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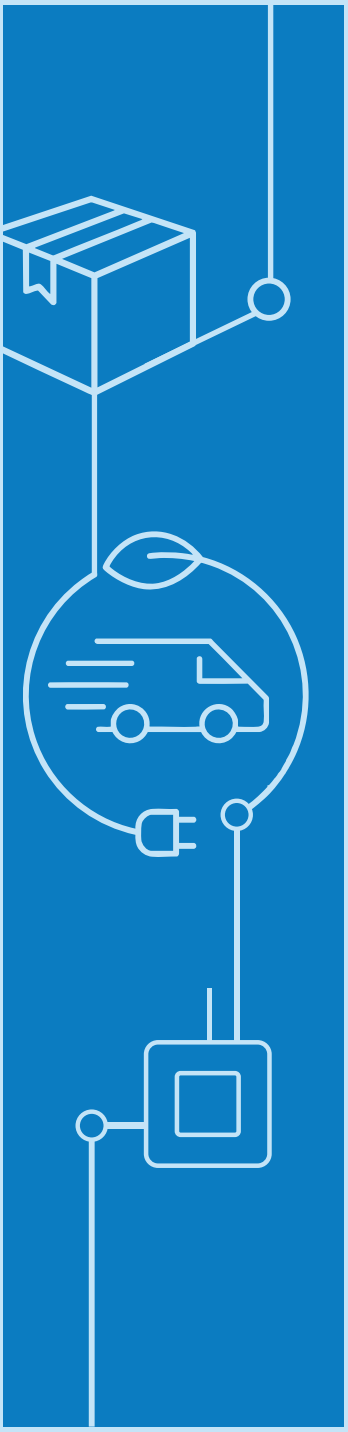

HOW GENAI TURBOCHARGES THE AUTOMOTIVE SUPPLY CHAIN

The automotive industry is undergoing a radical transformation, shifting to software-defined, autonomous, connected, and electric vehicles (EVs), which demands a complete overhaul of traditional mechanical systems and a renewed focus on sustainability and ethical sourcing. This transition necessitates a rebuild of supply chains, with automakers forging long-term agreements for critical materials and diversifying their sourcing pools to meet EV production targets while reducing carbon footprints. Navigating these complex global supply chains, from demand forecasting to regulatory compliance and sustainable practices, is being fundamentally simplified and optimized by Generative AI (GenAI). GenAI platforms provide real-time visibility, enable accurate demand forecasting, streamline procurement, enhance supplier relationship management, and revolutionize warehouse and logistics operations, ultimately empowering OEMs to achieve greater efficiency, resilience, and sustainability across their entire value chain.

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Software-based vehicle architecture is foundational for the next generation of autonomous, connected and electric automobiles. Mechanical systems installed in ICE vehicles, such as engine blocks, exhaust systems and engine oil filters, are being replaced with artificial intelligence (AI)-powered processors, advanced electronics, and electrical components. Moreover, these advanced vehicles are being designed to enable the circular economy – enhance the use of recycled materials and replace carbon-intensive raw materials with sustainable alternatives. Notably, regulations mandate ethical sourcing and carbon-light operations by original equipment manufacturers (OEMs).

Automakers need to rebuild their supply chains as assembly lines are being recalibrated to ramp up electric vehicle (EV) production. A diversified sourcing pool and an agile supply chain are imperative to ensure access to raw materials, achieve production targets, and rationalize costs, while reducing the carbon footprint.

Auto brands are entering into long-term agreements with global suppliers to secure the supply of essential materials (steel, copper and aluminum) and rare earths / critical minerals for batteries (lithium, graphite, cobalt, and nickel). General Motors has partnered with Element 25, an Australian mineral exploration company, for sourcing battery-grade manganese sulfate, a key ingredient in lithium-ion battery cathodes for EVs. In addition, General Motors has signed a deal with ArcelorMittal for supply of recycled and renewably produced (RRP) steel. Similarly, Ford has invested in an Indonesia-based nickel facility to meet the demand of EV battery plants in USA.
Demand-side dynamics, a complex supplier ecosystem, and emerging regulations challenge multi-year contracts with mining and manufacturing companies. Further, the end-to-end automotive supply chain needs to address diverse criteria, including fulfilling consumer demand, enabling cost-effective procurement, ensuring precision distribution and logistics operations, minimizing emissions and waste, and complying with regulations, notably product traceability.

Technology simplifies supply chain operations

The integration of generative AI (GenAI) systems into supply chain processes enables OEMs and tier-1 suppliers to monitor, analyze and optimize operations in real time. GenAI-driven automation creates a unified ecosystem spanning data, applications, workflows, and processes. This enables OEMs to gain real-time visibility across suppliers, manufacturing sites, inventory systems, distribution centers, and logistics partners.

Generative AI platforms simulate scenarios based on multiple variables, such as historical sales data, market trends, external risk factors, and supplier schedules. It generates accurate demand forecasts, which enables data-based inventory planning and production scheduling. Further, evidence-based predictions empower production planners to assess production requirements and optimize requisitions for a broad gamut of supplies. In turn, it rationalizes the inventory of raw materials, spare parts, sub-assemblies, and finished products.

A unified supply chain ecosystem enhances analytical and decision-making capabilities, while enabling a collaborative approach to streamline processes and boost resilience. Notably, the ability to identify potential bottlenecks and generate contextual recommendations drives operational efficiency, be it via route replanning to mitigate disruption or warehouse layout optimization to reduce costs. Significantly, it allows OEMs to align procurement with sustainability goals.

