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A Study on Need of Adoption of Electric Vehicles in India

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Abstract

A Fundamental requirement of modern life is transport; however, the traditional form of transport is quickly becoming outdated. In the fast-moving world, the transportation industry is a major factor that has a negative impact on the environment, contributing to resource depletion, air pollution, and climate change. Electric vehicles (EV) are powered by electricity and have an electric motor rather than a conventional gasoline-fuel internal combustion engine. Electric vehicles (EVs) are based on a battery instead of a gasoline tank and an electric motor instead of an ICE. These types of vehicles (EV) have zero tailpipe emissions and are eco-friendly. Environmental degradation demands a transportation revolution, and the adoption of electric vehicles in place of traditional vehicles signifies a positive step in this direction. As the third-largest auto market, India aims to become the top global market in the near future. The Indian central government plans a substantial increase in Electric Vehicle (EV) sales by 30% for private cars, 70% for commercial vehicles, and 80% for two- and three-wheelers by 2030. The objective of this study is to comprehend the need for the adoption of electric vehicles in India and the schemes of Govt to promote EVs. to understand the benefits of EVs. This paper is an exploratory research based on secondary data sourced from a number of research articles that have been published and compiled online. EVs hold the key to revolutionizing India's transportation sector. Maximizing the environmental impact of EVs cannot happen without collaborative efforts involving policymakers, businesses, governments, and individuals.

Keywords: *Electric Vehicles (EVs), Sustainable Development, Green Mobility, Environmental Protection, Climate Change, Renewable Energy, Government Initiatives, FAME Scheme, E-Mobility, Energy Security, Air Pollution, Transportation Sector, India*

Introduction:

A Fundamental requirement of modern life is transport; however, the traditional form of transport is quickly becoming outdated. In the fast moving world, the transportation industry is the major factor that is responsible to have a bad impact on the environment, contributing to resource depletion, air pollution, and climate change. As we know that the fossil fuels are non-renewable source of energy and their excessive use is destroying our planet gradually. Air pollution is one of the greatest threats globally. In India, air pollution has been increasing at an alarming rate. In India, owing to the migration of people to metropolitan cities, crowds and traditional transport systems are causing many problems in most metropolitan cities. At present, increasing pollution levels, poor fuel quality, old vehicles, inadequate maintenance, congested traffic, old automotive technologies, and traffic management systems are the main causes of breathing and health-related issues.

Electric vehicles (EV) are powered by electricity and have an electric motor rather than a conventional gasoline-fuel internal combustion engine. Electric vehicles (EVs) are based on a battery instead of a gasoline tank and an electric motor instead of an ICE. These types of vehicles (EV) have zero tailpipe emissions and are eco-friendly. Environmental degradation demands a transportation revolution, and the adoption of electric vehicles in place of traditional vehicles signifies a positive step in this direction. India is moving towards this revolution. Electric vehicles (EVs) serve as the best possible avenue for enhancing air quality, energy security, and economic opportunity due to the swift growth of the Indian automobile sector; now, it is imperative for the Indian government to understand the urgency to investigate sustainable mobility options in order to minimize reliance on foreign energy sources, cut greenhouse gas emissions, and minimize the negative effects of transport, such as global warming. In modern times, the introduction of new technologies has advanced the vehicle industry, and electric automobiles are alternatives to internal combustion engines. The demand for electric vehicles is rising globally due to their lower CO₂ emissions; compared to petrol or diesel vehicles, the emission impact of electric vehicles is much less.

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From the efficiency perspective of electric vehicles, they can cover approximately 60% of the electrical energy from the grid to power the wheels, whereas petrol or diesel cars can only convert 17%-21% of the energy stored in the fuel to the wheels. There was clear wastage of approximately 80%. The Indian government also aims to boost the production of electric vehicles in the automotive sector. Our govt. provides various incentives to promote electric vehicles in the Indian economy. Globally, the market for electric cars (EVs) is rapidly expanding. In India, the EV market of EVs is also experienced tremendous growth.

By 2030, India is ambitious to achieve approximately 40 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources to reduce the impact of charging electric vehicles. As petrol and diesel vehicles are highly polluting, they should be quickly replaced by fully electric vehicles. As India is the third-largest auto market, it aims to become the top market globally in the near future. The Indian central government plans a substantial increase in Electric Vehicle (EV) sales by 30% for private cars, 70% for commercial vehicles, and 80% for two- and three-wheelers by 2030.

Literature Review:

The Ministry of Statistics and Program Implementation's 2016 study on key indicators of household expenditure on services and durable items revealed that buses are the most frequently used mode of transportation in both urban and rural regions. According to a survey, almost 66% of households in rural regions and 62% of households in urban areas spend the most money on buses. EVs have revolutioned the mobility sector and represent a complete solution. However,, in the long run, the country needs an effective public transportation system, with cars that operate on electricity or other fuels, making this form of transportation efficient, convenient, pleasant, and safe and encouraging people to use it. The Indian electric car sector has made considerable progress in this regard.

