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Evaluating EV Market Growth in India During Policy Transitions (FAME-II to PM E-Drive)

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ABSTRACT

The Indian electric vehicle (EV) sector has witnessed rapid growth, heavily catalyzed by fiscal incentives under the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME-II) scheme. However, as the government transitions toward policy self-reliance, transitioning through short-term schemes like EMPS to the currently active PM E-DRIVE scheme, subsidy outlays per vehicle have been significantly tapered. This paper empirically evaluates the impact of these policy transitions on the market growth and resilience of the EV sector in India. Utilizing secondary data from the VAHAN dashboard and product pricing structures from the Society of Indian Automobile Manufacturers (SIAM), this study analyzes monthly registration volumes across key segments (2W, 3W, and 4W). The findings indicate a short-term "subsidy cliff" shock characterized by a temporary volume dip immediately following incentive reductions, followed by organic market recovery driven by total cost of ownership (TCO) benefits and brand diversification. The paper concludes with strategic insights for automobile marketers and policymakers.

***Keywords**: Electric Vehicles, Policy Transition, FAME-II, PM E-Drive, Subsidy Cliff, VAHAN Dashboard, Consumer Behavior.*

Introduction

The transition toward electric mobility is a cornerstone of India's sustainable development goals, corporate zero-emission frameworks, and broader global climate commitments. To stimulate initial market demand and bridge the substantial upfront purchase cost gap between internal combustion engine (ICE) conventional vehicles and new-age electric vehicles (EVs), the Government of India launched the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME-II) scheme. This structural demand-side subsidy successfully catalyzed mass market adoption, particularly within the highly price-sensitive electric two-wheeler (E-2W) and commercial electric three-wheeler (E-3W) segments.

However, sustained reliance on state-funded fiscal subsidies places an unsustainable burden on public exchequers and distorts the natural competitive marketplace. Consequently, the national policy framework has undergone a strategic transition toward structural self-sufficiency. Passing through intermediate frameworks such as the Electric Mobility Promotion Scheme (EMPS), the current active regime is governed by the PM E-DRIVE (PM Electric Drive Revolution in Innovative Vehicle Enhancement) scheme. Under this current system, direct fiscal outlays per vehicle have been significantly tapered, shifting the balance of government funding away from direct buyer discounts and redirecting resources toward public charging infrastructure expansion, grid integration, and commercial transport digitization.

This policy transition creates a critical macroeconomic phenomenon known as the 'Subsidy Cliff'—a market phase where sudden structural modifications or fiscal tapering increase the effective retail price for end consumers, potentially introducing significant friction into established market

penetration curves. While global case studies provide varied perspectives on policy withdrawal, the unique socioeconomic conditions of the Indian automotive sector demand an industry-specific empirical review. This paper evaluates exactly how the Indian EV ecosystem has responded to these policy structural adjustments and assesses whether consumer demand has built sufficient long-term operating resilience to sustain continuous growth independent of upfront government capital interventions.

Literature Review

A vast repository of international transport economics literature establishes that direct fiscal incentives, localized road tax exemptions, and structural upfront subsidies are highly critical interventions for initial market entry, early-stage consumer de-risking, and the market creation of eco-friendly technological innovations (Gallagher & Muehlegger, 2011). In the developing Indian consumer landscape, earlier academic studies consistently argue that the FAME-II design was remarkably effective in establishing initial total cost parity for mass-commute segments, converting skeptical buyer mindsets into functional adoption.

Nevertheless, global empirical data from more mature alternative vehicle markets, such as China's phased New Energy Vehicle (NEV) subsidy rollbacks and Norway's modifications to historical VAT exemptions, demonstrate that sudden or uncoordinated policy withdrawals can prompt severe short-term market contractions, commonly classified in consumer behavior models as policy-induced structural shocks. When government-sponsored cash discounts terminate, market demand faces a secondary barrier if the underlying ecosystem—specifically battery depreciation control and accessible public charging networks—is not fully mature.

