

A Review of Global Electric Vehicle Market Growth

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ABSTRACT

The global transportation sector is changing rapidly all over the world. Growing environmental worries, new technologies, and government policies are pushing the world toward more sustainable mobility (Sovacool et al., 2018). One of the most important developments is the rise of electric vehicles (EVs). EVs are seen as a practical way to reduce greenhouse gas emissions and decrease reliance on fossil fuels (Hardman et al., 2017). In the last decade, the EV market has grown quickly. Several factors have contributed to this growth such as Battery costs have fallen significantly, Governments have introduced supportive policies and Charging infrastructure has also improved in many regions (Li et al., 2017). As per the International Energy Agency, global EV sales exceeded 14 million units in 2023. This marked a major milestone in the global shift toward electric mobility (IEA, 2024).

This review paper examines the growth of the global EV market. It looks at regional adoption patterns, recent technological developments, and the economic effects of EV expansion. The study also reviews previous research to identify the main drivers, challenges, and future opportunities in the EV sector.

Overall, the findings show that EV adoption is increasing rapidly around the world. However, continued investment is still necessary. Improvements in charging infrastructure, battery

technology, and supportive policies will play a key role in ensuring long-term and sustainable growth of the EV industry.

Keywords: *EV market, Global EV sales, EVs Policy, EV Market Trends, Battery Technology*

1. INTRODUCTION

The transportation sector plays a very important role in global energy use and greenhouse gas emissions. According to the International Energy Agency (IEA, 2024), transportation is one of the largest sources of carbon emissions worldwide. Most vehicles still rely on fossil fuels such as petrol and diesel. Consequently, this sector contributes significantly to air pollution and climate change.

In recent years, environmental problems have become more serious worldwide. Many countries have also made international commitments to reduce carbon emissions and slow down global warming. As a result, governments and international organizations are encouraging the development of cleaner and more sustainable transportation technologies (Sovacool et al., 2018).

One of the most significant solutions to have emerged is the use of electric vehicles (EVs). Unlike traditional internal combustion engine vehicles, EVs run on electricity instead of fossil fuels. This means that they produce zero emissions during operation. EVs are also generally more energy-efficient, as electric motors convert energy more effectively than traditional engines (Hardman et al., 2017). These advantages make EVs an attractive option for reducing environmental impacts in the transportation sector.

Over the past decade, the adoption of electric vehicles has increased significantly. Several factors have contributed to this growth such as advances in battery technology have improved vehicle range and performance. At the same time, many governments have introduced incentives to encourage consumers to purchase EVs. These incentives include tax reductions, purchase subsidies, and investment in public charging infrastructure.

Leading economies such as China, the United States, and countries in the European Union have played a major role in accelerating EV adoption. These governments have implemented strong policy measures, including stricter vehicle emission standards, financial incentives for EV

buyers, and large investments in charging networks (ICCT, 2024). As a result of these initiatives, the global EV market has expanded rapidly and EV sales have grown each year.

Despite this rapid growth, the EV industry still faces several challenges. One of the main challenges is the high cost of batteries, which remains a significant component of the total cost of electric vehicles. Another issue is the limited availability of charging infrastructure in many regions, especially in developing countries and rural areas. Without adequate charging stations, potential consumers may hesitate to switch to EVs.

In addition, the production of EV batteries requires critical minerals such as lithium, cobalt, and nickel. The supply chains for these materials are still developing and can be vulnerable to geopolitical risks, price fluctuations, and environmental concerns related to mining activities (BloombergNEF, 2024). These challenges highlight the importance of continued technological innovation, sustainable resource management, and supportive government policies.

Given these developments, it is important to understand how the global EV market is evolving. This review paper therefore examines major trends in the global electric vehicle market, including technological progress, regional adoption patterns, and key market drivers. The study is based on existing academic literature, industry reports, and international data sources. By analyzing these sources, the paper aims to provide a comprehensive understanding of the opportunities and challenges shaping the future of the electric vehicle industry.