Mohamedetal.(2018) found that India's main goal in implementing EVs was to lower greenhouse gas emissions and reduce oil costs. The Indian government's 2030 goal is challenging and ambitious. The government ought to maximize the benefits of the opportunities that are accessible and determine appropriate strategies to address the issues that the deployment of EVs will bring about, and India is being forced to adopt Vision 2030 as a result of its obligations under numerous environmentally friendly agreements.

Bhalla et al. (2018) found that manufacturers of electric vehicles and the Indian government must invest more in fostering societal acceptance of vehicles by expanding infrastructure and prioritizing technological advancements that foster vehicle confidence. The government and car manufacturers bear the responsibility of creating consumer perceptions in addition to investing in vehicle manufacturing.

Sarode and Sarode(2020) According to the reports, India adopted electric mobility technology later than other nations. Additionally, Indians have difficulty adjusting to this new technology. Even if they purchase an electric vehicle, they are unable to use it for long-distance or daily trips. This is caused by the outdated battery technology, which has a lower range and takes longer to fully charge. Furthermore, India lacks sufficient charging stations to allow individuals to recharge their cars.

Goel et al. (2021) found that increases in fuel efficiency are possible with hybrid, plug-in hybrid, and electric vehicles; however, the cost of ownership is higher than that of conventional vehicles. Generally, over their lifetime, consumers, society, automakers, and legislators will benefit economically from their lower petroleum consumption and higher production. India's e-mobility goals will be aided by the government's recent measures and subsidies. This technology has a significant potential for addressing global warming challenges and is an important aspect of renewable energy and energy security.

Bhatta charyya and Pradhan(2023)examined the primary originality of this research as an overview of the obstacles and issues related to electric vehicles in an Indian setting. Different barriers and bottlenecks affect the EV industry in emerging economies; some are minor inconveniences, others have a significant influence on the interaction of expansion. India has set an extremely ambitious goal of reaching100%electric portability by 2030.

Research Methodology:

This paper is an exploratory research based on secondary data sourced from a number of research articles that have been published and compiled online. Various previous studies have served as the foundation for this research. Various reports, websites, research papers, journals, and other sources were searched in order to obtain the secondary data.

Objectives:

- To comprehend the need of adoption of electric vehicles in India .
- To comprehend the schemes of Govt. to promote EVs.
- To comprehend the benefits of EVs.

Need of adoption of EV in India :

At the world level, India's largest greenhouse gas emitter is in third place. The transportation sector is significantly responsible for such gas emissions, as the smoke released by vehicles causes high levels of carbon dioxide and nitrous oxide. The traditional transportation sector is also significantly responsible for one-third of India's particulate matter pollution, which traps heat and further drives climate change.

In India,the transport manufacturing sector poses several environmental challenges . Current Indian vehicle manufacturing practices play a major role in rapid resource depletion. Once manufactured, these vehicles contribute to greenhouse gas emissions owing tothrough their primary dependence on fossil fuels.

Rapid urbanization and population growth lead to increased traffic congestion, further damaging air quality, and increasing fuel consumption are the major factors for environmental degradation in India. Further, infrastructure development for transportation requires land acquisition and can result in habitat destruction and ecosystem disruption. Traditional transport systems have increased Greenhouse Gases that impact weather patterns, causing droughts, heat waves, and floods, all of which undermine agricultural productivity and increase the risk of food insecurity.

Our excessive dependence on transportation has made it a leading cause of air pollution in India. Air pollution leads to adverse health effects and accelerated climate change, especially in growing urban areas. Examining these disadvantages and their current impacts on the environment has explicated the urgent need for sustainable solutions and alternative approaches in the transportation sector.

By understanding demand for time, the government is taking steps to encourage electric vehicle adoption. With the adoption of EVs, India aims to decarbonize the transportation sector and is putting a step on the national transition path to clean energy.

Today's world demands "Sustainable Development" which is a universally accepted solution to economic development of humankind for the present and future generations. It is a socio-economic process characterized by the fulfillment of human needs, which does not harm or degrade the quality of the natural environment indefinitely.

To achieve sustainable development, many nations are moving forward with the adoption of EVs. India should also observe the prospects and difficulties associated with the introduction of electric vehicles in India. As EV are eco-friendly, we can further cut back on greenhouse gas emissions. Significant efforts should be made to reduce the amount of fossil fuel used for transportation, power generation, energy consumption, and carbon sequestration. An alternative to reduce carbon dioxide and gasoline emissions is the use of electric vehicles. **Goel et al. (2021)**

Therefore, it is necessary to adopt EVs as early as possible to achieve Sustainable Development.

Govt. Initiatives to promote EVs:

In India, the government has introduced several initiatives to encourage EV adoption. These include:

FAME I & II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles): The government of India has incentivized the purchase of EVs and facilitated the installation of charging infrastructure through this program. The FAME is a government program that has complemented this drive by offering demand-side incentives. Private automakers rose to the occasion and made investments in new R&D centers and factories to producing electric vehicles.

NEMMP (National Electric Mobility Mission Plan): This plan was launched in 2020 and aims to achieve a target of 30% electric vehicles on Indian roads by 2030.

