

**A STUDY ON CONSUMER PREFERENCES TOWARDS ELECTRIC  
VEHICLES OVER FUELLED VEHICLES; A COMPARATIVE  
ANALYSIS AMONG URBAN AND RURAL AREAS IN ERNAKULAM**

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**BHARATA MATA COLLEGE THRIKKAKARA  
KERALA**

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RESEARCH AND POST GRADUATE DEPARTMENT OF COMMERCE  
(Affiliated to Mahatma Gandhi University, Kottayam)

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DATE: 31-3-2024

**CERTIFICATE**

This is to certify that this project entitled “**A STUDY ON CONSUMER PREFERENCES TOWARDS ELECTRIC VEHICLES OVER FUELLED VEHICLES; A COMPARATIVE ANALYSIS AMONG URBAN AND RURAL AREAS IN ERNAKULAM**” is a bona fide record of work carried out VIGHNESH, ABHISHEK MB, LEEMON JOHNY under my supervision and guidance in partial fulfillment of the requirements for the award of the Degree of Bachelor of Commerce of the Mahatma Gandhi University. It has not previously formed the basis for the award of any Degree, Fellowship, Associateship etc.

They are allowed to submit this Project Report.

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## **DECLARATION**

We hereby declare that the project **“A STUDY ON CONSUMER PREFERENCES TOWARDS ELECTRIC VEHICLES OVER FUELLED VEHICLES; A COMPARATIVE ANALYSIS AMONG URBAN AND RURAL AREAS IN ERNAKULAM”** is our original work and has not been submitted earlier to MG University or to any other universities. We have undertaken this project work in partial fulfillment of the requirements of B.com 2020-2023 in Bharata Mata College, Thrikkakara, Ernakulam affiliated to MG University Kottayam.

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## **ACKNOWLEDGEMENT**

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**CHAPTER – 1**  
**INTRODUCTION**



## **1.1. INTRODUCTION**

An EV is defined as a vehicle that can be powered by an electric motor that draws power from a battery and enables charging from an external source. The highest number of electric vehicle registrations takes place in the state of Uttar Pradesh in India. In 1996, the first electric vehicle was a three-wheeler. 1832 around 1832, a crude electric vehicle first appeared under the leadership of Robert Anderson and, however, it was not until the 1870s that electric cars became more practical By Scooter's India Pvt Ltd, and it was named VIKRAM SAFA.

Around 1832, a crude electric vehicle first appeared under the leadership of Robert Anderson and, however, it was not until the 1870s that electric cars became more practical. Electric vehicles are mostly used or introduced by many people to solve their transportation problems, reduce fuel consumption and improve and protect the environment. Electric vehicles do not require petrol or diesel fuel and maintenance costs are low. It has less maintenance. One of the most important benefits of EVs is the impact they have on our environment. Clean EVs have no tailpipe emissions, reducing air pollution. Since the EV's electric motor works in a closed circuit, it does not emit any harmful gases. In India, Uttar Pradesh has the highest number of electric vehicles, but if we take it in our world, China has the highest number of electric vehicles, and that's where you can see the highest number of electric vehicles.

The adoption of electric vehicles in India is expected to increase due to growing awareness of environmental concerns and government initiatives promoting sustainable transportation. Increasing awareness of environmental issues and a desire to reduce air pollution, consumers are becoming more inclined towards eco-friendly transportation options like electric vehicles. Although the initial cost of EVs may be higher, the overall cost of ownership, including fuel and maintenance, tends to be lower than traditional vehicles. This cost advantage is becoming more evident, making EVs an attractive choice. Efforts are being made to enhance charging infrastructure across the country. As charging stations become more accessible, range anxiety decreases, making electric vehicles more practical for daily use. Ongoing advancements in battery technology are leading to improvements in range, charging times, and overall performance of electric vehicles, making them more appealing to consumers. These combined factors contribute to a positive outlook for the growth of electric vehicles in India. However, challenges such as charging infrastructure expansion and continued technology development will play crucial roles in determining the pace of this transition.

## **1.2 STATEMENT OF PROBLEM**

The focus of this project is to analyse consumer preferences for electric vehicles compared to traditional fuel-powered vehicles, specifically conducting a comparative analysis between urban and rural areas in Ernakulam. The study aims to investigate current electric vehicle options and understand customer attitudes and preferences towards them, with a particular focus on the urban and rural areas of Ernakulam.

As environmental concerns continue to rise across India, there is a growing conversation about taking every possible precaution to preserve the planet. Diesel and gasoline vehicles are recognized as significant contributors to environmental damage, prompting a need for a shift towards electric vehicles. However, the concept of electric vehicles is not yet fully established, and many people remain unfamiliar with it. While awareness of electric cars exists, there are lingering doubts about their reliability and safety. This research seeks to explore the perceptions and attitudes of people towards electric vehicles and the underlying technology, particularly in both rural and urban areas.

## **1.3 NEED AND SIGNIFICANCE OF STUDY**

The study primarily concentrates on forecasting future demand and gauging customer perceptions of electric vehicles, enabling a statistical analysis of public interest in these vehicles. Additionally, the research aims to elucidate the perspectives and experiences of diverse electric vehicle consumers. The project specifically delves into consumer preferences for electric vehicles as opposed to conventional fuel-powered vehicles, conducting a comparative analysis between urban and rural areas in Ernakulam. It seeks to examine the current landscape of electric vehicle options and understand consumer attitudes towards and preferences for these vehicles, with a particular focus on the youth demographic. By doing so, the study aims to identify the various factors influencing the adoption of electric vehicles."

## **1.4 OBJECTIVES OF STUDY**

The objectives of a study on customer knowledge on electric vehicles (EVs) could include the following:

1. To analyze the trends and factors determining the purchase of electric vehicles
2. To know the perception of public towards electric vehicles in urban and rural area
3. To compare the economies of electric vehicles over fueled vehicles.

## **1.5 SCOPE OF STUDY**

With the annual expansion of the electric vehicle (EV) sector, there is a burgeoning opportunity for researchers to delve deeper into this domain, uncovering profound insights into its consumer demographics. These researchers will leverage market data directly provided by consumers themselves. The promising future of electric vehicles suggests an imminent ubiquity, providing researchers with increased access to a wealth of primary and secondary data. To ensure the accuracy of research outcomes, it is advisable to broaden the scope of the questionnaire, encompassing a diverse range of respondents, and conduct a thorough and comprehensive inquiry.

## **1.6 METHODOLOGY OF THE STUDY**

The methodology outlines the structured process of gathering information and data for research purposes. This framework includes various components such as defining research goals, selecting samples, employing sampling methodologies, and other relevant factors. It represents a comprehensive sphere covering diverse aspects essential to research. This involves referencing existing published works such as literature, scholarly articles, periodicals, and relevant governmental online resources. Our objective is to conduct project research by utilizing both primary and secondary data sources.

### **1.6.1 DATA COLLECTION METHOD**

The most important part of any research project is gathering data. When collecting data, there are frequently main and secondary approaches. Two categories for data classification are: -

#### **PRIMARY DATA**

Primary data primary data refers to original information collected by the researcher to fulfill specific research objectives. One common method of gathering primary data is through telephone surveys using questionnaires.

#### **SECONDARY DATA**

Secondary data consists of information that was originally collected for purposes other than the current research. Sources of secondary data may include company profiles, newspapers, and other published materials. In our study, we have utilized both primary and secondary data sources.

### **1.6.2 SAMPLE SIZE**

For our research, we have gathered data from approximately 100 respondents.

### **1.6.3 TOOLS FOR DATA ANALYSIS**

Various tools were employed to analyse the collected data. Charts were generated to aid in drawing conclusions, while graphs and ranking methods were utilized to filter the data for precise percentage analysis.

#### **1) Mean**

The mean is calculated by dividing the sum of observations by the total number of observations.

#### **2) Percentage Analysis**

Percentage analysis is employed to interpret the data obtained from the questionnaire, presenting the findings in terms of percentages.

#### **3) Ranking Method**

Data ranking is conducted based on the percentage analysis, assigning ranks to the results accordingly.

#### **4) Graphs**

Graphical representations such as pie charts and bar graphs are utilized to visually present the results obtained from the percentage analysis.

### **1.7 LIMITATIONS OF THE STUDY**

The readiness of individuals to respond may fluctuate based on their choices and decisions.

- Less time for Study
- The conclusions will be different in each people.
- The response may not be correct.
- The limited sample size could impact the generalizability of the findings, as it may not accurately represent the broader population.
- The research was constrained to a particular region within the Ernakulam District.

### **1.8 CHAPTERIZATION**

#### **CHAPTER 1**

The first chapter deals with the introduction to the topic “consumer preferences towards electric vehicles over fuelled vehicles; a comparative analysis among urban and rural areas in Ernakulam”. cope of the study, statement of the problem, objectives, Research methodology, limitations.

## **CHAPTER 2**

The second chapter deals with the review of literature done by researche on consumer perception on electrical vehicles.

## **CHAPTER 3**

The third chapter deals with the theoretical framework, it deals with some general theories, functions, problems etc. about on this topic.

## **CHAPTER 4**

the fourth chapter deals with the analysis and interpretation.

## **CHAPTER 5**

The fifth chapter deals with findings and suggestions.

**CHAPTER - 2**  
**REVIEW OF LITERATURE AND**  
**THEORITICAL FRAMEWORK**

## **2. THEORETICAL FRAMEWORK**

### **2.1 ELECTRIC VEHICLES**

An electric vehicle is defined as a vehicle that uses one or more electric motors for propulsion (EV). It can be powered independently by a battery, a collection system, or electricity from sources outside the vehicle (sometimes charged by solar panels, or by converting energy to electricity produced by a generator or energy cells). Electric spacecraft, electric planes, and face and aquatic craft are examples of electric vehicles (EVs). Linked, Autonomous, Shared and Electric (CASE) Mobility is an emerging mobility paradigm that combines EVs for road buses together with other future automotive technologies like autonomous driving, linked cars, and participatory mobility.

#### **2.1.1 HISTORY OF AUTOMOBILE INDUSTRY**

The term "automotive industry" refers to the broad range of businesses that produce engines for automobiles, including bodywork and most motor parts—all except tires, batteries, and gasoline. Traveller cars and light trucks are essential business products. These include vans, game utility vehicles, and pickups. The auto, truck, transport, and bike sections explore the layout of modern auto vehicles; gas and diesel car motors are examples of these types of motors.

Because of its impact on twentieth-century history, the automotive industry's historical background, albeit being brief in comparison to many other endeavours, is of great interest. In the late nineteenth century, the business had its start in Europe. The United States completely dominated global trade throughout the first part of the 20th century thanks to the invention of large-scale industrial techniques. The current situation sharply changed in the latter half of the century as Japan and western European countries emerged as major producers and exporters.

Technology emerges in its own unique way and is closely linked to the automotive sector. There is new technology developed every day, which leads to innovation. Inventors of automobiles today are more likely to create environmentally friendly vehicles with consideration for keep in mind the decrease in fossil fuels. Most likely, they're trying to find the car a renewable energy source. Electric vehicles are a better choice for this because of their linear performance and lack of pollution. The primary factor is the electric vehicle's performance. Fuel-powered vehicles, however, have unique features and advantages. Electric vehicles require a longer period of time to charge than fuel-powered ones.

#### **2.1.2 TYPES OF ELECTRIC VEHICLES**

1. Hybrid Electric Vehicles (HEV)

2.Plug-in hybrid Electric Vehicles (PHEV)

3.Battery Electric Vehicles (BEV)

4.Fuel Cell Electric Vehicle (FCEV)

### **Hybrid Electric Vehicles**

A hybrid electric vehicle (HEV) is a vehicle that combines an all-electric system with a conventional internal combustion engine (ICE) system (hybrid vehicle drive train). The purpose of the electric power train is to outperform a conventional car in terms of performance or fuel economy.

### **Plug-in hybrid Electric Vehicles**

A plug-in hybrid electric vehicle (PHEV) is a hybrid electric car that has a battery pack that can be recharged externally by plugging in a charging wire to an external electric power source or internally using the generator powered by the internal combustion engine.

### **Battery Electric Vehicles**

Battery electric vehicles (BEVs), pure electric vehicles, only electric vehicles, completely electric vehicles, or all-electric vehicles (a hydrogen fuel cell, internal combustion engine, etc.) are electric vehicles (EVs) that solely rely on chemical energy stored in rechargeable battery packs as their only source of propulsion.

### **Fuel Cell Electric Vehicle**

A fuel cell vehicle (FCV) or fuel cell electric vehicle (FCEV) is an electric vehicle that powers its on board electric motor using a fuel cell, sometimes in combination with a tiny battery or super capacitor. Compressed hydrogen and airborne oxygen are typically used by car fuel cells to generate energy. Most fuel cell cars are considered zero-emission vehicles since they only release heat and water while they operate. In contrast to internal combustion vehicles, hydrogen-powered vehicles concentrate pollutants in the natural gas that has undergone reformation, which is where hydrogen is often produced.

## **2.1.3 EXAMPLES OF ELECTRIC VEHICLES**

1.Ola

2.Ather

3.Okinawa Autotech

4.Revolt



### **Ola Electric**

Ola Electric Mobility is a Bengaluru-based producer of electric two-wheelers in India. Its production facility is at Krishnagiri, Tamil Nadu, India.