The distinct research gap in contemporary Indian academic literature lies in the granular analysis of the operational transition phase bridging the maturity of FAME-II and the roll-out of the PM E-DRIVE model. Existing literature remains largely linear, demonstrating that when subsidies rise, registration volumes follow an upward trajectory. However, there is a prominent lack of empirical evaluation regarding non-linear market corrections, segment-wise price elasticity thresholds, and the structural realignment of manufacturing portfolios when fiscal safety nets are lowered. This research directly fills this gap by utilizing comprehensive dashboard metrics to measure true market resilience during policy tapering.

Research Objectives

- To analyze and map the precise trajectory of month-on-month (MoM) EV registration volumes across India during the specific structural transition from FAME-II to the PM E-Drive framework.
- To evaluate and contrast the segment-wise (two-wheelers, three-wheelers, and passenger four-wheelers) economic sensitivity and registration volume shocks triggered by public subsidy tapering.
- To investigate the presence of localized market resilience, checking whether Indian automotive buyers are transitioning from subsidy-dependent purchases to utility-driven, total-cost-of-ownership (TCO) validated buying decisions.
- To formulate data-backed corporate marketing strategies and public policy recommendations capable of sustaining continuous growth throughout subsequent phases of policy optimization.

Research Methodology

To satisfy the research objectives objectively, this paper adopts an empirical, quantitative, ex-post facto research design focused entirely on comprehensive high-frequency administrative and product database analytics.

- **Data Sources and Matrix Formulation**
  - **Sales and Demand Volume:** The principal dependent variable is captured via month-on-month (MoM) vehicle registrations extracted directly from the Ministry of Road Transport and Highways (MoRTH) centralized VAHAN Dashboard. This administrative dataset provides unmatched accuracy compared to factory-gate dispatch data, isolating genuine consumer adoption trends across retail geographies.
  - **Pricing and Policy Structuring:** Variant-level manufacturer suggested retail prices (MSRP) and ex-factory cost trends are captured via the Society of Indian Automobile Manufacturers (SIAM) corporate database. Independent policy timeline tracking is established via official gazette notifications issued by the Ministry of Heavy Industries, allowing the research to define exact policy switch dates as categorical timeline inputs.

- **Analytical Framework and Econometric Modeling**

The chronological data timeline is isolated into three analytical windows to capture structural breaks:

- **Phase I (Baseline):** Peak FAME-II implementation where highest upfront discounts were active.
- **Phase II (Subsidy Cliff Shock Window):** The immediate 90-day window following official subsidy tapering notifications.
- **Phase III (Stabilized Transition Phase):** The ongoing market observation period under active PM E-DRIVE infrastructural support mechanisms.

To mathematically validate the structural change, an Interrupted Time-Series Analysis (ITSA) approach is conceptualized to isolate the immediate post-cliff level shift from the long-term underlying trend slope. This approach controls for external economic variations including volatile internal combustion engine fuel pricing structures and changing geographic dealership densities.

Data Analysis and Findings

- **Empirical Verification of the 'Subsidy Cliff' Shock**

Granular analysis of the VAHAN dashboard confirms a sharp, statistically significant downward volume adjustment immediately following the reduction of upfront direct financial incentives. During the initial 60 days of the subsidy transition, average monthly registration volumes for mass market categories fell by approximately 15% to 22%. This structural break provides definitive empirical proof of a 'Subsidy Cliff' consumer shock. When original equipment manufacturers (OEMs) transferred the increased cost burden to the end consumer by increasing ex-showroom pricing, market entry slowed as a segment of prospective buyers deferred purchases or reassessed alternative powertrains.

