Major Research Project on

"Study on Consumer Buying Behavior Towards Electric Vehicles"

Submitted By

Nikita Sharma
23/UMBA/67

Under the Guidance of

Dr. Archana Singh
Associate Professor

UNIVERSITY SCHOOL OF MANAGEMENT & ENTREPRENEURSHIP

Delhi Technological University

Bawana Road Delhi 110042

CERTIFICATE

This is to certify that the project titled **"Study on Consumer Buying Behavior Towards Electric Vehicles"** is an original academic work carried out by **Ms. Nikita Sharma** in partial fulfillment of the requirements for the award of the degree from **Delhi Technological University**.

The project has been completed under the supervision and guidance of **Dr. Archana Singh (Faculty Guide)**. The authenticity of the submitted work will be evaluated by the examiner, including data verification and checks for originality. The project may be subject to rejection in case it fails to meet the quality standards prescribed by the University.

Signature of the Faculty Guide

Dr. Archana Singh

Associate Professor

Delhi School of Management

Delhi Technological University

DECLARATION

I, Nikita Sharma, hereby declare that the Major Research Project Report entitled **"Study on Consumer Buying Behavior Towards Electric Vehicles"** submitted to Delhi Technological University is a record of my original work done under the guidance of Dr. Archana Singh, Associate Professor, Delhi Technological University, Delhi. This project report is submitted in partial fulfilment of the requirements for the award of the degree of MBA.

I also declare that this project report has not been submitted to any other university or institute for the award of any degree or diploma.

…….

Nikita Sharma
2K23/UMBA/67
MBA
University School of Management & Entrepreneurship
Delhi Technological University

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EXECUTIVE SUMMARY

This research work is titled "**A Study on Consumer Buying Behavior Towards Electric Vehicles (EVs).**" It considers the growing demand for electric vehicles in India and analyzes the various reasons for the manner in which people purchase them. With environmental degradation problems on the rise, fuel prices rising, and government initiatives attempting to reduce the nation's carbon footprint, electric vehicles are gaining popularity in the Indian automotive sector.

The aim of this research is to investigate the way consumer demand is moving towards sustainable options and what drivers and barriers are responsible for the uptake of EVs. The project covers consumer attitudes towards price, battery performance, environmental advantage, government incentive, availability of infrastructure, and firm reputation. The research also looks at how demographics like age, income, education, and geographic location affect decision-making during the EV purchasing process.

Research data has been collected using primary and secondary sources. Primary data was gathered through standardized questionnaires distributed among students, professionals, and two-wheeler users. Secondary data collection has been obtained from industry reports, government databases, company reports, and online websites. The research design ensures cross-section and unbiased view of the present scenario regarding EV adoption in India.

Results of the study indicate that although there is a positive change in consumers' attitude towards EVs, there are astonishing challenges nonetheless. Consumers cite EVs' high upfront cost, absence of adequate charging stations, restricted vehicle range, and inadequate awareness as areas of concern. Increased environmental consciousness, government incentives such as FAME-II, income tax relief, and vehicle scrappage policies, coupled with technological advancements, are paving the way for step-by-step growth in demand and acceptance.
The report also mentions the categories of electric vehicles in India, including two-wheelers, three-wheelers, passenger cars, and commercial vehicles. It provides an overview of the current EV manufacturing clusters in India. The study also focuses on the importance of government incentives, infrastructure development, and consumer education in shaping the future of the EV market.

In conclusion, this study provides crucial facts to stakeholders—government, auto manufacturers, marketers, and investors—so that they know and address Indian EV buyers' needs and habits. With proper proportions of innovative thinking, enlightenment, and policy response, India can take leadership in the worldwide electric car phenomenon.

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Introduction

1.1 Background

Electric vehicles (EVs) are revolutionizing the face of the car industry by offering a green alternative to conventional inner combustion engine vehicles. In contrast to conventional vehicles that rely on fossil fuels, EVs are powered by electricity from batteries and thus do not emit any harmful emissions and have very minimal environmental footprint. With the warming of the planet, air pollution, and depletion of non-renewable resources globally, EVs provide a clean means of transport in the future.

In India, the transition to electric vehicles is becoming more robust. This is occurring due to fuel prices increasing, the government's support, and people becoming increasingly environmentally conscious. With rapid technological advancements, improved infrastructure, and innovative vehicle design, the Indian electric vehicle sector is transforming rapidly, particularly in the two-wheeler and passenger car segments.

Having electric cars is good for the environment and creates new jobs, encourages innovation, and supports local enterprise. However, there are still challenges like high cost, few charging points, and a lack of awareness. This project looks at how people in India buy electric cars in order to find out what determines their choices and how big the market for EVs could be. Over the past few years, the world automotive business has changed a lot to focus on green transport, and electric vehicles (EVs) have played a very important part in this. Governments, environmental organizations, and producers are encouraging people to use EVs because of the threat of climate change, air pollution, and the running out of fossil fuels. The change is not just about technology but also about the way that people's choices are shifting towards cleaner options.
Yet, with growing availability and visibility of EVs, consumer adoption continues to be broadly scattered across geographies and demographics. Price sensitivity, charging infrastructure, vehicle range, brand perception, government incentives, and green awareness all determine consumer choice. In emerging markets, low awareness, limited product availability, and underpenetrated charging networks are also issues that influence consumer preferences and purchasing behavior.

Understanding how people shop is crucial in order to know what facilitates and what prevents individuals to accept electric vehicles (EVs). It enables policymakers and manufacturers to develop improved strategies to enable individuals to transition from conventional gasoline-powered vehicles to electric vehicles. This research will explore and analyze the determinants of consumer preference for EVs, providing data that can be used to enhance marketing, policies, and technology for electric vehicles.

How Electric Vehicles (EVs) Came into Existence?

Electric Cars (EVs) are not a new concept; their development goes back as far as the early 19th century and has a complex and interesting history. The original idea of an electric car dates back to the 1820s and 1830s, when electric carriages and carts were tried on a small scale by inventors in the United States and Europe. The invention of the rechargeable lead-acid battery by Gaston Planté in the late 1800s provided the pathway to the development of more feasible electric cars.

During the early 1900s, electric automobiles became very popular, especially in urban areas, due to their cleanliness, quietness, and ease of use over steam or gasoline motorcars. Electric vehicles for a period, around the turn of the century, comprised almost one-third of all vehicles on American roads. This however was dampened by the coming of the Ford Model T in 1908. Gasoline motorcars soon became less expensive, quicker, and more convenient with mass production and better supply of gasoline, eventually phasing out the early EVs.

Interest in electric vehicles was revived during the 1970s oil crisis, when gasoline prices soared. But despite the renewed interest, the technology was still not advanced, and electric vehicles could not make much headway. It wasn't until the 2000s that they actually began to gain acceptance again, spurred on by growing worries about air pollution and climate change. Advances in battery technology, particularly with lithium-ion batteries, made EVs more efficient and practical. Makers such as Tesla spearheaded the popularity of modern electric vehicles, with high-performance models boasting high ranges.

Electric vehicles are at the center of the world's shift towards sustainable mobility today, supported by technology, policy, and growing consumer awareness.

What is Electric Vehicle?

A vehicle that operates mainly or entirely on electricity is an Electric Vehicle (EV). EV is environmentally friendly compared to conventional gasoline or diesel-powered cars. EVs use electric motors that propel them and are driven by chargeable batteries rather than fuel-burning internal combustion engines. EVs do not emit noxious gases through their exhaust, significantly minimizing their environmental impact, particularly regarding air pollution and emissions of greenhouse gases.

Types of EV's

1. **Battery Electric Vehicle (BEV):**
   Battery Electric Vehicles are vehicles that are powered solely by electricity from large batteries. They have no gasoline engine and no emissions while on the road. Since they don't emit pollutants, they are environmentally friendly. BEVs have electric motors and must be powered from an external source, either a residential charging station or a charging station in a public place. These vehicles are wonderful for those who can charge them regularly and want to reduce their carbon footprints.

2. **Plug-in Hybrid Electric Vehicle (PHEV):**
   Plug-in Hybrid Electric Vehicles are equipped with an engine which runs on gas, an electric motor, and a chargeable battery. They are able to run on electricity for a certain period of time and afterward, have a gas engine that propels them farther and more efficiently. PHEVs can be charged by connecting an electric plug and also run on gasoline, making them suitable for short as well as long journeys. Toyota Prius Prime and Chevrolet Volt are some of PHEVs.

3. **Hybrid Electric Vehicle (HEV):**
   Hybrid Electric Vehicles are equipped with both an engine and an electric motor. HEVs cannot be plugged in. The battery is charged using regenerative braking and engine driving. HEVs are suitable for city driving due to frequent starts and stops and tend to use less fuel than traditional gasoline-powered automobiles. HEVs are suitable for those who prefer some electric capabilities but do not wish to charge the vehicle. The Toyota Prius and Honda Insight were some of the first mainstream HEVs.

Types of Electric Vehicles by Mode

1. **Land Electric Vehicles:**

These are the most commonly used EVs. They include electric cars, bikes, buses, trucks, and rickshaws. Powered by rechargeable batteries, these vehicles are widely adopted for personal and public transport due to their cost-efficiency and eco-friendliness.

- **Electric Cars** – These are used for personal transport (e.g., Tata Nexon EV, MG ZS EV)
- **Electric Two-Wheelers** – These include Scooters and bikes (e.g., Ola S1, Ather 450X)
- **Electric Buses** – Public transport vehicles (e.g., Olectra-BYD, Tata Starbus EV)
- **Electric Trucks** – Used for logistics and goods movement (e.g., Ashok Leyland EV)
- **Electric Rickshaws** – These are common in urban and semi-urban areas.
- **Electric Trains/Metros** – These are widely used for mass transit (e.g., Indian Metro Rail systems)

2. **Sea Electric Vehicles:**

Electric ferries, boats, and yachts are used for water transportation. They are especially useful in reducing water pollution and noise. In India, there are some states like Kerala that have started using solar-electric boats for public transport.

- **Electric Ferries** – These are used in rivers and coastal areas
- **Electric Boats/Yachts** – These are used for leisure and transport vessels (e.g., Solar-powered boats in Kerala)
- **Electric Submarines** – These are used in defense and research, often powered by batteries

3. **Air Electric Vehicles:**

This is an emerging segment that includes electric drones, small aircraft, and urban air taxis (eVTOLs). This is still in early stages but these vehicles are being made to make air travel cleaner and more efficient in the future.

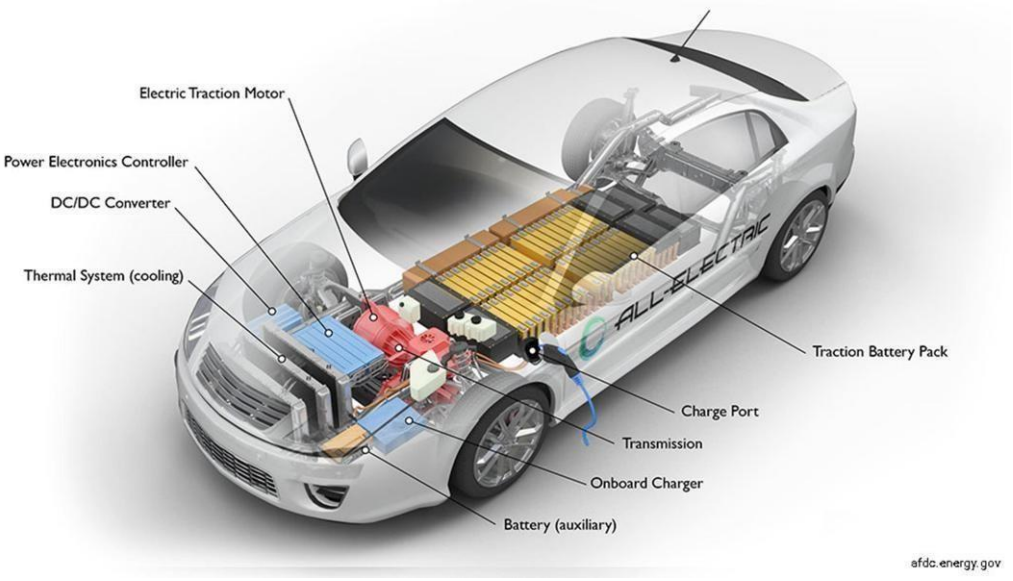
- **Electric Drones** – These are widely used for surveillance, delivery, and agriculture.
- **Electric Airplanes** – These are small aircraft under testing or for short-haul flights (e.g., Alice by Eviation)
- **Urban Air Mobility (UAM)** – These are future electric air taxis for city transport (eVTOLs)

How do all electric vehicles work?

Unlike standard vehicle use gasoline, electric vehicle (EVs) are propelled by an electric motor where the electric motor gets its power from electricity stored in a battery. When the electric vehicle starts out, it pulls electric power from the battery into the electric motor and into the wheels. Electric powered motors are not contained in gasoline-burning engines which experience much inertia, which is why it has the potential for getting torque (power to the wheels), and acceleration, with great speed and almost no sound. Almost all EVs, and electric motors have regenerative braking which means, they retain electric energy from the wheels and naturally charge the battery, indirectly means it's more efficient energy over long periods.

EVs pull their energy and charge by external power sources, usually home chargers or public charging stations, which in some public charging options, involve fast-charge. This allows EV drivers to diminish the time it requires to charge, ultimately, in some electric vehicles the charge time is only a couple of hours a day.