### **Ather**

Bangalore serves as the home base for the Indian electric vehicle startup Ather Energy. In 2013, Tarun Mehta and Swapnil Jain started it. The Ather 450X and the Ather 450 Plus are the two electric scooters that it produces. It has also developed the Ather Grid, a nationwide network of electric vehicle charging stations.

### **Okinawa Autotech**

Okinawa Autotech is an Indian company that produces electric scooters. The company was founded by Jeetender Sharma and Dr Rupali Sharma and has its headquarters in Gurgaon.

### **Revolt**

Revolt Intellicorp was established with an investment of around Rs. 400–500 crore and is headed by Rahul Sharma, who was also a co-founder of Micromax mobile phones. The company would start with an electric and artificial intelligence motorcycle.

## **2.1.4 ADVANTAGES OF ELECTRIC VEHICLES**

- 1.No Fuel Emission
- 2.Running Costs
- 3.Low Maintenance
- 4.Performance
- 5.Popularity

### **No Fuel Emission**

The main argument in favour of electric cars is this. If you want to reduce the environmental impact of your own mobility, an EV is the ideal choice. Since the electric engine in an EV operates on a closed circuit, it does not produce any of the gases that are often associated with global warming. Fuel and gasoline are not needed in an entirely electric automobile, which is fantastic for lowering your carbon footprint.

### **Running Costs**

Since electric vehicles don't use gasoline or diesel to operate, you could also see a large decrease in your fuel expenses. As of this writing, unleaded gas for a medium-sized automobile can cost more than £100 in the UK. Comparatively, depending on the model and plan you have, fully charging an electric car at home might cost as much as £15.10.

### **Low Maintenance**

Everyone knows that cars need a little care every now and then. Over the course of their lives, gasoline and diesel engines need expensive engine maintenance, whereas electric cars don't. An electric motor only has about 20 moving parts that could break down, compared to hundreds in a typical combustion engine. As a result, your EV will likely need less frequent maintenance than a conventional car.

### **Performance**

Using a car on the roads is what makes owning one enjoyable most of the time. The aesthetics of electric vehicles haven't always been the most elegant, and many people have low expectations for their performance when compared to traditional engines. As more manufacturers have saturated the market with their own versions of the technology, the performance of EVs has increased dramatically. Electric cars have a surprising amount of acceleration power and are lightweight because all of their power is generated from a standing start.

### **Popularity**

For those who like to be different from the crowd, the increasing popularity of electric vehicles may be a disadvantage, but for many others, it's a huge benefit. As more EVs use our roads, additional infrastructure will be needed to facilitate their use. As more electric cars hit the road, this number is expected to keep going down while the number of charging stations is probably going to keep going up.

## **2.1.5 DISADVANTAGES OF ELECTRIC VEHICLES**

1. Driving Range
2. Recharge Time
3. Battery Life

### **Driving Range**

For individuals who have studied electric cars, "range anxiety" is a familiar term. While EVs today can't travel as far as a fossil fuel vehicle, their range on a single charge has grown dramatically in recent years and continues to do so. The most widely used electric cars of today have a range of over 100 miles between charges. Range anxiety may be greatly decreased by a hybrid electric car's combination of an electric motor and combustion engine.

But the majority of automobile trips are under thirty miles, which most EVs can handle without any problems. Comparably, fueling an automobile with a fossil fuel engine necessitates a different mindset. Like with your phone, you just charge the automobile on a regular basis instead of topping it full sporadically.

### **Recharge Time**

When your gasoline gauge starts to flash at you, it takes precisely five minutes to pull into the motorway service station, fill up, and then go back behind the wheel. All of us are used to this sensible process.

Electric car charging does require more time. A leisurely overnight charge at home, which is sufficient for the majority of uses, is thought to account for 80% of EV charging. Additionally, many companies now provide electric vehicle charging stations in their employee parking lots, as do we at Good Energy.

### **Battery Life**

A battery is essential to the operation of an electric automobile; without it, you cannot drive anywhere! However, depending on the manufacturer and model, the batteries used in EVs now in the UK have a limited lifespan and need to be replaced every 10 to 20 years. When considering an electric vehicle, it's critical to account for the potential longer-term cost of battery replacement.

## **2.2 Factors Influencing Customer Perception**

### **1. Individual experience**

Customers' perceptions of a product are greatly influenced by their experiences with it during both the buy and use phases. Customers might develop a favourable opinion of the brand if the quality, customer service, value, logo, colour, restrictions, and other elements had the capacity to establish a strong psychological bond with them. On the other hand, it would leave a lasting impression if customers felt that the brand was not worth their participation.

### **2. Promoting Clients**

Since promotions provide buyers the chance to see the products before anybody else does, they are probably the factor that affects customers' opinions the most. Campaigns and public relations initiatives can assist an organization in winning over the trust of its intended audience.

### **3. Influencers**

Most of the time, things are purchased after being tried and tested by another person. Those who have utilized and gotten the product initially are considered influencers. Because the influencer's advice

originated from a reliable source, people are more willing to purchase and try the amazing product that they have tested.

#### **4. Client audits**

Many individuals look up customer reviews before making a purchase. This demonstrates how crucial client audits are to determining client impression. Customers are more likely to give a product negative feedback if they notice that it has fewer stars. The client experiences a detrimental psychological effect from it.

#### **5. Web-based life**

Online life is currently the most dependable tool for controlling consumer impression. Customers develop opinions about a product when reliable information about it is shared with the internet community. On the internet, articles, images, and videos can be submitted, which aids in generating the concept that the organization desires.

### **2.3 PROPERTIE**

#### **Components**

Different types of batteries, traction motors, and motor controller designs are used depending on the size, power, and intended use, which can range from small motorized wheelchairs and shopping carts to peddles, electric motorcycles and scooters, neighbourhood electric vehicles, industrial forklift trucks, and many hybrid vehicles.

#### **Energy sources**

EVs are significantly more efficient and produce far fewer direct emissions than fossil fuel-powered vehicles. But they do depend on electricity, which is frequently generated by a combination of fossil fuel and non-fossil fuel facilities. Consequently, EVs may be made to be generally less polluting by switching the power source. In certain regions, consumers can pressure utilities to source their electricity from renewable sources.

#### **Batteries**

An electric-vehicle battery (EVB) powers the propulsion system of a battery-powered vehicle (BEVs), in addition to the traction battery specialist systems used for commercial (or recreational) vehicles. These batteries are frequently lithium-ion secondary rechargeable batteries. Traction batteries, which are specifically designed with a high ampere-hour capacity, are necessary for electric vehicles such as forklifts, vans, lorries, electric cars, electric scooters, and riding floor scrubbers.

## **Efficiency**

EVs convert over 59–62% of grid energy to the wheels. Conventional gasoline vehicles convert around 17–21%.

## **Charging capacity**

Grid The worldwide demand for power may grow by up to 25% by 2050 compared to 2020 if practically all road cars were electric.

## **Charging stations**

An electrical power source for plug-in electric vehicle charging, such as that of electric cars, electric trucks, electric buses, neighborhood electric vehicles, and plug-in hybrids, is provided by a charging station, also known as a charge, point or an EVSE.

## **Battery swapping**

Rather than charging via electrical plugs, EV batteries can be manually changed in a couple of minutes at specialized stations.

## **Dynamic charging**

TRL (formerly Transport Research Laboratory) offers three power supply options for dynamic charging, or charging a car while it is moving: overhead power lines, ground level electricity via rail, and induction.

## **Safety**

Regulation 100, the first international regulation on the safety of fully electric and hybrid electric vehicles, was adopted by the United Nations in Geneva (UNECE) to guarantee that vehicles with a high voltage electric power train, such as hybrid and fully electric vehicles, are as safe as combustion-powered vehicles.

## **Environmental**

EVs don't release any pollutants into the atmosphere when they are charged, but the energy required to do so could be harmful to both the environment and human health. Carbon emissions from the production and use of an EV are frequently less than those from a regular car. In cities, electric vehicles (EVs) almost always produce less pollution than internal combustion vehicles.

## **Socio-economic**

"Those communities that are most polluted and which also emit the least pollution tend to be among the poorest in Britain," and "pollution is most concentrated in areas where young children and their

parents are more likely to live and least concentrated in areas to which the elderly tend to migrate," are the findings of a 2003 UK study.

### **Energy efficiency**

From the tank to the wheels, electric vehicles (EVs) are around three times more efficient than cars with internal combustion engines. When a moving vehicle is immobile, it does not consume energy, in contrast to internal combustion engines that burn fuel when they are idle.

### **Total cost**

As of 2021, the lifespan costs of gas or diesel-powered vehicles are often cheaper than those of an equivalent electric vehicle (EV) in regions of the world where fossil fuels are subsidized. However, depending on the area and yearly mileage, the overall cost of ownership of an EV varies significantly.

### **Heating of EVs**

Heating a car's interior and defrosting windows in cold climates consumes a lot of electricity. Internal combustion engines already produce this heat as waste combustion heat that has been redirected from the cooling system.

## **2.4. REVIEW OF LITERATURE**

Literature reviews play a crucial role as they provide a roadmap to a particular subject, furnishing an outline or initiating point, especially when time constraints impede extensive research. Scholars rely on the comprehensiveness and breadth of a literature review to bolster their credibility within their academic domain. Moreover, literature reviews lay down a firm groundwork for the argumentation presented in a research paper.

In contrast to the format of an annotated bibliography, which usually centers on individual sources, a literature review tends to be structured thematically, prioritizing concepts over individual sources. This method aims not only to list sources but also to provide an in-depth analysis of each source. Rather than presenting sources individually, it is beneficial to identify themes or shared topics that connect your sources through thorough yet targeted reading within your discipline. Below are examples of literature reviews we have crafted on our particular subject area.

**1. Mohammed MeerAhmed M. Alia and Anand A Deshmukh**, The provided text serves as a comprehensive literature review on various aspects related to electric vehicles (EVs). It covers multiple studies and research articles examining different facets of EV adoption, consumer perceptions, market trends, and challenges across different regions and demographics. The review encompasses studies discussing the environmental benefits of EVs, consumer attitudes towards EV adoption, factors influencing purchasing decisions, the role of charging infrastructure, government policies and incentives, technological advancements, and challenges hindering widespread adoption. Each study contributes valuable insights into the understanding of consumer behaviour, preferences, and perceptions regarding electric vehicles, providing a holistic view of the current landscape and potential strategies for promoting EV adoption and overcoming barriers. Overall, the literature review offers a thorough examination of the existing research on electric vehicles, highlighting key findings, methodologies, and implications for future research and policymaking in the field.

**2. Satyendra Pratap Singh Electric Vehicles in India: A Literature Review**, a literature review in this research paper focusing on electric vehicles (EVs) and their potential impact on air pollution mitigation and transportation in India. It discusses the current scenario of air pollution in India, emphasizing the significant contribution of industrial and transport sectors to pollution levels and the resulting health hazards. The literature review highlights the potential of EVs in reducing greenhouse gas emissions and air pollution, along with their advantages such as lower operating costs and environmental friendliness.

**3. Paul Wolfram and Nic Lutsey, Electric vehicles: literature review of technology costs and carbon emissions.** This paper examines the potential integration of electric vehicle (EV) technology into Europe's lower-carbon vehicle fleet from 2020 to 2030 by synthesizing existing research literature on technology costs and carbon emissions. It assesses three main EV propulsion systems: battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hydrogen fuel cell electric vehicles (HFCEVs). Projections indicate significant cost reductions across all systems by 2030, with PHEVs expected to decrease by 50%, BEVs by 60%, and HFCEVs by 70% compared to 2015 levels. Analysis of greenhouse gas emissions and energy demand on a well-to-wheel basis reveals that BEVs using European grid-mix electricity could halve average vehicle emissions, with additional reductions possible through a lower-carbon grid and improved powertrain efficiency by 2020. However, realizing these benefits requires targeted policy interventions such as stringent CO<sub>2</sub> standards and incentives for EV adoption, alongside efforts to decarbonize the grid. While the focus is on Europe, similar dynamics are observed in electric vehicle markets globally, emphasizing the relevance of these findings beyond the region.

**4. Xiaoning Xia 1, Pengwei Li: - A review of the life cycle assessment of electric vehicles: Considering the influence of batteries,** this study examines the environmental performance of electric vehicles (EVs) compared to internal combustion engine vehicles (ICEVs) across their life cycles, with a focus on battery-related impacts. It finds that EVs exhibit higher environmental impact during the production phase due to battery manufacturing, but fare better than ICEVs in the use phase, contingent upon clean energy generation. Recycling and repurposing retired batteries contribute positively to EVs' environmental benefits. Despite mitigating greenhouse gas emissions and fossil energy consumption over their life cycles, EVs show higher impacts in metal and mineral consumption and human toxicity potential compared to ICEVs. To promote EVs at scale and achieve sustainable development, optimizing power structures, enhancing battery technology, and improving recycling efficiency are crucial, alongside closed-loop battery production and resource-conscious policies.

