

Major Research Project

Perception & Acceptance of EV's in India

Submitted By
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2K22/DMBA/94

Under the guidance of

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CERTIFICATE

This is to certify that the work titled 'Perception & acceptance of EV's in India' as part of project at DSM,DTU submitted by Prince Gautam in the 4th semester of MBA (DSM,DTU) during the academic year 2023-24 was conducted under my guidance and supervision.

This work is his original work to the best of my knowledge and has not been submitted anywhere else for the award of any credits / degree whatsoever.

The project is submitted to Delhi School of Management, Delhi Technological University in partial fulfilment of the requirement for the award of degree of Masters of Business administration.

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DECLARATION

I Prince Gautam, a Student of Delhi School of Management, declare that the project entitled “Perception & acceptance of EV’s in India” is my work conducted under the supervision of Dr. Vikas Gupta as partial fulfillment of the dissertation project for the course of MBA submitted to Delhi School of Management, DTU, Delhi. I further declare that to the best of my knowledge, the project does not contain any part of any work which has been submitted for any other project either in this university or in any other without proper citation.

I also confirm that the report is only prepared for my academic requirement, not for any other purpose. It might not be used with the interest of the opposite party of the corporation.

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EXECUTIVE SUMMARY

This project report delves into the theme of "Perception & Acceptance of EV Vehicles in India," crafted through a comprehensive synthesis of primary and secondary data sources. Primary data acquisition involved direct engagement with respondents via structured questionnaires, while secondary data was gleaned from a variety of reputable sources such as books, the internet, newspapers, and magazines.

The report is structured into several chapters to facilitate a thorough exploration of the topic. The introductory chapter provides an overview of Electric Vehicles (EVs), setting the stage for subsequent discussions. The following chapter conducts a literature review, offering a robust justification for the chosen project title.

Moving forward, the report examines the business environment surrounding electric vehicles, encompassing governmental initiatives aimed at promoting EV adoption, an analysis of state-wise electric vehicle penetration in India, as well as a comprehensive SWOT Analysis and Porters Five Forces Analysis.

The research methodology chapter outlines the framework within which the study was conducted, elucidating aspects such as research definition, problem statement, objectives, design, data collection methods, and analysis techniques. Additionally, it discusses the intricacies of primary and secondary data collection, sampling plans, units, sizes, and methods, alongside a discourse on data analysis and interpretation, research report preparation, and the inherent limitations of the study.

The subsequent chapter delves into the data analysis derived from the responses garnered through the questionnaire, employing frequency tables and Chi-square tests to extract meaningful insights. Following this, the report presents findings based on the data analysis, culminating in a conclusive chapter that synthesizes the key discoveries and draws insightful conclusions.

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CHAPTER 1

INTRODUCTION

1.1 Introduction to Electric Vehicles

Amidst the dwindling reservoirs of fossil fuels and their escalating costs, the automotive industry is actively seeking alternative energy sources to power vehicles. In this context, Electric Vehicles (EVs) have emerged as a promising solution, both for the industry and the environment in India. EVs represent a shift away from traditional petroleum-based vehicles, presenting themselves as an innovative and environmentally sustainable option. By substituting internal combustion engines with electric counterparts, EVs hold the promise of significantly reducing pollution while offering consumers a financially advantageous alternative. The global adoption of EV technology by numerous countries underscores its potential to contribute to environmental improvement on a global scale.

1.2 Types of Electric Vehicles

The Indian EV's market is rapidly evolving, with ongoing advancements in technology and infrastructure aiming to support and expand the adoption of electric mobility across the country. Four categories of electric vehicles are presently accessible:

- Battery Electric Vehicle (BEV): Operating solely on electricity, these vehicles demonstrate higher efficiency when contrasted with hybrid and plug-in hybrid counterparts.

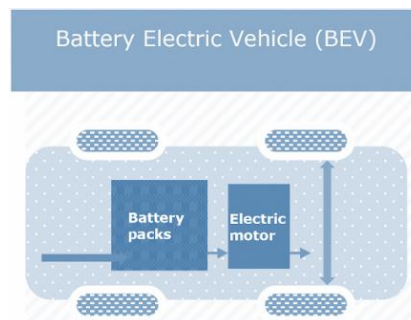


Figure 1.1 Battery Electric Vehicle

- Hybrid Electric Vehicle:

- Hybrid Electric Vehicle (HEV): This vehicle employs both an internal combustion engine, typically fueled by petrol, and a battery-powered motor powertrain. The petrol engine serves the dual purpose of propulsion and recharging the battery when it is depleted. However, it is worth noting that these vehicles are not as efficient as fully electric or plug-in hybrid vehicles.

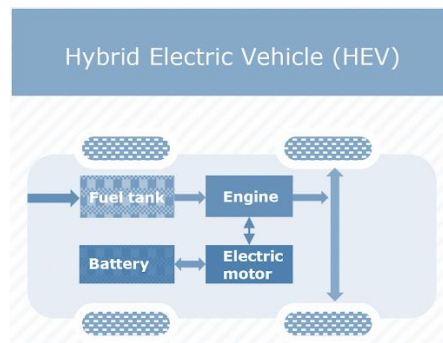


Figure 1.2 Hybrid Electric Vehicle

- Plug-in Hybrid Electric Vehicle (PHEV): These vehicles utilize both an internal combustion engine and a battery that can be charged from an external socket, denoted by the presence of a plug. This enables the battery to be recharged using electricity rather than solely relying on the engine. While Plug-in Hybrid Electric Vehicles (PHEVs) are more efficient than traditional Hybrid Electric Vehicles (HEVs), they are still not as efficient as Battery Electric Vehicles (BEVs).

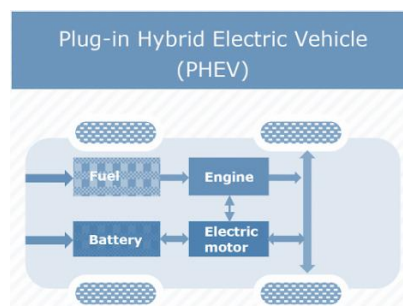


Figure 1.3 Plug-in Hybrid Electric Vehicle

- Fuel Cell Electric Vehicle (FCEV): Electric energy is generated through the conversion of chemical energy, as exemplified by hydrogen Fuel Cell Electric Vehicles (FCEVs).

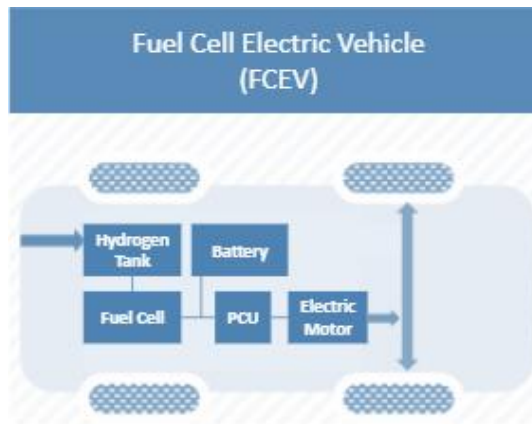


Figure 1.4 Fuel Cell Electric Vehicle

1.3 Business Environment of Electric Vehicles

Government efforts aimed at fostering the adoption of Electric Vehicles (EVs) in India.

To bolster the adoption of electric vehicles (EV's) nationwide, the central government has unveiled several promotional initiatives over the past decade. These include tax incentives for EV owners, the expansion of public EV's charging infrastructure, and other supportive measures.

Central Government Policy on Electric Vehicles in India

- The Indian central government introduced the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme in 2015 with an approved budget of INR 795 Cr for two years. Extended until September 2018, the scheme prioritized technology advancement, demand generation, pilot initiatives, and charging infrastructure development.
- Presently in its second phase, Phase-II of the FAME India Scheme, effective from April 1, 2019, spans a duration of 5 years with a total budgetary allocation of Rs. 10,000 crore. FAME II is geared towards facilitating the electrification of public and shared transportation by providing subsidies for the deployment of 7,090 e-Buses, 500,000 e-3 Wheelers, 55,000 e-4 Wheeler Passenger Cars, and 1,000,000 e-2 Wheelers.
- The Department of Heavy Industries has approved 2,636 charging stations across 62 cities in 24 States/UTs as part of the FAME India scheme phase II.
- The Energy Efficiency Services Ltd (EESL), supported by the government, has released tenders for 20,000 EVs to be deployed nationwide for government usage. This initiative aligns with the government's objective of achieving an EV sales penetration target of 30% for private cars, 70% for commercial cars, 40% for buses, and 80% for two- and three-wheelers by 2030.
- On May 12, 2021, the Government sanctioned a Production Linked Incentive (PLI) scheme aimed at bolstering the manufacturing of Advanced Chemistry Cells (ACC) within the country, with the objective of lowering battery prices domestically. This reduction in battery costs is poised to translate into decreased expenses for electric vehicles. Under the Production Linked Incentive (PLI) scheme for Automobile and Auto Components, endorsed on September 15, 2021, Electric Vehicles are included. This

initiative boasts a budgetary allocation of Rs. 25,938 crore over a span of five years.

