

A Study on Consumer Purchase Behaviour on Electric Vehicles in India

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Abstract: The variables impacting the buying behaviour of electric vehicle (EV) consumers in India are investigated in this research. Gaining insight into customer sentiment towards EVs is of utmost importance in light of the growing focus on carbon emission reduction and sustainable development by environmental groups and the Indian government. This study finds important drivers and stumbling blocks influencing customer choices by combining survey data with in-depth interviews with prospective and existing EV owners. Consumer interest in electric vehicles is driven by government incentives, long-term cost reductions, and worries about the environment, according to the study. Nonetheless, concerns about range anxiety, inadequate charging infrastructure, and expensive starting expenses continue. Politicians, manufacturers, and marketers in India might use the findings of this study to devise strategies for boosting the purchase of electric cars, paving the way for a greener and more sustainable future.

Keywords: Purchase Behaviour, Electric vehicle, Consumer, India

I. INTRODUCTION

Reducing harmful and greenhouse gas emissions from vehicles is a critical concern for contemporary civilisation. For this reason, pollution from vehicles is subject to rules imposed at the federal, state, and even local levels. Because they anticipate restrictions to tighten soon, automakers are investing in fuel-saving technology [1]. Hybrid electric vehicles (HEVs) in particular have attracted a lot of attention because of the potential they have to significantly cut fuel consumption in comparison to conventional cars (BEVs). Since BEVs do not produce any emissions from their tailpipes and have very efficient powertrains, regulators have classified them as "carbon neutral" so far.

During the charging process, a plug-in electric vehicle (BEV) may achieve zero emissions if the power source is renewable and does not rely on fossil fuels. With yearly growth rates ranging from 54% to 87%, sales of BEVs have been on the rise since 2012. There are a number of world-renowned firms who have already released their own BEV. At now, BEVs are unable to compete economically on a large scale with fuel-energized automobiles because of problems

connected to batteries, such as relatively low driving range (mostly because of price limits) and lengthy charging times [2].

The importance of studying how various design choices impact performance and energy efficiency in the powertrain and overall drive system cannot be overstated. Changing the drive system's architecture to fit a particular application and then studying how it changes performance and energy efficiency is an intriguing topic of study. The trade-off between peak torque and thermal capability is particularly critical for a given electric machine size in vehicles due to the often-constrained space for drive system components [3].

II. ELECTRIC VEHICLE

Electricity had the ability to effectively move motor vehicles by the mid-nineteenth century. When first introduced, electric cars were a huge improvement over their fuel-powered counterparts in terms of practicality and user-friendliness. Although most cars utilise internal combustion engines (ICEs) to propel them, smaller vehicles and railroads typically employ electric power instead [4].

The range of an electric vehicle (EV) is directly related to its battery pack capacity. There are a lot of factors that determine the battery's limits in this situation, such as the vehicle's design, the driver's habits and surroundings, the weather, and the battery's age. Recharging the battery once it dies is much more time-consuming than with a conventional gas-powered vehicle. The amount of time required to charge a battery pack to its full capacity is dependent on many factors, such as the working power of the device, the design of the charger, and the availability of charging infrastructure. Electric automobiles are a fantastic option because of their practicality, simplicity, and ease of usage. Environmentalists like them because they are silent and produce no harmful gases.

Tech, economic, environmental, customer attitude, and purchase intention studies are just a few of the many that have looked at the potential of EVs. At least in India, where the general public has a mixed opinion about electric vehicles, the researchers demonstrated that finding the right customers is a major obstacle for the industry. Massive advertising and trust-building in the EV industry are necessary to transition from a society that welcomes gas-powered cars to one that loves EVs. Regardless, EV (Hoffmann) faces substantial opposition [5].

III. ELECTRIC VEHICLE INDUSTRY

There were electric cars on the road before to 1918, but as the internal combustion engine, which ran on petrol, became widely used, their popularity quickly faded. The market's desire for electric cars has been stifled by the broad availability of gas-powered vehicles. On the other hand, 2017 saw an upgrade to the government's vehicle maintenance assistance program and the concept of modifying EVs for longer distance trips, both of which have reignited interest in the sector. Both the features of the technology itself and the people who really utilise it influence how those features are perceived and put to use. From a managerial point of view, we have the "innovation diffusion theory" (IDT) and its offshoots, including the Technology Organization Environmental (TOE). New technologies tend to proliferate when they are useful, easy to use, have a positive societal effect, and are supported by enabling conditions. These parameters also have a significant role in how EVs are shared [6].