**5. Karan Mahal, Priyadarshini Patil, Electric vehicles and India recent trends in the automobile sector,** the synthesis of literature on electric vehicles (EVs) underscores the critical role of advancing battery technology and establishing adequate recharging infrastructure for the widespread adoption of EVs. While studies emphasize the need for governmental initiatives and innovative policies to promote EVs, particularly in regions like India, challenges such as cost, infrastructure, and consumer awareness persist. Research explores various factors influencing consumer preferences, including environmental concerns, cost, comfort, and technological trust. Additionally, there's a recognition of



the significant challenges in transitioning the transportation sector from internal combustion engines (ICEs) to EVs, requiring comprehensive planning, research, and development efforts. Despite the potential environmental benefits, EVs face hurdles related to range anxiety, weight limitations, and market acceptance, particularly for smaller vehicles like scooters. Efforts to address these challenges through infrastructure development, policy support, and technological advancements are crucial for realizing the full potential of EVs and achieving sustainable transportation goals globally.

**6. Dr. M. Robinson and p. Rajavignesh from anna university (bit campus) market opportunities of electric vehicles,** the literature review explores the market opportunities of electric vehicles (EVs) globally, emphasizing the role of EVs in addressing environmental sustainability concerns. The review highlights the increasing adoption of EVs driven by factors such as global warming, pollution, and rising oil demand, leading governments to implement policies to promote EV adoption. Despite the growing interest from big companies and startups, consumer awareness about EVs remains a challenge. The classification of EVs into battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), fuel cell electric vehicles (FCEVs), and plug-in hybrid electric vehicles (PHEVs) is discussed, along with the growth potential of the EV market globally and in India. Government incentives and initiatives, such as the FAME-India scheme, are identified as key drivers for EV adoption. The literature review covers various studies analyzing EV market growth, technological advancements, policy interventions, and consumer behavior, emphasizing the importance of promotional activities to boost EV sales worldwide.

**7. M. Viswanath, K. M. Arunraja, K. Lakshan Raaj, A Literature Review on Hybrid Electric Vehicles.** The literature review presents a comprehensive overview of hybrid electric vehicles (HEVs), highlighting their potential to address issues like dwindling fuel resources and carbon dioxide emissions. HEVs integrate internal combustion engines with electric propulsion systems, offering advantages such as improved fuel economy, reduced emissions, and flexibility in power delivery. The review discusses various types of HEV powertrain configurations, including series, parallel, and series-parallel hybrids, each with its unique advantages and complexities. While HEVs may have higher initial costs compared to conventional vehicles, their efficiency and reduced emissions make them a promising solution for sustainable transportation. Overall, HEVs represent a significant advancement in automotive technology, offering a viable pathway towards cleaner and more efficient mobility.

**8. Unnati Tuladhar, Nuttaya Yuangyai, Theerakamol Pengsakul, Saroj Gyawali**<sup>2</sup>**The Determination of Willingness to Pay for Electrical Vehicles: A Literature Review.** This study seeks to investigate the various factors that impact individuals' readiness to invest in electric vehicles

(EVs). Through this review, it becomes evident that factors like range anxiety, demographic attributes, fuel efficiency, availability of charging infrastructure, and governmental policies all contribute significantly to individuals' willingness to invest in EVs. There is a potential for future research to delve into the willingness to pay for EVs in emerging economies, where these vehicles are still at an early stage of adoption. Moreover, gaining insights into consumer preferences will be crucial for the widespread acceptance and success of EVs.

**9. V. Madhusudhana Rao, A. Nagaraju, A. Krishnaveni, S. Nagaraju, A Literature Review on Hybrid Electric Vehicles,** the literature review provides a comprehensive analysis of hybrid electric vehicles (HEVs), emphasizing their potential to reduce fossil fuel usage, decrease pollution, and incorporate renewable energy sources in transportation. HEVs combine internal combustion engines with electric propulsion systems, offering versatility in power delivery and performance. The review discusses various types of HEV powertrain configurations, including series, parallel, and series-parallel hybrids, highlighting their advantages and complexities. While HEVs may have higher initial costs compared to conventional vehicles, their enhanced fuel economy and reduced emissions make them a promising solution for sustainable mobility. Overall, HEVs represent a significant advancement in automotive technology, catering to the growing demand for environmentally friendly transportation solutions.

**10. Samyak Nagrale, Ankit Waghmare, Literature Survey on EV Battery Management System,** the literature survey explores the critical aspects of Electric Vehicle Battery Management Systems (BMS), emphasizing their role in ensuring battery safety, longevity, and optimal performance. It discusses the challenges associated with BMS implementation and highlights various techniques and methodologies proposed in the literature. Key operations of an effective BMS, including cell balancing, state of charge (SOC) estimation, thermal management, and communication protocols, are reviewed extensively. Furthermore, the survey identifies future directions for BMS development, such as predictive maintenance, smart parameter setting, inline quality control, and security considerations. Overall, the survey underscores the importance of interdisciplinary collaboration and advanced technology integration for the advancement of BMS in electric vehicles.

**11. Jonathan Muir, Are Electrified Cars Really the Future?** The literature review explores the growing popularity of electrified cars as a potential solution to reduce carbon emissions amidst concerns about climate change. It discusses the benefits of electric and hybrid vehicles, such as government subsidies and advancements in technology, while also addressing challenges like charging infrastructure and misconceptions about their environmental impact. Despite their increasing adoption, the essay highlights that electrified vehicles alone may not be sufficient to

address the climate crisis, as their impact on global emissions is relatively small compared to the overall challenge. Moreover, it raises concerns about the environmental sustainability of electric vehicle manufacturers, particularly regarding the trading of carbon credits. Ultimately, while electric cars offer promise in reducing emissions, the essay emphasizes the need for broader and more comprehensive efforts to combat climate change.

**12. Syalini. S 1, Dr M. P. Prathiba<sup>2</sup> Consumer Perception and Purchase Intention of Electric**

**Vehicles in Ernakulam,** The study investigates consumer perceptions and purchase intentions of electric vehicles (EVs) in Ernakulam, India. It explores various factors influencing consumer preferences and analyses the relationship between perception and purchase intention. Findings indicate that male customers exhibit a higher intention to purchase EVs compared to females. Additionally, there is a difference in perception between genders, with males having a more favourable view of EVs. Moreover, there is a strong positive correlation between perception and purchase intention, suggesting that customers with positive perceptions are more likely to intend to purchase EVs. Furthermore, there is an association between gender and the planning to purchase EVs in the future. The study underscores the increasing demand for EVs in India due to environmental concerns and rising fuel prices, emphasizing the importance of infrastructure development and consumer awareness to facilitate the transition to electric mobility.

**14. Mr. Rohit K. Nair, Dr. Maya S. (2017) in their work "Economic Factors and Electric Vehicle**

**Adoption: "** this study analyzed the economic factors influencing the adoption of electric vehicles. The study considered aspects such as total cost of ownership, incentives, and economic feasibility, providing a comprehensive understanding of how economic considerations impact consumer decisions to purchase electric vehicles in Ernakulam.

**13. Dr. Arvind K. Nair, Prof. Anitha S. Nair, Ms. Sneha R. (2021) conducted a study titled**

**"Economic Analysis of Electric Vehicles versus Conventional Vehicles: A Case Study in Ernakulam."** The research aimed to compare the economic aspects of owning and operating electric vehicles versus conventional fuel-powered vehicles. The paper explored factors such as fuel costs, maintenance expenses, and government incentives, providing insights into the economic viability of electric vehicles in the specific context of Ernakulam.

**14. Ms. Riya M. Nair, Dr. Rahul K. Menon, Prof. Geetha S. (2019) in their paper "Total Cost of**

**Ownership for Electric Vehicles: A Comprehensive Review"** delved into the total cost of ownership (TCO) for electric vehicles, considering factors beyond the initial purchase price. The study on aspects such as fuel savings, maintenance costs, and incentives, provides a comprehensive analysis of the economic advantages of electric vehicles over conventional vehicles.

**15. Dr. Ananya S. Nair, Prof. Vivek R.** (2020) explored "Government Incentives and Economic Viability of Electric Vehicles: This focused on the impact of government incentives and subsidies on the economic viability of electric vehicles in Ernakulam. The study provided insights into how policy interventions can influence the economic equation for consumers, making electric vehicles more financially attractive.

**16. Ms. Aparna M. Nair, Dr. Arjun R. Nair, Prof. Sharmila S.** (2018) conducted a study titled "Comparative Economic Analysis of Electric and Conventional Vehicles: A Case Study in Ernakulam."The research compared the economic aspects of electric and conventional vehicles, considering factors such as fuel prices, maintenance costs, and other important considerations available to consumers when evaluating the economic potential of electric vehicles.

**17. Mr. Rohit K. Nair, Dr. Maya S.** (2017) explored "Economic Factors Influencing Electric Vehicle Adoption". This paper focused on economic factors influencing the adoption of electric vehicles, including fuel prices, maintenance costs, and resale values. The study provided insights into how these economic considerations impact the decision-making process for consumers in Ernakulam.

**18. Mr. OmkarTupe, Prof. Shweta Kishore, Dr ArlophJohnvieira** (2020) on their study "Consumer perception of electric vehicles in India" talked about the continuous use of petroleum products and its increasing costs have highlighted the need for an additional energy source to power vehicles. The automotive industry in India is considering Electric Vehicles (EVs) as a solution for both business and environmental benefits. Despite the implementation of positive strategies by various states, the current market share of electric vehicles in India remains relatively low. This paper explores the potential scope of Electric Vehicles in the country and examines consumer perceptions regarding the same.

## **CHAPTER - 3**

# **DATA ANALYSIS AND INTERPRETATION**

## DATA ANALYSIS AND INTERPRETATION

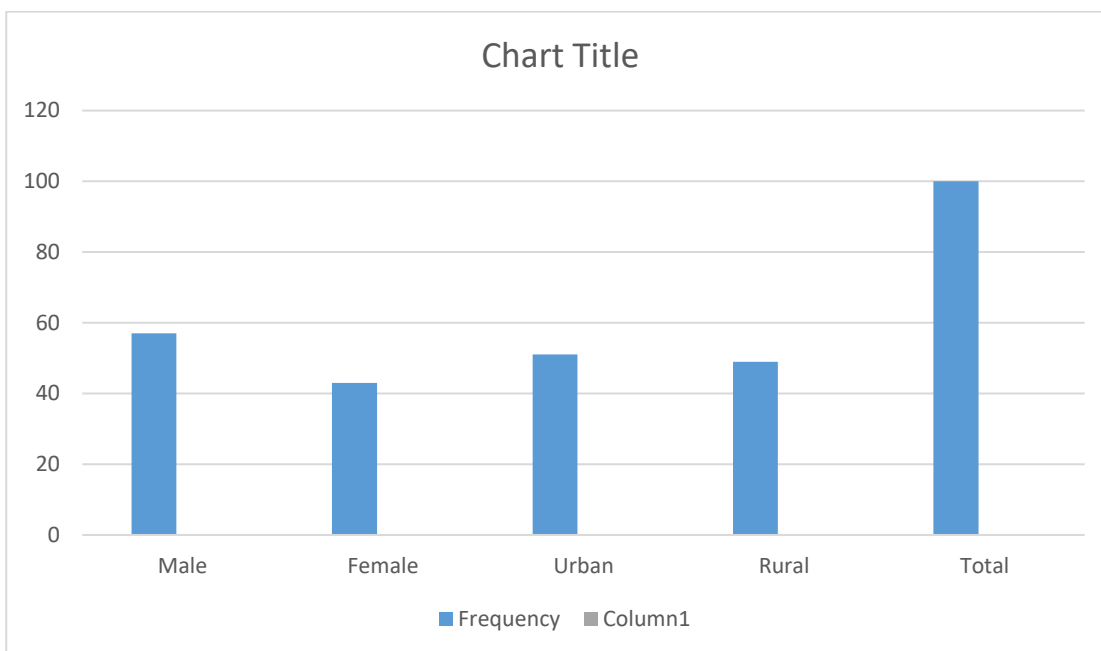
In order to ascertain conclusions, relevance, and ramifications of findings, data analysis and interpretation entails giving meaning to information that has been gathered. It aids in the classification, processing, and summarization of data to address important issues. Pie charts and histograms are two ways that data can be shown.