- These charging stations have been allocated on a state-wise basis as follows:

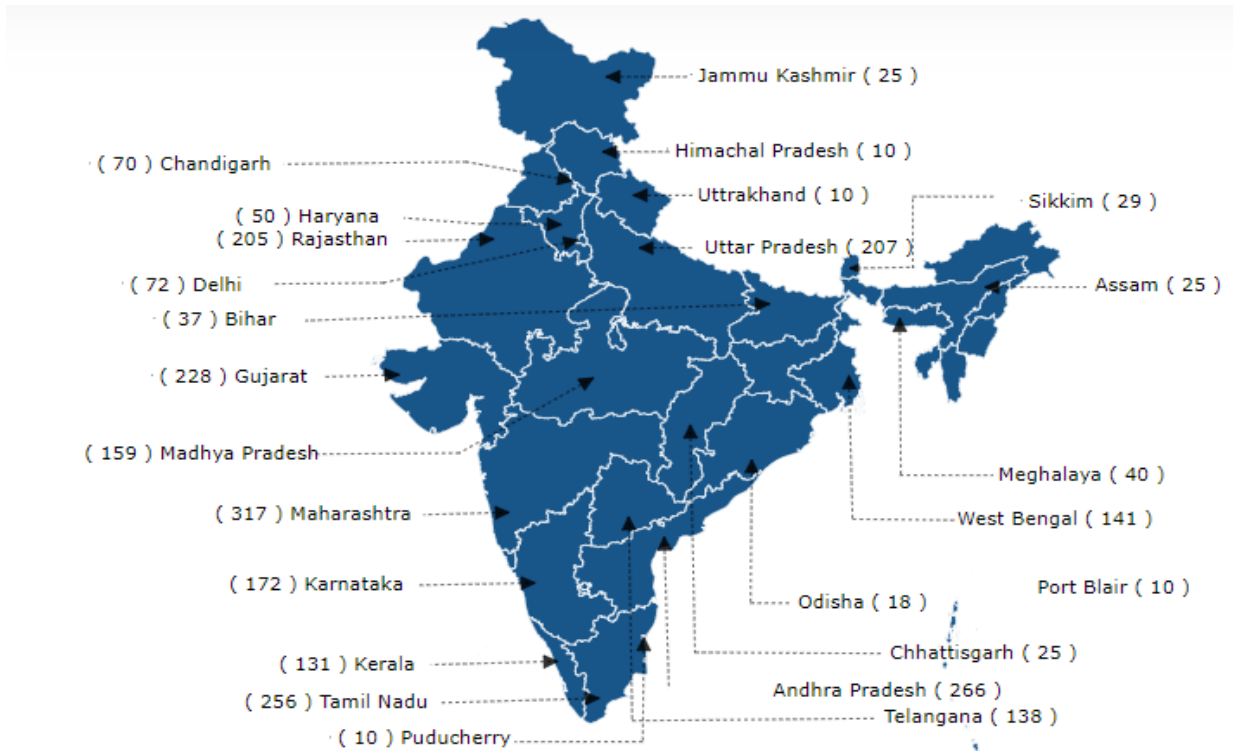


Figure 1.5 Charging Stations

- Phased Manufacturing Programme (PMP) to foster electric mobility and advance the development of electric vehicles, a phased manufacturing plan has been devised. This plan considers the existing manufacturing landscape in the nation, aiming to promote domestic production of electric vehicles, assemblies/sub-assemblies, and components over time through a progressive duty framework. The objective is to substantially enhance value addition and capacity building within the country.
- National Mission on Transformative Mobility and Storage, The mission seeks to spearhead strategies for transformative mobility and phased manufacturing programs for electric vehicles, electric vehicle components, and batteries. Impact: Propel mobility solutions for the betterment of the industry, economy, and nation. Enhancing urban air quality, reducing India's reliance on oil imports, and fostering the adoption of renewable energy and storage solutions. The mission will establish a strategic roadmap to harness India's scale and size in developing a competitive domestic manufacturing ecosystem for

electric mobility. The objective is to enhance the quality of life and promote "Ease of Living" for all citizens, while also generating employment opportunities across various skill sets through the "Make in India" initiative.

Andhra Pradesh Policy

- The policy introduced by the Andhra Pradesh government primarily emphasizes fostering innovation by offering grants and venture funds to research institutions, incubators, and startups engaged in advancing battery technology, fuel cell technologies, EV power trains, and EV electronics. Additionally, it aims to facilitate investment in charging and battery-swapping infrastructure, as well as the development of hydrogen generation and fueling stations.
- The government aims to attract over INR 30,000 Crore in combined investments over the next five years, potentially generating employment opportunities for 60,000 individuals. Additionally, it targets the establishment of manufacturing units capable of producing at least 10 GWh of high-density energy storage within the same timeframe, catering to both domestic and export markets. Moreover, the government plans to transition the entire APSRTC bus fleet, comprising over 11,000 buses, to electric buses (BEVs/FCEVs) by 2029, with the initial phase focusing on achieving 100% conversion in the top four cities by 2024.

Bihar EV Policy

- Bihar's Electric Vehicle Policy 2019, currently in the draft phase, aims to establish a robust manufacturing ecosystem for e-vehicles within the state. The policy is geared towards achieving sustainable development goals in the transportation sector and positioning Bihar as the premier investment destination for the EV sector.
- Establish rapid-charging stations along state and national highways in the state at intervals of every 50 kilometers.
- Attract on-site investments totaling INR 2,500 crore and generate direct employment opportunities for 10,000 individuals in the state.

Karnataka EV Policy

- The Karnataka government introduced the policy in September 2017 with a primary

objective of fostering an environment conducive to attracting investments worth INR 31,000 crore and generating employment for 55,000 individuals. The policy aims to position Karnataka as the preferred hub for electric mobility development and to nurture a skilled workforce to support the industry's demands. As one of the early adopters, the state offers incentives such as interest-free loans on net SGST for EV manufacturing firms. Additionally, Karnataka plans to establish charging infrastructure as a commercially viable venture to attract private investments.

Kerala EV Policy

- Kerala is embarking on a groundbreaking initiative to establish state-of-the-art training and skill development centers tailored to meet the demands of the burgeoning electric vehicle (EV) sector worldwide. The initiative aims to cultivate specialized expertise among professionals, catering to the unique requirements of the global EV industry. The policy sets ambitious targets for the adoption of electric vehicles by 2020, including 200,000 two-wheelers, 50,000 three-wheelers, 1,000 goods carriers, 3,000 buses, and 100 ferry boats.
- The policy places a significant emphasis on bolstering production capabilities across both the electric vehicle (EV) value chain and the infrastructure value chain.

Maharashtra EV Policy

- Last year, Maharashtra introduced a robust EV policy with the aim of positioning the state as a frontrunner in both electric vehicle (EV) manufacturing and adoption, while also fostering the export of EVs, components, batteries, and charging infrastructure.
- The objective is to boost the number of EV registrations in Maharashtra to 500,000, alongside attracting investments totaling INR 25,000 crore in various sectors such as EV manufacturing, component manufacturing, battery assembly, and charging infrastructure within the state. Additionally, the policy provides incentives for the acquisition of e-buses and extends support to buyers and end-users of private electric vehicles.

Madhya Pradesh EV Policy

- Madhya Pradesh has also embraced the electric vehicle (EV) movement, aiming primarily to foster sustainable electric mobility and significantly enhance the state's air

quality by reducing emissions from the transportation sector. The policy's core focus is to accelerate the adoption of electric vehicles, with the ambition of accounting for 25% of all new registrations of public transport vehicles by 2026.

- This policy is designed to implement measures supporting job creation across various sectors related to electric vehicles (EVs), including driving, sales, financing, servicing, charging infrastructure, and manufacturing. Additionally, it offers incentives such as free parking and road tax/registration waivers, as well as the provision of swappable batteries for e-rickshaws. Moreover, financial assistance from the Dedicated Urban Transport Fund (DUTF) is available for the deployment of electric buses.

Delhi/NCR EV Policy

- Given Delhi's pressing issues with pollution, the revised policy unveiled in late 2019 is laser-focused on curbing emissions from the transportation sector. Its primary objective is to drive the swift uptake of battery electric vehicles (BEVs), with the target of comprising 25% of all new vehicle registrations by 2023. The policy places particular emphasis on prioritizing two-wheelers, three-wheelers, public transport (buses), and taxi fleets. Additionally, Delhi aims to integrate 50% electric buses into its public transportation system by 2023.
- The state is purportedly strategizing to incentivize dealers and charging facility providers to commit to long-term investments, thereby fostering conducive environments for both private and public charging infrastructure. Delhi's policy introduces a distinctive electricity tariff specifically tailored for EV charging and urges distribution companies (discoms) to collaborate with owners of residential and non-residential buildings to guarantee the availability of adequate power supply infrastructure for the installation of these charging points. Furthermore, the policy pledges to ensure public charging infrastructure at intervals of no more than 3 kilometers throughout the state.

Tamil Nadu EV Policy

- Tamil Nadu (TN) is also striving to lure substantial investments into the electric vehicle (EV) industry within the state. TN has established an ambitious target of attracting INR 500 billion in investments for EV manufacturing, with the overarching objective of fostering a comprehensive EV ecosystem and ultimately generating 150,000 new job

opportunities.

- Establish a resilient infrastructure for electric vehicles, encompassing sufficient power supply and a network of charging stations offering favorable tariff structures.
- Foster innovation in electric vehicle technology for both automotive and shared mobility sectors by cultivating a supportive ecosystem and robust infrastructure, with the vision of positioning Tamil Nadu as the premier EV hub of India.
- Cultivate a highly skilled workforce for the electric vehicle (EV) industry by leveraging the technical institutions already established within the state, while simultaneously generating new employment opportunities within the EV sector.
- Position Tamil Nadu as the preferred choice for electric vehicle and component manufacturing enterprises, encompassing battery and charging infrastructure facilities.

Telangana EV Policy

- Telangana, India's newest state, sets its sights on drawing investments totaling \$3 billion and generating employment opportunities for 50,000 individuals by 2022 through initiatives in electric vehicles (EVs), spanning shared mobility, charging infrastructure development, and EV manufacturing. The state's strategy entails delineating incentives across both the demand and supply sides of the EV ecosystem, outlining a concise roadmap for the establishment of charging infrastructure, and offering incentives targeting various components of electric vehicle ownership costs.
- The focus extends to skill enhancement in EV design, development, and manufacturing, coupled with initiatives to incentivize the manufacturing of battery cells and packs through special status and incentives. The Telangana government sets ambitious targets, aiming for 100% electric buses for intra-city, intercity, and interstate transport by 2030, with milestones of 25% by 2022 and 50% by 2025.

