

# A STUDY ON FACTORS CONTRIBUTING IN THE GROWTH OF THE PURCHASE INTENTIONS OF ELECTRIC VEHICLES IN INDIA- A THEORITRICAL STUDY

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## ABSTRACT:

This study aims to investigate the factors contributing to the purchase of electric vehicles (EVs) in India. As the Indian government encourages the adoption of sustainable transportation, understanding the key factors influencing consumer purchase decisions is crucial for accelerating the transition to electric mobility. This research explores various factors that shape purchase intentions for EVs, including environmental considerations, cost savings, range and charging infrastructure, performance and technology, government policies and incentives, and social influence.

Moreover, the study uncovers the importance of technology and performance features in influencing consumer decisions. Consumers value advanced features, such as regenerative braking and connectivity options, which contribute to a superior driving experience. Social influence, including peer recommendations and positive experiences shared by existing EV owners, also emerges as an influential factor.

## INTRODUCTION

Electric vehicles (EVs) have gained significant attention in recent years as a more sustainable and environmentally friendly alternative to traditional internal combustion engine (ICE) vehicles. As the world strives to reduce carbon emissions and combat climate change, the transition to electric vehicles plays a crucial role in achieving these goals.

Purchase intention refers to an individual's willingness and motivation to buy a particular product or service. When it comes to electric vehicles, purchase intention is influenced by several factors that are worth considering. Let's explore some of the key factors that can shape one's intention to purchase an electric vehicle.

several factors contribute to an individual's purchase intention regarding electric vehicles. Environmental concerns, cost savings, range and charging infrastructure, performance and technology, government policies and incentives, infrastructure development, and social influence all play a role in shaping the decision-making process. As the popularity of electric

vehicles continues to grow, understanding these factors can help potential buyers make informed decisions and accelerate the transition to a sustainable transportation future.

## NEED FOR THE STUDY

The study on electric vehicles (EVs) is essential for several reasons which are EVs have the potential to significantly reduce greenhouse gas emissions and air pollution compared to internal combustion engine vehicles. Understanding the environmental benefits of EVs and quantifying their impact on reducing carbon emissions and improving air quality is crucial in assessing their role in mitigating climate change and promoting sustainable transportation.

By conducting studies on electric vehicles, researchers, policymakers, and industry stakeholders can gain valuable insights into various aspects of EV adoption, ranging from environmental impact and energy efficiency to infrastructure planning, consumer behavior, policy development, economic opportunities, and grid integration. These studies are crucial for fostering the widespread adoption of electric vehicles and facilitating the transition to a sustainable and low-carbon transportation system.

## PROBLEM STATEMENT:

India is facing significant challenges in transitioning to electric vehicles (EVs) despite ambitious goals to promote sustainable transportation. The problem statement for a study on electric vehicles in India can be framed as follows:

lack of a robust and widespread charging infrastructure network is a major obstacle to the adoption of electric vehicles in India. Insufficient charging stations, particularly in public spaces and rural areas, hinder the convenience and accessibility of EV charging. This problem statement aims to explore the current status of charging infrastructure in India, identify gaps, and propose strategies to develop a comprehensive and efficient charging network. Electric vehicles generally have a higher upfront cost compared to conventional vehicles, making them less affordable for many Indian consumers. Limited availability of affordable electric vehicle models and concerns about battery replacement costs contribute to the perceived cost barrier. This problem statement seeks to analyze the cost dynamics of electric vehicles in India, including upfront costs, operational savings, and potential government incentives, to identify strategies to make EVs more cost-competitive and economically viable for Indian consumers. The study on electric vehicles in India should examine the existing policy and regulatory landscape and identify areas for improvement. Analyzing government incentives, tax policies, subsidies, and regulations related to electric vehicle adoption will help identify gaps and recommend effective policy measures to accelerate the transition. This problem statement seeks to assess the efficacy of current policies and propose recommendations to create an enabling environment for electric vehicle adoption in India.

By addressing these challenges and exploring the associated opportunities, the study on electric vehicles in India can provide valuable insights and recommendations to stakeholders, including policymakers, industry players, and consumers, to drive the widespread adoption of

electric vehicles and support the country's transition towards sustainable and environmentally friendly transportation.

## REVIEW OF LITERATURE

**Lane and Potter (2007)** explored the study of potential customers of electric vehicles was carried out which was based on two theories, which were: theory of planned behaviour and value belief norm theory. After the study, he concluded that the ease of use, reliability, performance, energy efficiency and safety of the vehicle were the main factors which were affecting the purchase and sales of electric vehicles in a good way. However, there was no study or findings to prove and backup the mentality of consumers of India towards electric vehicles' adoption. There were no relevant studies supporting the perception and adoption process among Indian consumers.