### 3.1 GENDER WISE CLASSIFICATION

**Table 3.1 Gender Wise Classification**

Gender	Frequency	Percentage
Male	57	57
female	43	43
Total	100	100
Urban	51	51
Rural	49	49

**Figure 3. 1 Gender Wise Classification**



**Interpretation:**

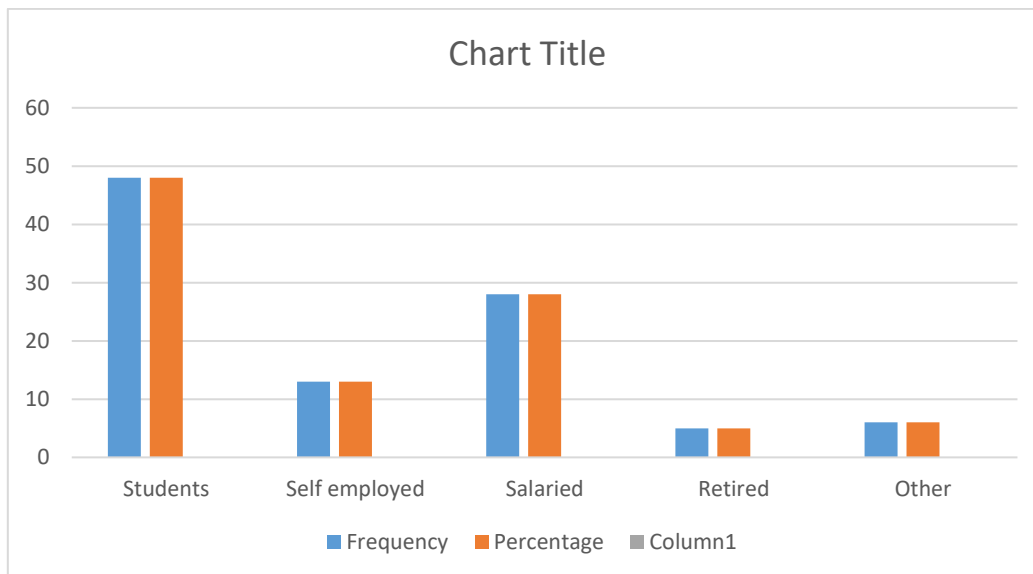
This chart shows the age of the respondents. From the table above it is clear that majority of the respondents are from male (57%) and female are less than men (43)

**3.2 OCCUPATIONAL STATUS OF THE RESPONDENTS**

**Table 3.2 Occupational status of the respondents**

Profession	Frequency	Percentage
Students	48	48
Self employed	13	13
Salaried	28	28
Retired	5	5
Other	6	6

**Figure 3.2 Occupational status of the respondents**



**Interpretation:**

This chart shows the profession of the respondents. From the table above it is clear that majority of the respondents are students (48%) and then the salaried (28%) then the self-employed (13%) then the other (6%) and the retired (5%).

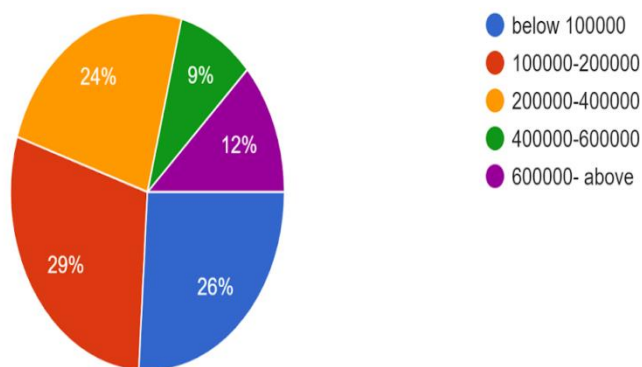
**3.3 ANNUAL FAMILY INCOME OF THE RESPONDENTS**

**Table 3.3 Annual Family Income of the Respondents**

Below 100000	26
100000- 200000	29
200000- 400000	24
400000- 600000	09
600000- above	12

**Figure 3.3 Annual Family Income of the Respondents**

What is your annual household income?  
100 responses





**Interpretation:**

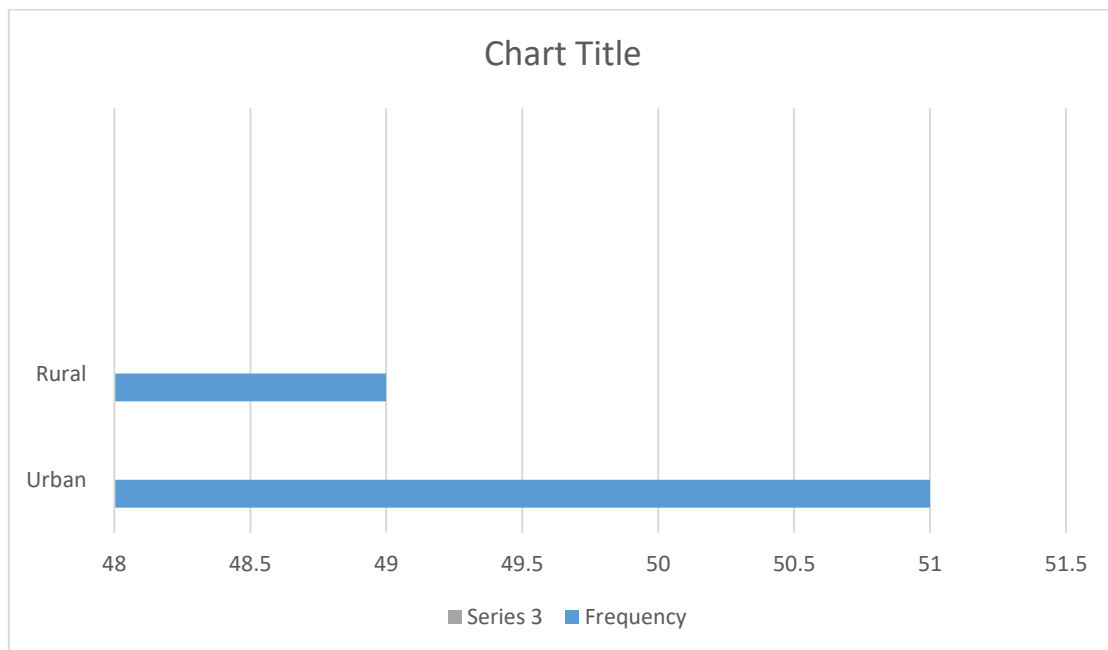
It could be observed that 26 of respondents were having annual income less than or equal to 100000rs, 29 had income in between 100000- 200000rs. 24 had income in between 200000- 400000rs. 9 respondents had income between 400000- 600000rs. And 12 respondents had income greater than 4000000rs.

**3.4 AREA BELONGS TO**

**Table 4.4 Area Belongs to**

Area	Frequency	percentage
Urban	51	51
Rural	49	49

**Figure 4.4**



**Interpretation:**

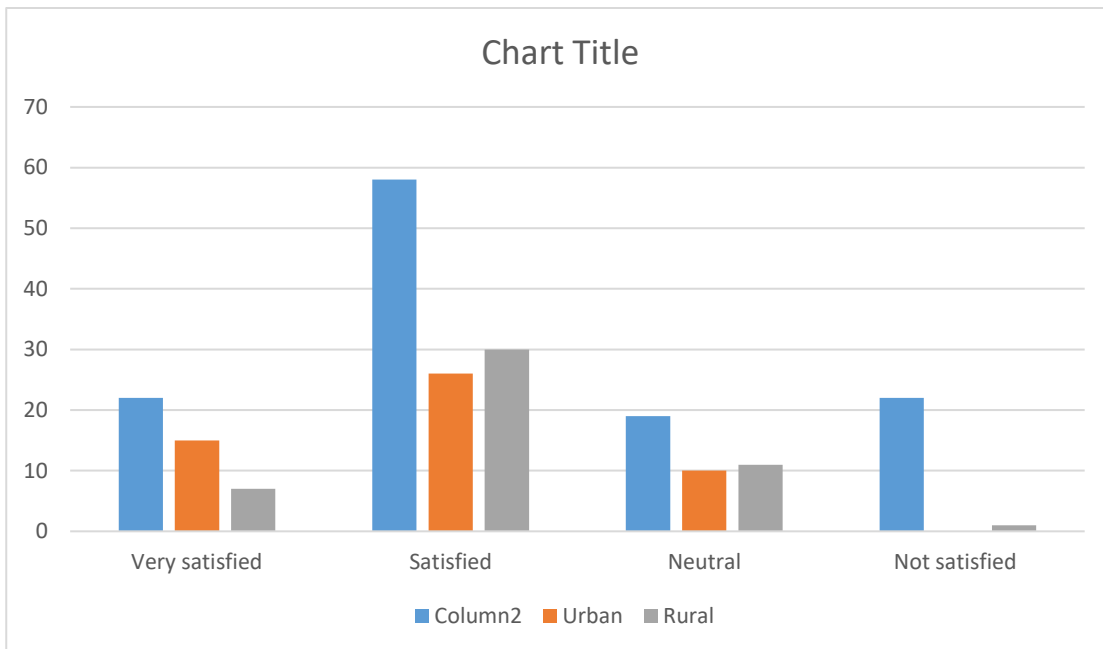
The more respondents were from urban (51%) and Rural responders were Less than urban (49%) areas.

### 3.5 THE DRIVING EXPERIENCE

**Table 4.5 The Driving Experience**

		Urban	Rural
Very satisfied	22	15	7
Satisfied	58	26	30
Neutral	19	10	11
Not satisfied	22	0	1

**Figure 3.5 The Driving Experience**



**Interpretation:**

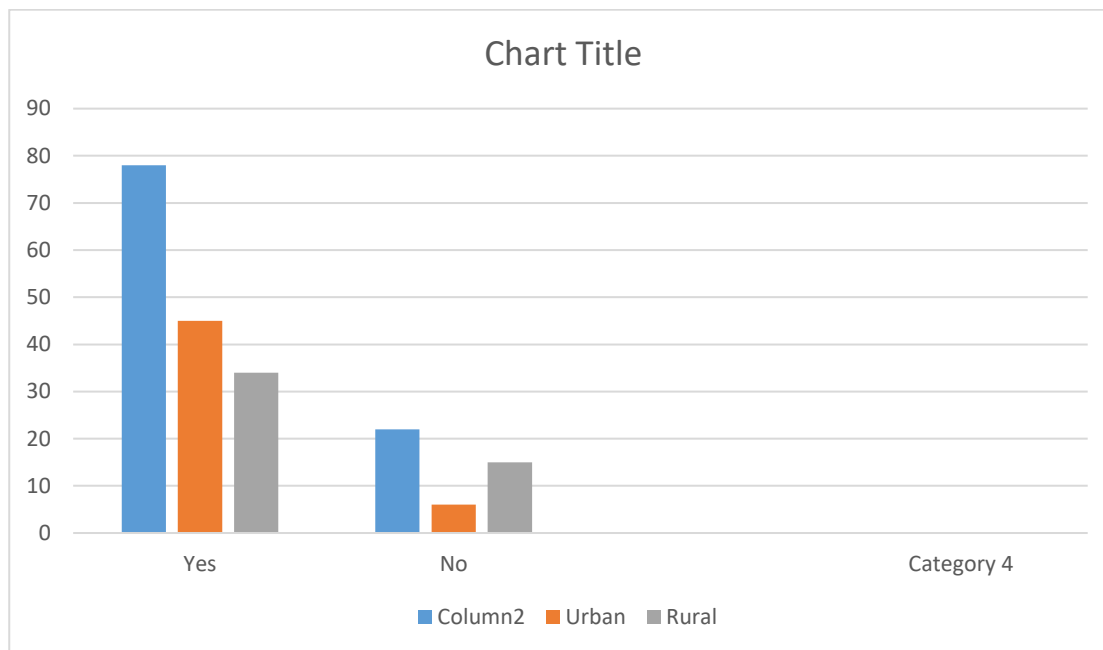
In satisfaction level majority people are satisfied (58%, urban 26, rural 07) and 22%(urban 15, rural 07) people are very satisfied and 19%(rural 11, urban 10) people were in respondent of neutral. And the one person was not satisfied in the driving experience.

### 3.6 THE EVS SERVICE CENTRE LOCALITY

**Table 3.6 The EVs Service Centre Locality**

		Urban	Rural
Yes	78	45	34
No	22	06	15

**Figure 3.6 The EVs Service Centre Locality**



**Interpretation:**

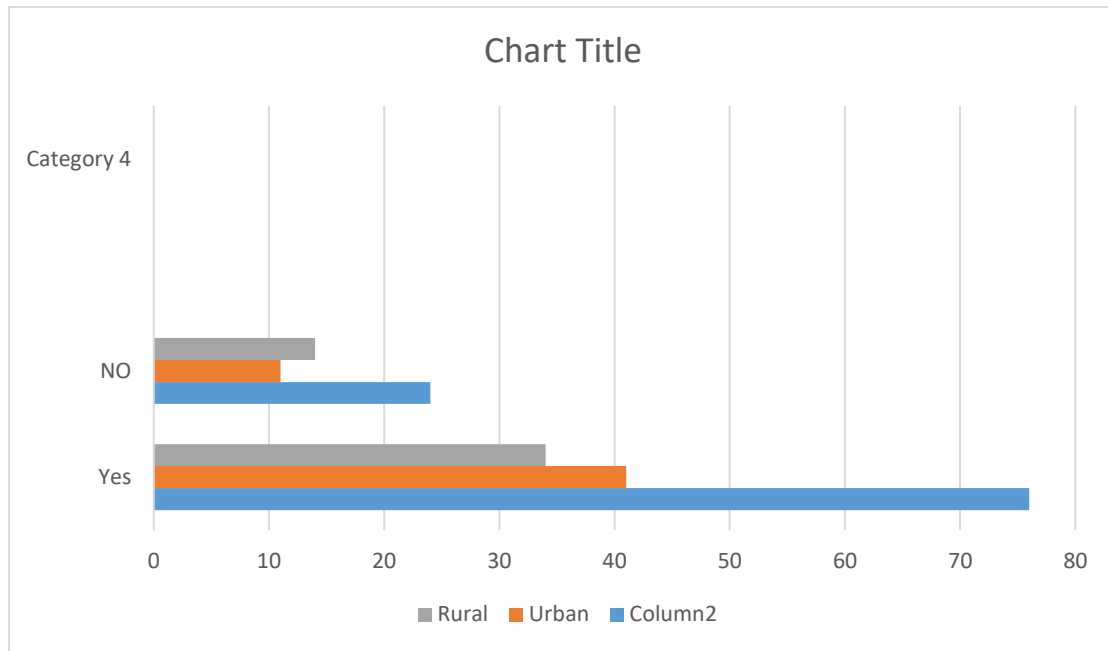
This chart shows that 78 (urban 45, rural 34) people have the service centre of EVs in their own locality. But 22 (urban 06, rural 15) people have not the service centre of EVs in their own locality.