2. REVIEW OF LITERATURE

There is a large and growing body of research that looks at the expansion of the electric vehicle (EV) market from different angles, including government policies, technological progress, consumer behavior, and economic effects. The studies reviewed here highlight the key factors shaping the development of the EV market.

2.1. Policy and Regulatory Studie

Li, Long, Chen, and Geng (2017) explored how policy tools such as purchase subsidies, tax benefits, and environmental regulations influence EV adoption. Their findings show that financial incentives play a major role in encouraging consumers to buy EVs by lowering upfront costs. They also pointed out that government spending on charging infrastructure and supportive regulations is essential for speeding up the shift to electric mobility. Overall, the

study stresses the importance of combining financial support with infrastructure development to ensure long-term market growth.

Dr. Netaji B. Kale (2026) examined current trends and future prospects in the global EV market. The study identifies policy support, technological innovation, and infrastructure development as key drivers of growth. It emphasizes that strong government involvement—particularly in funding charging networks and advancing battery technology—is critical for sustainable progress. The research also highlights the need for collaboration between policymakers, automakers, and energy providers to support long-term expansion.

The International Council on Clean Transportation (2024) focused on transport policies aimed at reducing emissions and promoting electric mobility. The report found that countries with strict environmental regulations and zero-emission vehicle mandates tend to achieve higher EV adoption rates. Policies such as fuel efficiency standards, carbon reduction goals, and financial incentives were shown to have a strong impact on market development.

2.2. Technological Innovation Studies

Hardman, Chandan, Tal, and Turrentine (2017) studied both consumer perceptions and technological progress in the EV sector. Their research shows that advances in battery technology, longer driving ranges, and faster charging times have significantly increased consumer interest in EVs. They conclude that ongoing technological improvement is key to overcoming adoption barriers.

BloombergNEF (2024) provided an in-depth analysis of battery technology and the future of the EV market. The report notes that lithium-ion battery costs have dropped sharply over the past decade due to innovation and economies of scale. As these costs continue to fall, EVs are expected to become more competitive with traditional internal combustion engine vehicles.

2.3. Consumer Adoption Studies

Sovacool, Axsen, and Kempton (2018) examined the social and behavioral factors influencing EV adoption. Their findings suggest that technological improvements alone are not enough to drive widespread use. Instead, factors such as consumer awareness, environmental concerns, and supportive policies play a critical role in encouraging adoption.

Sierzchula, Bakker, Maat, and Van Wee (2014) carried out a cross-country study to identify what drives EV adoption. They found that government incentives, access to charging infrastructure, and income levels are key factors. Countries with more developed charging networks tend to have higher adoption rates.

Kumar and Alok (2020) focused on EV adoption in India, highlighting the importance of national policies and financial incentives. Their research suggests that expanding charging infrastructure and supporting domestic battery production could significantly boost EV adoption in developing economies.

2.4. Market Trends and Industry Studies

The International Energy Agency (2024), in its Global EV Outlook, reported that global EV sales surpassed 14 million units in 2023, showing rapid growth in the sector. The report also projects that the global EV fleet could reach around 250 million vehicles by 2030 under current policy conditions.

The World Bank (2022) examined the economic and environmental benefits of EVs in developing countries. The study found that electric mobility can help reduce greenhouse gas emissions and improve air quality in urban areas. It also emphasizes that strong government support and infrastructure investment are essential for accelerating EV adoption in emerging markets.

3. OBJECTIVES OF THE STUDY

The main objectives of this study are:

1. To examine global electric vehicle market growth trends.
2. To analyze regional EV market development across major countries.
3. To review existing academic studies related to EV adoption and market growth.
4. To identify key drivers and challenges affecting EV market expansion.
5. To evaluate the economic impact of EV market growth.

4. RESEARCH METHODOLOGY

This study adopts a qualitative literature review approach used secondary data sources (Saunders et al., 2019). Literature review includes examining and synthesizing previously published studies, reports, and policy documents to develop a comprehensive understanding of a research topic.