**Oliver and Lee (2010)**, studied certain variables, for example, social direction, mental self portrait, and social qualities, impact the individuals who choose to make strides toward environmental friendliness. Moreover, a similar report shows that individuals in Asia practice cooperation more and experience that natural qualities are connected to benevolent and conventional qualities, and this conduct permits customers to pick up data with respect to green items.

**Caperollo and Kurani (2011)** worked on a round theory in 36 households on consumer perception and intention to purchase electric vehicles in California, USA, and get to know that electric vehicles The main reason for not adopting was disturbances in the functioning of the battery, the fact of not finding suitable charging stations nearby, refusal to accept new technologies and driving habits

**Ozaki R, Sevastyanova K, (2011)** in his study found that early adopters of electric vehicles are young, and have greater income and higher education. The number of respondents was 891 and the response rate 61%. The survey showed that the owners of electric vehicles are men (72%); 55% are over 60 years. They have at minimum 6 years of higher education and reside in the eastern parts of Norway.

**Hanappi et al. (2012)** did an online study in the area of Vienna to scrutinize factors in the decision to buying alternative fueled vehicles. The total sample was 714 defendants aged between 17 and 85 years. The study demonstrates that with increasing age the chance of car purchasers choosing a substitute powered vehicle drops.

**Windish (2011)** in his study used data from a National Transport Survey when learning the potential for confidentially owned electric cars in the Paris region. In addition, she used a model of total cost of ownership (TCO) for the designated region. A mixture of these two data sources collective with constraints regarding Electric Vehicles ownership (e.g. recharging at home) indicated that 10 out of a hundred of households in the area conform with the criteria; 0.03 out of a hundred in Paris (due to the parking criteria), 2.7 out of a hundred in Petite Couronne and 20.2 in Grande Couronne. Two situations were. Two situations were developed screening the rise in likely Electrical Vehicles ownership by changing policies.

**Graham-Roett al (2012)** in light of his examined semi organized subjective meeting technique 40 non-business UK and ICE drivers and found that the fundamental main impetus

behind buying goals is ecological parameters, vehicle cost, fuel cost, battery gear, power source, execution, security and cutting edge innovation

**Carly et al. (2013)** researched and found 2,302 people with a driver's license in the United States Adoption and perception varied according to education, , age, gender, experience, education, environmental notions, and pointed out that numerous factor that reduce the sales of electric vehicles are traditional vehicle cost factors, nonexistence of infrastructure, and recharge time. He based his study on the basis of the principle of rational choice.

**Jansen et al (2013)** study proposes that the adequacy of EVs relies upon viable experience, cost of procurement, cost of fuel, range and speed likewise the lead of EV. Researchers accept that the principal objective of marketing ought to be to improve the nature of human life and advertisers ought to endeavour to 10 advance individuals' buying expectations with the correct promoting procedure. Personal satisfaction isn't just identified with the fulfilment of necessities, requests, and wants, and fulfillment isn't just occupied by the nature of products and ventures, in light of the fact that the earth we live in must have a specific degree of value

**Bergsagel (2013)** conducted qualitative research, which was based on the model of adopting electric vehicles in 50 drivers with personal vehicles in the United Kingdom and found that the main factors for purchase are technical costs, personal and social factors.

**Kupra et al (2014)** gave another virtue to the development of research from the political landscape by studying 911 residents of the United States. They found that the acceptance of EVs would greatly increase political confidence, energy independence and being a concern for climate change..

## NEED FOR PROMOTION OF ELECTRIC VEHICLES

Promotion of electric vehicles (EVs) is essential for several reasons:

**Environmental Benefits:** Electric vehicles have a significantly lower carbon footprint compared to traditional internal combustion engine (ICE) vehicles. Promoting EVs helps reduce greenhouse gas emissions, air pollution, and dependence on fossil fuels, leading to a cleaner and healthier environment.

**Climate Change Mitigation:** Electric vehicles play a crucial role in mitigating climate change. By transitioning to EVs, we can decrease our reliance on fossil fuels and reduce the amount of CO<sub>2</sub> emitted into the atmosphere, helping to combat global warming and meet climate goals.

**Energy Efficiency:** EVs are more energy-efficient than ICE vehicles. Electric motors convert a higher percentage of energy from the grid to power the wheels, whereas ICE vehicles lose a significant amount of energy as waste heat. Promoting EVs encourages the use of energy in a more efficient manner, reducing overall energy consumption and improving energy security.