### 3.7 KNOWLEDGE ABOUT CHARGING STATIONS IN OWN LOCALITY.

**Table 3.7 Knowledge About Charging Stations in Own Locality.**

		Urban	Rural
Yes	76	41	34
NO	24	11	14

**Figure 3.7 Knowledge About Charging Stations in Own Locality.**



**Interpretation:**

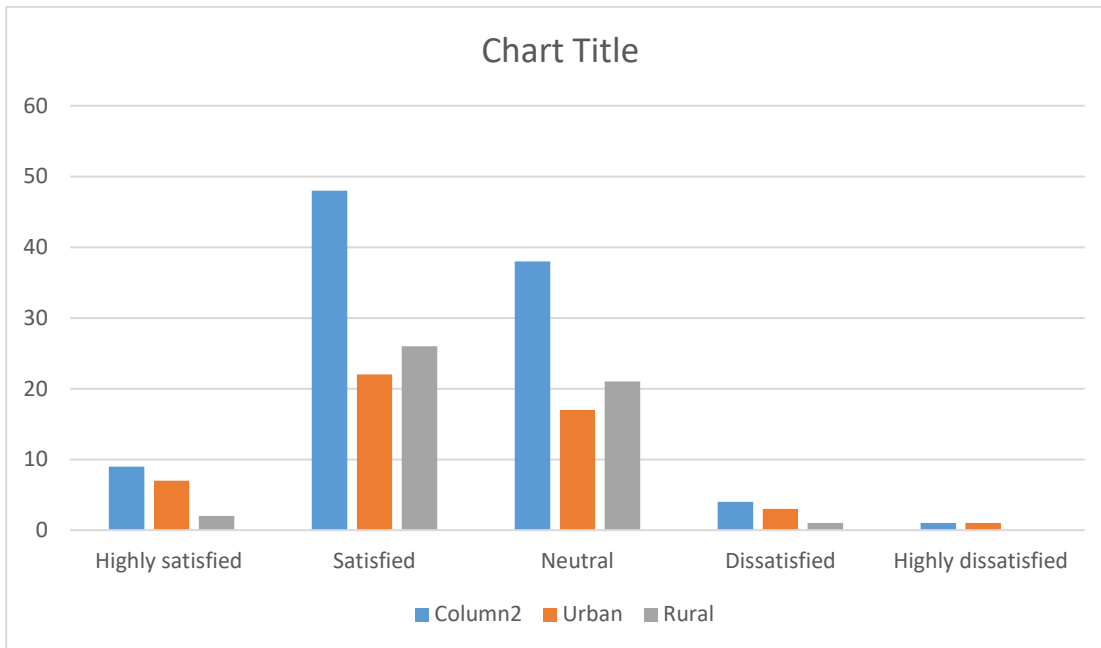
In this chart 76 (urban 41, rural 34) people know the locality of charging station in their own locality. But 24 (urban 11, rural 14) people do not know the charging locality in their own locality.

**3.8 THE COMFORTABILITY OF INDIVIDUAL’S CHARGING IN PUBLIC STATIONS**

**Table 4.8 The Comfortability of Individual’s Charging in Public Stations**

		Urban	Rural
Highly satisfied	9	07	2
Satisfied	48	22	26
Neutral	38	17	21
Dissatisfied	4	3	1
Highly dissatisfied	1	01	00

**Figure 3.8 The Comfortability of Individual’s Charging in Public Stations**



**Interpretation:**

From the table above it is clear that majority of the respondents are satisfied in their charging public centre. And 38(urban17, rural 21) people are in the level of neutral. The 9 (urban 07, rural02) people are very satisfied in the charging public stations. The 4 (urban03, 01) people are dissatisfied in their charging public centre. But there is one person who highly dissatisfied.

**3.9 INTERVALS OF CHARGING EVS PER WEEKS**

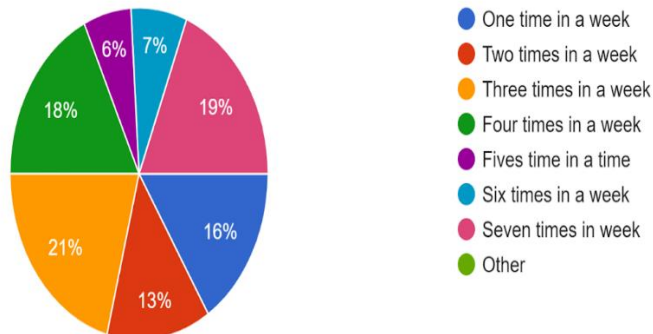
**Table 4.9 Intervals of Charging EVs Per Weeks**

One time in a week	16
Two times in a week	13
Three times in a week	21
Four times in a week	18
Fives time in a time	6
Six times in a week	7
seven times in week	19
Other	16

### Figure 3.9 Intervals of Charging EVs Per Weeks

What is the intervals of charging your EVs per weeks?

100 responses



#### Interpretation:

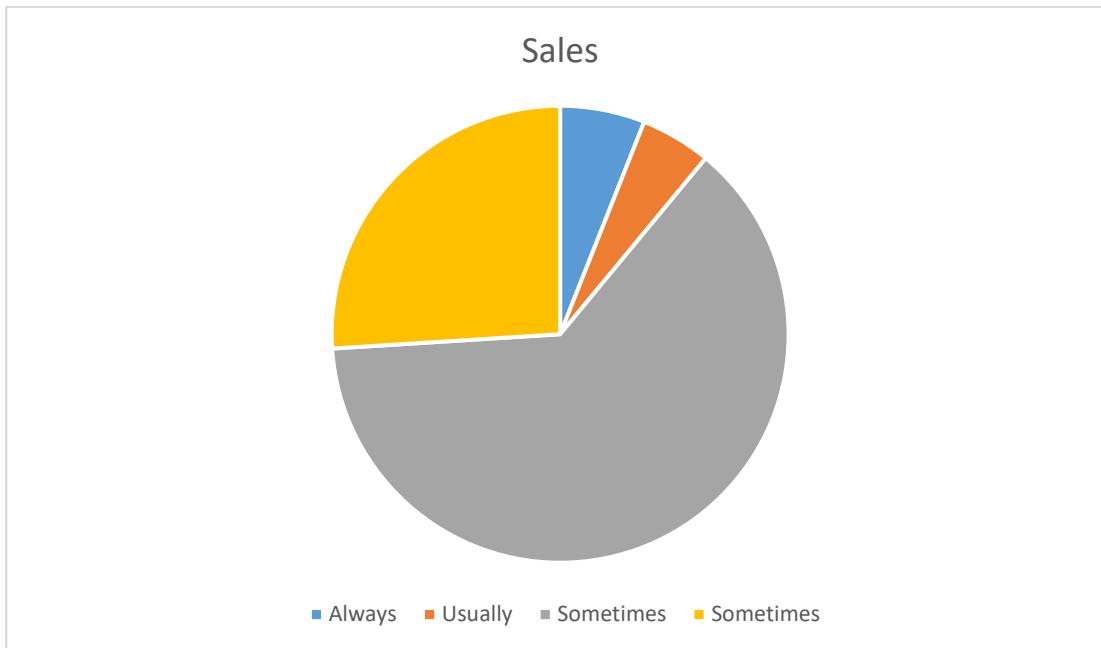
The charging gape is different in each people. The majority people are charging three times in a week. There are 19 people who charge every day. And there 16 people who charge one time in a week.

### 3.10 FORGET TO CHARGE THE VEHICLE FOR

Table 4.10 Forget to Charge the Vehicle For

Always	6
Usually	5
Sometimes	63
Never	26

**Figure 3.10 Forget to Charge the Vehicle For**



**Interpretation:**

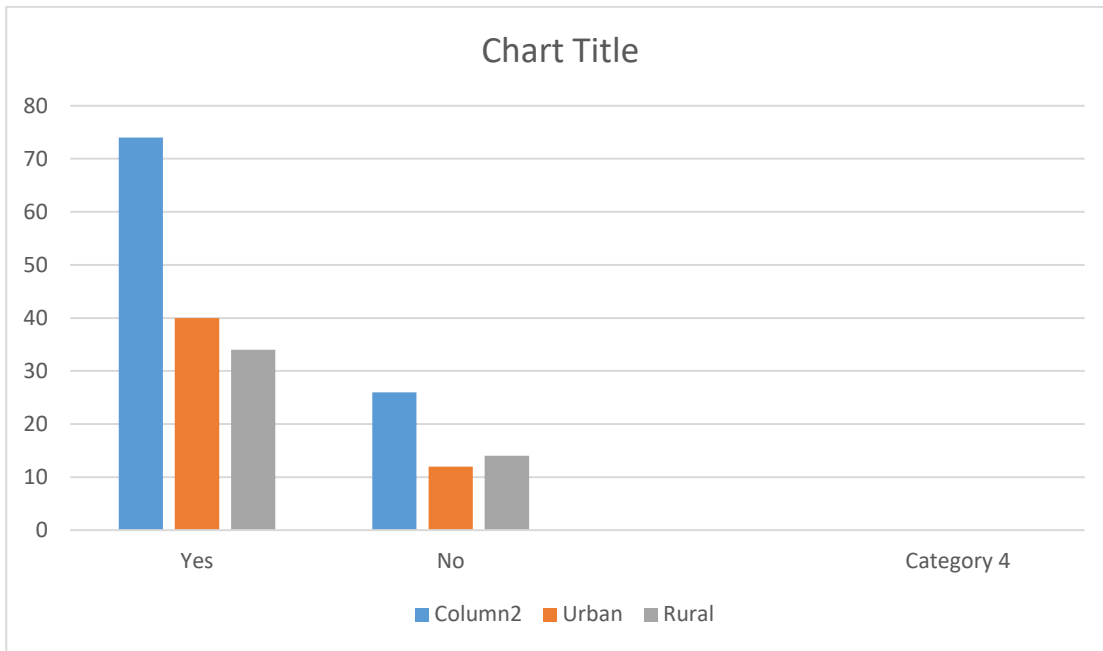
In this chart we can understand that majority of people (63) forget to charge sometimes. And there are some people (26) who do not forget to charge their vehicle. But there are people (6) who forget always to charge their vehicle. And people who forget usually are 6.

**3.11 THE SATISFACTION IN CHARGING CAPACITY OF BATTERY**

**Table 4.11 The Satisfaction in Charging Capacity of Battery**

		Urban	Rural
Yes	74	40	34
No	26	12	14

**Figure 3.10 The Satisfaction in Charging Capacity of Battery**



**Interpretation:**

In this chart we can understand the majority people (74, urban40, rural 34)) are satisfied in charging capacity. And 26 (rural 14, urban 12) people are not satisfied in their battery charging capacity.

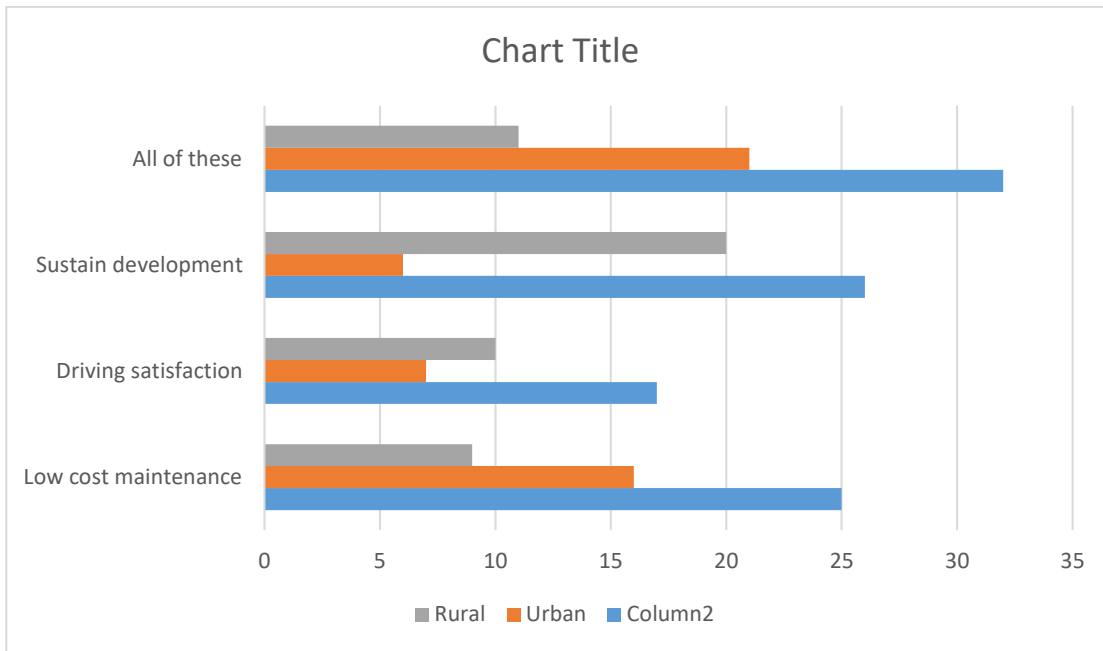
**3.12 The Advantage of EVs in Opinion**