Tax Benefits: To promote the purchase of electric vehicles, the Indian government is planning to offer an additional income tax deduction on the interest

paid for loans used to purchase electric vehicles. The Goods and Services Tax (GST) Council has set a lower rate for electric vehicles as compared to tax rate for petroleum-based vehicles.

PLI (Production Linked Incentive): This scheme aims to improve domestic manufacturing and attract global companies to invest in the Indian market for the manufacturing of electric vehicles.

Promotion of EVs Government Fleet: To encourage the use of electric vehicles in the public sector, the government plans to replace existing government vehicles with electric ones. This would also have a positive impact on the adoption of EVs in the private sector.

Benefits of EVs

To achieve Sustainable Development, adoption of EVs is an important step which would help in various ways which can be sum up as follows:-

1. Zero tailpipe emissions.

Electric vehicles have a wonderful feature: their capacity to produce zero tailpipe emissions. Unlike traditional Internal Combustion Engines (ICE) that burn petrol or diesel and emit harmful carbon emissions through the exhaust, EVs operate without a tailpipe. The foundation of an EV is its battery, and most EVs use a lithium-ion battery, which does not emit pollutants during its energy discharge or recharge cycles. EVs are based on technology that allows for repetitive charging and discharging of batteries without contributing to air pollution.

2. Minimise Resource Depletion

If we discuss the production process, EVs are far less resource-intensive than traditional vehicles, which gives them a huge environmental advantage. In contrast to traditional vehicles, EVs' simpler mechanics is the reason for this resource efficiency. In addition, the batteries in EVs can be recycled, reducing the need for new resources and waste, and greater adoption of EVs can substantially mitigate the environmental impact of extensive mining and the depletion of non-renewable resources.

3. Less Harmful Fluids

One of the significant environmental advantages of the Electric vehicles is that they eliminate the use of fossil-based products, such as motor oil used in petrol and diesel vehicles. Unlike vehicles based on petrol or diesel, EVs do not require various lubricants and fluids that can cause environmental hazards. Motor oil, commonly found in petrol and diesel vehicles, contains toxic compounds that can contaminate water sources and harm both humans and wildlife. This emphasis on the use of less harmful fluids makes EVs a more environmentally friendly choice.

4. Less Noise Pollution

Owing to urbanization and increased dependence on technology, noise pollution has been created to a large extent. Electric vehicles are the best option for reducing **noise pollution**, as electric motors operate significantly quietly. This decreased noise level positively impacts various environments, such as residential areas and natural landscapes, contributing to an improved quality of life. As cities grow and their populations increase, the embrace of EVs becomes

important in promoting quieter and more peaceful surroundings.

5. Eco-friendly materials:

In addition to the operational benefits of electric vehicles, the use of **eco-friendly materials** in manufacturing is another advantage. Although many manufacturers use recycled materials in smaller components, EV manufacturers lead the way by integrate these materials into the vehicle structure.

6. Low maintenance Cost

In EVs, the maintenance requirement is also lower because of the absence of an internal combustion engine.

7. Health Benefits:

EVs are eco-friendly, and reduced harmful emissions lead to reduced air pollution and less noise pollution, which is beneficial to human health.

8. More Safer:

EVs have special features, such as a low center of gravity, thereby making them less likely to capsize, having a low risk of fires and explosions, and their body construction, which gives them more durability, making them safer during collisions.

9. Cheaper to operate:

EVs are cheaper to operate because they have a high efficiency and fuel economy by reducing the cost for the owner. The electricity required to charge an EV is approximately one-third of the amount per kilometer to purchase fuel for vehicles.

Conclusion and Suggestions:

The adoption of EVs can be the best solution to address various problems, such as climate change, global warming, and environmental degradation, by significantly reducing the emissions from fossil fuels. Electric vehicles can play an important role in keeping the world away from fossil fuels towards cleaner, renewable energy sources. EVs have great potential to address present-day environmental challenges. EVs hold the key to revolutionizing India's transportation sector by reducing harmful emissions, increasing the demand for renewable energy sources, and fostering sustainable production and disposal practices. Adoption of EVs cannot occur without a collaborative effort involving policymakers, businesses, governments, and individuals.

Policymakers should create favorable policies, regulations, and incentives to promote the installation of renewable energy sources to power EVs. Govt. should provide start-up incentives to manufacture spareparts and components of EVs. Awareness programs regarding EVs should be organized at the state and district levels so that the general public can accept transport revolution.

It is also the duty of businesses to work alongside governments to boost EV adoption. In particular, they can invest in research and development of renewable energy sources and materials. They should also sponsor events to raise awareness of the need for end-to-end green mobility options. With these concerted efforts, the environmental impact of EVs by 2030 is significant. The Indian Government's Vision 2030 regarding EVs is an ambitious and difficult task. The Government

should utilize the opportunities available and find suitable ways to tackle various threats in the way of adoption. At Present, it is India is obligated to implement Vision 2030 regarding EVs to meet various environment-friendly agreements.

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Conflicts of interest

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