Uttar Pradesh EV Policy

- During the transitional phase, the policy promotes the adoption of hybrid electric vehicles (HEVs) and plug-in electric vehicles (EVs). It aims to establish 200,000 charging stations (comprising fast, slow, and swapping options) by 2024, with a goal of having 1 million EVs across all categories on the roads by that time. Additionally, the policy targets achieving 70% electric vehicles in public transport by 2030.

- The state provides a range of incentives for electric vehicle (EV) manufacturing units, including capital interest subsidy, infrastructure interest subsidy, industrial quality subsidy, stamp duty and electricity duty exemptions, and reimbursement of SGST. These incentives are applicable to manufacturing units of all sizes, from large to micro. Additionally, a single window system streamlines the approval process for both EV and battery manufacturing units.

Uttarakhand EV Policy

- The policy sets out to drive the widespread adoption of electric vehicles (EVs) in Uttarakhand, with the dual goals of fostering a cleaner environment and positioning the state as a premier hub for both EVs and EV component manufacturing. It outlines plans for achieving 100% electrification of public transport, including e-buses, as well as shared mobility services like e-bike-taxis. Additionally, it aims to transition goods transport to electric vehicles, encompassing electric 2-wheelers, 3-wheelers, 4-wheelers, and other mini goods-transport vehicles, in five priority cities by 2030.

State-wise electric vehicles in India

Below are the growth rates for electric vehicles over the past four years:

Table 1.1 No. of EV registered

Year	No of Electric vehicles registered	Percentage increase in registration, year on year
2018	130254	-
2019	166822	28.07%
2020	124654	-25.28%
2021	331466	165.91%
2022	1024808	209.17%
2023 (till 03-08-2023)	847439	-

Source: <https://parivahan.gov.in/parivahan>

The table shows a significant increase in electric vehicle registrations over the past six years (2018-2023). Here are some points:

- There were over 847,000 electric vehicles registered by August 2023, which is a

substantial increase from the 130,000 registered in 2018.

- The biggest year-over-year increase was between 2021 and 2022, at over 200%. There was a decline in registrations in 2020 compared to 2019.

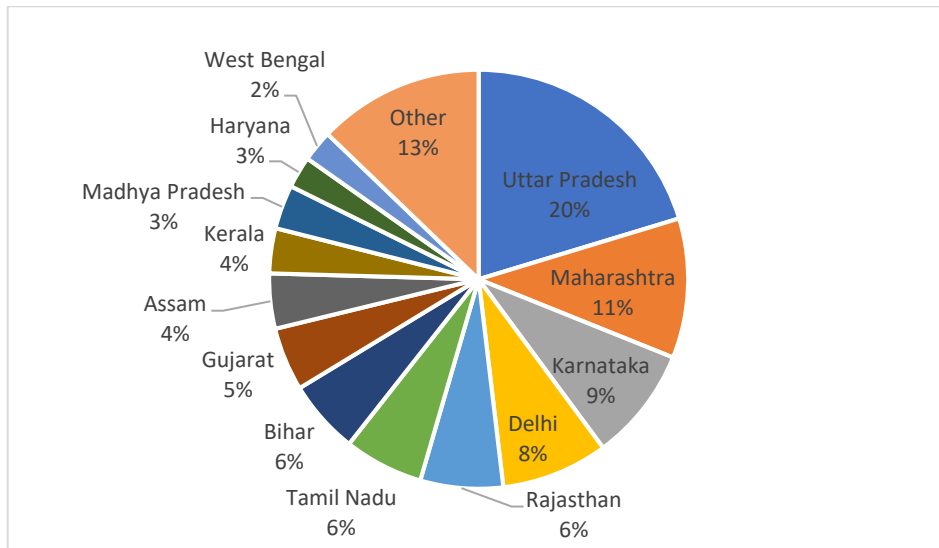


Figure 1.6 Total no of Electric Vehicles as on 03.08.2023

Source: <https://parivahan.gov.in/parivahan>

- The pie chart shows the number of electric vehicles registered in various states of India as of August 3rd, 2023.
- State with the Highest Percentage of Electric Vehicles: Uttar Pradesh has the highest percentage of electric vehicles registered at 20%.
- State with the Lowest Percentage of Electric Vehicles: West Bengal has the lowest percentage of electric vehicles registered at 2%
- Other states Includes: Andhra Pradesh, Odisha, Chhattisgarh, Uttarakhand, Jharkhand, Punjab, Tripura, Goa, Jammu and Kashmir, Chandigarh, Puducherry, Himachal Pradesh, Manipur, UT of DNH and DD, Andaman & Nicobar Island, Meghalaya, Mizoram, Ladakh, Nagaland, Arunachal Pradesh & Sikkim.
- Data for Telangana and Lakshadweep is not available.
- Despite the government's target of achieving 30% electric mobility in the country by 2030, the current EV adoption index paints a distinct picture. According to a statement made by Minister of Road Transport and Highways, Nitin Gadkari, to the Lok Sabha, India has

397,000 registered electric/battery-operated vehicles as of July 9,2022

- According to a report by ET, the majority of vehicles listed by the government are electric rickshaws and e-carts, as per information provided by anonymous sources. These vehicle categories received legal approval in March 2015 and are officially recognized as motor vehicles.
- Speculation suggests that the actual count of electric vehicles could surpass the official figure significantly. Firstly, numerous electric rickshaws have been in operation nationwide without proper registration. Secondly, the data might omit statistics from electric two-wheeler and electric bicycle sales. Additionally, it may not encompass electric cars and four-wheelers utilized by mobility startups and automotive companies.
- NITI Aayog proposed a plan for the exclusive sale of electric vehicles in India by 2030. As part of this initiative, it recommended a complete transition to electric power for three-wheelers by 2023 and for two-wheelers with engine capacities below 150 CC by 2025.

SWOT ANALYSIS OF THE ELECTRIC VEHICLE (EV) INDUSTRY IN INDIA

STRENGTHS

- Environmentally conscious: Electric vehicles (EVs) contribute significantly less to pollution, boasting zero exhaust emissions. By choosing to power your EV with renewable energy sources, you can further minimize greenhouse gas emissions. Certain EV models, like the Ford Focus Electric and the Nissan Leaf, incorporate eco-friendly materials in their construction, such as recycled and bio-based materials in the former and a mix of recycled plastic bottles, old car parts, and secondhand appliances in the latter.
- Silent Operation: Noise pollution is a persistent annoyance in urban areas. Unlike traditional vehicles, electric vehicles (EVs) operate quietly, offering the potential to minimize traffic noise in parking lots and residential streets. This silent operation enhances the quality of life for both occupants and neighboring communities.
- Cost-Effective Ownership: Electric vehicles (EVs) boast a low cost of ownership compared to traditional vehicles. Once you purchase an EV, you only need to recharge the battery, which is typically more economical than refueling with petrol or diesel, given the relatively lower electricity prices in India.

- **Cost-Efficient Operation:** Electric vehicles (EVs) offer a more economical running cost due to their high efficiency and fuel economy. Charging an EV typically costs around one-third as much per kilometer compared to purchasing fuel for a conventional vehicle.
- **Health Advantages:** The decreased emission of harmful pollutants from electric vehicles (EVs) contributes to improved air quality, benefiting overall health. Additionally, EVs generate significantly less noise pollution compared to traditional petrol or diesel vehicles.

WEAKNESSES

- **Charging Time Requirement:** Electric vehicles necessitate time for recharging, typically requiring charging sessions lasting 4-8 hours, conducted two or three times a week. This aspect can be considered a drawback of electric vehicles due to the time-consuming nature of the charging process.
- **Limited Recharging Infrastructure:** Due to the relatively novel and not yet widely adopted nature of electric vehicles in our country, the recharging infrastructure is not extensively available across most regions.
- **Costly Battery Replacement:** The batteries used in electric vehicles are currently expensive. Consequently, once the battery life is depleted, replacing it can entail substantial expenses. This aspect represents another challenge associated with electric vehicles.

OPPORTUNITIES

- **Government Incentives for Ownership:** The government is offering a range of subsidies to promote both the manufacturing and purchase of electric vehicles (EVs). Manufacturers receive subsidies to encourage the production of EVs, while buyers benefit from subsidies to facilitate their purchase.
- **Tax Reduction:** The government has implemented tax cuts on the manufacturing and purchase of electric vehicles (EVs). This tax reduction presents a significant opportunity for both automakers and buyers to increase the production and adoption of EVs, respectively.
- **Rising Fossil Fuel Prices:** The escalating prices of fossil fuels present a significant opportunity for the EV industry in India. As petrol and diesel become more expensive

and less affordable, individuals will seek more cost-effective mobility solutions, making electric vehicles (EVs) the preferred choice.

Threats

- **Competitive Landscape:** The EV industry faces competition from electric hybrids, alternative fuels, and hydrogen-powered cars. These alternatives pose a threat to electric vehicles as they offer potential substitutes, intensifying competition within the industry.
- **Escalating Electricity Prices:** Any future increase in electricity costs could pose a significant threat to the EV industry in India. Since the entire electric vehicle business relies on the availability of affordable electricity, higher prices could adversely impact the industry's viability.

PORTER'S FIVE FORCES ANALYSIS

Threat of new Entrants

- **Market Dominance of East Asian Companies:** The EV sector is largely dominated by East Asian companies such as Toyota, which recognize the substantial business potential in India. Given their advanced technology capabilities, these companies pose a threat to Indian counterparts, potentially impacting their market share.
- **Reduction in import duties:** reduction in import duties by the Indian government has encouraged new entrants in the EV Industry. Many foreign companies are coming to India thereby increasing the competition in our country.
- **Abundance of Skilled Workforce:** With a large pool of engineers in the country, India possesses ample skilled labor necessary for electric vehicle manufacturing. Consequently, there is a threat of new entrants emerging in the EV industry in India, leveraging this skilled workforce.

Bargaining power of Buyers

- **High Pricing:** Electric vehicles are relatively expensive in our country, compounded by the low import duties. Consequently, buyers have the option to import vehicles from other countries, granting them significant bargaining power in the EV industry in India.
- **Customer Service and Support:** The customer service and support for electric vehicles are commendable, enhancing the bargaining power of buyers over sellers in the EV

industry.