**Table 3.12 The Advantage of EVs in Opinion**

		Urban	Rural
Low-cost maintenance	25	16	09
Driving satisfaction	17	07	10
Sustain development	26	06	20
All of these	32	21	11



**Figure 3.12 The Advantage of EVs in Opinion**



**Interpretation:**

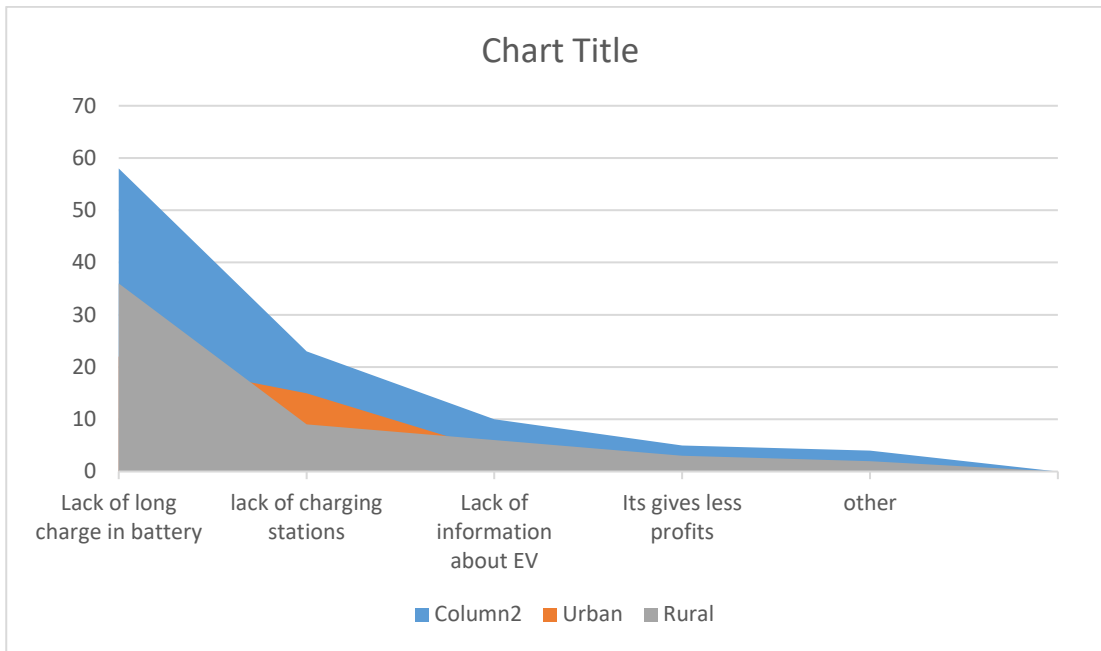
In this chart we can understand 25(urban 16, rural 09) people concerned the low-cost maintenance. And 17(urban 07, rural 10) people concerned in driving satisfaction. 26(urban 06, rural 20) people concerned in sustain development. And 32 (urban 21, rural 11) people concerned in other reason.

**3.13 Disadvantages of EVs In Opinion**

**Table 3.13 Disadvantages of EVs in Opinion**

		Urban	Rural
Lack of long charge in battery	58	22	36
lack of charging stations	23	15	09
Lack of information about EV	10	04	06
Its gives less profits	05	02	03
other	04	01	02

**Figure 3.13 Disadvantages of EVs in Opinion**



**Interpretation:**

In this chart we understand the main problem of EVs is the lack of long charge in battery around 58(urban 22, rural 36) people are complained about it. And other major problem is lack of charging stations around 23 (urban 23, rural 09) people. And lack of information about EV is other 10(urban 01, rural 02) people face the issue.

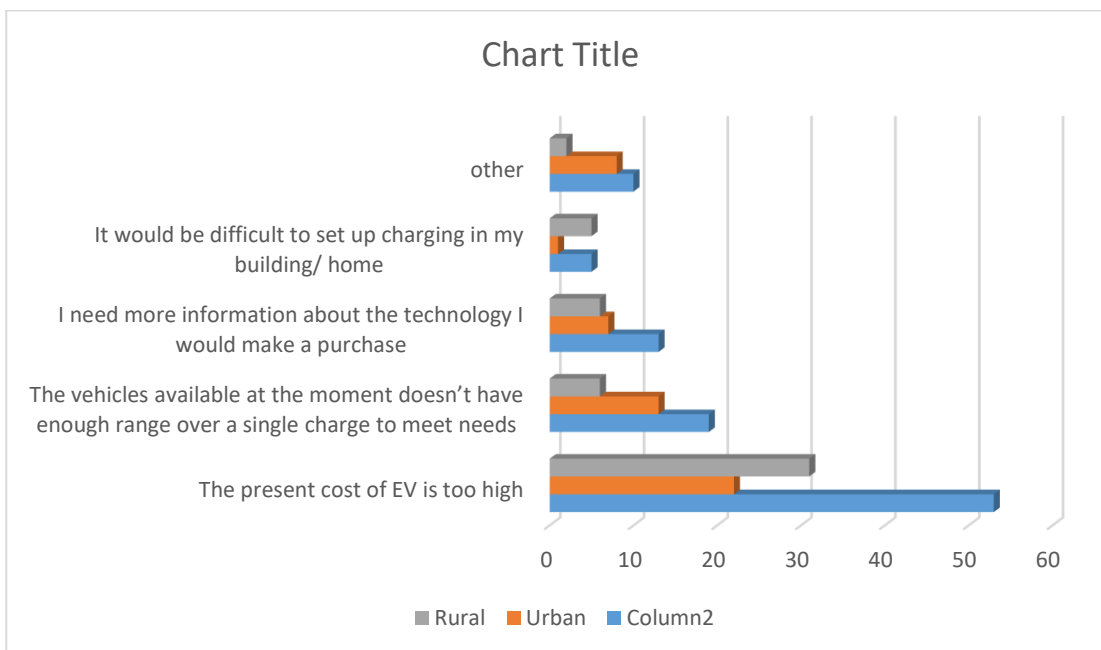
**3.14 THE PREVENTING REASON FROM BUYING AN EV**

**Table 3.14 The Preventing Reason from Buying an EV**

		Urban	Rural
The present cost of EV is too high	53	22	31
The vehicles available at the moment doesn't have enough range over a single charge to meet needs	19	13	6

I need more information about the technology I would make a purchase	13	7	6
It would be difficult to set up charging in my building/ home	05	01	04
other	10	08	02

**Figure 3.14 The Preventing Reason from Buying an EV**



**Interpretation:**

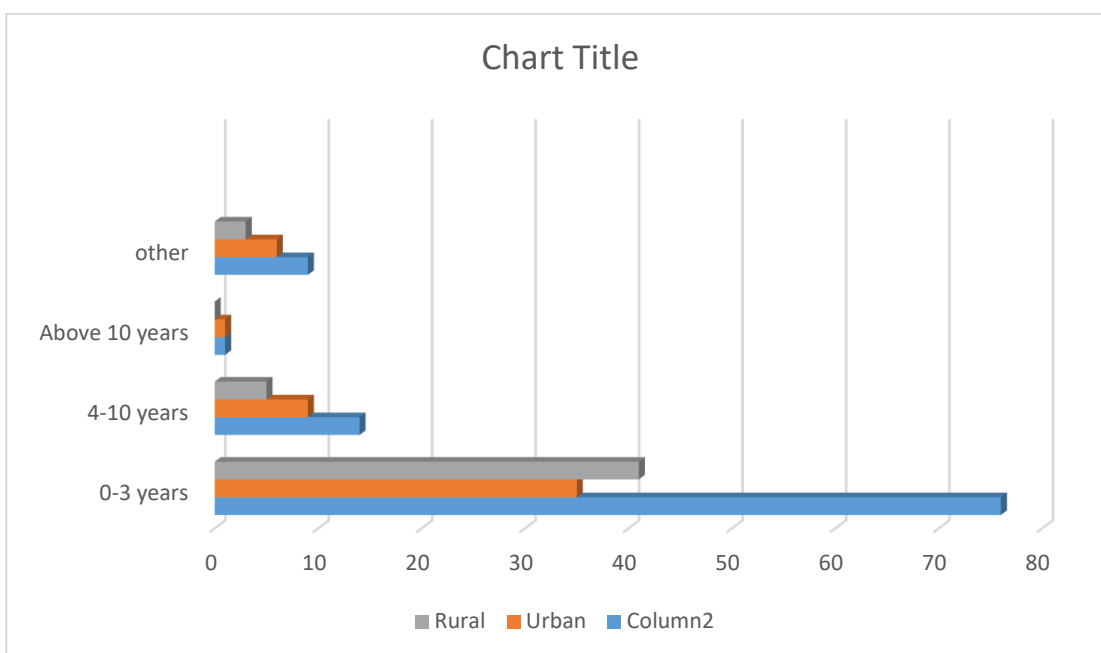
From this chart we can understand that main thing is that preventing 53 (urban 22, rural 31) people from buying EVs is the present high cost of EV. The vehicles available now doesn't have enough range over a single charge to meet needs is the other 19(urban13, rural 16) people face the problem. And 13 (urban 07, rural 06) people need more information about EV technology. 5 (urban 05, rural 04)people face the difficult to set up charging in home or building.

### 3.15 THE DURATION OF YEARS OWING EV

**Table 3.15 The Duration of Years Owing EV**

		Urban	Rural
0-3 years	76	35	41
4-10 years	14	09	05
Above 10 years	01	01	00
other	09	06	03

**Figure 3.15 The Duration of Years Owing EV**



**Interpretation:**

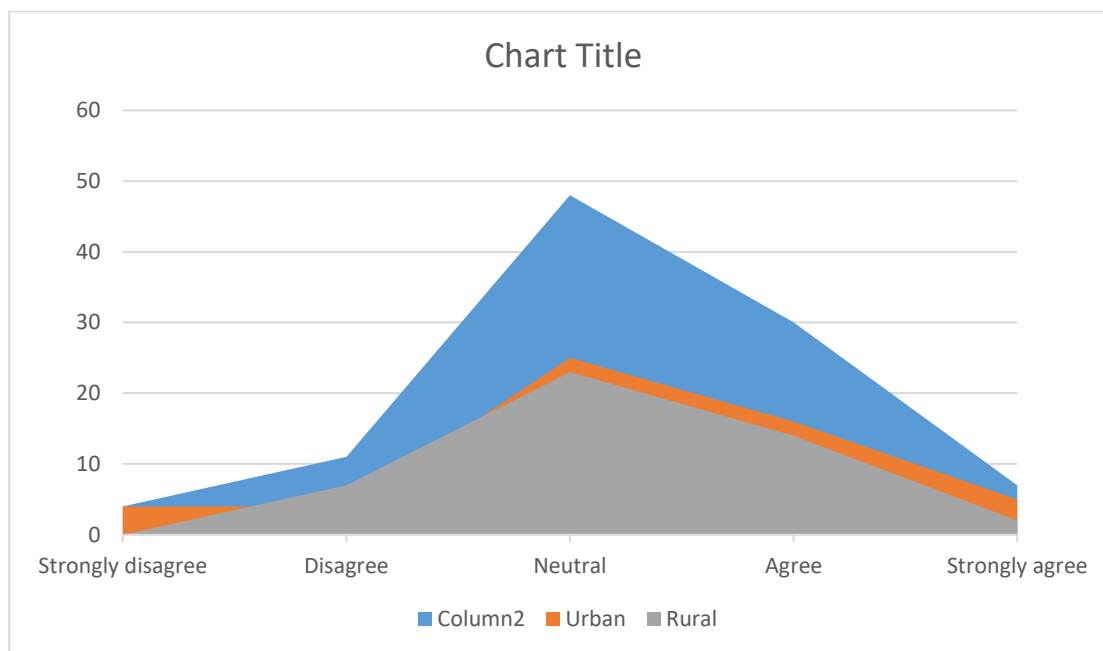
From the table above it is clear that most of respondents select in the option of 0-3 year (76, urban35, rural 41). And 14 (urban 09, rural05) people uses the vehicle since 4 -10 years. Above 10 years are only one person.