Secondary Data for this study were collected from academic journals, international reports, and policy documents. Some valuable sources include reports from the International Energy Agency, the International Council on Clean Transportation, and market outlook reports from BloombergNEF.

The collected data were analyzed using descriptive and comparative analysis techniques to understand & examine global EV market growth trends and regional variations.

5. EVS MARKET GROWTH, MARKET SHARE, INFRASTRUCTURE DEVELOPMENT AND VEHICLE TYPE

The data presented in Tables 1 to 5 provide a comprehensive overview of the global electric vehicle (EV) market in terms of regional growth, market share, infrastructure development, and vehicle type distribution (IEA, 2024; BloombergNEF, 2024).

5.1. Regional EV Market Analysis

Table 1: Regional EV Market Growth (2024–2030)

Country / Region	EV Sales 2024 (Million)	EV Stock 2024 (Million)	Forecast Sales 2030 (Million)
China	11	24	18–20
European Union	3	8	10–12
United States	1.6	4	6–7
India	1	3	5–6
Other Countries	2	6	8–10

(Source: International Energy Agency Global EV Outlook)

Table 1 shows that China leads the global EV market in both sales and total vehicle stock in 2024 (IEA, 2024). With around 11 million EVs sold and projections suggesting growth to 18–20 million units by 2030, China is likely to remain the dominant player in the coming years

(IEA, 2024). This strong performance is largely supported by active government policies, extensive manufacturing capabilities, and widespread adoption of electric vehicle technology (Li et al., 2017; ICCT, 2024).

The European Union and the United States are also experiencing notable growth, though not at the same pace as China (IEA, 2024). The EU is expected to reach between 10 and 12 million EV sales by 2030, driven by strict environmental regulations and emission reduction targets (Sovacool et al., 2018). In the United States, growth is more moderate, supported by increasing investment in charging infrastructure and federal incentive programs (BloombergNEF, 2024).

India, while still at an earlier stage of market development, shows strong growth potential (Kumar & Alok, 2020). EV sales are projected to rise from about 1 million units in 2024 to between 5 and 6 million by 2030. This growth reflects the impact of government initiatives and the increasing demand for efficient urban transportation solutions (NITI Aayog, 2023).

5.2. Market Share Distribution

Table 2: Global EV Market Share by Country

Country	Market Share 2024	Market Share 2030 Forecast
China	60–65%	50–55%
European Union	20–22%	23–25%
United States	10–12%	14–15%
India	3–4%	7–8%
Others	5–7%	10%

(Source: International Energy Agency Global EV Outlook)

Table 2 shows that China currently dominates the global EV market, holding about 60–65% of the total share in 2024 (IEA, 2024). Although this share is expected to decline slightly by 2030, China is still likely to remain the leading market. The small decrease is mainly due to the faster growth of EV adoption in other regions (BloombergNEF, 2024).

At the same time, both the European Union and the United States are projected to increase their shares of the global market by 2030, reflecting rising adoption rates and supportive government policies (ICCT, 2024). India is also expected to strengthen its position, with its market share

growing from around 3–4% to 7–8%. This trend highlights India’s emerging role as an important player in the global EV market (Kumar & Alok, 2020).

5.3. Growth Rate Analysis

Table 3: EV Market Growth Rate by Region (2024–2030)

Region	Estimated CAGR (2024–2030)	Key Growth Drivers
China	18–20%	Government incentives, strong manufacturing base
European Union	16–18%	Carbon regulations and EV subsidies
United States	14–16%	Federal tax credits and infrastructure expansion
India	20–25%	Government policies and urban mobility demand
Rest of World	15–17%	Emerging EV policies and investments

(Source: BloombergNEF EV Outlook)

Table 3 indicates that India is expected to record the highest compound annual growth rate (CAGR), estimated at 20–25% between 2024 and 2030 (BloombergNEF, 2024). This suggests that India could become one of the fastest-growing EV markets in the world (Kumar & Alok, 2020).