**Health Benefits:** Electric vehicles contribute to improved air quality by producing zero tailpipe emissions. This has direct health benefits, especially in urban areas where air pollution from vehicle emissions can cause respiratory problems, allergies, and other health

issues. Promoting EVs can lead to cleaner air, reducing the burden of pollution-related health problems.

**Sustainable Transportation:** As part of a broader sustainable transportation system, electric vehicles complement other modes of transportation, such as public transit and cycling. Promoting EVs encourages the development of integrated, multi-modal transportation networks that prioritize environmentally friendly options, reducing traffic congestion and enhancing urban livability.

**Economic Opportunities:** The promotion of electric vehicles can stimulate economic growth and create job opportunities. The EV industry encompasses manufacturing, research and development, infrastructure development, and maintenance services, contributing to the growth of a green economy and the creation of skilled jobs.

**Technological Innovation:** The adoption and promotion of electric vehicles drive technological advancements. As the demand for EVs increases, there is a greater focus on improving battery technology, charging infrastructure, and overall vehicle performance. This fosters innovation and competition among manufacturers, leading to advancements that benefit not only EVs but also other sectors such as renewable energy storage.

**Government Policy Objectives:** Many governments have set ambitious targets for reducing greenhouse gas emissions and transitioning to clean energy sources. Promoting electric vehicles aligns with these policy objectives and demonstrates a commitment to sustainable transportation solutions. Governments can offer incentives, tax credits, and subsidies to promote EV adoption and support the development of EV infrastructure.

By promoting electric vehicles, we can make significant strides towards a more sustainable and environmentally friendly transportation system, addressing climate change, improving air quality, and fostering economic growth. The collective effort from governments, industry stakeholders, and individuals is crucial in accelerating the transition to electric vehicles.

## REASONS FOR PURCHASE OF ELECTRIC VEHICLES

There are several reasons why people choose to purchase electric vehicles (EVs).

**Environmental Benefits:** One of the primary reasons for purchasing an electric vehicle is its positive impact on the environment. EVs produce zero tailpipe emissions, which helps reduce air pollution and combat climate change. By driving an electric vehicle, individuals can significantly lower their carbon footprint and contribute to a cleaner and greener future.

**Cost Savings:** While the upfront cost of electric vehicles is generally higher than that of traditional internal combustion engine (ICE) vehicles, EVs offer long-term cost savings. Electricity is typically cheaper than gasoline, resulting in lower fuel costs. Moreover, EVs require less maintenance since they have fewer moving parts and do not need oil changes or regular tune-ups. Over time, these savings can offset the initial higher purchase price.

**Government Incentives:** Many governments around the world provide incentives to encourage the adoption of electric vehicles. These incentives can include tax credits, rebates, grants, or discounts on registration fees. Taking advantage of these incentives can make electric vehicles more affordable and attractive to potential buyers.

**Improved Technology:** Electric vehicles have experienced significant technological advancements in recent years. The range of EVs has increased, allowing drivers to travel longer distances on a single charge. Additionally, charging infrastructure is expanding, making it more convenient to charge an EV. With the continuous development of battery technology, the overall performance and capabilities of electric vehicles are steadily improving.

**Energy Independence:** Electric vehicles offer the potential for reduced dependence on fossil fuels. By transitioning to electric transportation, countries can reduce their reliance on imported oil and increase their energy independence. This shift can lead to a more stable and secure energy future.

**Quiet and Smooth Driving Experience:** Electric vehicles are known for their quiet and smooth operation. The absence of an internal combustion engine results in reduced noise pollution, contributing to a more peaceful driving experience. Additionally, electric motors provide instant torque, delivering quick acceleration and a smooth driving experience.

**Public Health Benefits:** Electric vehicles can help improve public health by reducing local air pollution. Traditional vehicles emit pollutants such as nitrogen oxides, particulate matter, and volatile organic compounds, which can have adverse effects on human health. By transitioning to electric vehicles, communities can enjoy cleaner air and potentially reduce respiratory illnesses and other health issues associated with air pollution.

## ADVANTAGES OF PURCHASE OF ELECTRIC VEHICLES

The purchase of electric vehicles (EVs) offers several advantages. Here are some key advantages of owning an electric vehicle:

**Environmental Benefits:** EVs produce zero tailpipe emissions, which means they don't emit pollutants such as carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and particulate matter. By driving an EV, you can significantly reduce your carbon footprint and contribute to improving air quality, mitigating climate change, and protecting the environment.