- The emergence of the second-hand market for electric vehicles (EVs) shifts bargaining power to buyers, enabling them to acquire the same model of EV at significantly reduced prices, often close to half of the original cost.
- Due to the high cost of electric vehicles domestically and the relatively low import duties, individuals have the option to import EVs from abroad. Consequently, buyers wield significant bargaining power within the Indian EV industry.

Bargaining power of Suppliers

- The extensive network of dealerships provides buyers with abundant options for purchasing, thereby enhancing their bargaining power over sellers.
- While building brand loyalty typically bolsters the bargaining power of suppliers, in the current landscape of the EV industry in India, buyers hold the upper hand in negotiations.
- The lower rate of registration for electric vehicles compared to conventional ones shifts bargaining power to buyers rather than sellers.

Threat of Substitute products

- Public transportation serves as a potential substitute for electric vehicles, posing a threat to the Electric Vehicle Industry in India.
- The abundance of similar products in the market provides buyers with a wide array of choices, thereby enhancing their bargaining power over sellers.
- The ease of use of conventional cars in day-to-day life poses a threat to the electric vehicle industry, as they are perceived as viable substitutes.

Intensity of Competitive Rivalry

- The significant growth potential of the EV industry is drawing numerous players into the market, intensifying competitive rivalry among industry participants.
- The presence of multiple automotive companies vying for potential buyers of electric vehicles leads to strong competition and a high buyer power, fueling intense rivalry within the electric vehicle industry.

1.4 Objectives of Study

- Exploring the Opportunities and Challenges of Electric Vehicles (EVs) in India.
- Assessing the Effectiveness of Government Initiatives in Promoting Electric Vehicles.
- Examining the Adoption of Electric Vehicles Across Indian States.
- Understanding Consumer Motivations for Purchasing Electric Vehicles in India.
- Exploring Common Stereotypes Associated with Electric Vehicles.

1.5 Limitations of Study

- The questionnaire responses reflect the respondents' understanding within certain limits.
- The sample size was restricted due to specific limitations, thus preventing the generalization of the results.
- The analysis and conclusions are based on our understanding of the subject, which may be limited in certain aspects.
- Typically, respondents were occupied with their work and showed less enthusiasm in providing accurate responses.

1.6 Scope of study

Every day, we encounter numerous discussions and articles emphasizing the significance of electric vehicles (EV's) and the global efforts by governments to promote them. These initiatives aim to lessen reliance on oil, mitigate greenhouse gas emissions, and enhance air quality. Given that major pollutants emanate from metropolitan areas, it's crucial for residents in these cities to grasp the importance of reducing harmful gases and pollutants by embracing EV's and taking individual actions.

The goal of this project report is to gather insights into individuals' awareness, sentiments, and inclination towards purchasing vehicles, with the aim of fostering environmental sustainability.

CHAPTER 2

LITERATURE REVIEW

Numerous global studies have investigated consumer adoption of electric vehicles (EV's), examining factors such as EV cost, driving range per charge, battery recharge time, accessibility of charging infrastructure, and battery expenses. Additionally, previous research has explored attributes like range anxiety and various incentives—both monetary and non-monetary—offered to encourage EV adoption. Consumer preferences for business models in electric vehicle adoption: Factors such as mileage, lead time, and ownership costs were found to significantly impact purchase decisions for electric vehicles. Various studies have employed preference techniques to understand the diversity among consumers when making decisions to purchase an electric vehicle.

Technology encompasses the technical features of a vehicle. Previous research identifies range anxiety—concerns about the limited distance traveled per full battery charge—as a significant barrier to EV adoption. Infrastructure attributes pertain to the accessibility of charging facilities. Studies suggest a positive correlation between available charging infrastructure and EV adoption, as adequate facilities can alleviate range anxiety by saving time and reducing search costs for consumers.

The higher price of electric vehicles (EVs) could hinder their adoption. Evidence strongly supports policies related to financial attributes such as tax reductions or rebates, while non-financial incentives like free parking and toll reductions lack sufficient supporting evidence.

Other barriers to EV adoption include the non-availability of EVs and limited EV model options. Literature indicates that insufficient knowledge and untrained car dealership staff may discourage EV adoption.

Most research originates from North American and European countries, with further exploration needed regarding the impact of individual-specific variables on EV's adoption. Psychological factors have demonstrated a consistent and significant influence. Studies focusing on India are limited, with this article concentrating on electric cars, which represent only a subset of EV's.

- Livemint (2021) utilized questionnaires to explore the psychological factors impacting consumer adoption of electric vehicles across various business models. Their study delved into the Indian electric vehicle market, emphasizing technological, infrastructural, financial, behavioral, and external barriers. Employing a hybrid two-stage multi-criteria decision-making (MCDM) technique, their findings underscored the significance of EV limitations such as performance and range, total cost of ownership, insufficient charging infrastructure, and limited customer awareness of EV technology in influencing EV adoption.
- Chhikara (2021) employed qualitative research to explore the factors influencing the widespread adoption of battery electric vehicles (BEVs) in developing nations like India. Their findings highlighted the government's commitment to research and investment, along with the provision of both financial and non-financial incentives, as crucial drivers in promoting BEV adoption.
- PWC (2010) highlight the environmental perspective, rising CO2 emissions, and the depletion of fossil fuel reserves as key factors driving the rollout of electric vehicles (EVs), positioning them as a safety measure and ensuring future security. They emphasize the maturity and upward trend of technology in upcoming EVs, enabling high-distance coverage with efficiency and comfort.
- Business Standard (2021) provide an overview of EV adoption studies, concentrating solely on individual-specific psychological factors shaping people's intentions for electric vehicle adoption, and highlighting select representative studies. In contrast, our review expands upon their work in two key aspects: firstly, by examining a broader spectrum of influential factors beyond psychological constructs alone, and secondly, by presenting a comprehensive overview of existing academic studies on electric vehicle preferences.

Electric vehicles (EVs) are still in the early stages of adoption in India, with many individuals lacking experience in handling them. Despite potentially higher initial purchase prices, EVs offer lower running and maintenance costs compared to internal combustion engine vehicles, which have higher ongoing expenses. Perceived economic benefit (PEB) is a key factor influencing adoption, particularly as awareness of environmental concerns grows. Self-image (IM) and social influence (SoC.In) can also impact the adoption of high-involvement products like EVs.

Attitude (ATT) serves as a mediating variable, with behavioral intention (BI) as the dependent variable.

The higher initial cost of electric vehicles (EVs) compared to conventional vehicles acts as a barrier to adoption. However, studies indicate that incentives play a crucial role in promoting EV acceptance.

Research by Aasness and Odeck (2015) and Beresteanu and Li (2011) found that incentives, such as income tax benefits, contributed to increased market share for hybrid electric vehicles (HEVs) in the USA. Demonstrated that the energy costs for small electric buses were significantly lower than those for vehicles using traditional fuels. This difference in energy costs, attributed to lower energy consumption and power tariffs, results in reduced operational expenses for EVs compared to conventional vehicles.

Considering the total cost of ownership, which includes both upfront and operational costs, EVs often prove to be more economical in the long run despite their initial premium cost. This cost advantage is particularly beneficial for consumers with longer driving ranges. Numerous studies (Adepetu & Keshav, 2015; Barth et al., 2016; Lieven et al., 2011) support the notion that lower operating costs are a key factor driving EV adoption.

Recognizing the significance of this subject and the existing research gap, we undertook this study with the primary aim of exploring the critical issue of comprehending the challenges and obstacles faced by electric vehicles (EVs) in India.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Amidst the ongoing depletion of fossil fuels and the subsequent rise in prices, the automotive industry is actively seeking alternative energy sources to power vehicles. Electric vehicles (EVs) have emerged as a promising solution for both the automotive sector and environmental sustainability in India. Positioned as replacements for traditional petroleum-based vehicles, EVs represent a burgeoning technology that is both eco-friendly and economically viable.

The objective of the methodology section is to delineate the research procedure. The subsequent steps outline the marketing research process:

- Identifying the problem and establishing research objectives.
- Research Design.
- Sample Planning and gathering data.
- Data Analysis & Interpretation.
- Research Report Preparation.

3.2 Research Design

We selected descriptive research as our method of analysis. Descriptive research aims to gather comprehensive and accurate data for the study, underscoring the importance of meticulous methodology. This research design elucidates the characteristics of a population or phenomenon through thorough description.

3.3 Data Collection

Conducted a primary survey using online digital platforms such as Google Forms or offline methods by directly engaging with the target consumers.

Gathered secondary data from diverse sources including Google Scholar, government websites, company websites, magazines, textbooks, newspapers, and other reputable sources.

3.4 Data analysis & interpretation

After the survey concludes and the questionnaires are collected from respondents, the data needs to be meticulously tabulated. Subsequently, I analyzed the data using various statistical methods such as averages, percentages, correlations, and graphical techniques including pie charts, bar charts, tables, and others.

Types of chart

- Pie Chart.
- Column Chart.
- Other charts

3.5 Data Collection Instrument

The questionnaire includes a variety of question types, such as dichotomous, Likert scale, open-ended, and closed-ended quantifiable questions, including rating scales and ranking scales.