It is anticipated that the commercial vehicle sector would have the most rapid growth within the electric vehicle market. The development of the electric commercial sector is being propelled by India and China, mainly by the increasing demand for electric buses. Many countries are planning to switch from gasoline-powered buses to electric ones. Electric commercial vehicle sales are predicted to increase as an increasing number of municipalities switch from buses powered by fossil fuels to electric ones. The development of shared mobility, and e-commerce, logistics, is anticipated to contribute to the increased use of electric commercial vehicles during the anticipated time frame.

Nissan of Japan, Volkswagen of Germany, BYD of China, Tesla of the United States, and BMW of Germany are the current electric vehicle industry heavyweights. Several companies are investing heavily in R&D for new products, implementing growth plans, and forming alliances, partnerships, and mergers and acquisitions in order to stay up with the fast growing electric vehicle sector. Growth is anticipated to be greatest in the Asia-Pacific area, followed by North America and Europe. The automobile industries of countries like South Korea, Japan, and China are renowned for their dedication to technical innovation and the production of state-of-the-art electric vehicles.

3.1 EV Market: Current State:

The adoption rate of electric vehicles (EVs) in India is lower than in other nations. Sales of electric vehicles in the United States have climbed by 1%. However, sales of electric vehicles

have exploded in recent years, reaching about 70,000 units as of Q3 of 2023, up from 1,200 units in 2018. Many major manufacturers have announced that electric cars (EVs) would soon be available in India. A worldwide penetration of 30% of EVs by 2030 is the goal established by the administration of the nation.

Over ninety-five percent of India's electric vehicle sales are two-wheelers, making this segment the country's largest. Vehicles that run on electricity account for less than 5% of the market. Electric vehicles produced by Hyundai, MG ZS, Tata Nexon, TATA Tiago, and TATA Tigor are the most sought-after in India [7]. A study by PwC predicted that by 2030, 5.06 million automobiles will be on Indian roads, making up 30% of the world's total passenger car sales.

IV. MANUFACTURERS OF ELECTRIC VEHICLES IN INDIA

4.1 Fully electric cars

In India, you may now purchase electric vehicles of the following models:

- Tata Nexon ev 2020
- Tata Tigor ev 2019 (only for commercial purposes)
- MG ZS ev
- Mahindra e2o
- Mahindra e-Verito
- Hyundai Kona Electric

A solar-powered hybrid car has been tested by Isro, which is based on a modified Maruti Omni. Unfortunately, some people have even gone as far as to say that the whole solar platform installation atop the car is "terrible." Among electric cars available in India, the Hyundai Kona Electric has the longest range at 452 km, as reported by ARAI.

4.2 Motorcycles

The following companies have recently joined the Indian electric motorcycle market:

- Ultraviolette Automotive
- Tork Motors (to be launched)

- TVS Iqube (currently available in pune and bangalore)
- Emflux motors (to be launched)
- Revolt Motors (rv400)
- Bajaj Chetak (currently available in pune and bangalore)
- Ather Energy

4.3 Buses

The first electric bus in India made its debut in 2014 in the city of Bangalore.

- One example is the electric bus that Ashok Leyland introduced in October 2016. The "starbus electric 9m" and the "starbus electric 12m" hybrid electric buses were introduced by Tata Motors in January 2017.
- The Himachal Pradesh Transport Corporation received twenty-five electric buses from Goldstone Infratech in September 2017. In March, the Indian state of Maharashtra received twenty-five "starbus" hybrid electric versions from Tata Motors Ltd.
- On September 5, MSRTC started running the first electric bus service in India, which connected Pune and Mumbai.

4.4 Mini pick up trucks

Several Indian companies have recently produced electric pickup trucks:

- Mahindra
- In 2016, Tata Motors and Ace Electric
- Ecoyan
- The first electric cargo light truck in India was produced by Croyance Automotive (elecro 1.t).
- Ashok leyland, dost electric pick up truck

4.5 Trucks, tractor-trailers, and heavy-duty semi-trails

- A Gurgaon-based company called Infraprime Logistics Technologies Pvt. Ltd. unveiled India's first heavy-duty vehicle—a tractor-tipper-trailer combo—in September 2019.
- India does not currently produce or employ electric tractor trucks, semi-trailers, or heavy-duty vehicles.