Drive smart sourcing and parts management

Accurate demand forecasts streamline inventory and order management. GenAI platforms help revamp the procurement strategy for direct purchase from metals and minerals enterprises, and semiconductor manufacturers. Direct access to the source ensures ready supply and enhances parts replenishment strategies by supporting dynamic inventory policies, such as reorder point and safety stock level. Moreover, smart frameworks facilitate sourcing diversification while addressing requirements in terms of costs, lead times, flexibility, and carbon footprint.

GenAI models ensure sustainable sourcing and avoid disruptions by identifying supplier risks and predicting bottlenecks. AI algorithms assess supplier performance based on sustainability metrics. It also enables OEMs to prioritize suppliers that undertake end-of-life vehicle, battery and component recycling programs.

The automotive business is challenged by traceability of components and sub-assemblies. GenAI-powered models adopt a standardized approach to boost procurement transparency, and mitigate product, environmental and social risks across the supply chain. Volkswagen implemented a Raw Materials Human Rights Due Diligence Management System (RM HR DDMS), as part of its responsible sourcing program. This due diligence system of VW helps identify and assess human rights risks and the use of forced labor in the raw materials supply chain. It prevents human rights violations and establishes a verifiable record of ethical sourcing for the carmaker.

AI platforms automate end-to-end ordering processes and approval pathways. It not only boosts accuracy and efficiency but also enables seamless flow of information across geographically distributed teams. This improves sourcing cycle times. Moreover, AI-driven predictive insights and real-time alerts are useful to manage vulnerabilities and ensure regulatory compliance in a dynamic business landscape.

Simplify contract and supplier management

Autonomous driving and advanced vehicle safety systems are now integral to product lines and models. Automakers need to develop long-term partnerships with hardware, software and technology companies. The broader set of challenges: supplier evaluation, selection, negotiation of the partnership structure, finalization of the terms of agreement, design of a governance model, and establishment of metrics for performance monitoring for sophisticated supplies.

GenAI offers a robust solution for contract and supplier management. It simplifies contract drafting, analyzes specific clauses, and provides recommendations for effective negotiation. Procurement professionals are tasked with processing and managing a huge volume of data, ranging from vehicle technical characteristics and supplier credentials to price trends. Generative AI tools summarize and interpret data at scale. It synthesizes information from internal sources, such as warranty failures, and external reports, and correlates data to quantify supplier risk, recommend contractual terms, and offer actionable insights to accelerate contractual documentation.

AI-based analysis of the end-to-end supply chain network, classification of sourcing options, and risk scoring of suppliers drives smart operations. It allows OEMs to respond to and resolve supplier as well as SKU-level issues promptly. For instance, identify alternative suppliers due to price fluctuations for a specific part, or modify sourcing allocations among suppliers in the event of shipping constraints. Predictive insights into contractual obligations and supplier performance not only facilitates risk management, but also deepens supplier relationships.

Toyota Motor is a leader in supplier relations, according to the Plante Moran North American Automotive OEM Supplier Working Relations Index 2025. The ranking is based on suppliers' perception of how OEMs help them reduce cost to serve, and foster trust, among other criteria.

Improve warehouse and logistics operations

A smart automotive ecosystem is geared for warehouse capacity optimization, intelligent delivery routing, and efficient logistics planning. It rationalizes costs and accelerates delivery times, which are critical for production management and customer engagement. GenAI-based warehouse management maximizes space utilization, optimizes layout for robotic materials handling, and offers real-time visibility into inventory movement.

The 'Penske 2025 Transportation Leaders Survey: A Road to AI Adoption' revealed that transportation and logistics enterprises adopting AI realized benefits in terms of lower fuel usage, cost reduction, and lesser miles traveled through smart routing and optimization Notably, in the survey, leaders highlighted the need for better visibility into maintenance costs, fuel price trends, and fleet utilization.

GenAI models leverage rich data sets to run test scenarios, simulate real-world conditions, and share vehicle as well as fleet-level insights. Real-time simulations and predictive insights allow auto manufacturers to adapt to dynamic market conditions. Further, GenAI systems continuously learn from diverse data sources to improve recommendations, and augment operational decision-making capabilities, be it to minimize delays, reduce emissions, or enhance resource utilization.

Integrating GenAI into the enterprise

While GenAI solutions boost the efficiency, adaptability and resilience of global supply chains, the seamless integration of GenAI techniques into an existing technology landscape demands technical and functional expertise. Digital technology service providers build bespoke GenAI systems that align with the process and technology requirements of OEMs.

Technology experts implement holistic frameworks that mitigate risks irrespective of the auto enterprise AI maturity curve, while accelerating time-to-value of specific use cases and pilot projects. Significantly, the focus on data quality, fine-tuning of generative AI models, and constant monitoring enhance the accuracy and relevance of output.

About the Author

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Sharad is the Vice President and Market Leader for Manufacturing segment in Europe at Infosys. In a career that spans over two decades, he has played an instrumental role in establishing the company's presence in the manufacturing sector in Nordics and Benelux markets, which includes automotive, aerospace, discrete/industrial, and chemicals/resources. Leading with a consultative, problem-solving approach, his teams have been pivotal in building alliances and partnerships and a well-defined go-to-market strategy. Sharad and his team have helped clients set up best-in-class service operations leveraging people amplifiers and using technologies like Artificial Intelligence, Automation/Robotics, IoT/Industry 4.0, and DevOps/Agile.

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