CHAPTER 4

DATA ANALYSIS

4.1 Tools utilized for analysis - frequency distribution tables

Demographics

1. Age

Table 4.1

Age	Count of Age	Percentage Valid	Percentage	Cummulative Percentage
18-25	16	17.02	17.02	17.02
26-30	42	44.68	44.68	61.70
31-40	24	25.53	25.53	87.23
41-50	10	10.64	10.64	97.87
Above 51	2	2.13	2.13	100.00
Total	94	100.00	100.00	

Source: Own analysis

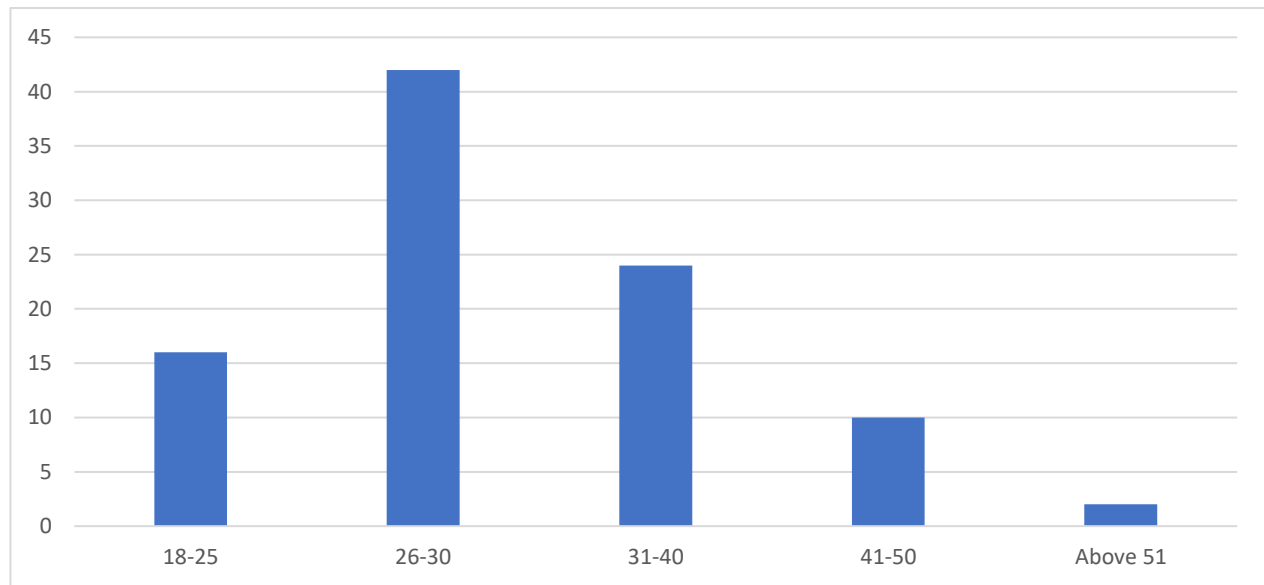


Figure 4.1 Count of Age

Based on the Bar Chart, it is evident that the highest number of respondents fall within the age range of 26 to 30 years, totaling 42 individuals, whereas the lowest number of respondents, only 2 individuals, are aged above 51 years.

2. Gender

Table 4.2

Gender	Count of Gender	Percentage	Valid Percentage	Cummulative Percentage
Female	45	47.87	47.87	47.87
Male	49	52.13	52.13	100
Other	0	0.00	0.00	
Total	94	100.00	100.00	

Source: Own analysis

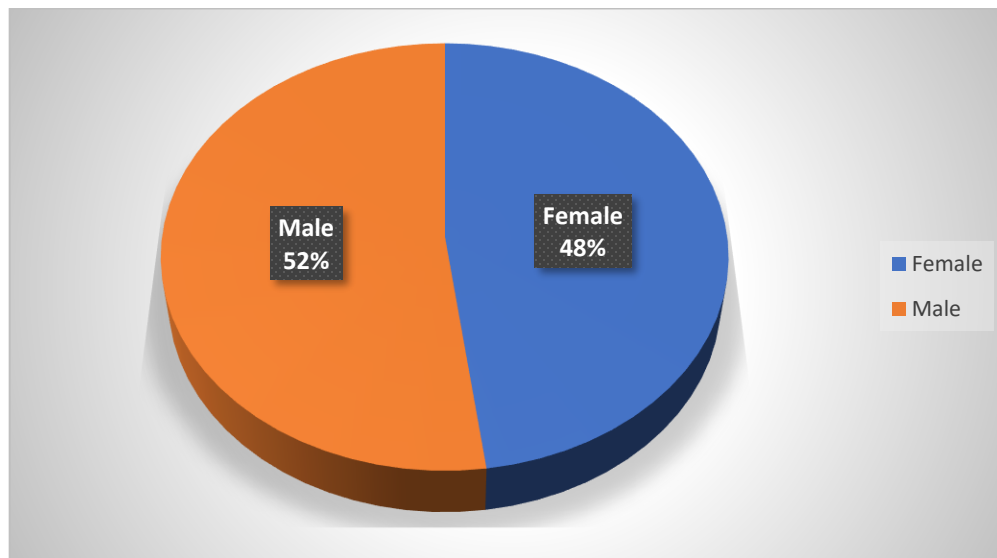


Figure 4.2 Count of Gender

Based on the Pie Chart above, we noticeable that out of the total 94 respondents, 45 were Female, while the remaining 49 were Male and other are 0.

3. Educational Qualification

Table 4.3 Educational Qualification

Educational Qualification	Count of Educational Qualification
High School or below	2
Bachelor's Degree	17
Master's Degree	67
Doctoral Degree	8

Source: Own analysis

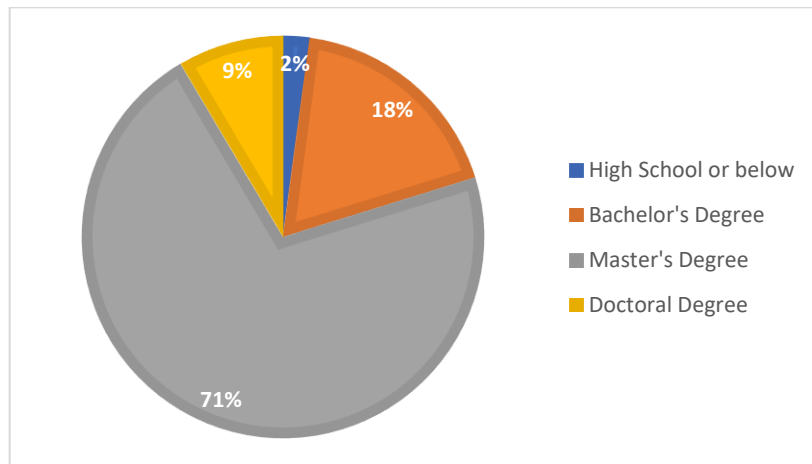


Figure 4.3 Total Education Qualification

From the above Pie chart, the educational qualifications of the respondents vary significantly: 71% hold Master's degrees, 18% have Bachelor's degrees, 9% possess Doctoral degrees, and 2% have completed High school or lower education levels.

4. Occupation

Table 4.4 Count of Occupation

Occupation	Count of Occupation
Entrepreneur	32
Home-maker	5
Retired	14
Salaried Employee	30
Student	13
Total	94

Source: Own analysis

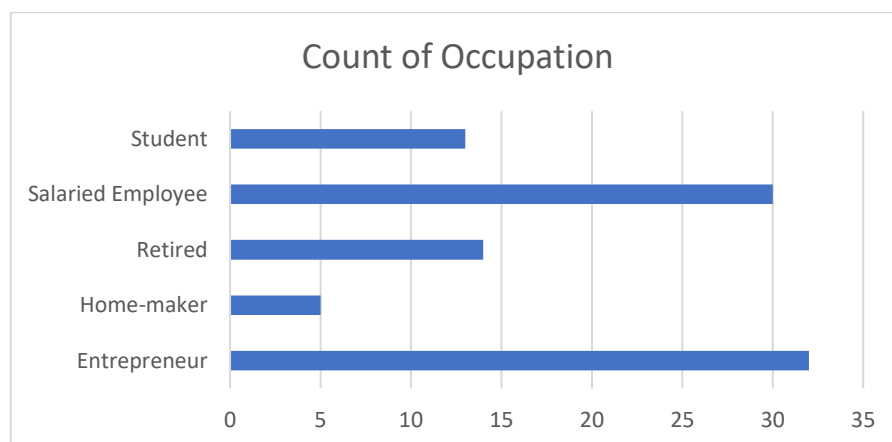


Figure 4.4 Count of occupation

Based on the Bar Graph, the occupation with the highest number of respondents was Salaried Employee, accounting for 30 individuals, whereas the occupation with the fewest respondents was Home-maker, totaling 5 individuals.

5. Annual Income (INR)

Table 4.5 Annual Income

Annual Income(INR)	Count of Annual Income(INR)	Percentage	Valid Percentage	Cummulative Percentage
1 Lakh - 3 Lakh	8	8.51	8.51	8.51
3 Lakh - 7 lakh	27	28.72	28.72	37.23
7 Lakh - 12 lakh	39	41.49	41.49	78.72
Above 12 lakh	13	13.83	13.83	92.55
below 1 Lakh	7	7.45	7.45	100.00
Total	94	100	100.00	

Source: Own analysis

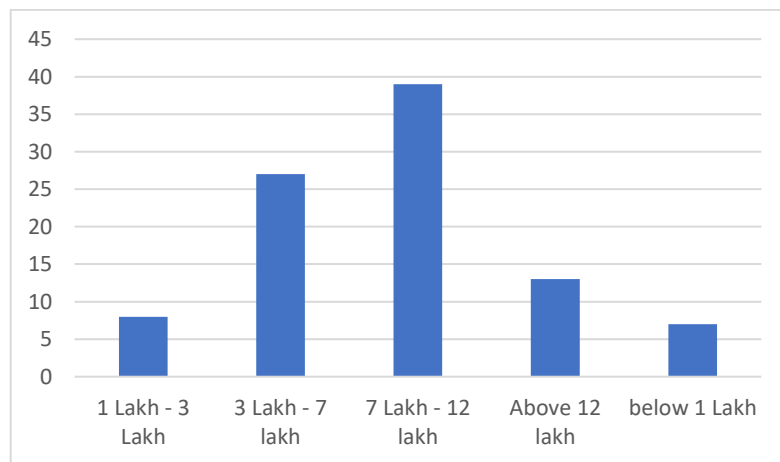


Figure 4.5 Count of Annual Income(INR)

Based on the Bar Graph above, the income level of the highest number of respondents fell within the bracket of 7 lakhs to 12 lakhs, whereas the income level of the fewest respondents was less than 1 lakh.