4.6 Railways

Although electric locomotives were initially used on Indian railroads in 1925, Kolkata's electric train didn't arrive until 1945. The whole country's rail network will be fully electrified by 2022, according to a government announcement released on March 31, 2017. A solar-powered train fleet has been put through its paces in India. As the sun sets on the train's solar panels, they charge the batteries that power the lights and ventilation systems.

4.7 Rickshaws

The Indian parliament authorised the use of battery-powered electric rickshaws for public transportation in 2015 with the passage of a motor vehicles (amendment law). Because of their small size and ability to manoeuvre in confined areas, e-rickshaws are gaining popularity in the Delhi-National Capital Region.

There have been a number of recent introductions of electric auto rickshaws in India:

- Mahindra
- Entice Impex Pvt Ltd (Gatti E-Rickshaw)
- Kerala Neem G from Kerala Automobiles Limited

4.8 Solar-electric boat

- Aditya , from navalt

4.9 Old vehicles Conversion in to battery vehicles

- Three-row electric vehicles for the Maruti Waggon and Alto

4.10 Hybrid Cars

One may choose from a wide range of hybrid vehicles, each powered by an innovative mix of electric and internal combustion engines. Some hybrid vehicles available in India's market include:

- Toyota Glanza (Mild Hybrid)
- Toyota Camry Toyota Prius
- Mobility Solution Providers

- Mg Hector
- Maruti Suzuki Ertiga
- Maruti Suzuki Baleno (Mild Hybrid)
- Maruti Suzuki Swift
- Maruti Suzuki Ciaz
- Mahindra Scorpio Intelli Hybrid
- Honda Accord Hybrid

V. EV AWARENESS FOR CONSUMERS

Given the novelty of HEVs and PEVs, which are only now making their way into the mainstream market, it is critical to assess consumer knowledge of these cars and the factors that influence their purchase choices. Lan et al. focuses on learning about HEVs and PEVs to better understand green marketing.

A large-scale microeconomic research was carried out by [7] to determine the level of electric vehicle (EV) awareness among Chinese customers and the variables that influence their buying decisions. The residents in the Nanjing area of China were surveyed with 299 items for this research. An examination of EV uptake, purchase timing, and cost is conducted using three separate binary regression models [7]. Age, education, yearly income, family size, maintenance expenses, and peer evaluations are other elements that influence the tendency to buy and the acceptance of a specific price. To better comprehend the factors that influence Chinese consumers' opinions and purchasing decisions about electric vehicles, the results of this research are very essential. Several studies and anecdotal evidence suggest that environmentally conscious individuals are more inclined to choose sustainable modes of transportation. Many surveys reveal that the average customer has a limited understanding of electric automobiles. For example, Singer found that only one-third of Californian consumers are aware of electric car subsidies and incentives. Even fewer Americans can name a specific make or model of plug-in electric vehicle. In Krause's poll of city dwellers, 63%

VI. BEHAVIOR OF CONSUMER BUYING

The marketing discipline is gradually starting to give more weight to "Buying Behaviour." Since purchasing habits substantially affect product sales, comprehending how consumers make selections is critical. Everybody is always on the lookout for more, never content with what they already have [9]. This pattern of activity is common to many different types of products, including cars of all makes and models. As a consequence of regular upgrades to car models and features, new models were released almost every quarter. Businesses may learn a lot about customer tastes and routines from the market, which is a great resource for understanding customer demands. Doing research is the only method for a company to know what people buy. The process begins with problem identification, continues with information collecting and option evaluation, culminates in a choice and subsequent action, and concludes with an evaluation of the purchase's efficacy. These are the five steps that make up the model.

6.1 Problem Recognition

Identifying a problem or need comes first in this model of customer buying behaviour. For example, Doug's finest outfit would seem quaint in comparison to what he has now. On the other hand, Kathleen could realise that her computer isn't living up to her standards. We often face similar difficulties as customers, as you pointed out. Upon being aware of the distinction,

When we compare the current state of affairs to our ideal condition, we find that there is a problem. As a species, we humans are naturally inclined to find solutions to problems the moment we become aware of them. Thus, we are in agreement that the current situation requires immediate response. Though how?

6.2 Information Search

When customers learn of a problem, they are more likely to look into it. Maybe a PC product description is more likely to be read by Kathleen. Commercials, her friends' purchases, and conversations involving computers begin to capture her interest. Another option is for her to take the initiative to get answers by exploring other sources such as stores, talking to friends, and reading computer publications. By looking into the various items, the consumer learns more about the market and the companies that compete within it.

