Impact of Electric Vehicles on Conventional Vehicles in India

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Abstract

India's automotive industry is undergoing a fundamental transformation driven by the rapid emergence of electric vehicles (EVs). The growing penetration of EVs is increasingly influencing the demand, production, and strategic orientation of conventional internal combustion engine (ICE) vehicles. This study examines the impact of electric vehicles on conventional vehicles in India by analysing adoption trends, segment-wise displacement, economic implications, environmental outcomes, and the role of government policy interventions. Using secondary data from industry reports, policy documents, and academic literature, the study observes that EV penetration reached approximately 7.8% by FY2025, with significant disruption in the two-wheeler and three-wheeler segments. The transition is being supported by incentives, lower operating costs, and emerging charging networks, while it is constrained by infrastructure gaps, battery supply chain dependence, and uncertainty in subsidy continuity. Overall, the findings suggest that EVs are not fully replacing conventional vehicles at present, but they are steadily reshaping market dynamics, competitive strategies, and consumer preferences. With continued policy support and infrastructure expansion, EVs are projected to account for nearly 20–30% of total vehicle sales by 2030, indicating a gradual but decisive shift in India's mobility ecosystem.

Keywords: Electric vehicles; conventional vehicles; internal combustion engines; EV adoption in India; market displacement; charging infrastructure; sustainable mobility.

1 Introduction

The automotive industry is a critical pillar of India's economic structure, contributing nearly 7% to the country's gross domestic product and supporting extensive employment across manufacturing, logistics, services, dealerships, and ancillary industries [5]. Historically, this sector has been dominated by internal combustion engine (ICE) vehicles, which rely heavily on fossil fuels and contribute significantly to urban air pollution and greenhouse gas emissions. Alongside environmental impacts, conventional vehicles are linked with rising congestion and public health costs in major cities. These concerns have intensified policy attention toward cleaner transport alternatives.

Rising environmental concerns, volatile fuel prices, and increasing dependence on imported crude oil—estimated at nearly 85% of total consumption—have strengthened the case for alternative mobility solutions in India [12]. Import dependence also creates macroeconomic vulnerability through exchange-rate pressures and exposure to geopolitical risks. In this context, EV adoption is increasingly viewed not only as an environmental strategy but also as an energysecurity and industrial-policy opportunity.

Electric vehicles (EVs) have emerged as a viable alternative, supported by advances in battery technology, declining costs, and favourable government policies. Since 2020, India has witnessed a steady increase in EV adoption, particularly in urban centres and in segments where daily travel distances are predictable. Government initiatives such as the Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme and the recently introduced PM E-DRIVE programme have played a pivotal role in accelerating this transition [7, 14]. As a result, the conventional vehicle market is facing increasing competitive pressure, especially in segments where EVs offer clear economic and operational advantages.

This paper analyses the impact of electric vehicles on conventional vehicles in India during the period 2020–2025, focusing on market trends, economic and environmental implications, and policy frameworks shaping this transition. The analysis emphasises how EV growth is interacting with conventional vehicle demand rather than treating EV adoption as an isolated trend.

2 Review of Literature

Existing literature highlights multiple dimensions of EV adoption in India. McKinsey and Company [11] emphasise the role of changing consumer preferences, technology improvements, and declining battery costs in driving EV demand. Bain & Company [10] report that two-wheelers and three-wheelers dominate EV adoption due to their lower upfront costs and suitability for urban mobility, particularly for short trips, shared mobility, and last-mile services.

Devarasan et al. [1] analyse the environmental benefits of EV adoption, noting significant reductions in tailpipe emissions and favourable lifecycle emission outcomes despite India's coal-intensive power grid. Such findings suggest that urban air-quality benefits appear immediately at the point of use, while long-term climate benefits expand as grid electricity becomes cleaner. Shalu and Pandey [2] identify total cost of ownership and policy incentives as key determinants influencing consumer adoption decisions, along with non-price factors such as charging convenience, perceived reliability, and resale expectations.

Industry reports by Mordor Intelligence [9], Fortune Business Insights [8], and Custom Market Insights [13] project strong growth in India's EV market over the next decade. Policyfocused studies by ICCT [7], PRS Legislative Research [15], and IEEFA [14] highlight the effectiveness and limitations of existing incentive structures, including the need for consistent implementation and infrastructure readiness. While the literature acknowledges rapid EV growth, there is limited consolidated analysis of how this growth is directly affecting conventional vehicle markets (in demand, strategic repositioning, and consumer switching), which this study seeks to address.

3 Objectives of the Study

The study is guided by the following objectives:

- To analyse trends in electric vehicle adoption in India.
- To examine the impact of EV growth on conventional vehicle segments.
- To assess the economic implications of the transition to electric mobility.
- To evaluate environmental benefits associated with EV adoption.
- To review policy initiatives supporting electric vehicles in India.

4 Trends in Electric Vehicle Adoption

Electric vehicle penetration in India increased from less than 1% in 2020 to approximately 7.8% by FY2025 [9]. This rise indicates that EVs have moved from an early-stage niche to a meaningful presence in select segments, supported by improving product availability and stronger ecosystem development. Growth has been highly concentrated in the two-wheeler and three-wheeler segments, which together account for more than 80% of total EV sales [6]. In comparison, passenger cars and commercial vehicles show slower adoption, reflecting their higher battery requirements, higher purchase prices, and broader infrastructure needs.

