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ELECTRIFIED MOBILITY AS AN ENGINE OF SUSTAINABLE ECONOMIC GROWTH: EVIDENCE ON THE ROLE OF TRANSPORT INFRASTRUCTURE

Shukurillaev Nizomiddin Akmaljon ugli

Annotation

This study explores electrified mobility as a driver of sustainable economic growth, with particular attention to the mediating role of transport infrastructure. It investigates how infrastructure such as EV charging stations, electrified rail, smart energy systems, and integrated transport networks shapes the economic and environmental outcomes of transport modernization. Existing evidence indicates that transport infrastructure investment can promote economic growth, while sustainability outcomes vary by transport mode, with rail generally associated with lower environmental harm than road- and air-based expansion. The growing importance of EV charging infrastructure and renewable energy integration further suggests that electrified mobility can strengthen productivity and connectivity while supporting decarbonization goals. This topic is relevant to policymakers and researchers seeking to understand how transport electrification can generate long-term economic value without intensifying environmental degradation.

Keywords

electrified mobility; sustainable economic growth; transport infrastructure; electric vehicles; EV charging infrastructure; rail electrification; infrastructure investment; environmental sustainability; low-carbon transport; renewable energy integration; green growth; transport policy; regional economic development; decarbonization; sustainable mobility.

1. Introduction

The global transportation sector is undergoing a structural transformation driven by technological innovation and the urgent need to reduce greenhouse gas emissions. Electrified mobility, which includes electric cars, buses, and rail systems powered by electricity rather than fossil fuels, has emerged as a central strategy for achieving sustainable development objectives.

The rapid growth of electric vehicles demonstrates the increasing momentum of this transition. Global EV sales exceeded 17 million units in 2024, accounting for more than one-fifth of all new car sales worldwide. This represents a substantial increase compared with previous years and indicates accelerating global adoption of electric mobility technologies.

The expansion of EV infrastructure is equally significant. The global charging network grew rapidly in recent years, with more than 1.3 million new public charging points added in 2024, representing over 30% annual growth. Infrastructure development is widely considered a key determinant of EV adoption, as the availability of charging networks directly influences consumer confidence and market expansion.

Transport infrastructure plays a central role in enabling the transition to electrified mobility. Charging stations, smart grids, battery supply chains, and electrified public transport systems create the foundation for sustainable transport ecosystems. Countries that invest heavily in these systems often experience accelerated technological innovation and economic growth within emerging green industries.

This study aims to analyze how electrified mobility contributes to sustainable economic growth and how transport infrastructure supports this transformation. Specifically, the research addresses three key questions:

1. How does EV infrastructure influence the adoption of electrified mobility?
2. What economic impacts arise from investments in electric transport infrastructure?

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3. How can infrastructure development support sustainable economic growth?

2. Methods

2.1. Research Design

The study uses a mixed-methods approach combining statistical analysis, comparative policy analysis, and literature review. Quantitative data on electric vehicle markets and charging infrastructure were collected from international databases and global mobility reports published between 2023 and 2025.

2.2. Data Sources

Data were obtained from international organizations and research institutions including: International Energy Agency (IEA); Our World in Data; International Council on Clean Transportation (ICCT).

Key indicators analyzed include:

global EV sales

EV market share

public charging infrastructure

economic indicators of green transport industries

2.3. Analytical Approach

The analysis was conducted in three stages:

1. Descriptive statistical analysis of EV market growth and infrastructure expansion.

2. Comparative analysis of leading EV markets including China, Norway, and the European Union.

3. Economic impact assessment examining how infrastructure investment influences economic productivity and industrial development.

3. Results

3.1. Global Electric Vehicle Market Expansion

Table 1: The global EV market has experienced rapid growth in recent years.

Year	Global EV Sales (million)	Share of New Car Sales
2020	3.0	4%
2021	6.6	9%
2022	10.5	14%
2023	14.0	18%
2024	17.0+	20–22%
2025	~20.0	~25%

Source: International Energy Agency (IEA), *Global EV Outlook 2025*; BloombergNEF EV Outlook 2025.