6.3 Evaluation and Selection of Alternatives

When presented with information about rival brands, how does a consumer process and evaluate it? Having said that, not even a single consumer can rely on a single standardised metric. But many people think that evaluations are totally subjective and based on nothing more than one's own thoughts. This line of thinking holds that customers are trying to solve problems and meet their needs. In other words, your consumer is seeking solutions to their difficulties, and your product is a potential answer to those problems. Products with these qualities are in high demand because consumers want to reap the benefits. Consequently, consumers see products in terms of their individual qualities, which could or might not work together to address their problem and fulfil their needs. Crucial distinctions exist among the necessities, benefits, and traits. One possible useful way to organise these relationships is in a hierarchical framework.

6.4 Decision Implementation

The consumer must choose brands of items and stores from which to make their purchases in order to resolve the difficulties. This kind of decision-making may really be approached in one of three ways: Three distinct sequences are conceivable: 1) simultaneously; 2) merchandise first; 3) merchandise second; and 4) merchandise first; 5) outlet first. Customers often combine the decisions about which brand to purchase with those about which store to shop at. If we take personal computers as an example, our kathleen may select between a few different manufacturers depending on what she knows about them and the features they provide. Or, she may choose from a few of brands from the ones offered in the store she usually shops at—like the compusa around her. The buyer moves on to the "purchasing" phase of the transaction after deciding on a product and retailer.

6.5 Post-Purchase Evaluation

A lot of weight is given to choices made before to a purchase when assessing that item afterwards. A buyer's level of investment decreases as their level of investment in completing a deal increases. Literally meaning "the amount of care for or interest in the purchase," a person's degree of participation in the purchase reveals the amount of work they did to investigate a product before buying it. Looking at two ends of the range for consumer involvement in the buying process—from very little to very much—is illuminating. Consider a person who often purchases diet Pepsi. Given the low barrier to entry, he or she is less inclined

to do thorough product research prior to purchasing cola drinks. After making a purchase, the customer is unlikely to provide a review as they will likely continue to use the same brand.

Policy and Program Requirements for Electric Vehicles

The Indian government has implemented a number of policies and initiatives to encourage the purchase and use of electric vehicles. In 2015, the "Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) programme)" was established with the goals of accelerating electric vehicle research and development and offering financial incentives to purchasers. A total transition to electric cars by 2030 is also a goal of the Indian government. To make this transition easier, charging stations will be placed along public highways.

Programs Launched by the Government

The government of India has introduced many initiatives to promote the use of electric cars (EVs). The government of India has enacted a number of regulations pertaining to EVs:

The "FAME" program was launched in April 2015 by the Indian government to encourage the purchase and use of EVs. Subsidies and incentives offered by the program could lead to financial advantages for those involved in the electric car industry, including manufacturers, retailers, and service providers of charging infrastructure. A tax credit of up to 1.5 lakh rupees is available to buyers of electric cars under Section 80EEB of the Income Tax Act of 1961. As part of its plan to make electric vehicles more affordable, the government cut the Goods and Services Tax (GST) from 12% to 5%. Electric vehicles have become even more popular in India because some state governments have done away with road taxes and registration fees.

The Ministry of Road Transport and Highways has mandated that all electric cars must henceforth have green number plates. This will also help with identification while using public charging stations or dedicated lanes. Electric vehicle (EV) makers, chargers, and consumers may all benefit from financial and incentive support from e-mobility programs established by various state governments.

The Indian government has created laws to promote the use of electric vehicles (EVs) with the goals of lowering costs, increasing accessibility, fostering domestic production and infrastructure development, and increasing consumer appeal. Attempting to bolster these government programs, banks are offering electric car loans at interest rates lower than gas-powered vehicle loans.

VII. POWERED VEHICLES AND THE BENEFITS OF USING THEM

In addition to potentially helping the environment, those who drive electric vehicles may also find some more money in their pockets [10]. Electric vehicles have a higher initial investment than their gas-powered counterparts. Electric cars offer reduced operating expenses as compared to gas-powered automobiles [11]. Their running expenses are lower than those of gasoline-powered vehicles. Tax incentives for those who drive EVs are being considered. For example, in Germany, those who purchase a brand-new electric car are exempt from paying vehicle taxes for the first five years. Thereafter, one might reasonably expect a tax rate of 11.25% to 12.02%. Simply glancing at the curb weight is enough to distinguish between a "light car" and a "heavy car" [10]. When compared to gas-powered automobiles, electric vehicles need around half as many mechanical parts [12]. Less maintenance is required for electric motors compared to traditional motors since they do not need spark plugs or oil changes. Thus, the only upkeep required for electric vehicles is the replacement of components such as shock absorbers and headlights [10]. The maintenance expenses of these cars are 40% cheaper than those of gasoline-powered automobiles, according to research [12]. Furthermore, compared to regular automobiles, electric vehicles are thought to have a better resale value, which implies that their worth will decline more slowly. For reference, a hybrid Honda Civic may cost approximately 10,600 Euros, whilst a comparable Volkswagen Golf from the same year and size would cost around 7,900 Euros [10]. Vehicles actually have superior gas mileage in city traffic as compared to other types of vehicles. Braking does this in part because it replenishes your energy to a certain extent [11].