Table 1: Segment-wise EV Penetration in India

Vehicle Segment	2020 (%)	2023 (%)	2025 (%)
Two-Wheelers	< 1	5.0	6–8
Three-Wheelers	5.0	20.0	30–40
Passenger Cars	< 0.5	1.5	4–5
Commercial Vehicles	Negligible	0.5	1.5

The rapid adoption of electric three-wheelers reflects strong economic incentives for commercial operators, including lower fuel and maintenance costs. In many cities, three-wheelers also benefit from predictable routes and high utilisation, which strengthens the business case for electrification. Passenger electric cars have witnessed slower growth due to higher upfront prices and limited charging infrastructure, along with consumer concerns related to charging time and real-world driving range.

5 Impact on Conventional Vehicles

The rise of electric vehicles has begun to influence demand patterns for conventional ICE vehicles. While ICE vehicles continue to dominate total vehicle sales, their growth rates have slowed, particularly in urban two-wheeler and three-wheeler markets [3]. This impact is visible through heightened price competition, increasing promotional activity by conventional manufacturers, and gradual changes in consumer expectations regarding operating cost and sustainability.

Table 2: Comparative Characteristics of EVs and ICE Vehicles

Aspect	ICE Vehicles	Electric Vehicles
Fuel Cost	High	Low
Maintenance Cost	High	Low
Urban Suitability	Moderate	High
Tailpipe Emissions	High	Zero
Policy Support	Limited	Strong

Conventionalmanufacturersareincreasinglyinvestinginelectricplatforms, indicatingstrategicrealignmentratherthanmarketexit. Manyfirmsareadoptingaportfolioapproach—maintaining ICE offerings while developing EV lines—suggesting a transition phase where both technologies coexist. This indicates that displacement is gradual and segment-specific, rather than immediate and economy-wide.

6 Economic Implications

Electric vehicles offer lower total cost of ownership compared to ICE vehicles, particularly in high-usage scenarios. Studies estimate cost savings of 20–30% over a five-year ownership period [2]. These savings arise mainly from lower electricity cost per kilometre, fewer moving parts leading to reduced maintenance requirements, and, in some cases, incentive-driven reductions in effective purchase price. However, the magnitude of savings varies by segment, usage intensity, and charging access.

At the macroeconomic level, widespread EV adoption could reduce India's oil import bill by 10–15% by 2030 [12]. EV expansion may also stimulate domestic industrial activity in battery assembly, charging infrastructure, electronics, and associated services, though it simultaneously raises challenges related to raw material sourcing and technology dependence.

7 Environmental Implications

EVs eliminate tailpipe emissions, contributing to improved air quality in urban areas. This is particularly relevant for Indian cities that face persistent particulate pollution and transportrelated emissions. Lifecycle analyses indicate that EVs produce significantly lower greenhouse Table 3: Projected Economic Benefits of EV Adoption

Indicator	Estimated Impact by 2030
TCO Savings	20–30%
Oil Import Reduction	10–15%
Job Creation	60 lakh
EV Market Size	USD 200 billion

gas emissions than ICE vehicles, even under India's coal-dominated electricity mix [1]. As renewable energy capacity expands and grid efficiency improves, the lifecycle emissions advantage is expected to widen further.

Table 4: Environmental Comparison of EVs and ICE Vehicles

Indicator	ICE Vehicles	Electric Vehicles
Tailpipe Emissions	High	Zero
Noise Pollution	High	Low
Urban Air Quality Impact	Negative	Positive
Lifecycle Emissions	High	Moderate

8 Policy Framework Supporting EV Growth

Government intervention has been a decisive factor in EV adoption. The FAME-II scheme and the PM E-DRIVE programme, with an allocation of 10,900 crore, have provided demand incentives and infrastructure support [7, 14]. Such measures reduce the effective price gap between EVs and ICE vehicles and encourage manufacturers and consumers to participate in the transition. In parallel, public procurement and fleet electrification efforts can create stable demand in early market stages.

Several states have introduced additional incentives, further accelerating adoption [15]. State policies often include road tax exemptions, registration fee waivers, subsidies for charging stations, and preferential treatment for commercial electric fleets. The combined effect of central and state policies has helped EV adoption progress faster in some regions than others.

Table 5: Major EV Policy Initiatives in India

Scheme	Allocation	Focus Area
FAME-II	–	Demand incentives
PM E-DRIVE	10,900 crore	EV adoption & charging
State EV Policies	Varies	Local incentives

9 Challenges and Constraints

Despite rapid progress, EV adoption in India faces challenges including inadequate charging infrastructure, high battery costs, limited domestic manufacturing capacity, and uncertainty regarding long-term subsidy structures [14]. Infrastructure limitations affect consumer confidence and restrict inter-city travel feasibility. Battery pricing and supply chain dependence influence affordability, while policy uncertainty can delay purchase decisions and manufacturer investments. To sustain adoption, attention is required on reliable charging availability, grid readiness, standardisation, and domestic manufacturing depth. At the same time, consumer awareness, financing availability, and after-sales servicing capacity are important for mainstream diffusion.

10 Conclusion

The study finds that electric vehicles are increasingly influencing India's conventional vehicle market. While ICE vehicles continue to dominate overall sales volumes, EVs have gained substantial market share in specific segments, particularly two-wheelers and three-wheelers. Economic advantages, environmental benefits, and strong policy support have accelerated this transition. However, infrastructure development and policy stability will be essential to achieving the projected 20–30% EV market share by 2030.

Overall, EVs are currently reshaping competition more through segment-wise disruption and strategic repositioning than through complete substitution of conventional vehicles. A phased and balanced transition strategy is therefore necessary to ensure sustainable mobility without destabilising the existing automotive ecosystem, while also enabling industry adaptation, workforce transition, and long-term environmental gains.

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