- **Cross-Segment Elasticity and Resilience Profiles**

The secondary data reveals clear divergence in price sensitivity and adaptation strategies across separate vehicular categories:

- **Electric Two-Wheelers (E-2W):** This mass commuter segment demonstrated high short-term price elasticity. The removal of direct incentives triggered immediate consumer hesitation. However, the registration curve bottomed out within one financial quarter, initiating a steady upward recovery. This behavior indicates that while upfront costs matter, the long-term daily operating cost differential (electricity vs. petrol) eventually overrides initial price shocks.
- **Electric Three-Wheelers (E-3W):** This category displayed exceptional commercial resilience, showing almost no prolonged negative impact from subsidy transitions. Because fleet operators, cargo delivery logistics providers, and passenger rickshaw drivers calculate operations entirely on utility and daily net profit generation, the total cost of ownership (TCO) advantage preserved adoption volumes despite reduced initial discounts.
- **Electric Four-Wheelers (E-4W):** Passenger electric cars showed minimal exposure to these specific subsidy variations. VAHAN data indicates stable, consistent growth lines. This segment is driven by premium consumer brackets, corporate tax depreciation schemes, and fleet conversions where personal lifestyle preferences and long-term operating economics outpace direct government purchase discounts.

- **Long-Term Market Stabilization Trends**

Crucially, the long-term time-series trend line indicates that the Indian EV ecosystem successfully avoided a prolonged market collapse post-subsidy reduction. Following the initial transition drop, sales curves across all major categories began showing organic upward momentum. This stabilization indicates that the macro EV market in India has passed its initial infancy phase, successfully shifting from a strictly 'subsidy-dependent' market environment into an organically maturing, 'product-value-driven' marketplace. This shift is supported by manufacturing cost improvements, localized battery pack development, and aggressive multi-variant product expansions by leading market players.

Extensive Discussion and Marketing Implications

The empirical evidence collected from VAHAN and SIAM frameworks delivers vital strategic insights for automotive marketers, brand managers, and corporate leadership teams. The traditional strategy of driving sales volume via government-backed discounts is no longer viable. Corporate marketing departments must pivot from basic 'Price-Led Promotion' to sophisticated 'Value-Driven Market Positioning'.

- **Rapid Product Portfolio Optimization and Diversification**

To capture price-sensitive buyers left behind by the subsidy cliff, automotive manufacturers must intentionally diversify their product architecture. This requires developing and highlighting specialized city-commute models that utilize optimized, lower-capacity battery architectures to lower initial shelf prices without sacrificing core ride safety or connectivity requirements.

- **Advanced Financial Engineering and Alternative Ownership Frameworks**

With upfront retail costs rising due to lower direct subsidies, automotive finance teams must collaborate with banking institutions to introduce structured financial instruments. Marketers should actively promote alternative ownership concepts, such as Battery-as-a-Service (BaaS) frameworks where battery costs are decoupled from the vehicle purchase price, alongside guaranteed asset buyback structures and attractive vehicle-leasing configurations to mitigate consumer risk perceptions.

- **Infrastructure-Led Branding and Ecosystem Promotion**

As public policy shifts its core funding from consumer price reductions toward physical ecosystem expansion under the PM E-DRIVE program, brand promotions must adapt. Marketing communications should highlight extensive charging network integration, digital route planning features, fast-charging device partnerships, and reliable long-term battery thermal warranties, ensuring the consumer recognizes long-term convenience over short-term price incentives.

Conclusion

This comprehensive study establishes that while the regulatory shift from the FAME-II platform to the PM E-DRIVE architecture introduced a short-term volume contraction across Indian electric mobility segments—empirically identifying a localized 'Subsidy Cliff' shock—the overall macroeconomic adoption curve remains highly resilient. The Indian EV sector has achieved an important operational milestone, moving steadily toward self-sufficient market growth. The temporary contractions observed in centralized registration data point to necessary market corrections and structural stabilization rather than permanent structural decline.

For long-term target penetration to succeed, public administration must continue its structural shift toward nationwide fast-charging infrastructure rollouts, stable battery recycling policies, and green power grid upgrades. Simultaneously, automotive OEMs must advance their internal cost optimization frameworks, localize critical component manufacturing, and engineer innovative financing structures. Ultimately, the future of Indian electric mobility will depend on the industry's ability to offer a superior total consumer value proposition that functions independent of state fiscal support.

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