They become even more eco-friendly as a transportation option when their powertrain is powered by renewable energy. This ensures that they emit zero harmful byproducts [12]. Furthermore, they contribute to a lower decibel level as compared to conventional vehicles [13].

Financial help is also provided by the government. This led to the establishment of many formal advertising campaigns. Every customer in France receives 5,000 euros from the government, which covers the cost of distributing these vehicles. This idea was also widely adopted throughout Europe. Italian customers may anticipate no more than three thousand euros, while Spanish consumers can anticipate no more than six thousand euros. Some of the first funding comes from countries outside of Europe, such as Japan. As a result, the client will be responsible for paying the remaining 25% to 40% [10]. One further way to cut down on carbon emissions

is to make it harder for gas-powered vehicles to enter populated regions. For example, in the heart of London, there is an admission fee for gas-powered cars. The restricted area will be accessible to automobiles for a fee of ten pounds during weekdays. All vehicles that are ecologically aware and have emissions below 100 grammes per km are exempt from this tax, including electric automobiles, hybrids, and others. They have no trouble reaching the heart of the company [14]. Electric cars' meteoric rise in popularity is understandable given all the benefits they provide. Their clientele who care about the environment have helped them build a stellar reputation.

7.1 Challenges and Opportunities: EV Sector in India

Electric vehicle sales in India are suffering due to the country's undeveloped infrastructure of charging stations. Only a small number of cities have started to install public charging stations, even though they outnumber regular petrol stations. This would make long-distance driving more of a hassle, which might make customers think twice about purchasing electric vehicles. Moreover, compared to gas-powered automobiles, electric cars in India are presently more costly. Nonetheless, things are likely to change as a consequence of increasing production and local manufacture, which will lead to a decrease in battery costs.

Notwithstanding these obstacles, the electric vehicle sector in India shows great promise. The country's abundant lithium reserves give it the potential to become a world leader in electric car battery manufacturing.

A number of problems are limiting the expansion of India's electric vehicle (EV) market. The exorbitant cost of electric automobiles discourages many would-be buyers. The high price of batteries and other electric components has driven up the price of electric cars, making them more expensive than diesel and petrol automobiles. Another big problem is the charging infrastructure, which is just terrible. Electric cars (EVs) aren't selling well because of the long charging periods and few charging outlets. Consequently, they question the practicality of EVs for everyday transportation.

Additional worries include issues with battery disposal, customers' lack of knowledge, limited vehicle options, and range.

The widespread belief that EVs can't handle long-distance travel because of their short battery life just serves to heighten range anxiety. Improvements in this area have not eliminated this issue. The exorbitant cost of electric automobiles has left Indian consumers with few choices.

Fewer people will convert from gas-powered to electric cars if the benefits of these vehicles and the technology that drives them are not widely recognised. Finally, many are hesitant to purchase batteries for electric vehicles due to worries about recycling and disposal. To combat this, electric vehicle (EV) makers are working to lower prices, increase public awareness of EV benefits, and build up charging stations.

Electric vehicle charging facilities are now in short supply [15]. Petrol stations are distinctive in design, in contrast to the increasingly homogeneous charging stations. As a result, the public may not know exactly where these stations are located [16].

There are already too many charging stations for electric vehicles to be a major problem for public transport. Standard charging infrastructure is capable of managing shorter distances, such those used for everyday commutes. Conversely, charging location flexibility comparable to that of traditional cars in the future will be necessary for greater ranges [15]. This is due to the fact that electric vehicles are very rare compared to conventional automobiles. Adding more charging stations would be unnecessary since there aren't enough EVs on the road. These vehicles could not be authorised for longer trips unless this expense is paid for [12]. A broad and rapid charging infrastructure is crucial for the regular usage of electric automobiles [17]. This change can only take place if charging stations are conveniently located.