### 3.16 SAVINGS OF MONEY OF THE OWNER BY USING EVs

**Table 4.16 Savings of Money of the Owner by Using EVs**

		Urban	Rural
Strongly disagree	04	04	00
Disagree	11	04	07
Neutral	48	25	23
Agree	30	16	14
Strongly agree	07	05	02

**Figure 3.16 Savings of Money of the Owner by Using EVs**



**Interpretation:**

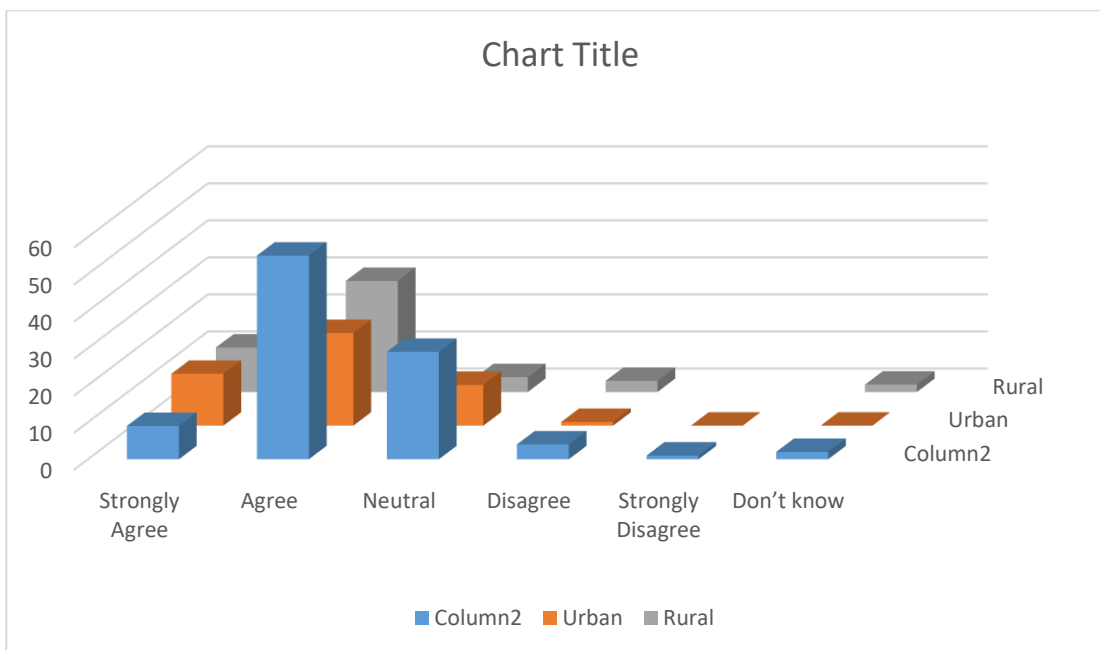
From this table above it is clear that 48% (urban 25, rural 23) of respondents thinks as neutral in saving money by using EVs. 30% (urban 16, rural 14) of people are in agree. 11% (urban 04, rural 07) of people in disagree and 04% (urban 04) people strongly disagree.

### 3.17 ELECTRIC VEHICLES ARE ECO-FRIENDLIER THAN PETROL AND DIESEL IN OPINION

**Table 4.17 Electric Vehicles Are Eco-Friendlier Than Petrol and Diesel in Opinion**

		Urban	Rural
Strongly Agree	09	05	03
Agree	55	25	30
Neutral	29	11	04
Disagree	04	01	03
Strongly Disagree	01	00	
Don't know	02	00	02

**Figure 3.17 Electric Vehicles Are Eco-Friendlier Than Petrol and Diesel in Opinion**



**Interpretation:**

From this table majority of respondents prefer in better change of technology (55% urban 25, rural 30). 29 (rural 11, rural 04) respondents are neutral in the technology of EVs. But 9% (urban 05, rural 03) dependence strongly agree.

### 3.18 THE OVERALL DRIVING EXPERIENCE OF EVS AND FUEL VEHICLES

**Table 3.18 The Overall Driving Experience of EVs and Fuel Vehicles**

		Urban	Rural
I prefer EV	69	37	32
I Prefer fuel vehicle	31	16	15

**Figure 3.18 The Overall Driving Experience of EVs and Fuel Vehicles**

**Interpretation:**

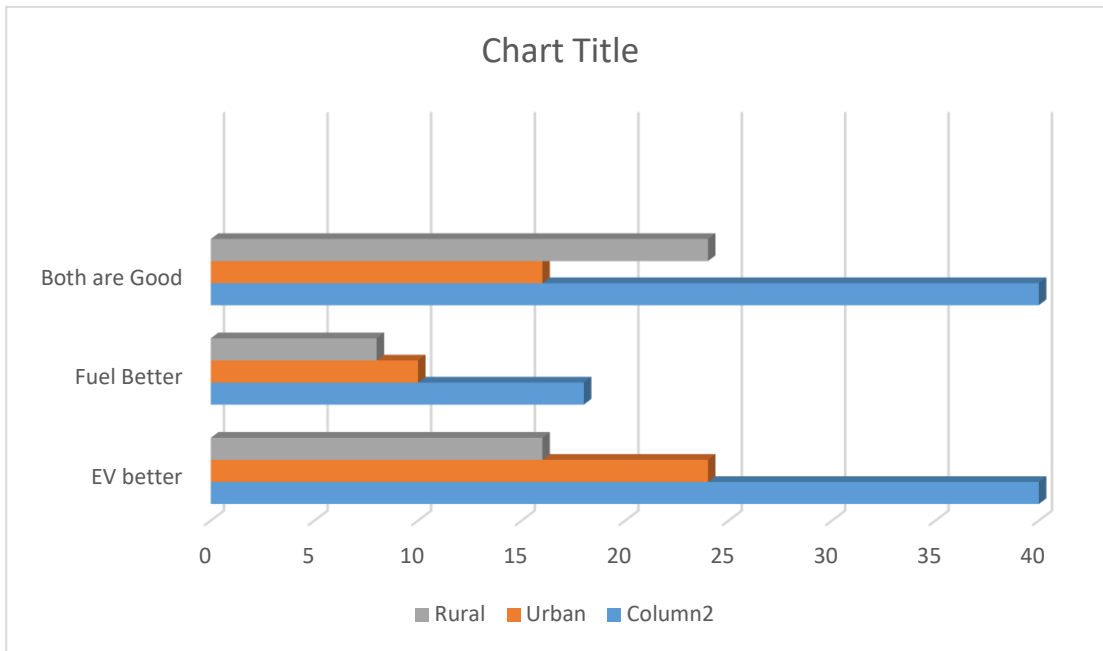
From this table it is very clear that majority respondents (69, urban 37, rural 32)) prefer EV. And other respondents (31, urban 16, rural 15) are on fuel vehicle.

### 3.19 THE MAINTENANCE COSTS OF EVS AND FUEL VEHICLES

**Table 3.19 The Maintenance Costs of EVs and Fuel Vehicles**

		Urban	Rural
EV better	40	24	16
Fuel Better	18	10	08
Both are Good	40	16	24

**Figure 3.19 The Maintenance Costs of EVs and Fuel Vehicles**



**Interpretation:**

From this table majority respondents say that Both EV and fuel vehicle good. But 40% (urban 24, rural 16) respondents are on side of EVs. 18 (urban 10 rural 08) respondents are on fuel vehicle.

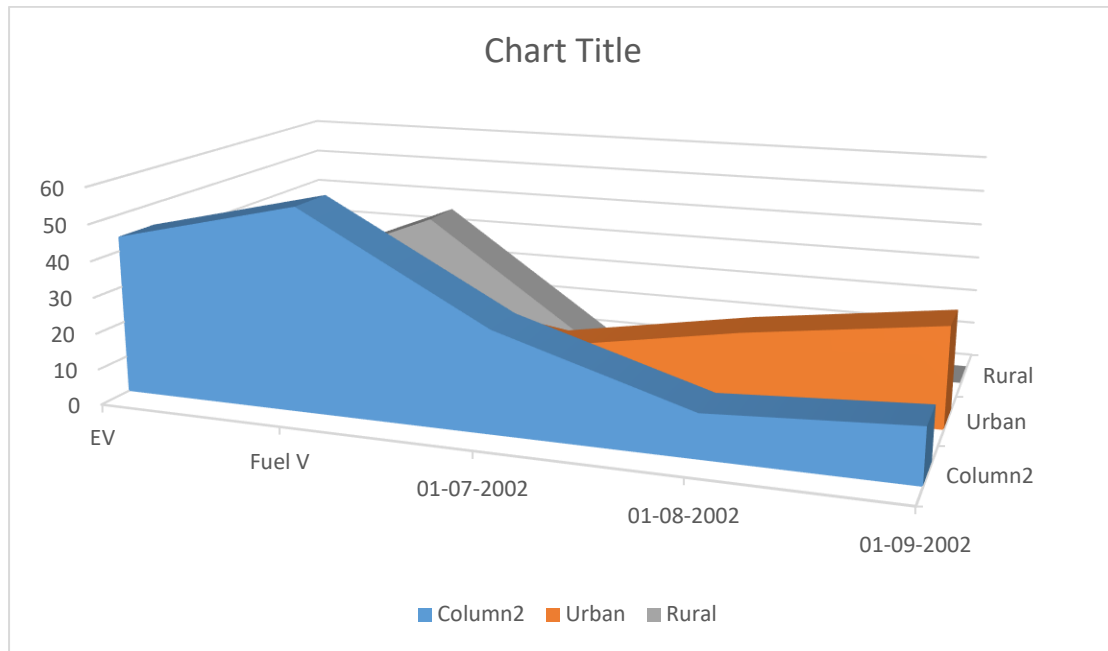
**3.20 WHICH TYPE OF VEHICLE IS MORE RELIABLE**

**Table 3.20 Type of More Reliable Vehicle**

		Urban	Rural
EV	44	29	15
Fuel V	56	20	36



**Figure 3.20 Type of More Reliable Vehicle**



**Interpretation:**

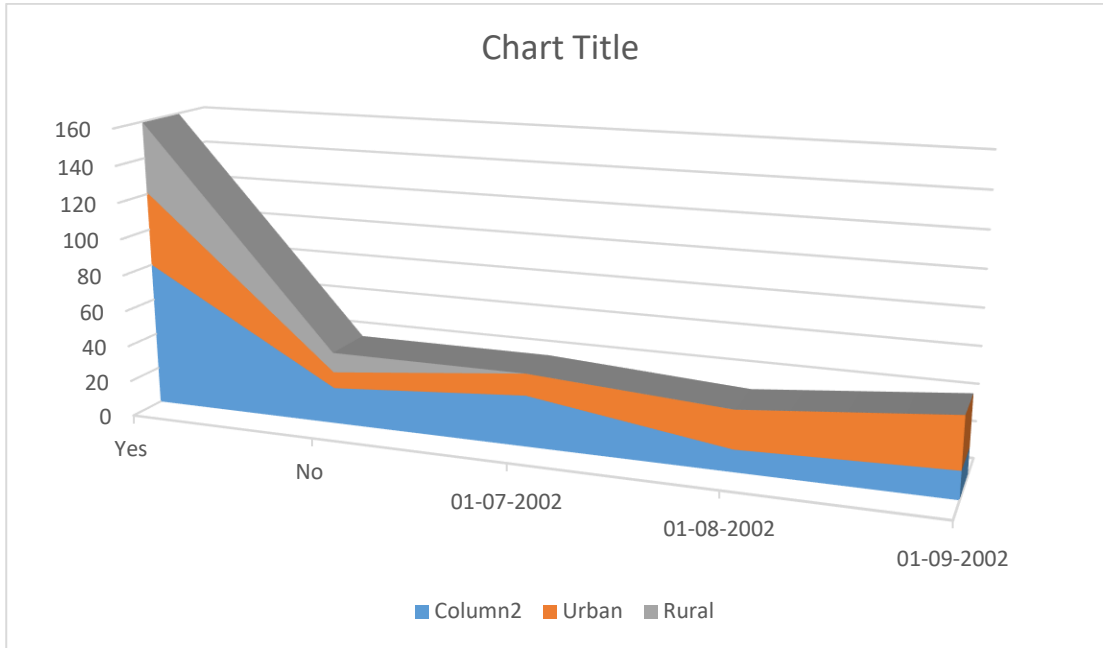
From this table majority of respondents are on Fuel Vehicle are more suitable for in reliable.

**3.21 DOES DRIVING PATTERN MAKE AN ELECTRIC VEHICLE A SUITABLE OPTION**

**Table 3.21 Does Driving Pattern Make an Electric Vehicle a Suitable Option**

		Urban	Rural
Yes	80	41	39
No	20	09	11

**Figure 3.21 Does Driving Pattern Make an Electric Vehicle a Suitable Option**



**Interpretation:**

From this table 80% (urban 41 rural 39) respondents are suitable for EV in their driving pattern. And 20% (urban 09, rural 11) respondents are not suitable for using EV vehicle.

**3.22 EV AND ELECTRICITY BILL**

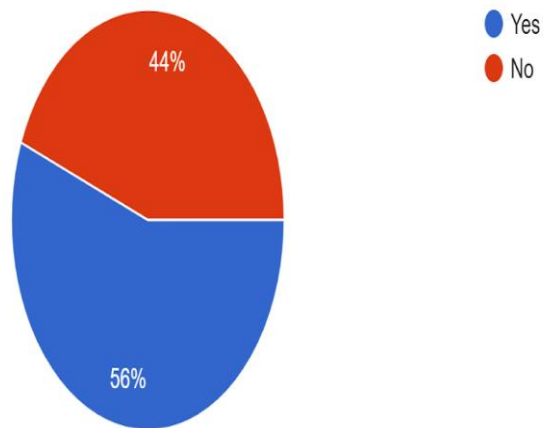
**Table 3.22 EV and Electricity Bill**

Yes	56
No	44

**Figure 3.22 EV and Electricity Bill**

Will charging an EV at home raise your electricity bill?