China also continues to show strong growth, with a projected CAGR of 18–20%, supported by its well-established EV ecosystem and infrastructure (IEA, 2024). Meanwhile, the European Union and the United States are experiencing steady growth, reflecting markets that are more mature but still expanding (Sovacool et al., 2018).

In addition, the “Rest of World” category shows encouraging growth trends, pointing to the increasing global spread of electric vehicle adoption (BloombergNEF, 2024).

5.4. Charging Infrastructure Development

Table 4: Global EV Charging Infrastructure by Region (2024)

Region	Public Charging Stations (Approx.)	Fast Chargers (%)
China	18,00,000	45%

Europe	6,00,000	30%
United States	2,00,000	25%
India	15,000	20%
Rest of World	1,50,000	25%

(Source: International Energy Agency)

Table 4 shows that China is far ahead in terms of EV charging infrastructure, with around 1.8 million public charging stations in 2024 (IEA, 2024). This wide network of charging facilities plays a key role in supporting the country's high level of EV adoption (Sierzchula et al., 2014).

Europe and the United States have also made strong progress in expanding their charging networks, but their overall infrastructure still falls short compared to China (IEA, 2024). In contrast, India currently has a relatively limited number of charging stations, which could slow down the pace of EV adoption (Kumar & Alok, 2020).

Overall, the data highlights a clear connection between the availability of charging infrastructure and the growth of the EV market (Sierzchula et al., 2014; Li et al., 2017).

5.5. Vehicle Type Distribution

Table 5: Global EV Sales by Vehicle Type (2024)

Vehicle Type	Market Share
Battery Electric Vehicles (BEV)	70%
Plug-in Hybrid Electric Vehicles (PHEV)	28%
Fuel Cell Electric Vehicles (FCEV)	2%

(Source: International Energy Agency EV Outlook)

Table 5 shows that Battery Electric Vehicles (BEVs) clearly dominate the global EV market, making up about 70% of total EV sales in 2024 (IEA, 2024). This reflects a strong shift toward fully electric vehicles, rather than hybrid alternatives (BloombergNEF, 2024).

Plug-in Hybrid Electric Vehicles (PHEVs) account for a smaller share of around 28%, while Fuel Cell Electric Vehicles (FCEVs) represent just 2% of the market. Their limited adoption is mainly due to higher costs and the lack of supporting infrastructure (IEA, 2024; Sovacool et al., 2018).

Overall, the analysis suggests that the global EV market is still concentrated in a few leading regions, particularly China, although other regions are gradually catching up (IEA, 2024;

ICCT, 2024). Market growth is largely driven by government policies, technological progress, and the development of charging infrastructure (Li et al., 2017; BloombergNEF, 2024).

6. DISCUSSION

Based on existing literature and market data, the global electric vehicle (EV) market is growing at a remarkable pace. This growth is not driven by a single factor, but rather by a combination of technological progress, economic incentives, environmental concerns, and supportive government policies. At the same time, there are still several challenges that could influence how quickly the market expands in the coming years.

6.1 Government Policies and Incentives

Government support has been one of the strongest drivers behind the rapid adoption of EVs worldwide. Many countries have introduced financial incentives such as subsidies, tax benefits, and purchase rebates to make EVs more affordable. These measures help reduce the high upfront cost, which is often a major barrier for consumers (Li et al., 2017, Kale et al., 2026,).

China is a clear example of how policy can shape market growth. Through strong government backing, including subsidies and large investments in charging infrastructure, China has developed the world's largest EV market (IEA, 2024). Similarly, European countries have implemented strict emission regulations and promoted zero-emission vehicles, which has significantly accelerated EV adoption across the region (ICCT, 2024, Ghani, A. A et al., 2025).

6.2 Technological Advancements in Battery Technology

Advances in battery technology have played a central role in making EVs more practical and affordable. Lithium-ion batteries, which are widely used in EVs, offer high energy efficiency and longer lifespans. Over the past decade, their cost has dropped dramatically—by nearly 80% since 2010—thanks to improvements in production and economies of scale (BloombergNEF, 2024).

