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# **Automobile Industry Electric Vehicle**

# Krishna Kumar<sup>1</sup>, Ms. Geeta Raut<sup>2</sup>

<sup>1</sup>BBA (MAM), School of Business, Galgotias University <sup>2</sup>Supervisor, School of business, Galgotias University

#### ABSTRACT

The 21st century is seeing a gradual change towards sustainable development with all aspects. As we can see the growth of electronic vehicles are also increasing day by day. Many government initiatives are also supporting EVs for future and also to protect our mother earth. These EVs technologies are developing their market in whole world. Companies like Tesla, MG, Tata are now started producing more EVs as demand of the vehicles are also increasing day by day. It will make us less dependent on fossil fuels which are renewable sources of energy. The main problem with these EVs are price concern as we can see that the EVs are generally costly than fuel vehicles. But with constant government support like making railways and public transport electric not rely upon fossil fuels, we are seeing the future in EVs. The demand of lithium, cobalt materials used in EVs are playing major factor among all nations. International Organizations like UN,COP are making policies for green environment are giving favour and subsidies to these companies. These EVs not only making a source of renewable energy but also leading to less environmental concern. Hence with a better supply chain and making it little cheaper and easier availability of EVs will make it more efficient.

### Introduction

The 21st century has begun a profound change in the way we think of transportation. For over a century, internal combustion engine vehicles have dominated roads worldwide. They allowed faster mobility, connected nations and fed global economies. However, they also brought with them a variety of problems:

- Air pollution,
- · Carbon emissions,
- Noise and
- an overwhelming dependence on fossil fuels.

In recent years, the growing environmental awareness and urgent decarbonization requests have stimulated the rise of a powerful alternative - electric vehicles. Electric vehicles are not totally new. Its conceptual origin dates back to over a hundred years. But it is only in the last decade that they have gained real impulse, thanks to technological innovation, changes in global policies and change of consumer preferences. The Ves are not just cars with beaters, they represent a reimagination of modern transport that aligns with the sustainability goals and clean energy transitions. This report explores the electric vehicle industry in its current market dynamics and the challenges it faces to innovations. The goal is to provide a balanced and well -researched overview that not only explains the growth of Ves, but also critically examines the economic and technological factors that shape their future.

# **History of EVs**

The story of electric vehicles begins not in the 21st century, but in the 19th. In the early 1830s, inventors in Europe and the United States were experimenting with battery-operated vehicles. By the late 1800s, electric vehicles were already sharing roads with steam and gasoline-operated cars. In fact, at the turn of the 20th century, electric cars enjoyed great popularity, especially in urban areas. They were cool, easy to operate and cleaner than their gas-operated counterparts. The invention of the first model electric vehicle is attributed to various people. In 1828, Hungarian priest and physicist Enos Jelik invented an early type of electric motor, and created a small model car operated by it. Between 1832 and 1839, Scottish inventor Robert Anderson developed a crude electric vehicle. Notable initial manufacturers such as Baker Electric and Detroit Electric sold to thousands of EVS customers, including famous celebrities and even royalty members. However, the emergence of champions by Henry Ford with model T, the rise of mass production techniques, dramatically reduces the cost of gasoline cars. The infrastructure of the road and coupled with the discovery of the huge petroleum reserves, which led to the decline of EVS by the 1930s.

For decades, electric vehicles were largely experimental or used in niche applications. Interest in EVS resumed in the 1970s during the oil crisis, and again with increasing environmental concerns in the 1990s. However, boundaries in battery technology and high production costs obstruct the adoption widely.

It was not the beginning of the 2000s, with the introduction of hybrid vehicles and the launch of Tesla Motors, that a real revival began. The release of Tesla's 2008 roadster, a completely electric sports car with an impressive range, is a sign of a new era. It was proved that electric vehicles can be both desirable and practical. Since then, the EV industry has increased rapidly, technical successes, fall in battery prices, and fuel by a rapidly required climate agenda.

# **Market Overview**

Electric vehicle market size is estimated at 1.46 trillion USD in 2025, and is expected to reach 2.73 trillion USD by 2029, growing at 17% during the forecast period (2025-2029) (2025-2029)

By 2025, electric vehicles represent one of the fastest growing segments in the global motor vehicle industry. Once a niche market has focused a central focus on car manufacturers, governments and investors. Global EV sales exceeded 14 million units in 2023, accounting for about 18% of all new car sales, and the figure is expected to exceed 40% by 2030.

Currently there is a dominance of some major players and regions in the market. China is an undisputed leader, with the highest EV adoption rate and the most developed domestic supply chain. Brands like Ola Electric, Beed and Tesla are not only endowed at home, but are also expanding internationally. In Europe, strict emission rules and liberal subsidy have made EVS rapidly popular, such as countries such as Norway and Netherlands are getting closer to full electrification.

The United States, while initially slow to adopt, gained momentum with Tesla's success and renewed federal incentives under inflation reduction act. Meanwhile, developing countries like India and Brazil are taking strategic steps to electrify their transport systems, especially two-wheelers, tree-wheelers and focus on public transport.

In addition to passenger vehicles, electrification is rapidly spreading to commercial fleet, distribution vans and buses. The innings is supported by both economic and regulatory encouragement, including low operating costs and zero-furusting sector mandate.

## **Growth of EVs**

Electric vehicles are radically transforming the transportation sector, redefining the automotive market and remodeling global transportation equipment and its uses.