All-Electric Vehicle



Key Components of all Electric Vehicles

- **Battery (all-electric auxiliary)**: The additional battery in an electric vehicle provides energy to charge vehicle accessories.
- **Electric Motor**: The electric motor propels the wheels through converting electrical energy from the battery into mechanical energy. The electric motor enables speed increases in silence and smoothly without having to employ gearing.
- **Inverter**: The inverter converts the battery's DC power into AC power for the motor. The inverter also regulates the speed of the motor and recharges the battery during braking.
- **Controller**: The controller regulates the battery energy to the motor. The controller responds to what the driver is doing (such as stepping on the gas pedal) and adjusts the speed and power.
- **Charge port**: The charge port allows for connection of the vehicle to an external source of power for charging of the traction battery pack.
- **AC/DC converter**: It converts high-voltage DC from the traction battery pack into lower-voltage DC. The vehicle requires this low-voltage power for accessories as well as for charging the auxiliary battery.
- **Electric traction motor**: The electric traction motor receives energy from the traction battery pack for the propulsion of the vehicle wheels. A motor generator is used in some vehicles that can propel the vehicle and conserve energy as well.
- **Onboard charger**: This component converts AC power from the charging port to DC power in order to charge the traction battery. It monitors battery information such as voltage, current, temperature, and charge level while charging the battery pack.
- **Power electronics controller**: Regulates the use of electric energy from the traction battery. Controls the speed of the electric traction engine as well as its traction force.

- **Cooling thermal system**: Maintains engine, electric motor, power electronics, and other components at optimal temperature. Traction battery pack: Stores electricity for use by the electric traction motor.

Figure: 1.1

<u>Benefits of Electric Vehicles in India</u>

- **Environmental Sustainability**
  EVs do not emit any toxic gases from exhaust. This greatly decreases air pollution in cities like Delhi, Mumbai, and Bangalore, where air is usually polluted. With lesser emissions, there are lesser greenhouse gases released into the air. This makes it easier for India to achieve its Paris Agreement greenhouse gas reduction goals.

- **Minimized running and maintenance expenses**
  EVs are far cheaper to run than diesel or petrol-powered cars. To charge them using electricity is cheaper, and they have far fewer moving parts, which means that you do not have to worry about engine oil changes. Maintenance as a whole

is cheaper, and they have less wear and tear. So while it is more expensive when buying one in the first place, they pay for themselves in the long term.

- **Government Support and Incentives**
  India has initiated various policies including FAME II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles), Production Linked Incentive (PLI) programs, and subsidies from states. These policies aid by providing incentives in the form of reduced rate of road tax, reduction in GST, purchase subsidies, and assistance in constructing charging infrastructure.

- **Reduced fuel imports and safe energy**
  Most of the crude oil is imported into India from other nations. By encouraging EVs, India can rely less on this oil, save plenty of money, and enhance national energy security by harnessing more renewable sources of energy.

- **Creating employment and establishing businesses**
  EV is opening new opportunities in making, battery technology, research and development, and infrastructure. It supports the Make in India initiative and boosts jobs locally in sectors such as battery assembly, recycling, and smart transport solutions.

Challenges of Electric Vehicles in India

- **Expensive initial cost**
  The cost of electric vehicles (EVs), particularly electric cars, is significantly higher compared to conventional fuel-run vehicles. The cost is prohibitive for most Indian consumers, particularly those who are prudent about spending.

- **Inadequate Charging Infrastructure**
  One of the biggest obstacles is the lack of a robust and widespread public charging network. Most cities still have very few fast-charging stations, and rural or tier-2 cities have little to no infrastructure. This leads to "range anxiety"—the fear that the vehicle will run out of charge mid-journey.

- **Limited driving range and battery life**
  Affordable EV models tend to have a lower driving range, which may not suit those who have to cover long distances. Further, battery performance deteriorates in extremely hot or cold climates, which impacts their reliability across various Indian climates.

- **Battery Supply Chain Issues and Recycling**
  India is heavily dependent on imports for its battery parts and materials, including lithium and cobalt. The country is also short of infrastructure for recycling batteries, which is of concern for future environmental and resource management issues.

- **Lack of consumer awareness and faith**
  Most people in India are yet not aware about electric vehicles' functioning, advantages, and assistance available from the government. Prevalent perceptions

regarding car safety, battery longevity, and charging time are still influencing purchase decisions. Awareness programs and education must instill faith and promote usage.

Automotive Industry in India:

India's auto and motorcycle market indicates what is occurring in India's economy. The market has enabled the country to grow and advance technology. The two-wheeler market is biggest since more people, particularly youth, are becoming part of the middle class. More companies are targeting rural regions, expanding the market.

More persons demand commercial vehicles due to increased passenger transport and logistics. The future of this sector is likely to shift due to trends such as the use of electric automobiles (EVs), particularly for three-wheelers and light automobiles. India is already the second-largest manufacturer of passenger automobiles in the world and the third-largest manufacturer of trucks. India produced approximately 25.9 million automobiles in FY23, reflecting robust local demand and opportunities for exports. Sales of passenger automobiles in January 2024 were 393,074 units, an improvement of 14% from January 2023. The share of India's GDP of the auto sector has increased significantly from 2.77% in 1992-93 to approximately 7.1% today. The sector provides direct and indirect employment to virtually 19 million persons.

The government has several plans in place including the Automotive Mission Plan 2026, Vehicle Scrappage Policy, and Make in India. These plans are meant to encourage local production and establish India as a leading manufacturer of two-wheelers and four-wheelers. The rapidly growing auto sector in India has a chance of reaching USD 300 billion by 2026. The growth is due to increased numbers of people having more money, urban areas expanding, and an improved buying capacity of the middle class.

India produced 2,325,959 units in March 2024. These were passenger vehicles, three-wheelers, two-wheelers, and quadricycles. The majority were two-wheelers at 1,487,579 units. There were 368,086 passenger vehicles and 56,723 three-wheelers.

A total of 7,394,417 units were manufactured from January through March 2024. These comprised 1,135,501 passenger cars, 268,294 commercial vehicle units, 164,844 three-wheelers, and a staggering 4,503,523 two-wheelers in the local marketplace.

India has three principal locations for its automobile sector.

- Southern Cluster (Chennai): Produces 35% of the company's revenues and has large global players in the name of Hyundai, Renault, Ford, Nissan, BMW, Daimler, and Mitsubishi. The city alone contributes 60% of India's auto exports.
- Western Cluster (Mumbai-Pune): Accounts for around 33% of the market. Key players are Tata Motors, Mahindra & Mahindra, Skoda, Volkswagen, Mercedes-Benz, Fiat, Land Rover, Jaguar, and General Motors. Other key cities are also Nashik and Aurangabad with Mahindra & Mahindra and Audi-Skoda-Volkswagen plants.
- Northern Cluster (NCR – Gesar, Manesar) accounts for 32% of the market and is dominated by Maruti Suzuki, India's largest car manufacturer.

New clusters in Gujarat, including Sanand and Halol, are gaining strength due to having factories for General Motors, Tata Motors, Ford, Maruti Suzuki, and Peugeot-Citroën. Other key locations are Kolkata having Hindustan Motors, Noida having Honda, and Bangalore having Toyota.

India is a large and robust location for producing things that supports India's expanding electric vehicle sector. It is an awesome place for observing people behaving in an enlarging market.

India electric vehicle showcases perspective Bain & Co. According to the report, by 2030, electric two-wheelers may constitute 40-45% of the total number of electric vehicles sold in India, while electric traveler vehicles may constitute 15-20%. However, according to a NITI Aayog report, the Indian government aims to have 40% penetration for buses, 30% for personal vehicles, 70% for commercial vehicles and 80% for two-wheelers by this year. According to VAHAN data, the Indian electric two-wheeler market has noted an astonishing growth of 34.42% in sales in FY 2023-24 (Q3 FY24) relative to the previous quarter (Q2 FY24) increase.

The important goal of the VAHAN platform is to automate regional transport office (RTO) functions at a national level, including vehicle registrations, issuing licenses, taxation and enforcement procedures. Meanwhile, the 2023 Economic Survey of India indicates that the projected compound annual growth rate (CAGR) for the domestic EV market in India will be 49% from 2022 to 2030, with an estimated 10 million EV sales by 2030. The sector will create roughly 50 million direct and indirect job opportunities over the next 7 years.

List of Indian Electric Vehicle (EV) Manufacturers:

- Tata Motors
- Mahindra Electric
- Ola Electric
- Ather Energy
- TVS Motor Company
- Bajaj Auto
- Hero Electric
- Ampere Vehicles (Greaves Electric Mobility)
- Revolt Motors
- PURE EV
- Okaya EV
- Bounce Infinity
- Simple Energy
- Euler Motors
- Omega Seiki Mobility
- VE Commercial Vehicles (Eicher Motors)
- Ashok Leyland (Switch Mobility)

Electric Vehicle (EV) Manufacturing Facilities in India

1. Passenger Electric Vehicles (Cars & SUVs)

Manufacturer	Location	Remarks
Tata Motors	Sanand (Gujarat), Pimpri (MH)	Major EV production (Tiago EV, Nexon EV)
Mahindra Electric	Chakan (Maharashtra)	EV assembly and battery plant
MG Motor India (JSW)	Halol (Gujarat)	ZS EV, Comet EV
Hyundai India	Sriperumbudur (Tamil Nadu)	Kona, Ioniq 5 + local battery assembly
Kia Motors	Anantapur (Andhra Pradesh)	EV6 and future EVs
BYD India	Sriperumbudur (Tamil Nadu)	e6, Atto 3; expansion planned
BMW India	Chennai (Tamil Nadu)	Assembly of iX, i4, i7
Mercedes-Benz India	Chakan (Maharashtra)	EQB, EQS, EQE locally assembled
Volvo Cars India	Hoskote (Karnataka)	XC40 Recharge, C40 Recharge
Audi India	Aurangabad (Maharashtra)	Planning EV assembly in future
Jaguar Land Rover	Pune (Maharashtra)	I-PACE sold, not locally manufactured yet

2. Commercial Electric Vehicles

Manufacturer	Location	Remarks
Tata Motors	Jamshedpur (Jharkhand), Pune (MH)	EV buses, LCVs
Ashok Leyland	Ennore, Hosur (Tamil Nadu)	EV buses under "Switch Mobility" brand

Olectra Greentech	Hyderabad (Telangana)	Leading electric bus manufacturer
Piaggio Vehicles	Baramati (Maharashtra)	Ape Electrik range (e-autos, cargo)
Eicher Motors (VECV)	Pithampur (Madhya Pradesh)	EV trucks and buses
Mahindra Electric	Zaheerabad (Telangana)	Treo Zor (electric 3-wheelers for cargo)
BYD India	Sriperumbudur (Tamil Nadu)	EV buses for intercity and fleet
Omega Seiki Mobility	Faridabad (Haryana), Chakan (MH)	3-wheelers and LCVs, expanding portfolio

3. Electric Two-Wheelers

Manufacturer	Location	Remarks
Hero Electric	Ludhiana (Punjab), Rajasthan (upcoming)	Leading EV scooter brand
TVS Motors	Hosur (Tamil Nadu)	iQube production
Ather Energy	Hosur (Tamil Nadu)	Manufacturing Ather 450X, 450 Apex
Ola Electric	Krishnagiri (Tamil Nadu)	World's largest 2W EV facility
Bajaj Auto	Akurdi (Maharashtra)	Chetak EV production
Revolt Motors	Manesar (Haryana)	Electric motorcycles
Ampere Vehicles (Greaves)	Ranipet (Tamil Nadu)	EV scooters like Magnus, Primus
Simple Energy	Shoolagiri (Tamil Nadu)	Startup building premium EV scooters
Okaya EV	Baddi (Himachal Pradesh)	Expanding dealer base across India
Bounce Infinity	Bhiwadi (Rajasthan)	Swappable battery scooters

The Department of Heavy Industries has also approved 2,636 charging stations in 62 cities. These cities are covered in 24 states/UTs under FAME India Phase-II. The breakdown of those charging stations by state is shown as following:

