptions of several aspects of electric bikes. According to the study's findings, that aspect has both a good and a negative impact on consumer contentment. Since the majority of the respondents here weigh the price and mileage when buying a new bike, there is a large market for electric bikes in the two-wheeler industry. However, one of the things that have an impact on the marketing of electric bikes is their battery. The majority of customers are drawn in by the advertising produced by electric bike retailers and businesses. The majority of respondents are knowledgeable about an electric bikes, and they typically learn about them from friends and family.

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