**Cost Savings:** While the upfront cost of an EV is often higher than that of a traditional internal combustion engine (ICE) vehicle, EVs offer long-term cost savings. Electricity is typically cheaper than gasoline, so recharging an EV is generally less expensive than refueling a gas-powered car. Additionally, EVs have fewer moving parts and require less maintenance, resulting in potential savings on oil changes, engine repairs, and other maintenance tasks associated with ICE vehicles.

**Energy Efficiency:** Electric vehicles are more energy-efficient than ICE vehicles. They convert a higher percentage of the energy from the electrical grid into powering the wheels, whereas ICE vehicles lose a significant amount of energy as waste heat. This higher energy efficiency contributes to reducing overall energy consumption and enhancing energy security.

**Performance and Acceleration:** Electric motors deliver instant torque, which means that EVs can provide quick acceleration and a smooth driving experience. The immediate power delivery of electric motors often results in faster acceleration compared to traditional vehicles with internal combustion engines.

**Quiet and Comfortable Ride:** Electric vehicles are known for their quiet operation. Without the noise of an internal combustion engine, EVs provide a more peaceful and enjoyable driving experience. The reduced noise pollution also benefits communities, especially in urban areas.

**Range and Charging Infrastructure:** Over the years, the range of electric vehicles has significantly improved. Modern EVs can travel longer distances on a single charge, making them suitable for daily commuting and even long-distance trips. Furthermore, the charging infrastructure for EVs is rapidly expanding, with an increasing number of charging stations available in public spaces, workplaces, and residential areas, providing convenience and peace of mind for EV owners.

**Government Incentives and Tax Credits:** Many governments and local authorities offer incentives and tax credits to encourage the adoption of electric vehicles. These incentives can include financial subsidies, rebates, tax credits, reduced registration fees, and access to carpool lanes. Taking advantage of these incentives can help reduce the upfront cost of purchasing an EV and make them more affordable.

**Technological Advancements:** The development of electric vehicles drives technological advancements in battery technology, charging infrastructure, and vehicle design. As the EV market expands, manufacturers invest in research and development, leading to improved battery range, faster charging times, and more innovative features in electric vehicles.

**Reduced Dependence on Fossil Fuels:** Electric vehicles contribute to reducing our dependence on fossil fuels, which are finite resources with significant environmental and geopolitical implications. By transitioning to EVs and utilizing renewable energy sources for charging, we can move towards a more sustainable and energy-independent future.

Owning an electric vehicle provides numerous advantages, including environmental benefits, cost savings, improved performance, and a more enjoyable driving experience. As technology continues to advance and the charging infrastructure expands, electric vehicles are becoming an increasingly attractive option for drivers worldwide.

## IMPACT OF ELECTRIC VEHICLES ON ENVIRONMENT

Electric vehicles (EVs) have a positive impact on the environment in several ways:

**Reduced Greenhouse Gas Emissions:** EVs produce zero tailpipe emissions since they run on electricity rather than burning fossil fuels. This results in a significant reduction in greenhouse gas emissions, including carbon dioxide (CO<sub>2</sub>), which is a major contributor to climate change. By transitioning to EVs, we can mitigate the environmental impact associated with transportation and work towards meeting climate goals.

**Air Quality Improvement:** EVs contribute to improving local air quality by eliminating the release of pollutants such as nitrogen oxides (NO<sub>x</sub>), particulate matter (PM), and volatile organic compounds (VOCs) that are emitted by traditional internal combustion engine (ICE) vehicles. These pollutants can have adverse effects on human health, causing respiratory problems, cardiovascular issues, and other health risks. By reducing air pollution, EVs help create healthier and cleaner environments in urban areas and beyond.

**Renewable Energy Integration:** EVs offer the potential for greater integration of renewable energy sources into the transportation sector. Charging an EV using electricity generated from renewable sources such as solar, wind, or hydroelectric power further reduces the carbon footprint associated with driving. This synergy between EVs and renewable energy contributes to a more sustainable and environmentally friendly energy system.

**Energy Efficiency:** EVs are more energy-efficient compared to ICE vehicles. Electric motors convert a higher percentage of the energy stored in the battery into powering the wheels, whereas ICE vehicles lose a significant amount of energy as waste heat. This higher energy efficiency means that more of the energy consumed by an EV is used for propulsion, resulting in reduced overall energy consumption and a more sustainable use of resources.