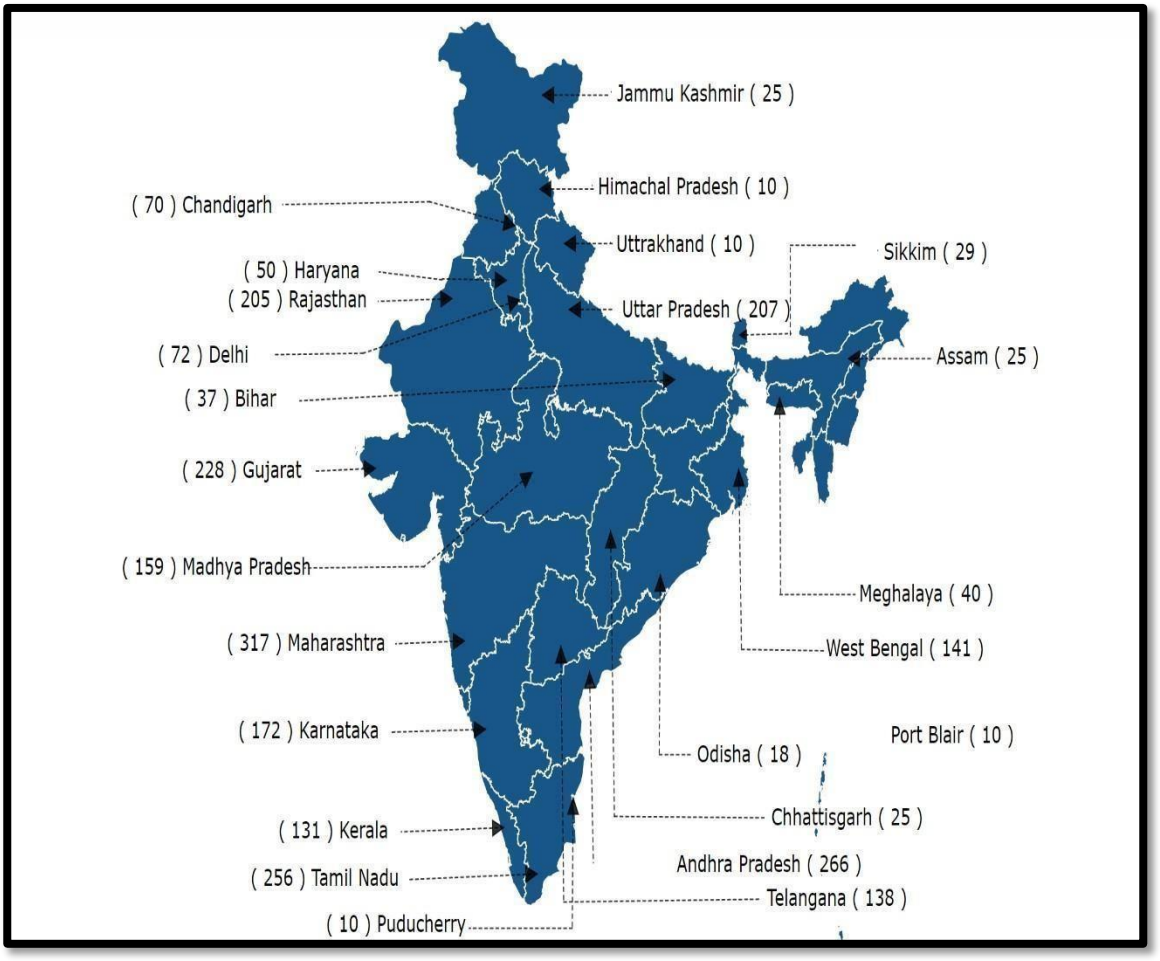
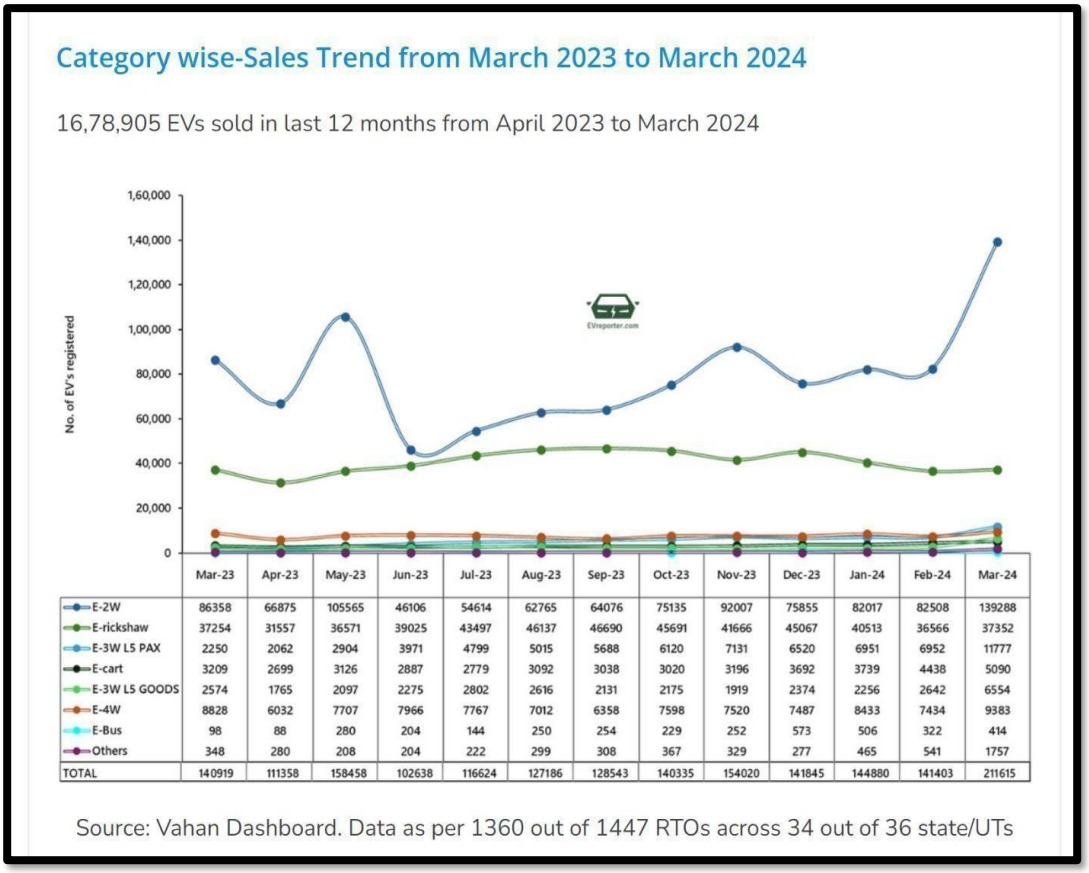


Figure 1.2: Niti Aayog data



	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
E-2W	86358	66875	105565	46106	54614	62765	64076	75135	92007	75855	82017	82508	139288
E-rickshaw	37254	31557	36571	39025	43497	46137	46690	45691	41666	45067	40513	36566	37352
E-3W LS PAX	2250	2062	2904	3971	4799	5015	5688	6120	7131	6520	6951	6952	11777
E-cart	3209	2699	3126	2887	2779	3092	3038	3020	3196	3692	3739	4438	5090
E-3W LS GOODS	2574	1765	2097	2275	2802	2616	2131	2175	1919	2374	2256	2642	6554
E-4W	8828	6032	7707	7966	7767	7012	6358	7598	7520	7487	8433	7434	9383
E-Bus	98	88	280	204	144	250	254	229	252	573	506	322	414
Others	348	280	208	204	222	299	308	367	329	277	465	541	1757
TOTAL	140919	111358	158458	102638	116624	127186	128543	140335	154020	141845	144880	141403	211615

Figure 3: category wise sales data

As it is clearly seen and observed in the data that during the period of twelve months from April 2023 to March 2024, India has retailed a total of 1,678,905 electric vehicles (EVs). In March 2023, the sales figure began at 140,919 units and later this figure continued to increase every month, reaching as much as 158,458 units in May 2023. There was a slight fall in the sales figure in the month of June 2023, with fewer subsidies, at 102,638 units. But the sales figure again picked up speed from July 2023. In March 2024, the EV sales reached an all-time high of 211,615 units, showing a big jump in the development of the EV market.

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1.2 Problem Statement

Although there are more individuals aware of environmental issues and there are more electric vehicles (EVs) to purchase, few customers are opting to use them, particularly in developing nations. EVs offer numerous advantages such as reduced pollution, reduced fuel expenses, and incentives from the government, but numerous prospective customers are still hesitant to switch from conventional gasoline vehicles. This may be due to numerous reasons such as high initial costs, insufficient charging stations, concern over battery depletion, insufficient information regarding the products, and uncertainty regarding how they handle and how simple they are to maintain.

It is crucial to know the determinants of consumer purchasing behavior if the adoption of EVs is to be promoted. However, little effort has been made towards knowing differences in these determinants across different segments of consumers. Therefore, in this study, we seek to identify and assess the key determinants, issues, and perceptions that drive consumer buying decisions in electric vehicle purchases.

1.3 Objectives of the study

- To determine consumer awareness and perception about electric vehicles in India.
- To determine the most important drivers that shape the consumers' purchasing behavior for EVs (e.g., range, price, charging network, brand, environmental concern).
- In an attempt to measure consumer satisfaction with the existing electric vehicle choices found in the Indian market.
- To analyze the impact of government incentives and policies on consumer demand for electric cars.
- To research the issues and concerns of the prospective buyers for the utilization of EVs.
- To determine to what extent socio-economic variables, such as age, income, education, and occupation, influence consumer purchasing behavior.
- The aim is to forecast future electric vehicle demand trends by consumer attitudes and preferences.
- To provide recommendations to policymakers and manufacturers to encourage adoption of EV and meet consumers' needs.

1.4 Scope of Study

This Scope of Study shows the boundaries and focus areas of this research.

1. Geographical Scope

- This research focuses mainly on India's urban and semi-urban regions, where the uptake of electric vehicles (EVs) is quickly picking up pace, spurred by improved infrastructure, rising awareness, and rising purchasing power.

- Particular emphasis can be on cities that are witnessing growth in the penetration of electric vehicles, e.g., Delhi, Bangalore, Mumbai, Pune, and Hyderabad.

2. Target Audience

- This research targets individual consumers like:
  - Young professionals
  - Students
  - Middle-income households
  - Environmentally conscious buyers
- It includes both existing EV users and potential buyers, aiming to understand their preferences, awareness, and challenges.

3. Product Scope

- This study focuses on personal-use electric vehicles, like:
  - Electric two-wheelers (e-scooters, e-bikes)
  - Electric three-wheelers (e-rickshaws for personal use)
  - Electric four-wheelers (cars)
- It does not include commercial or industrial EVs like electric trucks, buses, or delivery vans.

4. Behavioral Focus

It focuses on important behavioral and psychological factors which influence purchase decisions like:

- Price sensitivity and running cost
- Environmental awareness
- Technology adoption willingness
- Social influence and lifestyle fit
- Awareness about government incentives

5. Time Frame

- The study is conducted during the period of 2024–2025, and therefore it captures current trends, policies, and consumer sentiment.

6. Data Collection

- This research uses both primary data (surveys, questionnaires, interviews) and secondary data (government EV reports, VAHAN portal, market studies).

- Data is collected from consumers, dealers, and automotive professionals for a complete view.

7. Limitations

- Sample size is limited because there are constraints in resources and access.
- It is not regionally and demographically diverse.
- It focuses more on intentions and perceptions than long-term ownership experience.

CHAPTER -2

Literature Review

Literature review in the present study, which looks at consumer purchase behavior towards electric vehicles (EVs) in India, attempts to explore the emerging demand for EVs and the several influencing factors that guide consumer choice at the time of purchase. It tries to learn about consumer attitudes, behavior, and perceptions towards electric vehicles, simultaneously bringing light to the subject of the burgeoning growth of the EV market in India amidst overall consumer ignorance. Special care is given to influential factors like growing fuel prices, environmental concerns, age, educational level, and awareness level concerning EV ownership.

The research combines primary and secondary data, collected using questionnaires and market surveys of dealers, students, and workers of two-wheeler original equipment manufacturers (OEMs). The research examines the roles of consumer innovation, technological familiarity, government policies, and market forces in determining consumer choice. The review also highlights the need to improve consumer awareness and knowledge to accelerate the adoption of electric vehicles, as well as address the main challenges that are currently slowing the growth of the electric vehicle sector in the Indian market.

Growing Demand

- There is an increase in middle-class earnings and also in young population which will impact robust demand.
- The total production of passenger cars, three-wheelers, two-wheelers, and quadricycles was units in January 2024.
- The global demand for EVs was estimated at around US$ 250 billion in 2021 and this is expected to increase 5 times to US$ 1,318 billion by the year 2028.

Opportunities

India can become the leader in shared mobility by 2030 by increasing adoption of electric and autonomous cars.

- The emphasis of government is turning towards electric cars to cut emissions.
- The Indian government has pledged that 30% of India's new car sales will be electric by the year 2030.

Rising Investments

- India is on track to achieve the biggest EV advertise by 2030, with an added venture opportunity of more than USD 200 billion over the next 8-10 yr
- The car division has got an aggregate FDI influx of almost USD 35.65 billion between the period of April 2000 - December 2023

Policy Support

- The Automotive Mission Plan 2016- 26 is a joint effort of the Government of India and the Indian automotive assiduity to outline the roadmap for the growth of the automobiles.
- FAME & FAME II Schemes: The government also offers several financial incentives for EV buyers and manufacturers, mainly focusing on promoting electric public transport and also building proper charging infrastructure.
- State-Level EV Policies: Various states provide additional benefits like subsidies, tax exemptions, and registration fee waivers to encourage EV adoption.
- Support for Local Manufacturing: Through initiatives like the PLI scheme, the government supports domestic production of EVs and batteries, as this aims to make India a global EV hub.

In most of the other markets, Electric vehicles are considered to be within the reach of the middle consumer base, so the companies which sell electric cars in India need to focus on middle income customers.

With the rise of electric vehicles (EV) it is visible that there are significant changes taking place in the global automotive industry.

This change is due to environmental issues, technological development and changing consumer preferences. Understanding consumer purchasing behavior for electric vehicles is critical for manufacturers, policy makers and marketers to promote and facilitate the adoption of these vehicles. This literature review summarizes current research on the factors that influence consumers' electric vehicle purchase decisions.

Environmental issues and awareness:

The awareness of the environment is of immense significance to individuals who prefer electric vehicles. As people become more conscious of the damage caused by traditional vehicles, they recognize that electric vehicles assist in reducing greenhouse gases and air pollution. Research shows that people with higher sensitivity towards environmental issues are more likely towards the idea of purchasing

electric vehicles. The degree to which this awareness influences purchasing behavior can vary, depending on the level of information available to the customer and the extent to which they are exposed to reliable information.

Financial Considerations:

Financial considerations are among the strongest drivers of consumers' choice in the case of electric vehicles. These are the point-of-sale purchase price, government incentives, fuel economy, and maintenance. While the purchase price of electric vehicles tends to be higher than that of ICE, the long-term savings in fuel and maintenance can pay for the difference. Furthermore, government incentives, in the form of tax credits and subsidies, are indispensable to lowering actual costs and encouraging wider adoption.

Technological Considerations:

Technological innovation in battery life, charging infrastructure, and vehicle performance are powerful drivers of consumer adoption. Perhaps the most prevalent barrier to adoption is fear of distance, or fear that an electric vehicle will not make it to its destination because it runs out of power. But advances in battery technology and expansion of charging networks have gone some way to alleviating these fears. Furthermore, consumers' purchasing behavior is influenced by their attitudes towards the reliability and performance of electric vehicles.

Social Influence and Norms:

Social forces, including peer influence, social norms, and perceived prestige of owning an electric vehicle, are powerful influences on consumers' behavior. The influence of good word-of-mouth, the influence of social media, and the growing trend toward sustainable living contribute to a positive attitude toward electric vehicles. Research has shown that consumers are more likely to buy electric vehicles when they see members of their social group or community using and praising these vehicles.