Consumer Perception & Acceptance on Electric Vehicles.

6. what type of vehicle do you own?

Table 4.6 Count of Vehicle

Type of vehicle	Count
CNG	12
Diesel	5
Diesel, CNG	5
Diesel, CNG, Electric	2
Diesel, Electric	3
Do not own	1
Electric	11
None	1
Petrol	27
Petrol, CNG	5
Petrol, Diesel	18
Petrol, Diesel, CNG	1
Petrol, Diesel, Electric	2
Petrol, Electric	1
Grand Total	94

Source: Own analysis

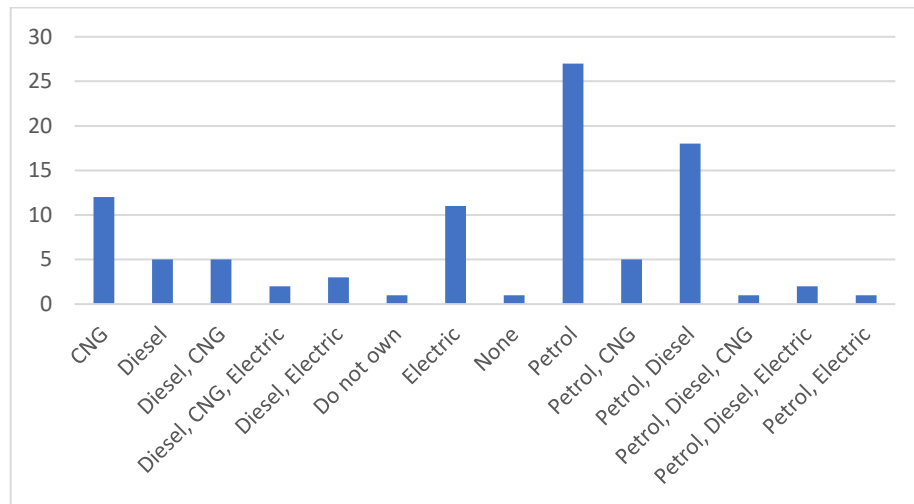


Figure 4.7 Count of If yes, what type of vehicle do you own

7. Have you ever driven an Electric Vehicle.

Yes or No

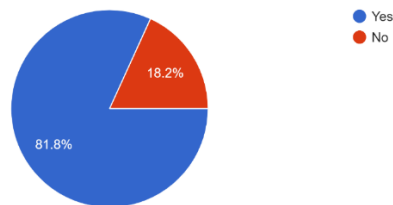


Figure 4.7 Driven an Electric vehicle

8. What type of EV's do you currently own?

Scooter, Bike, Car & Other vehicle.

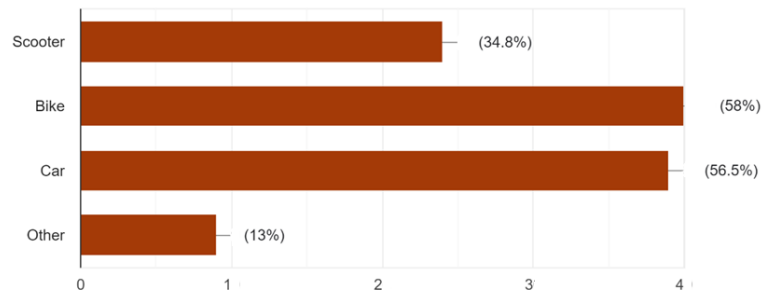


Figure 4.8 Frequency of own vehicle

9. How would rate your knowledge about Electric Vehicles.

Please rate your knowledge of electric vehicles on a scale of 1 to 5, where 1 represents "very limited knowledge" and 5 represents "extensive knowledge."

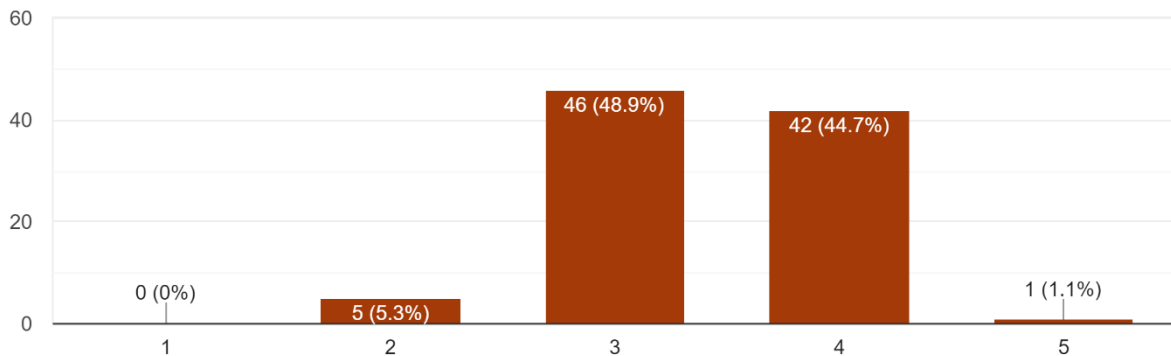


Figure 4.9 Knowledge about EV's

10. Select the benefits that you believe Electric Vehicles (EVs) offer:

Please click that if your answer is:

SD=Strongly Disagree (1), D=Disagree (2), N=Neutral (3), A=Agree (4), SA=Strongly Agree(5)
Based on: Environmental Benefits, Cost Savings, Energy Efficiency, Reduced dependence on Fossils fuels, contribution to climate change mitigation, Technology advancement, Government incentives, Health Benefits & Sustainable benefits.

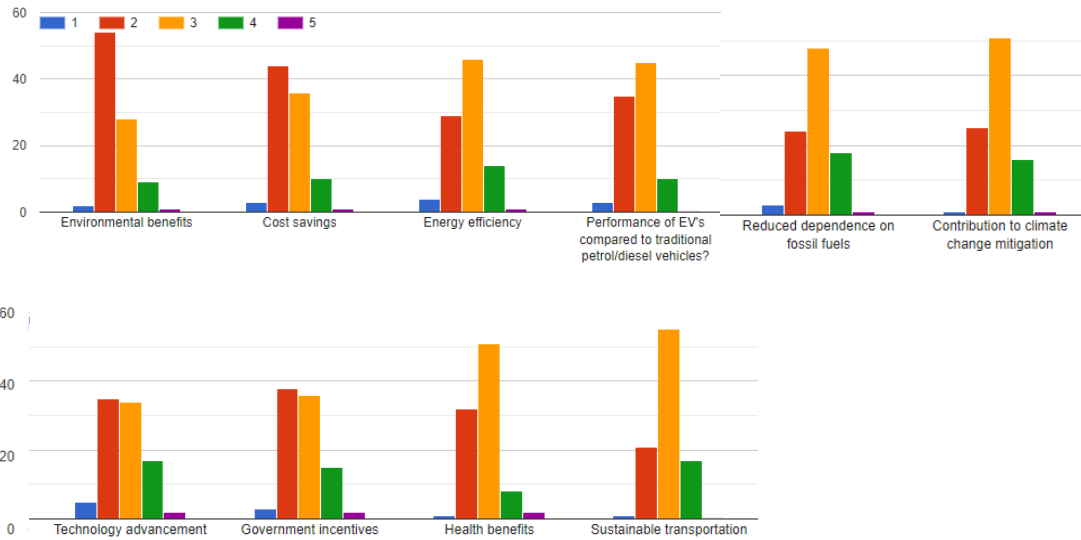
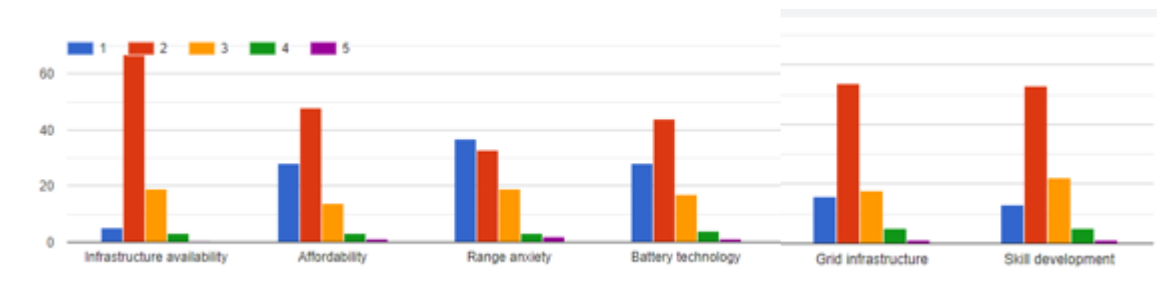


Figure 4.10 Rating Benefits of EV

11. Please rate the following challenges based on Electric Vehicles (EVs) on a scale of 1 to 5
Click if your answer is

1= Not a challenge, 2= Minor challenge, 3=Moderate challenge, 4= Significant challenge, 5= Very significant challenge

Based on: Infrastructure Availability, Affordability, Range Anxiety, Grid infrastructure, Skill Development, Supply chain Constraints, Consumer Awareness, Policy support & Manufacturing ecosystem.