EV adoption has grown exponentially, with sales increasing nearly sixfold between 2020 and 2024. This trend indicates the rapid diffusion of electric mobility technologies across global markets. 2025 values represent projected/early estimates based on current market trends. Preliminary estimates indicate that global electric vehicle sales may reach approximately 20

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million units in 2025, representing around 25% of total new car sales worldwide, reflecting the continued acceleration of electrified mobility adoption.

3.2. Growth of Charging Infrastructure

The expansion of charging networks has supported EV market growth.

Table 2: Global Public EV Charging Infrastructure

Year	Public Charging Points (million)
2021	2.1
2022	2.7
2023	~4.0
2024	>5.0
2025*	~6.5

Source: International Energy Agency (IEA), *Global EV Outlook 2025*; ICCT Global Charging Infrastructure Report.

2025 values represent projected global totals based on infrastructure expansion trends. Global public EV charging infrastructure continues to expand rapidly. By 2025, the number of public charging points worldwide is expected to exceed 6.5 million, reflecting sustained investment in charging networks and supporting the accelerating adoption of electric vehicles. China remains the global leader in infrastructure deployment, accounting for approximately 65% of global public charging stations, followed by the European Union and the United States.

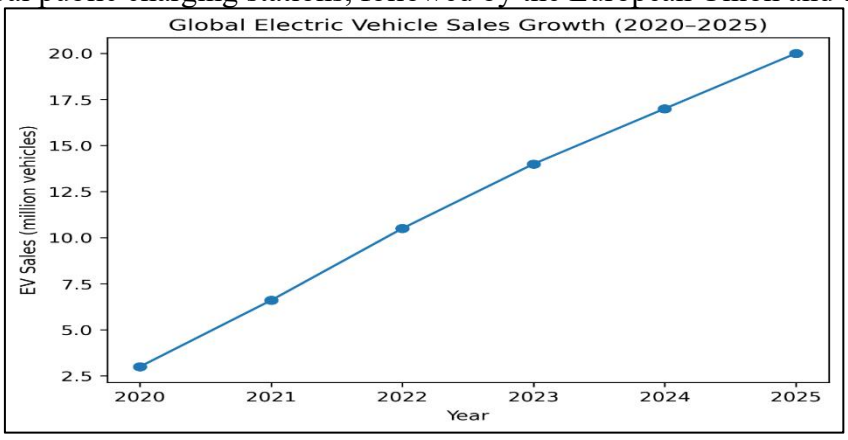

Figure 1. Global Electric Vehicle Sales Growth (2020–2025)

The figure clearly illustrates the rapid expansion of the global electric vehicle market between 2020 and 2025. EV sales increased from approximately 3 million units in 2020 to around 20 million units in 2025, demonstrating strong and consistent growth in electrified mobility adoption. This upward trend reflects the combined effects of technological innovation, expanding charging infrastructure, supportive government policies, and growing environmental awareness. The continuous increase in EV sales indicates that electrified transport is becoming a central component of the global transition toward sustainable economic development and low-carbon mobility systems.

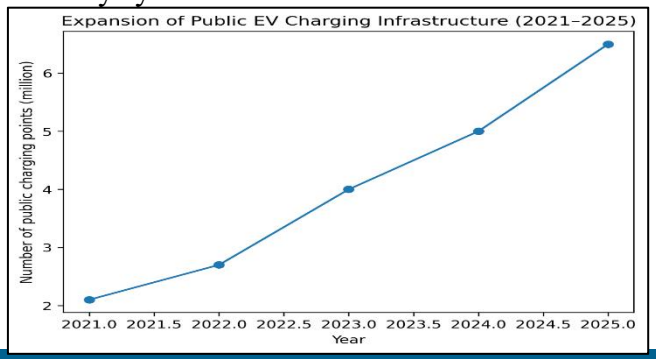

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Figure 2. Expansion of Public EV Charging Infrastructure

Figure 2 demonstrates the rapid expansion of global public EV charging infrastructure over the period 2021–2025. The number of charging points increased from approximately 2.1 million in 2021 to an estimated 6.5 million in 2025, reflecting significant global investment in transport electrification infrastructure. This growth highlights the critical role of charging networks in facilitating the adoption of electric vehicles. The expansion of infrastructure reduces range anxiety, improves accessibility to charging services, and strengthens consumer confidence in electric mobility technologies. Consequently, the development of charging infrastructure represents a key enabling factor in accelerating the global transition toward sustainable transportation systems.