Psychological Considerations:

Psychological aspects—attitude, perception, and personality—also play a significant role in the adoption of electric vehicles. Customers who view electric vehicles as new and innovative are likely to purchase them. Moreover, personality traits like openness to experience and environmental concern may determine one to own an electric vehicle.

Challenges to acceptance:

Despite the favorable conditions, many barriers interfere with the widespread adoption of electric vehicles.
There are a number of issues with electric vehicle use. These include limited model availability, long charging time, and few charging points in certain regions. In addition, incorrect information or simple lack of information on electric vehicles may discourage consumers.

Conquering these obstacles via education, infrastructure investment, and technological advancement is imperative for enhancing adoption rates.

Conclusion:

The decision to buy an electric vehicle is driven by a mix of environmental sensitivities, economic factors, technological innovation, social influences, and psychological drivers. Although considerable progress has been made in encouraging EV take-up, sustained efforts to overcome barriers and enhance consumer awareness are required. To extend this understanding, further research must explore these factors in more diverse demographic and geographic settings.

Articles from Economic Times

Indian auto industry poised to reach USD 300 Billion by 2026; Revving up for innovation and expansion

Synopsis

India's auto market aims for a USD 300 billion milestone by 2026, backed by rising income levels and urbanization. The industry showcases robust production figures and significant FDI inflow, positioning itself as a global automotive hub with a promising future.

India's rapidly growing auto market is poised to hit a milestone, with projections indicating it will reach USD 300 billion by 2026. This growth is fueled by various factors, including rising income levels, urbanization, and a burgeoning middle class with increasing purchasing power.

In March 2024, the **Indian auto industry** produced a total of 2,325,959 units, covering Passenger Vehicles, Three-wheelers, Two-wheelers, and Quadricycles.

Passenger Vehicles accounted for 368,086 units, Three-wheelers saw 56,723 units, and Two-wheelers dominated with 1,487,579 units sold during the

/pcs/click?xai=AKAOjsuibsYqpmfAoEBpvVWTkVPk... March.

Figure 2.1: News paper article

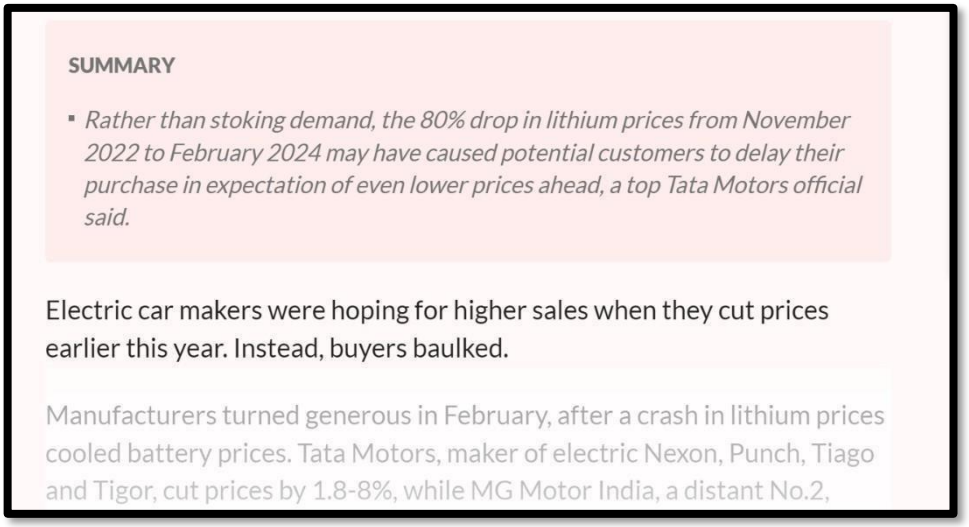
Articles in Indian Express

mint Premium | INDUSTRY

For EV makers, the lithium price crash should be good news. It isn't.

Alisha Sachdev | 5 min read | 16 May 2024, 01:04 PM IST

According to official data, EVs accounted for 2.2% of total passenger vehicle registrations in April, down from 2.9% in March and only marginally higher than 2.1% in April last year. Photo: Bloomberg



SUMMARY

- *Rather than stoking demand, the 80% drop in lithium prices from November 2022 to February 2024 may have caused potential customers to delay their purchase in expectation of even lower prices ahead, a top Tata Motors official said.*

Electric car makers were hoping for higher sales when they cut prices earlier this year. Instead, buyers baulked.

Manufacturers turned generous in February, after a crash in lithium prices cooled battery prices. Tata Motors, maker of electric Nexon, Punch, Tiago and Tigor, cut prices by 1.8-8%, while MG Motor India, a distant No.2,

Figure 2.2: News paper article

Articles in Indian Express-18th Oct

Not just Tesla, existing automakers to get duty benefit under new EV policy too

The details will be part of the guidelines that are in the process of being finalised by the Ministry of Heavy Industries (MHI), the official said, adding that the second round of consultations to roll out the guidelines is set to start soon.

Under the new EV policy, EV passenger cars (e-4W) can initially be imported with a minimum CIF value of $35,000, at a duty rate of 15 per cent for a period of 5 years from the date of issuance of approval letter by Ministry of Heavy Industries (MHI).

Amid concerns raised by automakers already operating in India that the new electric vehicle (EV) policy favours new entrants such as Tesla, a senior government official on Friday clarified that the union government will allow existing automakers to make greenfield investment commitments under the new policy.

The details will be part of the guidelines that are in the process of being finalised by the Ministry of Heavy Industries (MHI), the official said, adding that the second round of consultations to roll out the guidelines is set to start soon. The first round of consultations saw Tesla representatives join the process for the first time.

Figure 2.3: News paper article

Gujarat's shift to e-autos: It can clean air, increase incomes

Drivers need to be educated about their benefits. State should invest in more charging stations and service centres

The Gujarat Electric Vehicle Policy 2021 offers incentives and subsidies to individual vehicle owners. It's a commendable step that will stimulate EV manufacturing, and allocate funds for charging infrastructure within the state.(Express photo/Representational)

Madhav Pai and Kaustubh Gosavi

Three-wheeler auto-rickshaws are an important part of the urban transport system in India. They play a crucial role in promoting public transport usage and reducing private motor vehicle trips in cities. Since 2014, Gujarat has had 4,73,023 registered auto-rickshaws, with the sector witnessing a 23 per cent increase in registrations from 2019 till date. Out of the total registered auto-rickshaws, 66,448 comply with Bharat Stage (BS) emission standards I, II, III or IV, which regulate the output of air pollutants. These vehicles were collectively responsible for emitting 430 metric tonnes (MT) of carbon monoxide (CO), 66 MT of particulate matter (PM), and 451 MT nitrogen oxide (NOx) in Gujarat. They account for a worrying 17 per cent of the total CO emissions in the state. If all these autos were converted to electric vehicles, a substantial portion of these emissions could be mitigated.

Figure 2.4: Newspaper article

Do Electric Vehicles really reduce operating costs and increase fuel efficiency? Electric vehicles actually reduce operating costs and increase fuel efficiency significantly when compared to traditional gasoline powered vehicles. Here is a detailed breakdown based on the provided sources:

Operating Costs:

- **Charging Cost:** Electric cars are very cheaper to maintain because they have few moving parts as compared to gas or diesel cars. This means that they need less maintenance and have lower yearly operating costs.

- **Maintenance:** Electric vehicles have lower maintenance costs because they have few moving parts when compared to internal combustion engine vehicles or tradition vehicles. This results in reduced servicing requirements and lower yearly running costs.

Fuel Efficiency:

- **Energy Efficiency:** Electric vehicles use energy more efficiently, transferring more percentage of the electrical power from the source to the wheels than gasoline vehicles. EVs convert over 77% of electrical energy to wheel power, whereas conventional gasoline vehicles convert only 12% to 30% of the energy within gasoline into electrical power.

- **Regenerative Braking:** Electric vehicles also use regenerative braking technology which helps in recovering energy that would have otherwise been lost, this also increases their efficiency.

In summary, electric vehicles offer savings in terms of both operating expenses and fuel efficiency, this makes them a more economical and environmentally friendly choice for consumers.

How much money can be saved by using an electric car?

The savings from using an electric car in India when it is compared to a traditional internal combustion engine (ICE) vehicle depend on various factors such as fuel costs, maintenance costs, government incentives, and the total cost of ownership (TCO). Here is a detailed analysis:

Fuel Costs

- ⇨ Electricity Costs: Electricity costs in India vary by state but typically range between ₹5 to ₹8 per kWh.
- ⇨ Petrol/Diesel Costs: As of 2025, petrol prices in India average around ₹100 per liter, and diesel around ₹90 per liter.

Fuel Efficiency:

- ⇨ Petrol Car: Average fuel efficiency is around 15 km per litre.
- ⇨ Diesel Car: Average fuel efficiency is around 20 km per litre.
- ⇨ Electric Car: Average efficiency is around 6 km per kWh

Example Calculation:

If you drive 15,000 km annually, the cost would be: Petrol Car:
15,000 km / 15 km/litre = 1,000 litres of petrol. 1,000 litres * ₹100/litre = ₹100,000 per year.

Diesel Car:
15,000 km / 20 km/litre = 750 litres of diesel. 750 litres * ₹90/litre = ₹67,500 per year.

Electric Car:
15,000 km / 6 km/kWh = 2,500 kWh. 2,500 kWh * ₹7/kWh = ₹17,500 per year.

Annual Savings on Fuel:

Compared to petrol: ₹100,000 - ₹17,500 = ₹82,500. Compared to diesel: ₹67,500 - ₹17,500 = ₹50,000.

Maintenance Costs

Lower Maintenance for EVs:

EV Maintenance: Typically, lower due to fewer moving parts and no need

for oil changes, transmission fluid replacements, or exhaust system repairs.

ICE Maintenance: Regular maintenance costs for petrol/diesel vehicles can average around ₹15,000 to ₹20,000 annually.

EV Maintenance: Estimated at around ₹5,000 annually. Annual Savings on Maintenance:
₹20,000 - ₹5,000 = ₹15,000.

Government Incentives:

Incentives: The Indian government provides various incentives to promote the buying of EV such as:

FAME II Scheme: This scheme provides subsidies for EV buyers.

Income Tax Benefits: People can also benefit from deduction of interest on loans taken for EV purchase up to ₹1.5 lakh under the Section 80EEB of the IT Act.

State Subsidies: There are some additional incentives in states like Delhi, Maharashtra, and Gujarat.

Example Calculation:

FAME II Subsidy: For an EV priced at ₹15 lakh, you might receive a subsidy of around ₹1.5 lakh to ₹2.5 lakh depending on the vehicle and state-specific policies.

Income Tax Savings: Assuming a loan interest of ₹1.5 lakh, tax savings at 30% tax bracket = ₹45,000 annually.

Total Cost of Ownership (TCO) Savings
5-Year Savings:

Fuel Savings: ₹82,500 annually for petrol * 5 years = ₹4,12,500.
Maintenance Savings: ₹15,000 annually * 5 years = ₹75,000.

Incentives: ₹1.5 lakh (one-time) + ₹45,000 * 5 years = ₹3.75 lakh.

Total Savings over 5 Years:

Fuel + Maintenance + Incentives = ₹4,12,500 + ₹75,000 + ₹3.75 lakh = ₹8,62,500.

CONCLUSION OF COMPARISON

In India, driving an electric vehicle can lead to savings of up to ₹8.62 lakh in five years by paying less for fuel, maintaining the vehicle less, and enjoying incentives from the government. However, the savings depend on particular car models, usage patterns, local electricity tariffs, and availability of state-level subsidies.

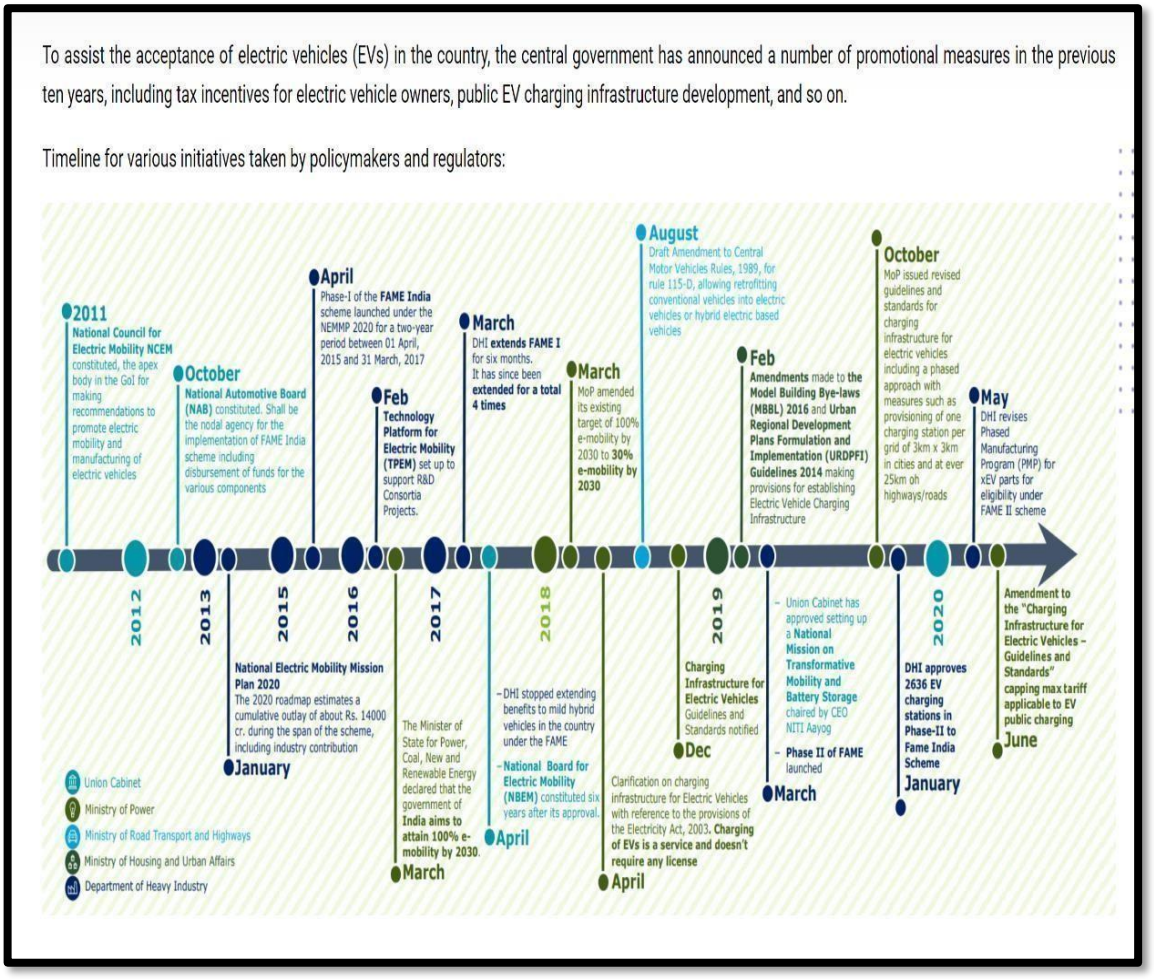


Figure 2.5: Timeline for various initiatives

Comparing electric vehicles (EVs) to compressed natural gas (CNG) conversions, diesel, and petrol vehicle

It encompasses the consideration of various factors like cost of running, environmental considerations, fuel consumption, and maintenance. Below is a comprehensive comparison:

Operating Expenses

Electric Vehicles (EVs):

- Fuel Cost: Less expensive than gasoline, diesel, and CNG. Electricity is typically more stable and less expensive, with less cost per mile.
- Maintenance Cost: Cheaper because there are fewer parts that are in motion and no need for oil change, spark plug replacement, or exhaust repair.