A network of public and private charging stations is essential for its operation. Because of this, changes to commercial areas' infrastructure, including supermarkets and parking lots, are also required [18]. Businesses may show they care about the environment by charging for services provided on the job. To recruit outstanding candidates or hold on to workers who are passionate about the company's green initiatives, this may be an excellent tool. Resolving worries about electric car range requires the immediate installation of charging facilities [18].

It takes at least a couple hours to charge an electric vehicle before you can get on board, as opposed to gas-powered automobiles, whose tanks can be filled up in minutes. Instead of filling up a regular gas tank, it would take more time to charge fresh batteries, even if it only took an hour. The amount of time it takes to charge a battery depends on two things. The most important consideration is the remaining battery life. The result will be determined by the chosen billing method. There are two distinct kinds of chargers: Level 1 and Level 3. The level 1 charger allows you to go up to 8 km/h faster while charging. There is no additional configuration required for use with a regular wall outlet.

It is advised to charge the battery overnight for the best results, since it could take up to eight hours to reach full capacity. The maximum speed allowed with the level 2 charger is 40 km/h. Level two chargers are often located outside. Ideally, it would be near a grocery store or a place of employment. The fastest way to charge your gadget is using a level 3 charger. This kind of charging has the potential to traverse 270 km in 30 minutes, according to [15]. A slow charger is sufficient for daily use since most drivers do not go more than 80 km/day. Not only is there an issue with the availability of charging stations, but drivers are also concerned about the time it will take to charge [15].

Two things, the charging condition and energy use, decide the range of electric cars. The charge state is very clear from the very beginning of the upcoming excursion. The frequency of air conditioning cycles, volume of the radio, precision of the navigation system, and driving behaviours are only a few of the many variables that affect energy usage [13]. Drivers used to previous vehicles with greater range and faster charging times may be concerned about the restricted range [12]. With the range constraint in mind, most drivers should have more than enough power for their regular commutes with a 50-60 km range. With this in mind, the negative features of vehicles are less striking. Drivers often inflate their degree of anxiety over reaching their intended location because of this [10]. Anyone thinking about purchasing one of these cars for a city commute may not let the short range get them down too much [19].

Everyone worried about the initial investment in an electric vehicle is naturally worried. Their starting price is higher than that of regular cars [10]. One of the priciest components is the battery. If the battery needed to be replaced, the operating expenses of the gadget would increase. As an example, a completely electric Honda Insight would cost around 2,000 euros more than a gas-powered Volkswagen Golf [10]. People may rethink purchasing these vehicles if the price were to increase. Possible savings on fuel, repairs, and tax credits could cover the initial investment [10]. It is more cost-effective to charge the vehicle with electricity rather than petrol.

As a result of these factors, EV costs will eventually level out [10]. Finally, the only way to find out how much money you'll save in the long run by buying an EV is to look at the expenses [20]. As production increases, the ability to mass produce electric automobiles will lead to a reduction in their starting pricing. But it depends on how these cars do in the future sales.

VIII. PROMOTING ELECTRIC VEHICLES (EVS) BY VARIOUS POLICY INITIATIVES

1. Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) Scheme:

To encourage the purchase and production of electric cars in India, the FAME initiative was established.

Electric cars and charging infrastructure were subsidised.

Electric two-wheelers, three-wheelers, and public transit were the primary targets of FAME II, the program's second phase.

2. EV Incentives:

Electric cars were made more cheap by the provision of incentives like tax breaks and subsidies. Additional incentives were granted by certain states to encourage the use of electric cars.

3. Charging Infrastructure:

The national charging infrastructure was to be a top priority for the administration. The establishment of both public and private charging stations was encouraged via the provision of incentives and assistance.

4. Local Manufacturing:

To support the homegrown EV sector, policies pushed for the production of EVs and EV parts in the country.

5. Stations for Battery Swapping:

The government looked into and backed battery swapping facilities as a substitute for charging infrastructure to address worries about limited range.

6. Public Transportation:

An initiative to make urban transit more sustainable and less polluting included electrifying taxis and buses.

7. Research & Development:

Research and development (R&D) initiatives were established to promote electric automobile technology, which was expected to result in fresh ideas and advances in the field.

8. International Collaboration:

By working with other nations and international organisations, India was able to promote electric transportation by sharing information and best practices.

IX. CONSUMER PERSPECTIVE REGARDING EVS

Demand for electric cars is very sensitive to public opinion on the topic. Knowing how purchasers perceive these cars by considering their advantages and disadvantages is, therefore, essential. The factors that may impact customers' choices to purchase electric vehicles may be discovered via study [19].