100 responses



**Interpretation:**

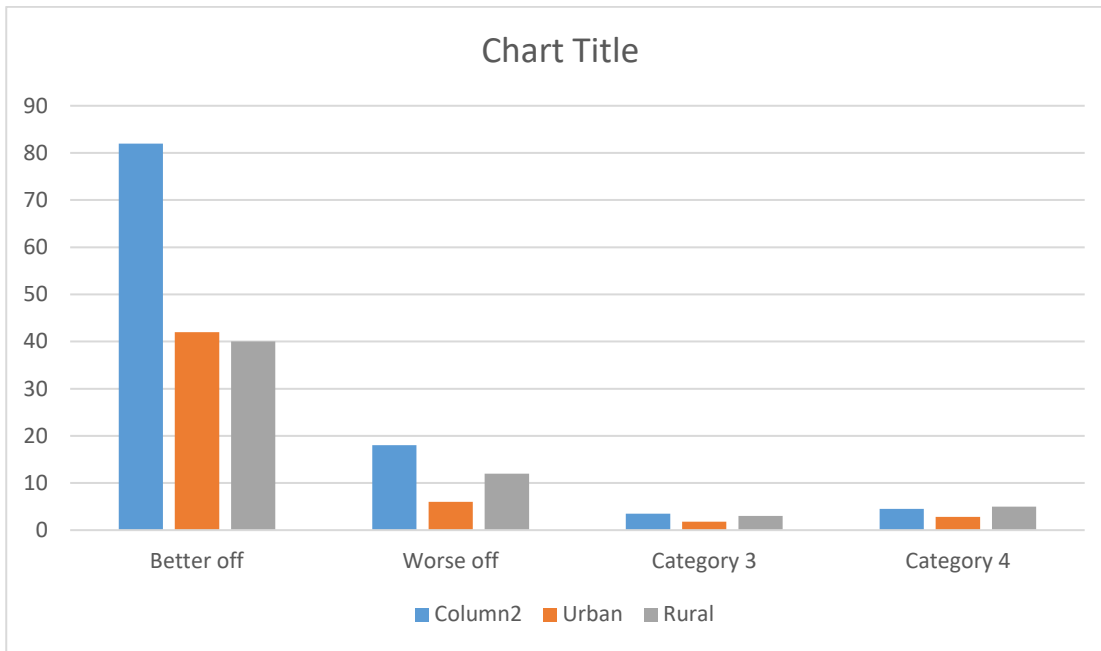
From this table 56% (urban20, rural 36) respondents are aware of increasing on electricity bill. And 44% (urban29, rural 36) respondents are understanding that EVs does note increase in electricity bill.

**3.23 EV PERFORMANCE DAY BY DAY**

**Table 3.23 EV Performance Day by Day**

		Urban	Rural
Better off	82	42	40
Worse off	18	06	12

**Figure 3.23 EV Performance Day by Day**



**Interpretation:**

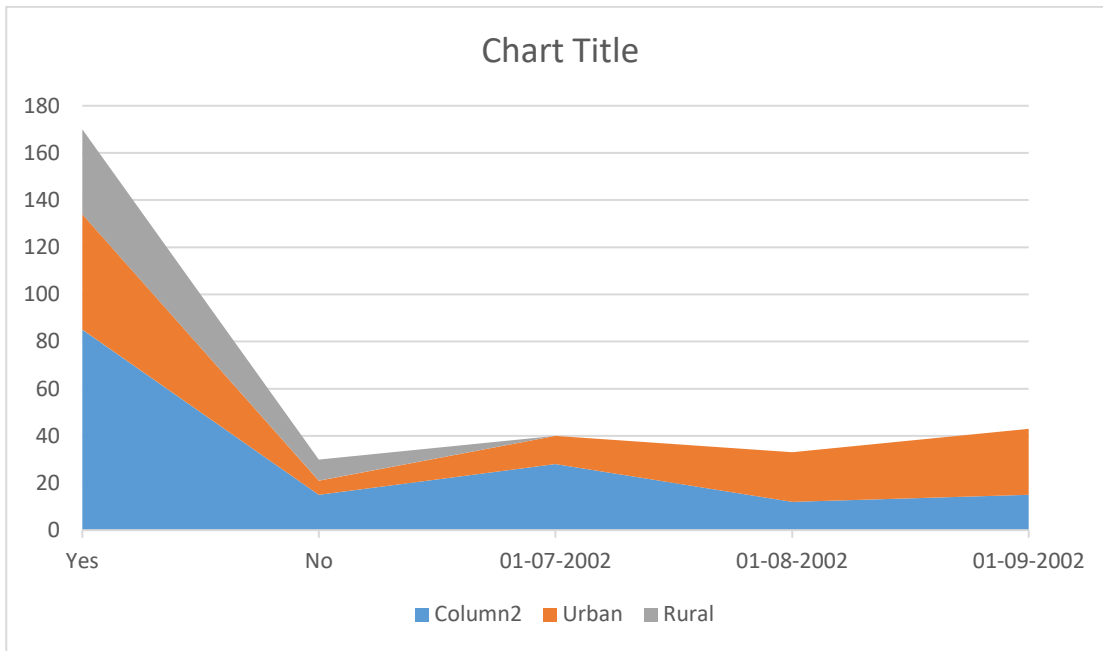
From this table 82% (urban 42 rural 40) respondents get better result in using EV. But 18% (urban 06, rural 12) respondents get worse experience in EV vehicle usage.

**3.24 RECOMMENDATION TO BUY AN EV**

**Table 3.24 Recommendation to Buy an EV**

		Urban	Rural
Yes	85	49	36
No	15	06	09

**Figure 3.24 Recommendation to Buy an EV**



**Interpretation:**

From this table 85% (urban 49, rural 36) people do recommend other to buy an EV. But 15% (urban 6, rural 9) people do not recommend buying EV to others.

## **CHAPTER 4**

# **FINDINGS SUGGESTIONS AND CONCLUSION**

This chapter will present the findings of the study, along with suitable suggestions recommended considering these findings.

#### **4.1 MAJOR FINDINGS:**

- > The survey received more responses from men (57%) than women (43%).
- > Electric vehicles are predominantly used by urban residents, with 51% from urban areas and 49% from rural areas.
- > 78% of respondents have access to an electric vehicle service center near their locality, while 28% do not.
- > The survey revealed high satisfaction among electric vehicle users, with 48% highly satisfied, 38% neutral, 4% dissatisfied, and 1% highly dissatisfied.
- > The main problems reported with electric vehicles are the lack of long battery charge (58 respondents), lack of charging stations (23 respondents), and lack of information about EVs (10 respondents).
- > Approximately 74% of respondents are satisfied with their vehicle's charging capacity.
- > Factors motivating people to buy electric vehicles include low maintenance costs (25 respondents), driving satisfaction (17 respondents), and sustainable development (26 respondents).
- > 88% of respondents believe that the performance of electric vehicles is improving over time, while 18% think it is worsening.
- > 80% of electric vehicle drivers consider electric vehicles the most suitable vehicles for their needs.
- > From this survey, we can understand that about 63% of people sometimes forget to charge their electric vehicles.
- > About 26% of people never forget to charge their electric vehicles.
- > Another limitation is that currently available electric vehicles do not have enough range on a single charge to meet needs.
- > Lack of information is another problem. Some people need more information about EV usage.
- > High cost of electric vehicles is another limitation.
- > Most everyone gets more satisfaction from their driving experience with electric vehicles.
- > The study reveals that 21% of the respondents charge their electric vehicles three times a week.

- > The majority of respondents have a positive attitude towards electric vehicles.
- > The main factor that convinces customers to buy an electric vehicle is a positive environment.
- > Most respondents are satisfied with the eco-friendly nature of electric vehicles.
- > Long recharging times discourage customers from buying electric vehicles.
- > From this survey, we can understand that about 85% of people recommend electric vehicles to others.

## **4.2 SUGGESTIONS**

- > Decrease the underlying expenses associated with electric vehicles to increase interest in them.
- > Electric vehicles can address the issue of rising petroleum costs; government promotion can facilitate future development.
- > Increase awareness about the use and benefits of electric vehicles among the general population.
- > Enhance the charging capacity of electric vehicles to encourage more purchases.
- > Install electric vehicle charging stations on public roads to further incentivize electric vehicle purchases.
- > Expand the ubiquity of electric vehicle service centers to facilitate purchases.
- > Invest in new innovations in electric vehicle technology to stimulate increased purchases.
- > One of the disadvantages of electric vehicles is the delay in charging, so it would be better to make it faster.
- > There are limited options for purchasing electric vehicles compared to fuel vehicles. Bringing more options to buy electric vehicles will lead to more electric vehicle adoption.
- > The mileage of electric vehicles needs to be increased.
- > Incentives and subsidies may be provided by the government for the purchase of electric vehicles.
- > Companies should concentrate on informing the public about new electric vehicle models.
- > Increasing the range of electric vehicles is essential.
- > Educating consumers about the benefits of electric vehicles is important.
- > Electric vehicle promotion also helps the government reduce reliance on crude oil and its high price.

## **4.3 CONCLUSION**

To conclude, it can be said that the overall perception about electric vehicles is positive, and there is a lot of scope for improvement and growth in the electric vehicle industry. However, there are few who are not that impressed with the concept of electric vehicles and have shown their dissatisfaction after using them. This is a clear sign, just like with any other product, that nothing is perfect in this



world, and the same goes for electric vehicles as well. Also, some are not sure about certain aspects, such as their low maintenance costs due to having fewer moving parts compared to internal combustion vehicles, and their servicing requirements being less than conventional petrol or diesel vehicles. Moreover, since they are environmentally friendly, it only makes sense to invest in electric vehicles instead of conventional vehicles. The government should make it a priority to promote the use of electric vehicles in India because they are environmentally friendly, have low maintenance costs, and offer several other advantages over conventional vehicles. The government has set the target of having 100 percent electric vehicles on the road in the country by 2030, and in order to achieve this vision, they would also need to ensure that they offer some cost advantages and subsidies to the manufacturers of electric vehicles to encourage them to produce more electric vehicles. At the same time, they would also need to ensure that they set up a sufficient number of charging points in the country to support the functionality of electric vehicles. The government would also have to ensure that electric vehicles are available and within the reach of everyone in every part of the country.

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# **APPENDIX**

# **CONSUMER PREFERENCES TOWARDS ELECTIC VEHICLES OVER FUELLED VEHICLES; A COMPARATIVE ANALYSIS AMONG URBAN AND RURAL AREAS IN ERNAKULAM**

## **QUESTIONNAIRE**

1. Your name
2. What is your Gender?
  - Male
  - Female
  - Transgender
3. Your profesion
  - Student
  - Self-employed.
  - Salaried
  - Retired
  - Other
- 4.What is your annual household income?
  - below 100000
  - 100000-200000
  - 200000-400000
  - 400000-600000
  - 600000- above
- 5.In which type of area do you live?
  - Urban
  - Rural
6. Have You ever driven an electric vehicle?
  - Yes
  - No
7. If yes what was your experience like?
  - Very satisfied
  - satisfied
  - Neutral
  - Not satisfied
8. Is EVs service centre near by your locality?

Yes

No

9. Rate the service from the service centers of EV.

Highly satisfied

Satisfied

Neutral

Dissatisfied

Highly dissatisfied

10. Do you know the charging stations in your locality?

Yes

No

11. How comfortable are you with charging your vehicle at public charging stations?

Highly satisfied

Satisfied

Neutral

Dissatisfied

12. What are the intervals of charging your EVs per weeks?

One time in a week

Two times in a week

Three times in a week

Four times in a week

Fives time in a time

Six times in a week

Seven times in week

Other

13. I forget to charge my vehicle for

Always

Usually

Sometimes

Never

14. Are you satisfied in the charging capacity of your EV?

Yes

No

15. In your opinion what are the advantages of EVs?

Low cost maintenanc

Driving satisfaction

Sustain development.

All of these

16. In your opinion what are the disadvantages of EVs?

Lack of long charge in battery

Lack of charging stations

Lack of information about EV

Its gives less profits

Other

17. What is the main thing that is preventing you from buying an EV?

\*The present cost of EV is too high

\*The vehicles available now doesn't have enough range over a single charge to meet needs

\*I need more information about the technology I would make a purchase

\*It would be difficult to set up charging in my building/ home

\*Other

18. How long have you been using E-vehicles?

0-3 year

4 to 10 years

Above 10 years

Other

19. Electric vehicle can save a lot of money to the owner" your opinion?

Strongly disagree.

Disagree

Neutral

Agree

Strongly agree.

20. Electric vehicles are more eco friendly than petrol and diesel. Your opinion

Strongly disagree.

Disagree

Neutral

Agree

Strongly agree.

21. Electric vehicle technology has improved, and they now have much better range?

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

22. How would you compare the overall driving experience of EVs and fuel vehicles?

I prefer EV.

I prefer fuel vehicles.

23. How would you compare the maintenance costs of EVs and fuel vehicles?

EV better

Fuel V better.

Both are Good.

24. Which type of vehicle do you think is more reliable?

EV

Fuel V

25. Does your driving pattern make an electric vehicle a suitable option for you?

Yes

No

26. Will charging an EV at home raise your electricity bill?

Yes

No



27. Is your EV perform better or worse day by day?

Better off

Worse off

28. Which kind of vehicle do you like?

EVs

Fueled vehicle.

29. Do you recommend others to buy an EV?

Yes

No