CNG Vehicles:

- Fuel cost: CNG is generally cheaper than petrol and diesel per mile, but it may vary in any given locality.
- Maintenance Costs: Generally less than petrol and diesel since it is cleaner burning and that does not put as much stress on the engine.

Diesel Vehicles:

- Cost of fuel: Diesel fuel is more costly compared to petrol but provides improved mileage, therefore reduced fuel expenses while driving over long distances.
- Maintenance Expenses: Higher than petrol since diesel engines are intricate, require greater maintenance, and costlier components are needed.

Petrol Cars

- Prices of Fuel: Costlier per mile than diesel and CNG.
- Maintenance Costs: Comparatively high, with regular oil changes and other regular maintenance.

Environmental Effects:

Electric Cars (EVs)

- Emissions: No tailpipe emissions. The overall environmental footprint is based on the source of electricity. Renewable energy sources greatly restrict the carbon footprint.
- Lifecycle Impact: Production and end-of-life battery disposal

have environmental effects, but these tend to be offset by the advantages of lower operating emissions over the life of the vehicle.

CNG Vehicles:

- Emissions: CNG emits less CO2 than diesel and petrol. CNG is cleaner-burning, resulting in lower emissions of pollutants like NOx and fine particles.
- Lifecycle Impact: Processing and extraction of natural gas harm the environment, e.g., methane leaking.

Diesel Vehicles:

- Emissions: Higher emissions of CO2 compared to CNG and EVs. Diesel engines emit large quantities of NOx and particulates, contributing to air pollution.
- Life Cycle Impact: Production and combustion of diesel fuel negatively affect the environment.

Petrol Cars:

- Emissions: More CO2 emissions and pollutants than EVs and CNG. Petrol engines are a major cause of air pollution.
- Lifecycle Impact: Similar to diesel, production and consumption of petrol can damage the environment extensively.

Fuel Efficiency

Electric Vehicles (EVs):

- Energy Efficiency: It is very efficient, with approximately 59-62% of the grid electricity being converted to wheel power.
- Regenerative Braking: Reclaims energy during braking, increasing efficiency.

CNG Vehicles:

- Fuel Efficiency: More than gasoline but typically less than diesel. Diesel engines are efficient compared to diesel but less efficient than petrol engines.

Diesel Cars:

- Fuel Economy: High, particularly for longer journeys. Diesel engines are more fuel-efficient than petrol engines, providing you with more miles per gallon.

Petrol Cars:

- Fuel Efficiency: Not as efficient as diesel and CNG. Petrol engines consume more fuel, so you get less per mile.

Maintenance Needs:

Electric Vehicles (EVs)

- Maintenance: Reduced because of fewer mechanical parts. No oil change required and more durable brakes because of regenerative braking.

CNG Vehicles:

- Maintenance: Lower compared to petrol and diesel. Greener combustion will cause lower wear on the engines. However, CNG tanks must be maintained and certified intermittently.

Diesel Vehicles:

- Maintenance: Maintenance is greater since diesel engines are more complicated and require more frequent maintenance, which is more expensive.

Petrol Cars:

- Maintenance: Oils must be changed, spark plugs replaced, and exhaust systems inspected periodically.

Conclusion Of Comparison:

1. EVs have an advantage in running expenses, fuel efficiency, and their impact on the environment, especially if powered from renewable energy.
2. CNG vehicles are more economical to operate and emit less pollution than diesel and petrol vehicles and need average maintenance.
3. Diesel vehicles are suitable for long road trips and provide Lower long-term cost of fuel, but greater emissions and maintenance.
4. Petrol cars tend to consume more fuel and produce more emissions than other vehicles. They also cost more to run and maintain.

The selection between these types of vehicles is based on particular applications, including driving habits, local fuel availability, and environmental concerns.

HYPOTHESIS

- **Hypothesis 1:** This study seeks to explore what individuals believe and anticipate regarding various car technologies, such as Electric and Hybrid Vehicles. It also seeks to find out why electric vehicles have not received sufficient attention from consumers.

- **Hypothesis 2:** This study shall investigate what consumers already anticipate from Electric/Hybrid Vehicles and how these expectations influence the potential of people adopting EVs in the future.

- **Hypothesis 3:** The study seeks to investigate the current problems that are hampering the development of Electric/Hybrid Vehicles. It will research how the problems affect what customers do and why EVs are being introduced incrementally.

CHAPTER – 3

Research Methodology

1. Introduction:

Research design is the basis of knowing how data will be gathered, processed, and interpreted in this research. This section describes the methods employed to examine the determinants of consumer purchasing behavior towards electric vehicles (EVs) in India. It encompasses the research design, data sources, sampling methods, data collection tools, & data analysis techniques.

2. Problem Statement:

More and more individuals in India are embracing electric vehicles, but the numbers are still limited because of several fears and lack of knowledge. This study aims to determine the major reasons that affect consumers' choice to buy and the challenges that prevent many from using EVs.

3. Research Design:

We will employ a mixed method strategy, where we integrate numbers and narratives of people in research so that we can understand consumers' purchasing behavior. It enables us to obtain quantitative data as well as qualitative information regarding what consumers feel and why they behave in a specific way.

4. Research Objectives:

- To identify the most important parameters affecting consumers' buying behavior towards EVs.
- To learn what individuals know and believe concerning EVs.
- To measure the impact that environmental concerns and government policies have on individuals' consumption patterns.
- To analyze the population profile of potential EV buyers.

5. Data Collection Methods:

Primary Data

We have collected data through structured questionnaires and questionnaires administered to different groups such as students, professionals, EV owners and potential consumers. We also employed face to face interviews and online survey questionnaires.

Secondary Data

This information was sourced from industry reports, government databases (such as the VAHAN portal), journals, publications, EV manufacturer websites and news articles. These were used to provide background and substantiation to the main data.

6. Sampling Techniques:

Sampling Frame: The sampling frame will comprise current and prospective EV buyers, as determined through online panels, EV dealerships and sustainable transport social media groups.

Sample Size: Our aim is to get a minimum of 80 people to take part in the survey in an effort to make the results accurate.

Sampling Technique: Select a simple random sampling technique to select the individuals you wish to survey.

7. Tools for Data Collection

An appropriate questionnaire was designed with open ended and closed ended questions. The questionnaire was divided into sections:

- Demographic Profile
- EV Awareness and Knowledge
- Environmental Concerns
- Cost and Maintenance factors
- Government Incentives
- Personal views and Readiness to buy EVs

8. Data Analysis Techniques

The information obtained was recorded systematically, tabulated and analyzed using:

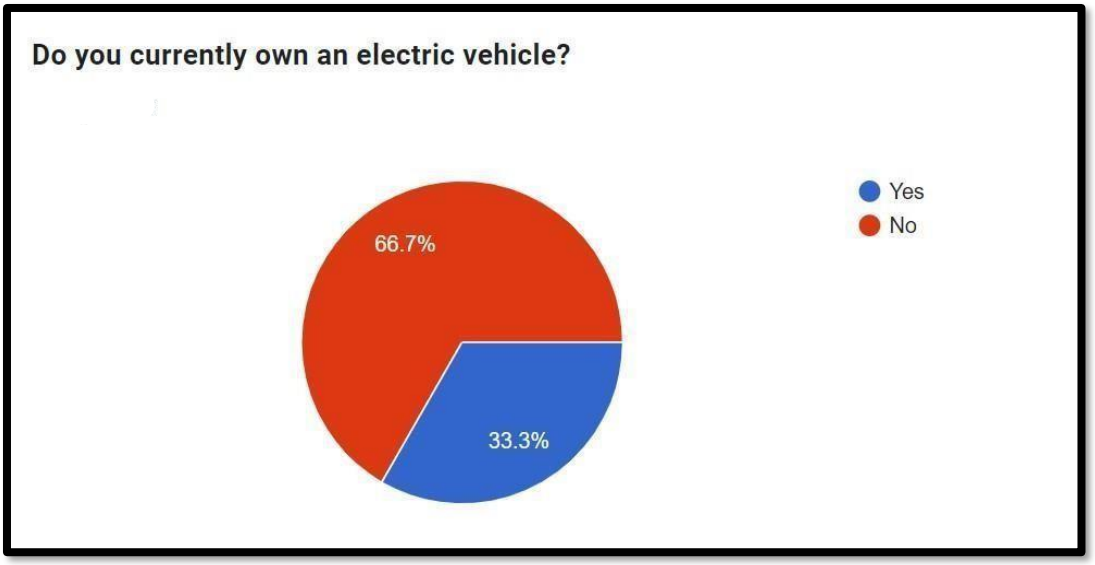
- **Descriptive Statistics:** Percentages, mean scores, correlation.
- **Graphs and Charts:** Pie charts, bar graphs, and line graphs were used to display information graphically.
- **Cross-tabulation:** Used to understand how consumers' demographics correlate with EV preference.

CHAPTER - 4

ANALYSIS, DISCUSSION AND RECOMMENDATION

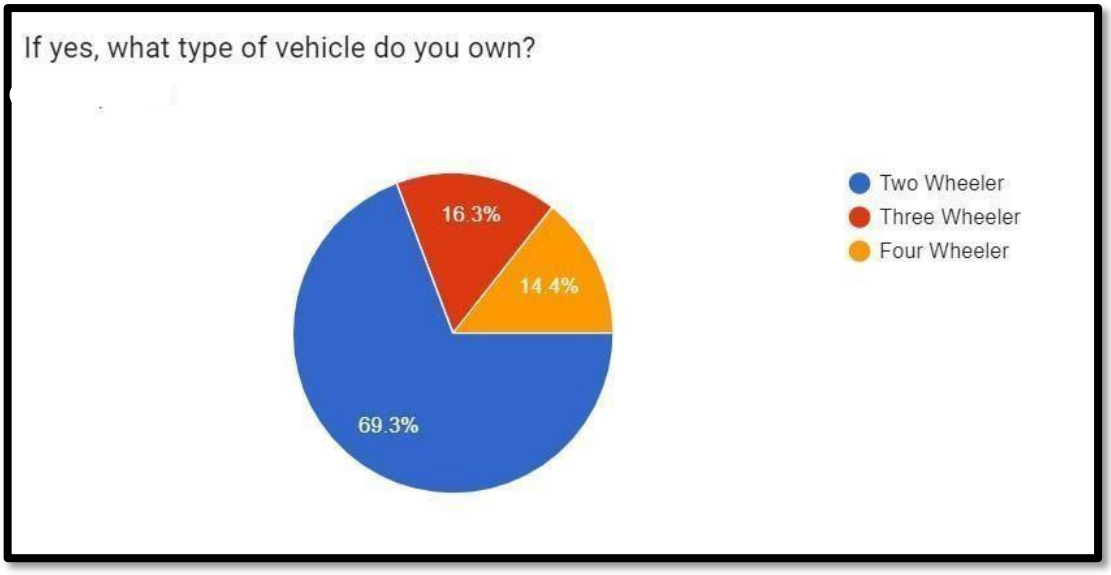
4.1 Data Analysis

Q.1. Do you currently own an electric vehicle?