This cost reduction has made EVs increasingly competitive with traditional vehicles. Looking ahead, emerging technologies such as solid-state batteries could further improve performance by extending driving range and reducing charging time, making EVs even more attractive to consumers.

6.3 Expansion of Charging Infrastructure

The availability of charging infrastructure is another critical factor influencing EV adoption. Consumers are far more likely to switch to electric vehicles when charging is convenient and accessible.

Governments and private companies are investing heavily in expanding charging networks, and the number of public charging stations has grown rapidly in recent years (IEA, 2024). However, this growth is uneven. While developed countries have relatively well-established networks, many developing regions still face infrastructure shortages, which can slow down adoption.

6.4 Environmental Benefits and Climate Policies

Environmental concerns are a major reason behind the global push toward electric mobility. The transportation sector is a significant contributor to greenhouse gas emissions, and EVs offer a cleaner alternative (Sovacool et al., 2018).

Many governments have set long-term climate goals and are encouraging the shift to electric vehicles through regulations and policy measures. Some countries have even announced plans to phase out petrol and diesel vehicles in the future. In addition to reducing carbon emissions, EVs also help improve air quality in urban areas by lowering harmful pollutants.

6.5 Challenges in EV Market Growth

Although the growth of the EV market is strong and promising, it is not without important challenges. One of the most significant issues is the limited supply of critical raw materials such as lithium, cobalt, and nickel, which are essential for battery production. Constraints in the availability of these resources could slow down future EV expansion and increase production costs (IEA, 2024; Alanazi, 2023).

In the case of India, participation in global value chains (GVCs) within the automotive and EV sectors remains limited. Key barriers include restricted access to essential raw materials, insufficient domestic capacity for battery manufacturing, and existing technological gaps. These challenges make it difficult for India to fully integrate into the global EV value chain (Ray, 2026).

China, despite being the global leader in the EV market, also faces several structural challenges. One major concern is the environmental contradiction of charging EVs using a power grid that is still heavily dependent on coal. In addition, there are gaps in charging infrastructure in certain regions, along with environmental risks related to battery production and disposal (Zgang, 2025).

Another common challenge across many countries is the relatively high upfront cost of electric vehicles compared to conventional internal combustion engine vehicles. Even though EVs offer lower operating and maintenance costs over time, the initial purchase price can discourage potential buyers. Furthermore, many countries will need to significantly upgrade their electricity grids to support large-scale EV adoption and ensure reliable charging infrastructure.

Overall, addressing these challenges will be essential for sustaining long-term growth and ensuring a smooth transition toward electric mobility.

6.6 Future Outlook of the EV Market

The overall outlook for the EV market remains very positive. Continued technological innovation, falling battery costs, and stronger environmental policies are expected to drive further growth. According to the International Energy Agency, the global EV fleet could reach around 250 million vehicles by 2030 under current policy scenarios (IEA, 2024).

Research by Dr. Netaji B. Kale 2026 also highlights that long-term success will depend on collaboration between governments, automakers, and energy providers. Investments in infrastructure, renewable energy, and supportive regulations will be essential to sustain this growth.

The study compares EV markets in China, Europe, and the United States, showing how these regions are transforming the global automotive industry. It highlights China as the key driver, mainly due to its strong policies and rapid infrastructure growth, which have pushed global automakers toward electrification. Although each region follows different strategies, the shift goes beyond vehicles, it reflects a broader transition toward sustainable energy use worldwide (Mohamed et al. 2024).

Beyond these factors, digitalization is beginning to play a larger role in the EV ecosystem. Smart charging systems, vehicle-to-grid (V2G) technology, and AI-driven energy management

are expected to improve efficiency and reduce pressure on power grids. These innovations could become important enablers of future EV expansion.

7. ECONOMIC IMPACT OF EV MARKET GROWTH

The rapid growth of the EV market is not only transforming transportation but also reshaping the global economy. Its impact can be seen in job creation, industrial development, technological innovation, and reduced dependence on fossil fuels (Sovacool et al., 2018; Hardman et al., 2017).