Several powerful forces are boosting global change to electric vehicles. The main one is the growing awareness of climate change and the urgent need to reduce greenhouse gas emissions. Transport is responsible for a significant portion of global carbon emissions, and the veses offer a cleaner alternative.

Governments around the world are playing a crucial role as

- Subsidies,
- · Tax incentives and

• Rigid fuel economy standards. They made the EVs more attractive financially. Some regions even announced future prohibitions on the sale of new gasoline and diesel vehicles.

Technological advances have been another watershed. Modern EV benefits from high -energy lithium -lithium ion batteries that offer longer bands and shorter charging times. Innovations in electrical transfers and regenerative braking have improvement efficiency, while air software updates are improving the user experience.

The consumer's feeling has also changed. As more people experience EVs through travel or rent sharing, acceptance is growing. Increased fuel prices and concerns about energy safety are leading buyers to electrical alternatives. In addition, automakers expanded their EV offerings between segments, making them accessible to a wider audience.

### **Barriers and Challenges for EVs**

Despite the impressive growth, the EV industry faces several significant challenges. One of the most cited problems is to charge infrastructure, battery supply chain, cost, etc. While major cities are rapidly installing public chargers, rural areas and developing regions still suffer from limited access.

Battery supply chains

It is another area of concern. The extraction of important materials such as lithium, cobalt and nickel usually raises ethical and environmental issues. In addition, the supply is concentrated in some countries such as Australia and Indonesia, making the industry vulnerable to geopolitical risks. In India, Jammu and Kasmir were identified by the GSI as lithium reserves.

#### Purchase cost

It's another barrier. Although the total cost of property ownership is decreasing, the starting price remains high for many consumers. This is particularly true in emerging economies, where accessibility is a critical factor.

#### Range anxiety

The fear of running out of power without access to a charger also remains a psychological barrier. While modern EVs usually offer 300 to 400 km in reach, consumer expectations are shaped by the almost without gasoline car limitation.

#### Customer confidence

Finally, there is the question of consumer confidence. The erroneous concepts about battery life, resale value and safety continue to reduce adoption. Education and dissemination are essential to overcome these obstacles.

# **Competitive Factors**

The GLOD market is highly dynamic, with a mixture of established automakers, ambitious startups and technology companies vying for dominance. Tesla remains the most prominent name, known for her innovation, performance and strong brand loyalty. With a growing portfolio that includes different models. Tesla redefined consumer expectations.

Chinese manufacturers like BYD emerged as powerful candidates. Byd has a fortress on electric buses and recently exceeded Tesla in global sales of electric vehicles. Other notable Chinese players include Nio, known for its battery exchange technology, and Xpeng, which focuses on autonomous direction.

European automakers like Volkswagen, BMW and Volvo are in transition aggressively their lineups. Volkswagen, in particular, has compromised billions to its battery identification and manufacturing series.

In India, Tata Motors leads the electric vehicle market, while Ola Electric is doing waves with its electric scooters. Startups like Ather Energy are also gaining traction.

Technology companies are also entering the fight. Apple and Xiaomi have made headlines with EV rumor projects and partnerships between automakers and AI companies are becoming increasingly common.

#### **Policies and Sustainability**

Government policy has been fundamental to shape the VE market. In the United States, the Inflation Reduction Act offers up to \$7,500 in tax credits for purchases. The European Union has set ambitious CO2 reduction goals and plans to ban the sale of new ice vehicles by 2035.

China's central and provincial governments provide extensive subsidies and non -monetary incentives, such as license plate benefits and access to restricted zones. Fame II policy schemes of India and production linked to production (PLI) aim to increase demand and domestic manufacturing.

Sustainability extends beyond emissions. The industry is now focused on the development of circular supply chains. Battery and second life recycling applications are being explored to reduce the environmental impact of battery production. Companies are investing in ethical mineral supply and exploring alternatives such as sodium ion batteries.

In addition, integration with renewable energy and smart grids can further improve the environmental benefits of the Ves. In the future, electric vehicles could even serve as mobile energy storage units, feeding the energy back to the network during the peak demand.

#### The Future

The future of the VE industry seems promising and complex. In addition to basic electrification, the next border includes autonomous direction, connectivity and integration with smart ecosystems in the city.

Wireless loading and ultra-fast loaders are already under development to make the pro property more convenient. EVs and solar -powered vehicles designed with recyclable materials are also on the horizon.

Fleet electrification, especially in logistics and public transportation, should grow rapidly. As regulations tighten and the price of carbon becomes more widespread, companies will face increasing pressure to adopt electric mobility. India also aims to obtain a 30% penetration in EV in private cars by 2030.

Consumer preferences will continue to evolve, influenced by cultural changes, generational values and finance innovations such as lesing EV and battery models as a service.

# Conclusion

The electric vehicle revolution is no longer a forecast - it is a reality in motion. While the challenges remain, the global moment is undeniable. Governments, companies and consumers are aligning around a more clean, smarter and sustainable mobility vision. However, the ves are more expensive than traditional fuel vehicles - preventing adoption to some buyers.

This report highlighted the historical context, market dynamics, technological advances and sociopolitical factors that influence the electric vehicle industry. Of course we are only at the beginning of this transformation.

As infrastructure expands, technology improves and public awareness grows, electric vehicles will become the norm and not the exception. The road ahead may have its swelling, but it is paved with potential. The VE industry is not just about cars; It is about reimaginating how we move around the world.