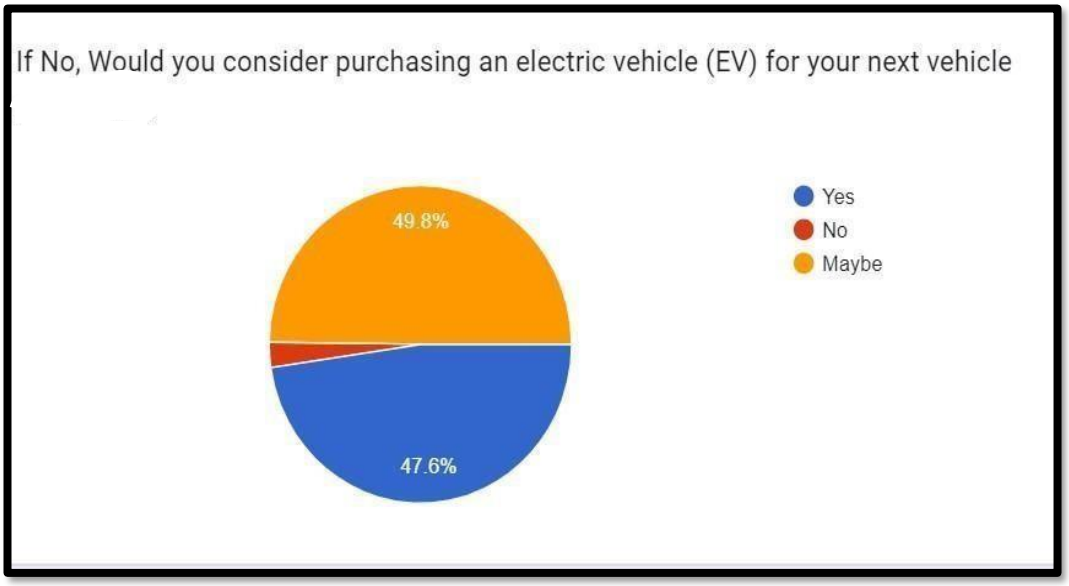
Interpretations: The pie chart shows that 33.3% of the respondents have electric vehicles (EVs), and an overwhelming 66.7% of the respondents do not have EVs.

Q.2. If yes, what type of vehicle do you own?



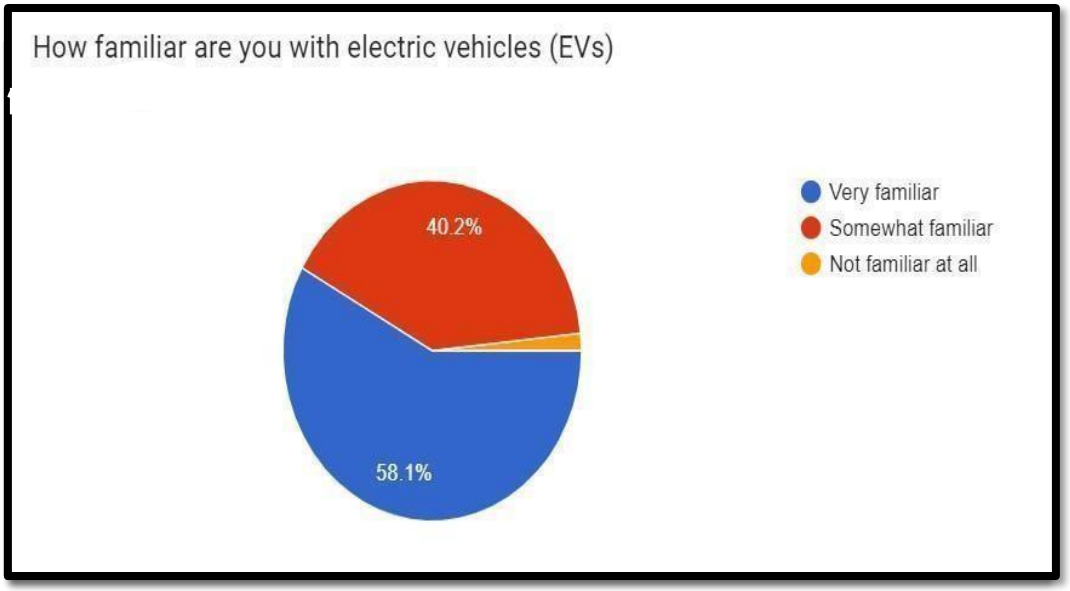
Interpretation: Of the electric vehicle (EV) users, a large majority of 69.3% own two-wheelers. Further, 16.3% utilize three-wheelers, and the rest of 14.4% own four-wheelers.

Q.3. If no, would you consider purchasing an electric vehicle (EV) for your next vehicle?



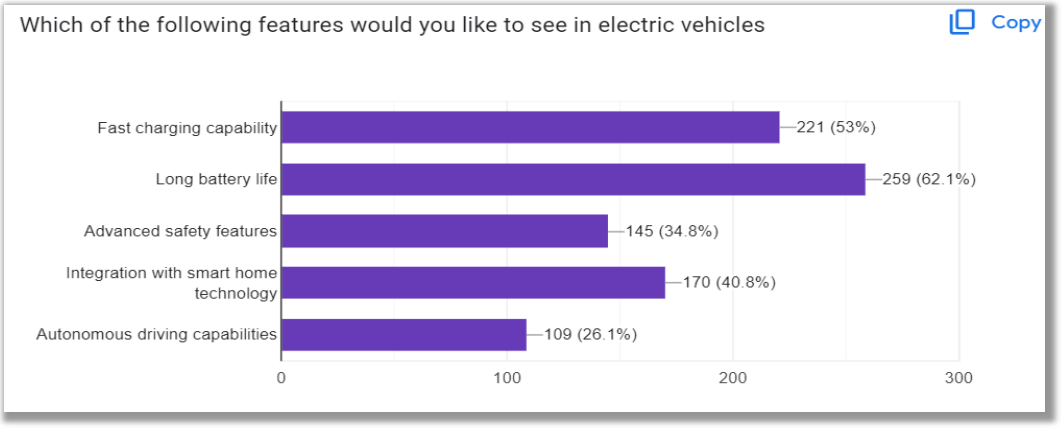
Interpretation: The chart shows that 49.8% of the participants are certain they would consider an electric vehicle (EV) as their next car purchase. Moreover, 47.6% attested that they would definitely select an EV, while the rest stated that they would not select an EV.

Q.4 How familiar are you with electric vehicles (EV)?



Interpretation: The pie chart shows 40.2% of respondents stated they have a moderate awareness of electric cars (EVs), while 58.1% stated emphatically that they were very aware of them. The rest reported having no awareness of EVs at all.

. **Q.5 Which of the following features would you like to see in electric vehicles?**



Interpretations:

- Long battery life: The most sought-after feature was obviously long battery life, with 62.1% wishing to see it appear in electric cars.
- Fast charging capability: This was the second most sought feature, as 53% of the sample expressed the desire to have it on electric vehicles.
- Integration with smart home technology**:** Smart home technology integration was something that 40.8% of the respondents wished to have.
- Advanced safety features: 34.8% of the respondents indicated they'd like this feature.
- Autonomous driving capabilities: Among the many choices, autonomous driving features were the least in demand, with only 26.1% of the survey wanting it to be part of electric vehicles.

Q.6. How significant are these factors on a 1 to 5 scale (1 = "Not important at all" and 5 = "Very important") when you consider purchasing an electric vehicle?

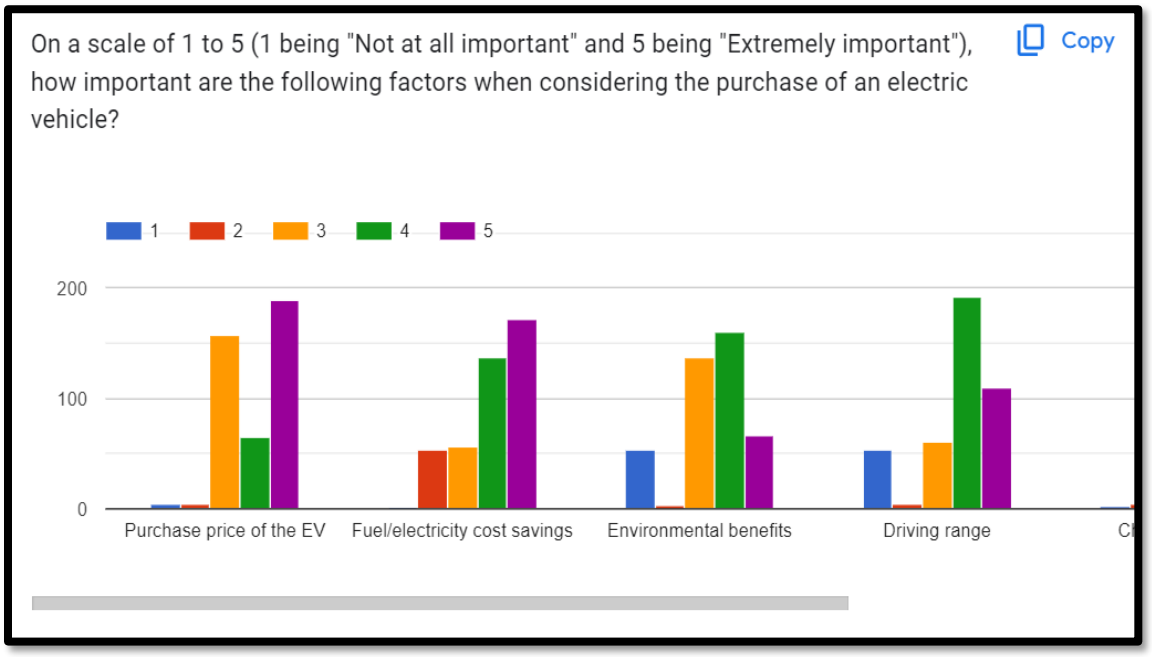
A) Purchase price of the EV

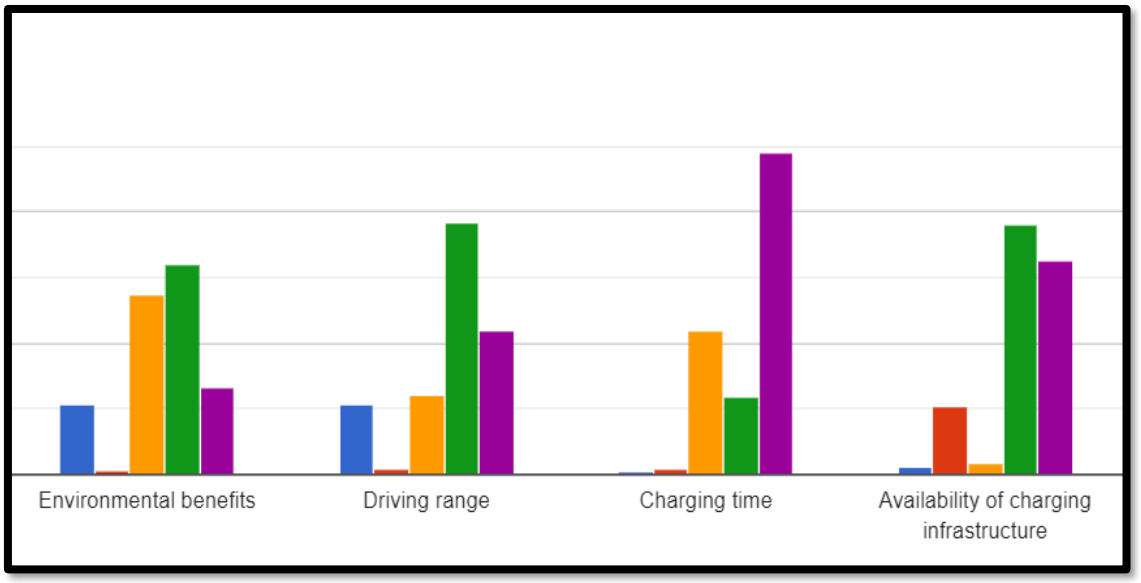
B) Fuel/electricity cost savings

C) Driving range

D) Charging time

E) Availability of charging infrastructure





Interpretations: The bar graph shows that, from the buyer's point of view, the most important feature of buying an electric vehicle is the price and total cost of it. The price ranks among the most important features of the purchase decision to the buyers. Availability of charging points

comes second. Compared to this, other features, including environmental characteristics and range, are considered less important by potential buyers.

Q.7. Which of the following would be the most important factor in your decision to purchase an electric vehicle?

A) Lower purchase price

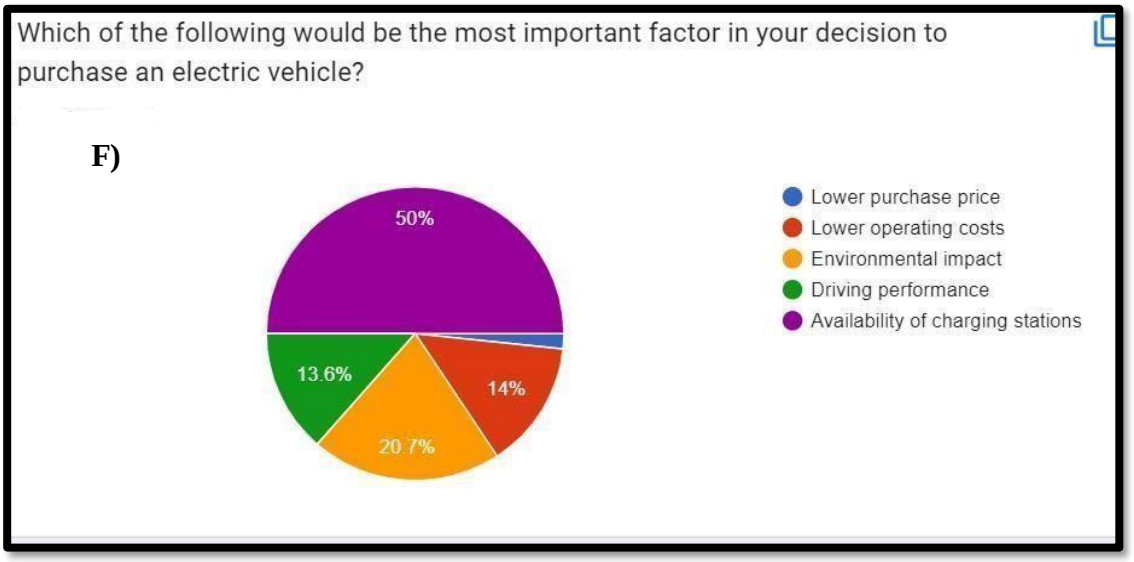
B) Lower operating costs

C) Environmental impact

D) Driving performance

E) Availability of charging stations.