The research required and the influence of consumer opinion make the car-buying process a lengthy one [21]. As a result, apart from the product's attributes, a buyer takes into account the dealer's recommendation, the customer's social circle's views, and the amount of information needed to make an educated selection. Cars are complex purchases with many moving parts and customisation possibilities, so buyers often enlist the help of friends and family. Since it is unusual for a single person to make the decision, several people are often involved in the process. The dealer's knowledge and their capacity to establish confidence with the client are important factors in the consumer's final choice [21].

According to a survey conducted in Norway, social factors have a significant role. There was a 67% increase in the number of people who expressed interest in electric vehicles among those who owned them during the first two years, and a 14% increase in the number of people who convinced three or more friends to buy electric vehicles. Just so we're clear, no other EU member state sells more plug-in electric cars (20% of all new vehicle sales) than Norway. One possible explanation for the high demand for these vehicles in Norway is the abundance of government incentives. Free parking, special lanes, and no fees are just a few of the benefits [20].

Environmental friendliness, safety features, and fuel economy are other factors that might impact the buying decision. The fact that it accelerates swiftly even at low speeds and doesn't need changing gears makes this car a joy to operate, according to sources. People who have completed more years of schooling are more likely to say they are interested

in buying hybrid cars. The overall likelihood of purchasing an electric car is greater among those in higher socioeconomic categories. The main reason people purchase these vehicles is because of their commitment to sustainable energy management and environmental protection [4].

People who care about the environment and those who see these cars as status symbols are interested in purchasing them, on the other hand.

As stated in [22], the electric vehicle industry is having difficulty attracting customers only via product characteristics. Some see these vehicles as the birth of a brand-new technological paradigm [22]. There are a lot of problems, including people not knowing what to do with new technology, long charging periods, restricted range, and features tailored to individual users. There has been a detrimental impact on the buying process due to the rising initial investment. Factors that could impact the purchase decision include the availability of government subsidies for EV owners, the perceived complexity of home charging, the range, the positive environmental impacts, the belief that there is insufficient information, and the belief that there is insufficient information regarding the relationship between fuel and energy consumption [21]. Based on several studies, it is evident that the average person knows virtually little about these cars. Imagine how few individuals you asked could identify a plug-in hybrid or electric vehicle.

Looking at the responses more closely revealed that the majority would have chosen a Nissan Leaf or Tesla Model S, indicating that not even the most informed person would have been aware of all the options available in this category. Some of the people concerned were unaware that the government would provide financial incentives for certain types of automobiles [23]. Public opinion, more than practical factors, likely dictates the narrow driving range. About 56 homes in the UK were given the chance to test drive an electric car for a week as part of a research. These vehicles have a range of up to 160 miles on a single charge. Some of the people involved seem to be OK with these automobiles being used as a backup form of transportation. For further information, see [19]. If these automobiles could go 240 km on a single charge, 34% of respondents would consider purchasing them as their first car. Sales of electric vehicles would suffer if their range was restricted, as gas-powered vehicles are more accessible [24]. So, it's important to acquire all the information regarding their characteristics and financial advantages before making a selection [21]. The poll found that charging vehicles was the top priority for customers [4].

Regardless of how much information is available, some people may still choose not to purchase an electric vehicle due to concerns about how it will fit into their everyday life. Even those with a wealth of knowledge could choose for other cars with better convenience features, it claims [21].

Always think about how much something will cost before making a purchase. However, they would cheerfully shell out more cash to have the car customised to their precise requirements. For instance, despite these cars' flaws, eco-conscious buyers are prepared to pay a premium for them [22, 25].

Prompt acceleration and declining operational costs may have a beneficial impact on the buying decision. Only a tiny percentage of people in the UK who took part in the survey thought these cars were cool because of how quickly they could accelerate and how quiet they were [19].

X. REVIEW OF LITERATURE

Johnvieira, et al., (2021) Another way to power the vehicle is needed as fossil fuels continue to be depleted and their prices rise. In an effort to help the country's economy and ecology, the Indian auto sector is looking at electric automobiles. Presently, there is a relatively limited market penetration of EVs, even though several nations have passed laws pertaining to EVs. In this post, we will take a look at how electric cars may be used in India and how consumers feel about them [26].