Country	Charging density	EV share
Norway	High	90%+
Netherlands	High	35%
China	Medium-High	50%
USA	Medium	10–15%

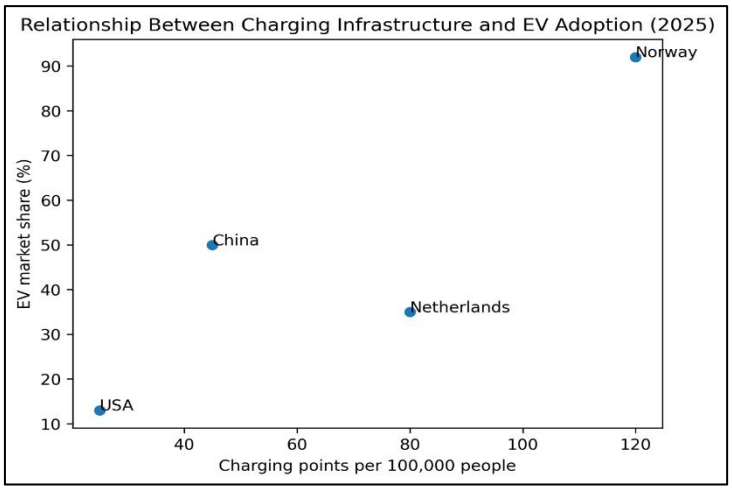

Figure 3. Relationship Between Charging Infrastructure and EV Adoption (2025)

Figure 3 illustrates the positive relationship between charging infrastructure density and electric vehicle adoption across selected countries. Countries with higher numbers of charging points per capita, such as Norway and the Netherlands, demonstrate significantly higher EV market shares compared with countries where infrastructure development is more limited. This pattern confirms that the availability of charging infrastructure is a fundamental determinant of EV market penetration. The findings suggest that strategic investment in charging networks can substantially accelerate the adoption of electric vehicles and support the broader transition toward electrified mobility.

4. Discussion

The results confirm that transport infrastructure is a critical factor in the successful transition toward electrified mobility. Countries with extensive charging networks and supportive policies demonstrate higher levels of EV adoption and stronger development of green mobility industries.

Infrastructure investments not only enable EV adoption but also stimulate innovation across several sectors including battery production, renewable energy integration, and smart grid technologies. These industries contribute significantly to economic growth and technological competitiveness.

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The economic benefits of electrified mobility extend beyond the transport sector. Lower operational costs of electric vehicles, improved air quality, and reduced dependence on fossil fuels generate long-term economic advantages for national economies.

However, the transition to electrified transport systems also presents challenges. Infrastructure investment requires significant capital, and unequal infrastructure distribution may slow EV adoption in developing regions. Governments must therefore implement comprehensive strategies combining financial incentives, regulatory support, and long-term infrastructure planning.

5. Conclusion

Electrified mobility represents one of the most promising pathways toward sustainable economic growth and environmental sustainability. The findings of this study demonstrate that the expansion of transport infrastructure plays a fundamental role in enabling the transition toward electric mobility.

Global electric vehicle sales exceeded 17 million units in 2024, representing more than 20% of global new car sales, and early estimates suggest that EV sales may reach approximately 20 million vehicles in 2025, accounting for around 25% of global car sales. This rapid growth is supported by the expansion of charging infrastructure, technological innovation, and supportive government policies.

Countries investing in electrified transport systems benefit from increased industrial development, technological innovation, and improved environmental performance. The expansion of EV charging networks and integration with renewable energy systems are key factors in accelerating the transition toward sustainable mobility.

Future research should focus on country-specific infrastructure strategies, economic modeling of EV infrastructure investments, and the integration of electrified transport systems with renewable energy networks in order to maximize the economic and environmental benefits of electrified mobility.

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