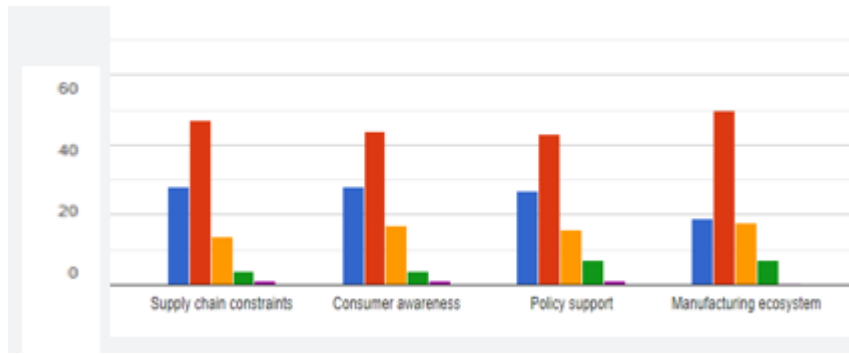


Figure 4.11 Rating based on Challenges of EV's

Intention to Adopt EV's

12. Would you consider purchasing an electric vehicle in future.

Blue= Definitely , red= probably, yellow= not sure, green= Probably not & purple = Definitely not

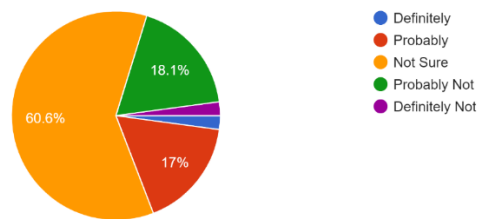


Figure 4.12 Future plan to buy EV

13. What factors would most influence your decision to purchase an EV's.

Based on: Govt. Incentives, lower operating costs, Advanced in battery technology, Improved availability of charging stations, Environmental concerns & other.

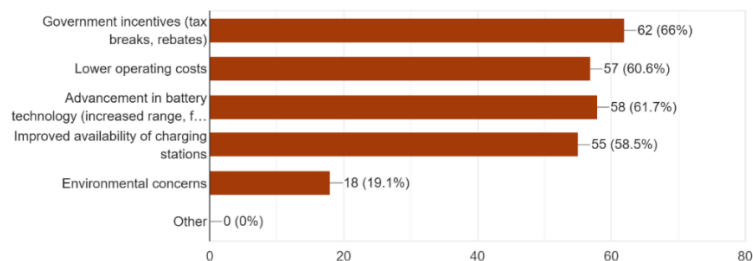


Figure 4.13 Factors influence EV

14. Which Electric Vehicle brands are you most familiar.

Based on: Tesla, Mahindra Electric, Tata, BYD Auto, Ola Electric & other.

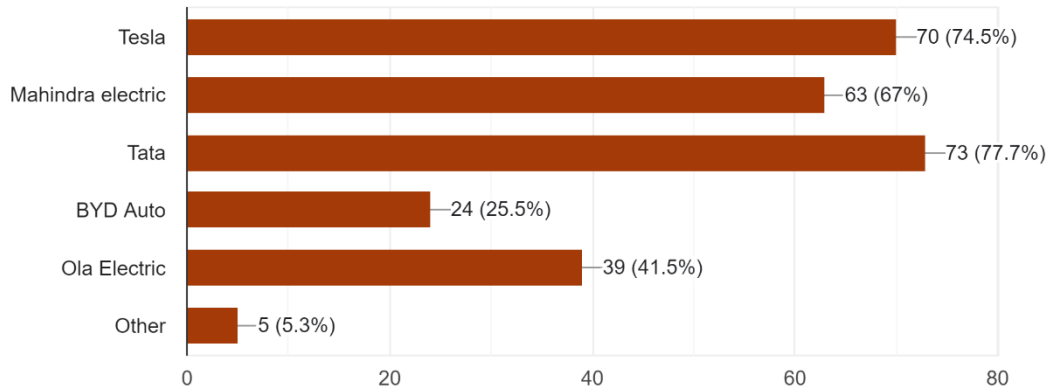


Figure 4.14 Familiar Brands

15.If you selected any brands in the previous question, which of these brands would you be most interested in considering for your next EV purchase?

Based on: Tesla, Mahindra Electric, Tata, BYD Auto, Ola Electric & other.

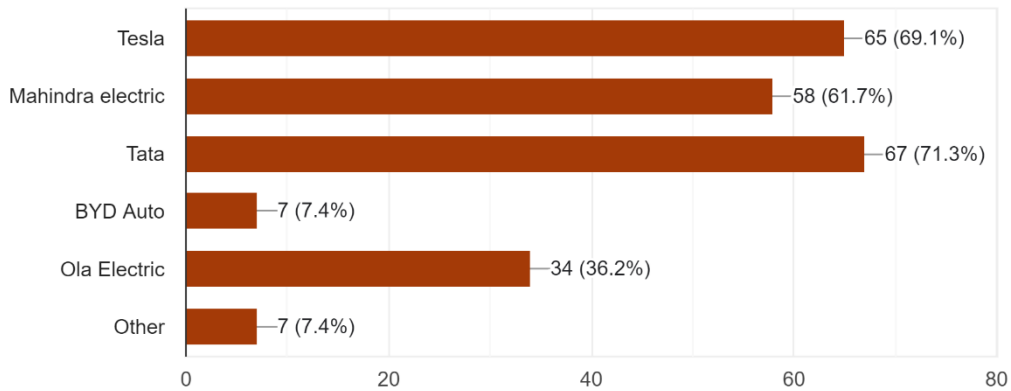


Figure 4.15 Future plan

4.2 Statistical analysis: chi-square for hypothesis

Q.A To find the relationship between the gender and electric vehicle?

Hypothesis:

H0: There is no a significant relationship between gender and electric vehicle.

H1: There is a significant relationship between gender and electric vehicle.

Table 4.2.1 Gender *Electric Vehicle

			Electric Vehicle		Total
			Yes	No	
gender	female	Count	6	39	45
		Expected Count	13.3	60.7	74.0
		% within gender	14.9%	85.1%	100.0%
	male	Count	11	38	49
		Expected Count	6.7	42.3	49.0
		% within gender	21.1%	78.9%	100.0%
Total	Count	17	77	94	
	Expected Count	16.92	77.08	94.0	
	% within gender	18.0%	82.0%	100.0%	

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.973	1	.324		
Continuity Correction	.599	1	.439		
Likelihood Ratio	.978	1	.323		
Fisher's Exact Test				.397	.220
Linear-by-Linear Association	.966	1	.326		
N of Valid Cases	150				

Source: Own analysis

Pearson Chi-Square (P)=0.324

P=0.324>0.05

Male were more likely to engage in electric vehicle than were women (21.1% to 14.9%).

4.3 Findings:

- Out of the 94 respondents, petrol vehicles are the most common, with 27 vehicles, comprising approximately 28.72% of the total. The second most common type is a combination of petrol and diesel vehicles, with 18 vehicles, accounting for about 19%.
- 81.8% of the respondents have driven an electric vehicle, while 18.2% have not driven one yet.

- In the survey, 58% of the respondents who own electric vehicles have a bike, 56.5% own a car, 34.8% own a scooter, and 13% own other types of vehicles.
- The survey results depicted in Figure 4.9 indicate that the majority of respondents rate their knowledge about Electric Vehicles (EVs) as moderate to high. Specifically, 48.9% of the 94 respondents rated their knowledge level as 3 out of 5, and 44.7% rated it as 4 out of 5. A smaller portion of the respondents, 5.3%, rated their knowledge as 2 out of 5, and only 1.1% considered themselves highly knowledgeable with a rating of 5 out of 5.
 - The highest levels of agreement (4 - Agree, and 5 - Strongly Agree) are observed for "Energy efficiency," "Performance of EVs compared to traditional petrol/diesel vehicles," and "Reduced dependence on fossil fuels," indicating strong positive sentiment towards these aspects. Notably, "Energy efficiency" and "Reduced dependence on fossil fuels" have the highest proportions of strong agreement, underscoring their importance to respondents. Conversely, "Cost savings" and "Environmental benefits" received more mixed responses, with significant portions of respondents indicating disagreement or neutrality.
 - The survey results depicted in the chart highlight the perceived challenges associated with electric vehicles (EVs). "Infrastructure availability" is identified as the most significant challenge, with a majority rating it as a "Very significant challenge" (5). "Grid infrastructure" and "Battery technology" also emerge as major concerns, predominantly rated as "Significant" (4) and "Very significant challenges" (5). "Range anxiety" and "Affordability" are recognized as moderate to significant challenges, with a notable proportion of respondents marking them as "Moderate" (3) to "Significant challenges" (4).
- A significant majority, 60.6%, indicated that they would "Not Sure" consider purchasing an EV, suggesting a less potential market interest. However, a notable 18.1% are "Probably not," reflecting uncertainty or the need for more information before deciding. Meanwhile, 17% of respondents indicated that they would "Probably" consider buying an EV, and a small percentage, represented by the slivers in blue and purple, expressed definitive stances, with a few respondents saying "Definitely" and others "Definitely Not".
- The primary factors influencing the decision to purchase an electric vehicle (EV) among 94 respondents. The most significant factor is government incentives (such as tax breaks

and rebates), cited by 66% of participants. Lower operating costs follow closely, influencing 60.6% of respondents. Advancement in battery technology, including increased range and faster charging, is important to 61.7% of respondents, while improved availability of charging stations affects 58.5%. Environmental concerns, although relevant, are less influential, affecting only 19.1% of the participants. No respondents selected "Other" factors. This data indicates that financial and technological improvements are key motivators for potential EV buyers.

- Figure 4.14 presents the familiarity of respondents with various electric vehicle (EV) brands. Out of 94 respondents, Tata is the most recognized brand, known to 77.7% of participants. Tesla follows closely, with 74.5% familiarity. Mahindra Electric is also well-known, recognized by 67% of respondents. Ola Electric has a significant recognition rate of 41.5%, whereas BYD Auto is familiar to 25.5% of participants. Only 5.3% of respondents indicated familiarity with other brands not listed. This data highlights the prominence of Tata, Tesla, and Mahindra Electric in the EV market, indicating a strong brand presence and recognition among potential consumers.
- Figure 4.15 depicts the preferred brands for future EV purchases among 94 respondents. Tata emerges as the top choice, with 71.3% of participants expressing interest in considering it for their next EV purchase. Tesla follows closely, with 69.1% of respondents showing interest. Mahindra Electric is also a popular choice, attracting 61.7% of potential buyers. Ola Electric is considered by 36.2% of respondents, whereas BYD Auto and other brands each garner interest from 7.4% of participants. This data suggests that Tata, Tesla, and Mahindra Electric are the most favored brands for future EV purchases, reflecting their strong market appeal and consumer trust.