7.1. Job Creation and Employment Opportunities: The expansion of the EV industry has created a wide range of job opportunities across sectors such as manufacturing, battery production, infrastructure development, and maintenance services. Studies suggest that millions of direct and indirect jobs could be generated as the industry continues to grow (Sovacool et al., 2018).

In developing countries like India, EV growth is expected to open up employment opportunities in areas such as battery manufacturing, charging station installation, and servicing (Kumar & Alok, 2020). Additionally, related industries such as electronics and component manufacturing also benefit from this expansion.

7.2. Contribution to GDP and Economic Growth: The EV industry contributes to economic growth by generating value across supply chains, from raw materials to final vehicle production. Increased manufacturing activity and technological innovation support overall economic development (Li et al., 2017).

Moreover, the growth of the EV sector attracts foreign direct investment, especially in emerging economies, further boosting industrial development and economic output (Kumar & Alok, 2020).

7.3. Reduction in Fuel Imports and Energy Security: EV adoption can significantly reduce dependence on imported fossil fuels, improving national energy security. Many countries rely heavily on oil imports, and shifting to electric mobility helps lower fuel consumption and reduce import costs (Sovacool et al., 2018).

In the long term, integrating EVs with renewable energy sources and smart grids can further strengthen energy systems and reduce vulnerability to global fuel price fluctuations.

7.4. Industrial Development and Technological Innovation: The EV market is driving innovation across multiple industries, including battery technology, artificial intelligence, and smart mobility solutions. Investments in these areas are accelerating technological progress and encouraging countries to build advanced manufacturing capabilities (Hardman et al., 2017).

7.5. Cost Savings and Consumer Benefits: From a consumer perspective, EVs offer long-term cost advantages. Although the initial purchase price is higher, lower fuel and maintenance costs can offset this over time (Sierzchula et al., 2014). As battery prices continue to fall, these economic benefits are expected to become even more significant.

Overall, the economic impact of EV market growth is largely positive. It supports job creation, innovation, industrial expansion, and improved energy security. However, to fully realize these benefits, governments must address key challenges such as supply chain constraints, infrastructure gaps, and policy coordination (Kumar & Alok, 2020).

8. RESEARCH GAP

Although several studies have examined EV adoption and market growth, important research gaps remain:

- Limited research on EV adoption in developing countries.
- Insufficient studies on long-term EV market projections.
- Lack of integrated research linking EV growth with energy infrastructure development.

Future research should address these gaps to provide a deeper understanding of EV market dynamics.

9. CONCLUSION

The global electric vehicle (EV) market has grown rapidly over the past decade, driven by a mix of environmental concerns, continuous technological improvements, and strong support from governments around the world. What was once a niche segment of the automotive

industry is now becoming a central part of the global transition toward cleaner and more sustainable transportation.

At present, China, the European Union, and the United States remain the leading players in the EV market, supported by well-developed infrastructure, strong policy frameworks, and large-scale manufacturing capabilities. However, the future of the market will not be limited to these regions alone. Emerging economies—particularly India—are expected to play an increasingly important role as demand rises, urbanization accelerates, and governments introduce supportive initiatives.

While the overall outlook is highly promising, the transition to electric mobility is not without its challenges. Issues such as uneven charging infrastructure, dependence on critical raw materials, and the need for consistent and effective policy implementation continue to shape the pace of adoption. In addition, upgrading power grids and ensuring sustainable battery production will be essential to support long-term growth.

Looking ahead, sustained investment will be key. Expanding charging infrastructure, advancing battery technologies, and strengthening policy support will all play a crucial role in maintaining momentum in the EV market. At the same time, greater integration with renewable energy, improvements in battery recycling, and the development of smart mobility solutions are likely to define the next phase of growth.

Overall, the EV market is set to become a cornerstone of the global energy and transportation transition. With continued innovation and coordinated efforts among governments, industries, and consumers, electric vehicles are expected to play a major role in shaping a more sustainable and economically resilient future.

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