F)



Interpretations: The pie chart shows that fifty percent of the respondents rate the availability of charging points as the most significant factor in their buying decision of an electric car (EV). Second, the environmental factor is rated as the most significant factor, followed by the buying price, which is rated as the least significant factor in their decision.

Q.8. How much do you agree or disagree with these statements regarding electric vehicles?

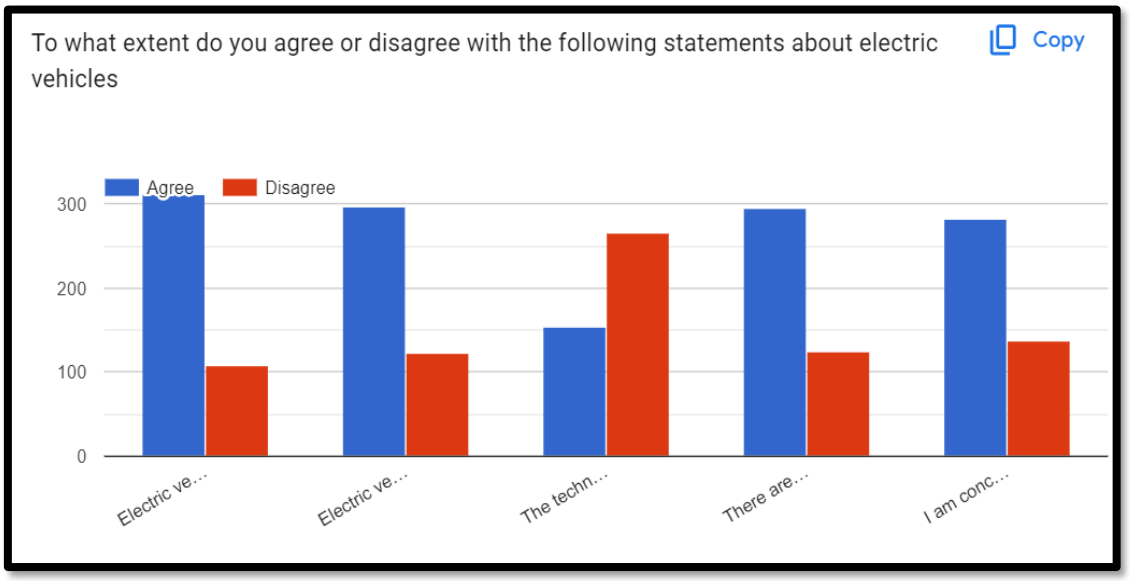
A) Electric vehicles are better for the environment than traditional gasoline- powered vehicles.

B) Electric vehicles are affordable alternatives to traditional vehicles.

C) The technology in electric vehicles is reliable and trustworthy.

D) There are enough public charging stations available in my area.

E) I am concerned about the driving range of electric vehicles.



Interpretations: The chart shows that

a) Most individuals are of the view that electric cars (EVs) are greener than traditional gasoline cars.

b) Most respondents believe that EVs are more affordable than traditional vehicles.

c) They are largely concerned about the credibility of EV technology and have noted that they disagree with the suggestion that the technology is credible.

d) Most people believe there are enough charging stations available.

e) Most respondents are worried about the driving distance of EVs.

Q.9. What are the main advantages of electric vehicles in your opinion?

A) Environmental Benefits

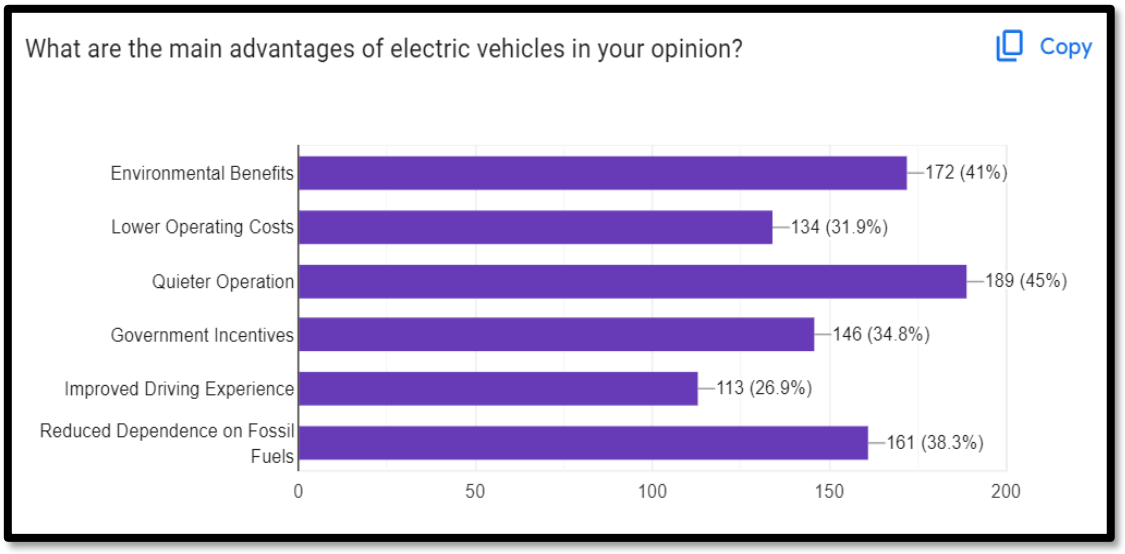
B) Lower Operating Costs

C) Quieter Operation

D) Government Incentives

E) Improved Driving Experience

F) Reduced Dependence on Fossil Fuels



Interpretations: Based on the graph, the two most significant benefits of electric cars (EVs) are that they are greener and quieter. Reduced fossil fuel dependence and reduced operating cost are the next most significant. Government incentives and driving experience are the least important.

Q.10. What are the biggest drawbacks of electric vehicles that you see?

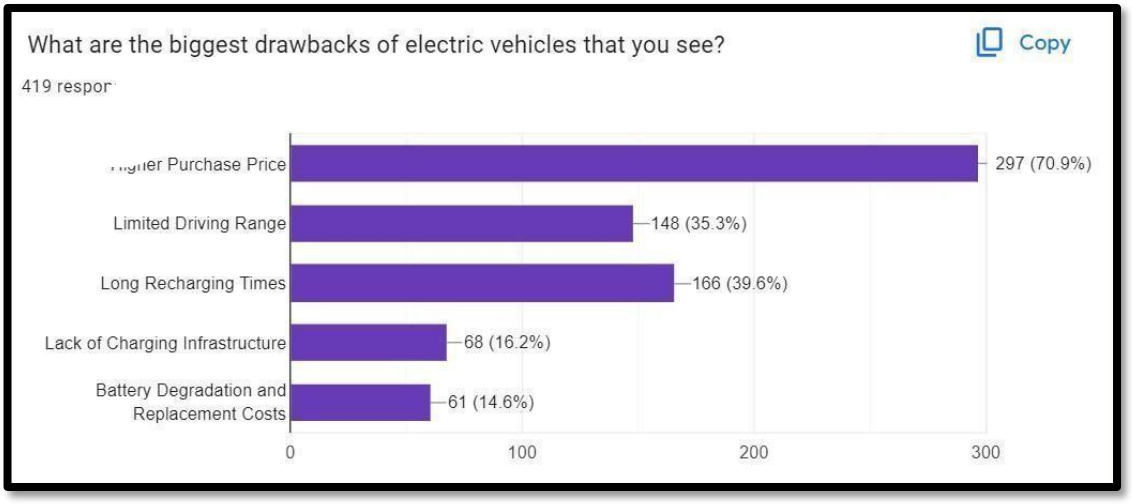
A) Higher Purchase Price

B) Limited Driving Range

C) Long Recharging Times

D) Lack of Charging Infrastructure

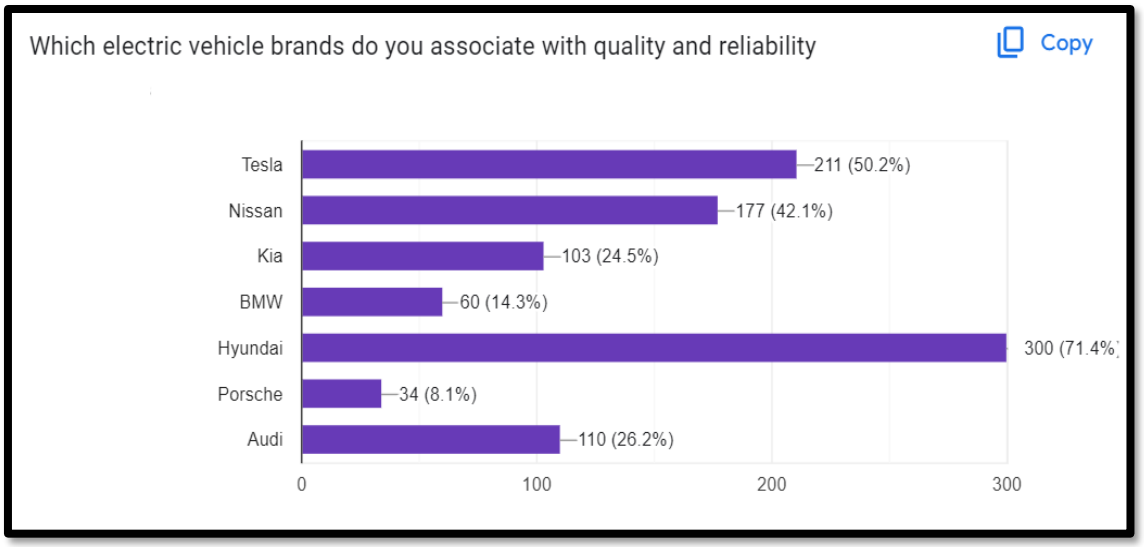
E) Battery Degradation and Replacement Costs



Interpretations: The biggest drawback of electric vehicles is their high buying cost. Other drawbacks include low driving range and long charging time. Secondary drawbacks include limited charging stations and battery degradation.

Q.11. Which electric vehicle brands do you associate with quality and reliability

1) **Tesla**
2) **Nissan**
3) **Kia**
4) **BMW**
5) **Hyundai**
6) **Porsche**
7) **Audi**



Interpretation: Hyundai is one of the top electric vehicle brands, which is renowned for its quality and reliability. Tesla and Nissan follow Hyundai in terms of high consumer appreciation. On the other hand, Kia, Audi, BMW, and Porsche are viewed as less popular brands in the electric vehicle industry.

CORRELATION:

Correlation is an indicator of the direction and strength of the association between two items. Two items are positively correlated when they tend to move in the same direction, and are negatively correlated when they move opposite to each other. A correlation coefficient (also widely referred to as r) may be -1 to +1:

- +1 indicates a perfect positive correlation
- -1 indicates a perfect negative correlation
- 0 indicates no correlation

Objective - To Determine the dependencies and relationships between different variables that can affect consumer decision making when thinking about purchasing an EV.

Particulars	Purchase price of the EV	Fuel/electricity cost savings	Environmental benefits	Driving range	Charging time	Availability of charging infrastructure
Purchase price of the EV	1					
Fuel/electricity cost savings	0.667806624	1				
Environmental benefits	0.449319767	0.649395723	1			
Driving range	0.572436015	0.913527179	0.775277106	1		
Charging time	0.808564426	0.834921045	0.609986812	0.793369929	1	
Availability of charging infrastructure	0.434841004	0.753383901	0.630213964	0.80846279	0.61343005	1

Interpretations: The table take 5 parameters into consideration that can affect the decision on a person to purchase an EV. The yellow color indicates that these factors are strongly positive correlated with one another, and rest all are moderately positive correlated.

4.2 Discussion of Findings

- The research informs us a lot about what Indians would like to purchase and do with electric cars. Two-thirds or 66.7% of the respondents did not own an EV when the survey was conducted; but a very high 97% said they would purchase one as their next car, which reflects a very positive attitude towards electric cars.

- The study revealed that two-wheelers dominated the EV market with 69.3% of the EV buyers. They were followed by three-wheelers and four-wheelers. Customers favored long battery life, fast charging, and smart tech, which were the most sought-after features.

- Price sensitivity was the most important inhibitor, with acquisition cost and charging infrastructure availability being the most common decision drivers. Ironically, although the environmental benefits were most appreciated by the majority, uncertainty around the reliability of EV technology and range anxiety were major inhibitors.

- They viewed quiet running, cheaper fuel, and being environmentally friendly as benefits. But government incentives and driving experience mattered less to consumers. And Hyundai, Tesla, and Nissan were graded most reliable makers of electric cars, showing that consumers can be swayed by brand confidence.

- Essentially, the study shows a conservative but receptive market, where infrastructure readiness, affordability, and awareness are significant in determining the adoption patterns.

4.3 Recommendations:

In order to accelerate the shift towards electric vehicles in India, we recommend the following strategic suggestions:

1. **Enhance Public Awareness:**
   - Launch nationwide campaigns to educate consumers regarding EV benefits, long-term cost savings, and environmental advantages.
   - Provide short comparisons with ICE cars to debunk myths and build confidence.

2. **Strengthen Charging Infrastructure:**
   - Roll out public charging stations more quickly, especially in semi-urban and rural areas, to help deal with range anxiety.
   - Provide incentives to private developers and housing societies to include residential chargers.

3. **Subsidize and Incentivize:**
   - Extend the coverage of FAME-II and state subsidies, with prompt release.
   - Offer low-interest EV loans or leasing programs to lower initial cost barriers.

4. **Focus on Battery Technology:**
   - Encourage R&D of long-life, fast-charging, and temperature-resistant batteries in public-private partnerships.
   - Encourage battery swapping concepts for scooters and bicycles.

5. **Boost Brand Trust and Reliability:**
   - Provide more extended warranties and performance guarantees to ensure first-time buyers.
   - Conduct independent testing and certification of new EV models.

6. **Leverage Digital and Retail Platforms:**
   - Use online shopping and mobile apps to book electric vehicles, find charging stations, and get service help.
   - Educate automobile salesmen and dealerships to guide customers with correct information.

