

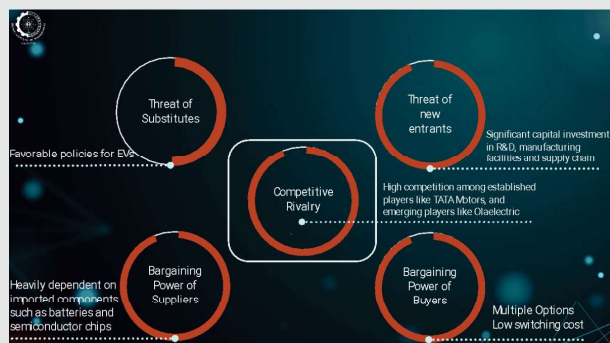
EV industry in India: A positive disruptor

by Abhishek Raj and Deepak Rohilla

India's electric vehicle (EV) industry is rapidly evolving and emerging as a significant disruptor in the automotive sector. With the Indian government's ambitious target of achieving 30% electric vehicle adoption by 2030, alongside increasing environmental consciousness and technological advancements, the industry is poised for substantial growth. In the first half of 2024, the Indian EV market expanded by 155% compared to the same period in 2023, according to the Society of Manufacturers of Electric Vehicles (SMEV), indicating strong momentum in the sector.

The Indian government's support has been crucial in this expansion, as evidenced by the 2024 Union Budget allocation of INR 8,000 crore (approximately USD 1 billion) towards subsidies for EV manufacturers and buyers and INR 2,500 crore (approximately USD 310 million) for the development of charging infrastructure. Despite these positive strides, the industry faces several critical challenges that must be addressed to sustain growth and achieve widespread adoption.

Here is the snapshot of a porterian analysis we we did on India's EV industry:



Challenges in the EV Industry and AI-Driven Solutions

The EV industry in India, despite its growth potential, faces three significant challenges:

1. Battery Manufacturing Insufficiency
2. Inadequate EV Infrastructure
3. Provision for Disposal of Used Batteries

1. Battery manufacturing insufficiency

Problem: The reliance on imported battery cells leads to supply chain vulnerabilities and cost uncertainties. For example, disruptions in imports from China in 2023 resulted in production delays and increased costs for Indian EV manufacturers.

AI Solution: AI can optimize the battery supply chain by predicting the best times to purchase raw materials based on market trends and historical data, minimizing costs and reducing reliance on imports. Amara Raja Batteries is exploring AI-driven strategies to enhance battery manufacturing efficiency and reduce import dependency.

2. Inadequate EV infrastructure

Problem: India's EV infrastructure is still underdeveloped, with approximately 20,000 public charging stations, far below the requirement for widespread EV adoption. This shortage affects consumer confidence and limits the growth of the EV market.

AI Solution: AI can analyze traffic patterns, vehicle density, and power grid capabilities to optimize the placement of new charging stations. Lithium Urban Technologies uses AI to identify the most strategic locations for charging stations, maximizing efficiency and reducing installation costs.

3. Provision for disposal of used batteries

Problem: The disposal of used batteries poses a significant environmental risk. Without proper recycling and disposal methods, toxic materials from batteries can contaminate soil and water sources, as seen in urban areas like Delhi and Mumbai.

AI Solution: AI can enhance recycling processes by optimizing collection routes and improving sorting mechanisms to increase the recovery rate of valuable materials. Attero Recycling is leveraging AI to improve battery recycling techniques, reduce environmental impact, and promote sustainability.



Optimizing service levels with the Newsvendor Model

The Newsvendor model is a decision-making tool used to determine optimal inventory levels by balancing the costs of overstocking and understocking. In the context of the EV industry, this model can help manufacturers and suppliers optimize service levels based on fluctuating demand and dynamic market conditions.

Use Case: Optimizing Inventory with AI and the Newsvendor Model

Challenge: Optimizing inventory costs while abreast with emerging technologies and increasing brand equity.

Solution with AI: AI can enhance the Newsvendor model by incorporating real-time data analytics and machine learning algorithms to predict demand more accurately. For example,

Mahindra Electric uses AI-driven demand forecasting to adjust its production schedules dynamically, ensuring optimal inventory levels, thereby reducing waste and improving service levels.

Implications of AI integration in the EV industry

1. Integrated value chain: AI enables a more integrated value chain, reducing costs, enhancing efficiency, and improving responsiveness to market changes.

2. India's transformation and positive externalities: AI can enhance the cost-competitiveness of India's EV industry by creating jobs, driving innovation, reducing fossil fuel dependency, and improving public health and air quality, thereby uplifting society.

3. Meeting increased electricity requirements through renewable sources:

With the rising adoption of EVs, there is a growing need for sustainable energy solutions to meet increased electricity demand. AI can optimize the integration of renewable energy sources, such as solar and wind, into the grid, ensuring a stable and green electricity supply for EV charging stations. Companies like ReNew Power use AI to manage energy flow efficiently from renewable sources to meet the growing demand for EV charging.

Financial aspects and capital structure optimization

1. Opportunity to optimize financing costs

- **Tax breaks and incentives:** The Indian government offers various tax incentives for EV manufacturers and buyers, including reduced GST rates and income tax rebates. These incentives lower the effective cost of capital for EV companies, making financing more accessible and affordable.

- **Inflation:** High inflation rates can increase the cost of raw materials and labor, affecting the overall cost structure of EV manufacturing. However, with effective financial planning and cost management strategies, companies can somewhat mitigate the impact of inflation.
- **Interest rates:** Lower interest rates in countries allied with India, such as Japan and the EU, allow Indian EV companies to secure cheaper loans and financing options. By leveraging these low-interest environments, companies can reduce their financing costs and invest more in R&D and infrastructure development.
- **Geopolitical status:** India's stable geopolitical relationships with key countries provide a favorable environment for attracting foreign investments. The expected conclusion of the Free Trade Agreement (FTA) with the EU will likely open up opportunities for Indian EV manufacturers to access technology and capital at reduced costs, enhancing global competitiveness.

2. AI's role in capital structure optimization:

- **Dynamic financial modeling:** AI can create dynamic financial models that consider demand forecasting and responsiveness to the VUCA environment.

- **Risk management:** AI algorithms can assess the risk profile of different financing options, helping companies choose the best mix of debt and equity based on their risk tolerance and market conditions.

Conclusion

The EV industry in India is at a pivotal moment, with significant potential to reshape the country's automotive landscape. While battery manufacturing, infrastructure, and sustainability challenges persist, AI integration offers innovative solutions to these problems. By optimizing demand forecasting, enhancing value-added services, and improving supply and manufacturing capabilities, AI helps create a more integrated and efficient value chain.

This transformation brings substantial economic benefits, including job creation, environmental sustainability, and new growth opportunities for MSMEs. By strategically leveraging AI and focusing on renewable energy, India can lead the global transition to electric mobility, ensuring a sustainable and prosperous future.

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