**Noise Pollution Reduction:** Electric vehicles operate much quieter than ICE vehicles. The absence of an internal combustion engine noise contributes to reducing noise pollution, providing quieter and more peaceful environments, particularly in urban areas. This benefit enhances the quality of life for individuals living near busy roadways or in densely populated areas.

**Lifecycle Emissions:** While it is important to consider the emissions associated with the production and disposal of EVs, studies have shown that even when accounting for these factors, EVs still tend to have lower lifecycle emissions compared to ICE vehicles. As the electricity grid becomes greener and more renewable energy is incorporated, the lifecycle emissions of EVs will further decrease.

It is important to note that the environmental impact of EVs can vary depending on factors such as the source of electricity used for charging, the manufacturing processes, and the recycling or disposal practices for batteries. However, overall, the widespread adoption of electric vehicles has the potential to significantly reduce greenhouse gas emissions, improve air quality, and contribute to a more sustainable and environmentally friendly transportation system.

## FACTORS CONTRIBUTING IN THE GROWTH OF ELECTRIC VEHICLES IN INDIA

The growth of electric vehicles (EVs) in India has been gaining traction in recent years, with increasing adoption and supportive government policies. Here are some key factors contributing to the growth of EVs in India:

**Government Initiatives:** The Indian government has introduced various initiatives to promote EV adoption. The Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME) scheme was launched in 2015, providing financial incentives for electric and hybrid vehicles, including two-wheelers, three-wheelers, and four-wheelers. The scheme aims to support the development of a robust EV ecosystem, including charging infrastructure, research and development, and domestic manufacturing of EV components.

**Incentives and Subsidies:** The government provides financial incentives and subsidies to make electric vehicles more affordable for consumers. These incentives include direct subsidies on the purchase price of EVs, exemption from road tax and registration fees, and



lower interest rates on loans for EV purchases. These measures help reduce the upfront cost barrier and make EVs more attractive to buyers.

**Charging Infrastructure Development:** The expansion of charging infrastructure is crucial for the growth of EVs. The government, along with public and private entities, has been investing in the development of charging infrastructure across the country. Initiatives like the National Electric Mobility Mission Plan (NEMMP) and the Electric Vehicle Charging Guidelines have been introduced to facilitate the installation of charging stations in public places, residential areas, and along highways.

**Two-Wheeler Dominance:** Electric two-wheelers have witnessed significant growth and adoption in India. Two-wheelers are the most common mode of transportation in the country, and the transition to electric two-wheelers is considered more feasible and economical. Several Indian manufacturers and startups offer electric scooters and motorcycles, catering to the increasing demand for sustainable and cost-effective urban mobility solutions.

**Public Transport and Government Fleets:** The Indian government has been promoting the adoption of EVs in public transportation and government fleets. Financial support is provided for electric buses, taxis, and rickshaws through schemes like FAME. Many cities in India have started introducing electric buses and e-rickshaws to reduce emissions and improve public transport efficiency.

**Technological Innovation and Domestic Manufacturing:** Both domestic and international automotive players are investing in EV manufacturing facilities in India. Several Indian startups are also focusing on developing innovative EV models and technologies. The growth of domestic manufacturing contributes to job creation, technology transfer, and the development of a self-sustaining EV industry.

**Growing Consumer Awareness:** There is increasing awareness and interest among Indian consumers regarding EVs. Concerns about air pollution, rising fuel prices, and the environmental benefits of EVs are driving consumer demand. Organizations and state governments are conducting awareness campaigns and events to educate the public about the advantages of EVs and dispel common misconceptions.

While the growth of EVs in India is still in its early stages, the aforementioned factors are contributing to an optimistic outlook for the future. The government's focus on promoting electric mobility, supportive policies, and the involvement of industry players are expected to drive the continued growth and adoption of EVs in India

MARKET SEGMENTATION OF THE ELECTRIC VEHICLES

<p><b>BY TECHNOLOGY</b></p> <ol style="list-style-type: none"> <li>1. Hybrid Electric Vehicle</li> <li>2. Plug-In Hybrid Electric Vehicle</li> <li>3. Battery Electric Vehicle</li> </ol>	<p><b>BY VEHICLE TYPE</b></p> <ol style="list-style-type: none"> <li>1. Two Wheelers</li> <li>2. Passenger Cars</li> <li>3. Commercial Vehicles</li> </ol>
<p><b>BY POWER SOURCE</b></p>	<p><b>BY POWERTRAIN</b></p>

1. Stored Electricity	1. Series Hybrid
2. On-Board Electric	2. Parallel Hybrid
3. Generator	3. Combined Hybrid

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