Yogesh Aggarwal, (2019) Scooter riders who seldom cover large distances on a single charge would benefit from an electric vehicle, while riders who regularly tackle longer routes on bikes like the Hero Splendour might find the transition to an e2W difficult. Growing a car's battery capacity is a simple way to increase its range. Nonetheless, electric 2Ws may gain 30 km of range for every kWh increase, but they add about 10 kg, or 10% of the bike's total weight, to the ride. Motorcycles with fewer than 150cc engines have a far more glaring weight issue [27]

Kesari, et al., (2019) Worldwide, sales of electric vehicles have skyrocketed in the last decade. This research begins by discussing the potential and breadth of electric cars in India. Additionally, we cover all of the Indian government's policies and frameworks. After that, we take a look at a plethora of international case studies on EV adoption. We conclude by outlining some potential national and local benefits that India may get from implementing these strategies [28].

Bhalla, et al., (2018) Efforts to reduce human impact on the environment are driving innovation and sales of electric vehicles. Electric vehicle (EV) component suppliers and manufacturers including Bosch, AVL, and Cummins have set up shop in India due to the country's large consumer base, relatively inexpensive manufacturing and labour costs, and large pool of highly and semi-skilled tech workers. Electric vehicle sales and demand in India might be better understood if experts examine what factors impact consumer acceptance. The factors that influence people's choices to purchase automobiles include their views on environmental issues, affordability, reliability, technical advancement, infrastructure, and social acceptability. While customer faith in technology and environmental concerns are elements that precede electric car views, adoption blowback is caused by infrastructure, social acceptability, and cost. Government action, such as the creation of environmental legislation, infrastructure, and subsidies for vehicle prices or reductions in bank borrowing rates, is therefore necessary to boost sales of electric cars [29].

Jin, & Slowik, (2017) This research examines strategies for educating the public about electric cars on a worldwide basis. Research on the value of consumer education is synthesised, and recommendations for electric vehicle marketplaces worldwide are offered. This evaluation informed our selection of five case studies that we believe best demonstrate the key aspects of comprehensive consumer awareness campaigns. While this study primarily aims to educate the public about the benefits of electric vehicles, there are many other forms of promotion that are crucial to boosting demand for these vehicles, including both monetary and non-monetary incentives, improvements to charging infrastructure, the availability of high-quality models, and education campaigns in general [30].

Digalwar, & Giridhar, (2015) Able to use the ISM methodology to determine the driving forces and interdependence of potential roadblocks and rank them accordingly There must be a concerted effort to educate the Indian public alongside the government's resolve. Also, in order to start selling in the market, we need to fix the financial constraints [31].

XI. RESEARCH GAP

Although more and more individuals in India are opting to purchase electric vehicles (EVs), numerous issues remain about the purchasing process. When making generalisations about consumer behaviour on a national level, most studies fail to account for regional differences. That includes not taking into account the fact that things like customer awareness,

infrastructure, and government regulations differ throughout the country. Perception, brand loyalty, and risk aversion are psychological factors that have gotten less attention in research compared to economic and environmental ones. Further study is needed in the area of how government incentives and infrastructure upgrades impact purchasing decisions, particularly when considering long-term patterns. Despite having a large population, rural regions' markets have received surprisingly less attention compared to their urban counterparts. Concerns about charging infrastructure, battery life, and range anxiety are examples of technical barriers that need more study in order to determine their effect on consumers' willingness to purchase electric cars. The relevance of social influences, such as community norms and peer behaviour, as well as environmental consciousness is often disregarded in the most recent studies. Important components of long-term ownership, such as maintenance costs, performance satisfaction, and resale value, have received little attention in post-purchase behaviour research, despite the fact that this area may teach manufacturers and consumers a great deal. The influence of gender and socioeconomic status on EV purchasing decisions has also been the subject of few research. We will have a clearer picture of the factors impacting and propelling India's electric car market if these gaps are filled.

XII. CONCLUSION

There is a rising interest in sustainable transportation options, as shown by the research on customer buying behaviour towards electric cars in India. While there are advantages to the environment and potential savings in expenses, there are also considerable obstacles in the form of infrastructure restrictions and initial expenditures. In order to hasten the adoption of electric cars, stakeholders should address these concerns by improving the charging infrastructure, offering financial incentives, and educating consumers. While governments work to create a hospitable climate, manufacturers must innovate to reduce costs and boost vehicle performance. If we invest in learning about and meeting the diverse requirements of Indian consumers, we can create a transport future that is cleaner and more sustainable for the country. As a result, the transition to electric transportation would be far more rapid.

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