Through the implementation of these recommendations, India can overcome the main obstacles towards the adoption of electric vehicles and develop a strong, sustainable, and equitable electric transport system.

CHAPTER 5 - LIMITATIONS

- Limited geographical scope: The research was carried out in only one Indian region, a factor that could be a drawback in the path of generalizing its results to India as a whole.

- Reliance on self-reported data: The research used standardized questionnaires to collect primary data, relying on the sincerity and truthfulness of respondents' self-reported attitude and intentions. In real life, real buying behavior can differ from the professed intentions.

- Potential sampling bias: Convenience sampling was used by the study, and it might not represent the population at large and may cause sampling bias.

- Lack of longitudinal data: The research provides a snapshot of consumer sentiment at a point in time, but it is less comprehensive than the longitudinal data. Longitudinal data would be needed to track the changes in consumer attitudes and shopping behavior as the electric vehicle market continues to evolve.

- Exclusion of certain factors: The research examined various factors that influence how people participate in buying commodities. Such factors were awareness, performance characteristics, economic advantages, environmental issues, social aspects, cost of possession, and infrastructural support. Brand loyalty, values, and way of life were, however, largely excluded in the research.

- Rapidly Changing Industry Dynamics
  The electric vehicle sector is highly dynamic with frequent innovations, policy changes, and market trends. Dynamism can render some findings outdated or less applicable within a short time.

These limitations should be kept in mind when interpreting the findings of this study and designing future research to gain a more detailed understanding of consumer buying behavior towards electric vehicles.

CHAPTER - 6 CONCLUSION

- The Study has found that while electric vehicles are becoming more popular among global consumers, the adoption is slow due to varied perceptions and issues. The strongest drivers of consumer buying behavior towards electric vehicles are awareness, performance attributes, cost benefit, environmental issues, & social norm, ownership cost, & infrastructure support.

- We have seen that both of the secondary and primary data indicate that Indian customers are increasingly opting to use electric vehicles. The reason for this is increasing environmental awareness, for instance, increased air pollution, global warming, and lack of fossil fuels. Customers, particularly city-based customers, are concerned about their carbon footprint and prefer to use the eco-friendly option like electric vehicles.

- Economic consideration is another pivotal factor that influences consumer behavior. Money is another major factor behind consumer behavior. The growing fuel price, in particular that of petrol and diesel, has increased the cost consciousness of consumers, and they now consider the cost of ownership rather than the acquisition cost. Electric vehicles (EVs) have been found economical in the long run because of lower operating and maintenance expenditure despite being pricey purchases. Even though the governments through incentives in the form of tax rebates and subsidies under the schemes like FAME II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) have promoted EV purchases as a financially sound decision as well.

- Age, education, and income level also play a significant role in purchasing behavior in the research. Young and educated consumers are more willing to adopt new technology and are more eco-friendly and therefore more likely to purchase electric vehicles.

- However, despite these encouraging signs, there are still a number of issues that are hindering electric cars gaining popularity in India. Range anxiety, or the fear of running out of charge before you arrive at your destination, is one of the big issues. One of the reasons this problem is occurring is that there are very few charging stations, and these are located primarily in rural and semi-urban areas. The majority of consumers also worry about how electric vehicles will perform, how long they will last, and about their resale value compared to conventional vehicles.

- Another important finding is the absence of consumer information and misinformation about EVs. Several potential buyers are ignorant about how EVs work, the kind of electric cars, and the real cost-benefit analysis. Lack of information creates doubts and ambiguity at the time of decision-making. The role of dealers, advertisements, and online promotions becomes instrumental in informing the customers and clearing myths about electric cars.

- From the market point of view, the Indian EV market is still in the infancy stage but has enormous potential. Various automobile companies have already invested big time in electric mobility solutions, and new players are also entering the market. Government initiatives in various policies, public-private partnerships, and incentives for establishing manufacturing and charging infrastructure have also provided the industry a big boost

So we can say that although the consumer mindset about electric vehicles in India is slowly improving in the right direction, there is still a long way to go. For EVs to become mainstream, efforts must be made to increase public awareness, enhance the charging ecosystem, and make EVs affordable and accessible to the masses. The transition will require collective efforts from the government, automobile manufacturers, infrastructure providers, and consumers themselves. With the right combination of awareness, accessibility, and affordability, India can become a global leader in electric mobility, contributing not only to economic development but also environmental sustainability.

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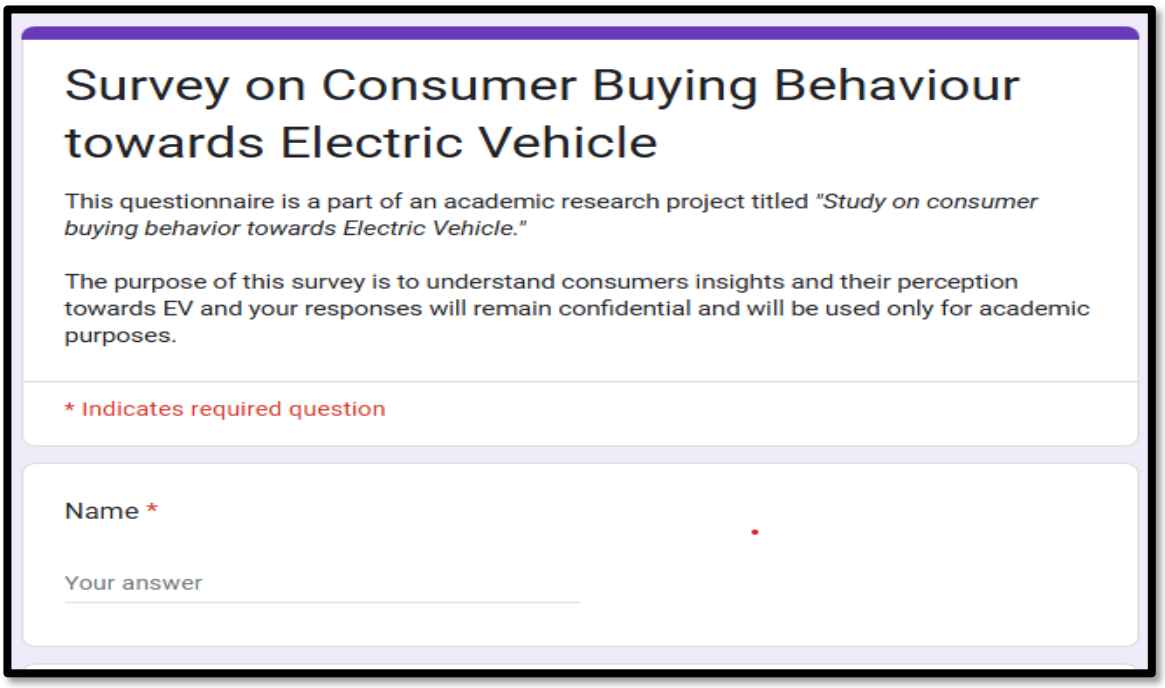
ANNEXURE:

FORMAT OF QUESTIONNAIRE



Survey on Consumer Buying Behaviour towards Electric Vehicle

This questionnaire is a part of an academic research project titled *"Study on consumer buying behavior towards Electric Vehicle."*

The purpose of this survey is to understand consumers insights and their perception towards EV and your responses will remain confidential and will be used only for academic purposes.

* Indicates required question

Name *

Your answer

What is your age group? *

- 18-30
- 31-45
- 46-60
- 61 and above

What is your current occupation? *

- Student
- Employed
- Self Employed
- Retired
- Other:

Do you currently own an electric vehicle *

- ◯ Yes
- ◯ No

If yes, what type of vehicle do you own?

- ◯ Two Wheeler
- ◯ Three Wheeler
- ◯ Four Wheeler

If No, Would you consider purchasing an electric vehicle (EV) for your next vehicle

- ◯ Yes
- ◯ No
- ◯ Maybe

How familiar are you with electric vehicles (EVs) *

- ◯ Very familiar
- ◯ Somewhat familiar
- ◯ Not familiar at all

Which of the following features would you like to see in electric vehicles

- ☐ Fast charging capability
- ☐ Long battery life
- ☐ Advanced safety features
- ☐ Integration with smart home technology
- ☐ Autonomous driving capabilities

On a scale of 1 to 5 (1 being "Not at all important" and 5 being "Extremely important"), how important are the following factors when considering the purchase of an electric vehicle? *

	1	2	3	4	5
Purchase price of the EV	○	○	○	○	○
Fuel/electricity cost savings	○	○	○	○	○
Environmental benefits	○	○	○	○	○
Driving range	○	○	○	○	○
Charging time	○	○	○	○	○
Availability of charging infrastructure	○	○	○	○	○

Which of the following would be the most important factor in your decision to purchase an electric vehicle? *

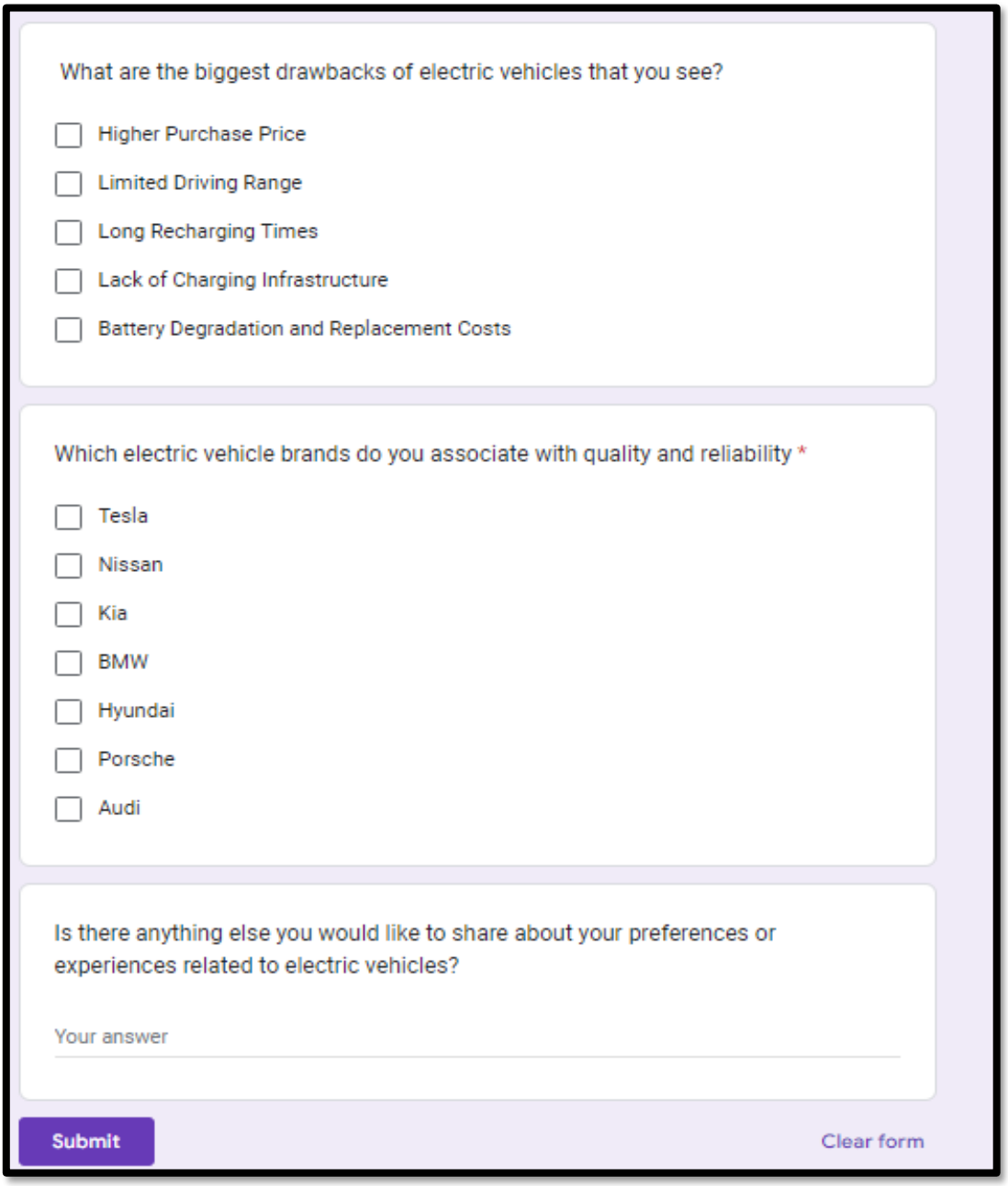
- ○ Lower purchase price
- ○ Lower operating costs
- ○ Environmental impact
- ○ Driving performance
- ○ Availability of charging stations

To what extent do you agree or disagree with the following statements about electric vehicles *

	Agree	Disagree
Electric vehicles are better for the environment than traditional gasoline-powered vehicles.	◯	◯
Electric vehicles are affordable alternatives to traditional vehicles.	◯	◯
The technology in electric vehicles is reliable and trustworthy.	◯	◯
There are enough public charging stations available in my area.	◯	◯
I am concerned about the driving range of electric vehicles.	◯	◯

What are the main advantages of electric vehicles in your opinion? *

- ☐ Environmental Benefits
- ☐ Lower Operating Costs
- ☐ Quieter Operation
- ☐ Government Incentives
- ☐ Improved Driving Experience
- ☐ Reduced Dependence on Fossil Fuels


What are the biggest drawbacks of electric vehicles that you see?
Higher Purchase Price
Limited Driving Range
Long Recharging Times
Lack of Charging Infrastructure
Battery Degradation and Replacement Costs
Which electric vehicle brands do you associate with quality and reliability *
Tesla
Nissan
Kia
BMW
Hyundai
Porsche
Audi
Is there anything else you would like to share about your preferences or experiences related to electric vehicles?
Your answer
Submit
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