4.4 Suggestions:

Based on the findings from my major research project on the Electric Vehicle (EV) market in India, I propose the following 11 suggestions for enhancing the EV ecosystem in 2024.

1. **Incentivize EV Purchases:** To boost consumer adoption, financial incentives such as tax rebates, subsidies, and reduced registration fees should be offered to make EVs more affordable.
2. **Expand Charging Infrastructure:** There is a critical need to develop a comprehensive and

reliable network of public charging stations across both urban and rural areas to address range anxiety and improve convenience for EV users.

3. **Enhance Battery Technology:** Investment in research and development should focus on advancing battery technology to increase energy density, reduce charging times, and extend battery life, making EVs more efficient and user-friendly.
4. **Promote Local Manufacturing:** Supporting local manufacturing of EVs and batteries through subsidies and incentives will help reduce costs, create jobs, and strengthen the domestic EV industry.
5. **Implement Stringent Emission Regulations:** Enforcing stricter emission norms for conventional vehicles can accelerate the transition to EVs and significantly reduce environmental pollution.
6. **Increase Public Awareness:** Educational campaigns are necessary to raise awareness about the benefits of EVs, including their positive environmental impact, cost savings, and performance advantages, to encourage wider adoption.
7. **Develop Affordable EV Models:** Manufacturers should be encouraged to produce a range of affordable EV models, including two-wheelers and three-wheelers, which are highly popular in the Indian market.
8. **Facilitate Easy Financing:** Collaborating with financial institutions to provide low-interest loans and favorable financing options will make EV purchases more accessible to a broader population.
9. **Encourage Corporate Adoption:** Incentives and policies should be designed to promote the adoption of EVs by corporate fleets, including taxis and delivery services, which can lead to significant reductions in urban emissions.
10. **Integrate Renewable Energy:** To reduce the overall carbon footprint, it is important to ensure that the electricity used for charging EVs increasingly comes from renewable energy sources.
11. **Policy Support and Coordination:** Developing cohesive policies at both the national and state levels, with clear guidelines and consistent implementation, will ensure effective coordination among all stakeholders in the EV ecosystem.

CHAPTER 5

CONCLUSION

The findings from major research project on the Electric Vehicle (EV) market in India provide a comprehensive understanding of the current landscape, consumer perceptions, and potential growth drivers. The data collected from 94 respondents reveals several key insights that can help shape future strategies for the EV market.

The most common type of vehicle among respondents is petrol vehicles, which account for approximately 28.72% of the total, followed by a combination of petrol and diesel vehicles at 19%. This indicates a predominance of traditional fuel vehicles, highlighting a significant opportunity for the EV market to capture a larger share. Interestingly, a substantial 81.8% of respondents have driven an electric vehicle, suggesting a growing familiarity and potential interest in EVs among the population.

Ownership patterns among EV respondents show that 58% have an electric bike, 56.5% own an electric car, 34.8% possess an electric scooter, and 13% own other types of EVs. This distribution indicates a diverse adoption of various EV forms, reflecting the versatile nature of EV applications in everyday life. Moreover, the survey results depicted in Figure 4.9 indicate that a majority of respondents rate their knowledge about EVs as moderate to high, with 48.9% rating their knowledge level as 3 out of 5 and 44.7% rating it as 4 out of 5. This suggests that while there is a good level of awareness, there remains a need for further education to increase in-depth knowledge.

Respondents expressed the highest levels of agreement on the benefits of EVs in terms of energy efficiency, performance compared to traditional vehicles, and reduced dependence on fossil fuels. This strong positive sentiment underscores the perceived advantages of EVs. However, aspects like cost savings and

environmental benefits received mixed responses, indicating areas where additional information and reassurance might be needed to convince potential buyers.

The survey also highlights significant challenges associated with EV adoption. Infrastructure availability is the most pressing concern, with a majority rating it as a "Very significant challenge." Other major concerns include grid infrastructure and battery technology, which are critical areas needing improvement. Challenges like range anxiety and affordability were also noted, suggesting that addressing these issues could significantly enhance EV adoption rates.

Market interest in purchasing EVs shows a degree of uncertainty, with 60.6% of respondents indicating they are "Not Sure" about purchasing an EV. This suggests a potential market that could be swayed with the right incentives and information. Notably, 18.1% of respondents are "Probably not" considering an EV, while 17% indicated they would "Probably" consider it, showing a spectrum of interest levels that can be targeted with tailored marketing strategies.

Key factors influencing the decision to purchase an EV include government incentives, cited by 66% of respondents, and lower operating costs, influencing 60.6%. Technological advancements in battery technology and the availability of charging stations are also crucial motivators. Environmental concerns, while relevant, are less influential, affecting only 19.1% of respondents. This data indicates that financial and technological improvements are primary drivers for potential EV buyers, emphasizing the importance of policies and innovations in these areas.

Brand familiarity and preference data reveal that Tata is the most recognized and preferred brand, followed by Tesla and Mahindra Electric. This suggests a strong brand presence and consumer trust in these companies. Ola Electric and BYD Auto also have notable recognition and interest, though to a lesser extent. These insights highlight the competitive landscape and brand dynamics in the Indian EV market.

The Electric Vehicle (EV) market in India is experiencing rapid evolution, with several emerging trends shaping its landscape in 2024. These trends highlight the country's growing commitment to sustainable mobility and the adoption of innovative technologies.

- **Increased Adoption of Two-Wheelers and Three-Wheelers:** The adoption of electric two-wheelers and three-wheelers continues to rise significantly. These vehicles, which are more affordable and practical for urban commuting, are becoming increasingly popular among consumers and small businesses, particularly in densely populated cities.
- **Expansion of Charging Infrastructure:** There is a substantial push towards expanding the EV charging infrastructure across the country. Public and private sectors are collaborating to install more charging stations in urban, suburban, and rural areas. Fast-charging networks are also being developed to reduce charging times, making EVs more convenient for long-distance travel.
- **Government Incentives and Policies:** The Indian government remains committed to promoting EV adoption through various incentives and supportive policies. Subsidies, tax breaks, and rebates are being provided to both manufacturers and consumers. Policies aimed at encouraging local manufacturing of EVs and batteries are also gaining traction, boosting the domestic EV industry.
- **Technological Advancements in Battery Technology:** Significant advancements in battery technology are being achieved, focusing on increasing energy density, reducing costs, and enhancing the safety and longevity of batteries. Innovations such as solid-state batteries and fast-charging capabilities are expected to revolutionize the EV market.
- **Corporate and Fleet Adoption:** Businesses are increasingly incorporating EVs into their fleets, driven by the need to reduce operational costs and meet sustainability goals. Delivery services, ride-hailing companies, and corporate fleets are leading the way in adopting electric vehicles, contributing to a significant reduction in urban emissions.

- Rise of EV Startups: The Indian EV market is witnessing a surge in the number of startups focused on electric mobility solutions. These startups are driving innovation in vehicle design, battery technology, and charging solutions, offering diverse and cost-effective options to consumers.

In conclusion, the research underscores the significant potential for the EV market in India, driven by increasing consumer awareness, positive perceptions of EV benefits, and a willingness to consider EV purchases. However, challenges such as infrastructure availability, grid and battery technology, and affordability need to be addressed to fully realize this potential. Strategic efforts focusing on financial incentives, technological advancements, and targeted education campaigns can play a pivotal role in accelerating the adoption of electric vehicles in India.

CHAPTER 6

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CHAPTER 7

ANNEXURE

Questionnaire

Section 1: Demographics

1.1 Age

1.2 Gender

1.3 Education qualification

1.4 Occupation

1.5 Annual Income(INR)

Section 2: Consumer Perception & Acceptance on Electric Vehicles

2.1 Do you currently own a vehicle?

Yes

No

2.2 What type of vehicle do you own?

Petrol

Diesel

CNG

Electric

Other

2.3 Have you ever driven an electric vehicle ?

Yes

No

2.4 What type of Ev do you currently own? Is it a

Car

Scooter

Bike

Other

2.5 How would you rate your knowledge about Electric Vehicles (EVs)?

1

2

3

4

5

2.6 Select the benefits that you believe Electric Vehicles (EVs) offer:

Please click that if your answer is:

SD=Strongly Disagree(1),D=Disagree(2),N=Neutral(3),A=Agree(4),SA=Strongly Agree(5)

1 2 3 4 5

Environmental benefits

Cost savings

Energy efficiency

Performance of EV's compared to traditional petrol/diesel vehicles

Technology advancement

Government incentives

Health benefits

Sustainable transportation

Reduced dependence on fossil fuels

Contribution to climate change mitigation

2.7 Please rate the following challenges based on Electric Vehicles (EVs) on a scale of 1 to 5,

Click if your answer is

1= Not a challenge, 2= Minor challenge, 3=Moderate challenge, 4= Significant challenge, 5= Very significant challenge

1 2 3 4 5

Infrastructure availability

Affordability

Range anxiety

Battery technology

Supply chain constraints

Consumer awareness

Policy support

Manufacturing ecosystem

Grid infrastructure

Skill development

Section 3: Intention to Adopt EV's

3.1 Would you consider purchasing an electric vehicle in the future?

Definitely

Probably

Not Sure

Probably Not

Definitely Not

3.2 What factors would most influence your decision to purchase an EV? (Select all that apply)

Government incentives (tax breaks, rebates)

Lower operating costs

Advancement in battery technology (increased range, faster charging)

Improved availability of charging stations

Environmental concerns

Other

3.3 Which electric vehicle brands are you most familiar?

Tesla

Mahindra electric

Tata

BYD Auto

Ola Electric

Other

3.4 If you selected any brands in the previous question, which of these brands would you be most interested in considering for your next EV purchase?

Tesla

Mahindra electric

Tata

BYD Auto

Ola Electric

Other

3.5 What additional information or resources would be helpful for you to make an informed decision about EVs?

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