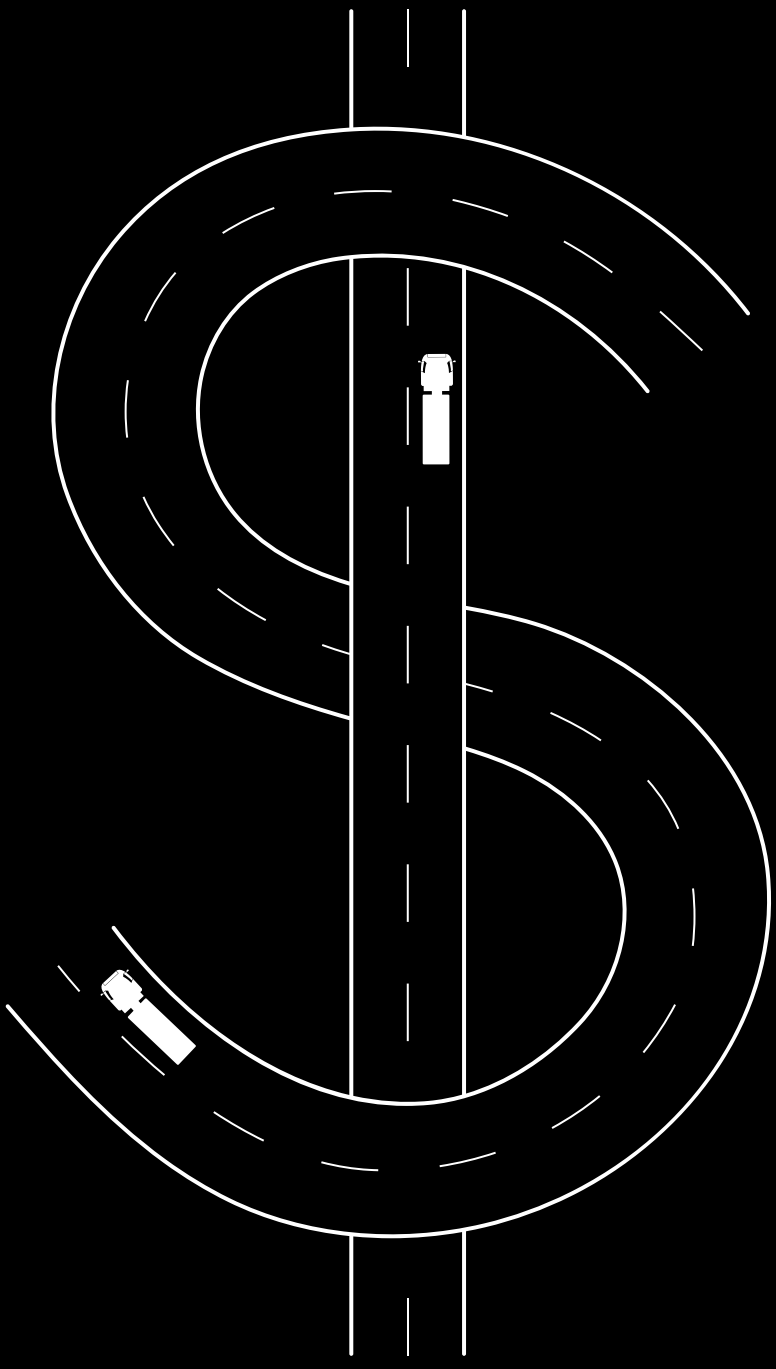
# MOVING THE GOALPOSTS: AI AND LOGISTICS

Artificial intelligence (AI) is going mainstream because of two parallel events – unprecedented availability of computing power and business outcomes from analyzing big data. This article explores how AI models capitalize on big data to reinvent logistics.

Logistics accelerates the movement of goods and provides a fillip to global trade. Logistics enterprises can ensure the smooth flow of commodities and finished products over land, sea, and air. These enterprises function in a borderless world, connect the dots between the central hub and spokes, streamline processes, and ensure that business users are empowered to make timely and informed decisions for logistics to function with clockwork precision. The catalyst for this synchronicity is the voluminous data harnessed during the journey of goods from origin to destination. However, enterprises face situations such as shipments that are misdirected, stuck in transit, or that cannot be traced. Machine learning can convert this logistical challenge into an opportunity. In fact, the compounding effect of big data and AI can create hyper-efficient logistics enterprises operating in a smart ecosystem.

Remote sensing, the Internet of Things (IoT), telematics, and geospatial mapping embed information into products and the vehicles transporting them – the origin, destination, journey, and the recipients of goods. So the physical flow of materials across the supply chain leaves a trail of data – which is usually in an unstructured format and scattered across



## Destination delight.

AI is revolutionizing logistics by optimizing resource utilization, increasing profit margins, and delighting enterprises and customers.

the ecosystem. This is a sweet spot for AI, which depends on large volumes of data to extract knowledge and learn through self-analysis.

The logistics industry can use AI tools to integrate data from diverse sources, devices, and systems, and distill business insights, letting them evaluate how road, air, rail, and ocean carriers, freight forwarders, third-party logistics (3PL) firms, and enterprises make informed decisions and operate more profitably.

## Last mile efficiency

Route optimization rationalizes the cost of last mile delivery, which is a significant overhead in logistics expenditure. AI algorithms can leverage historical trip sheets and real-time statistics to estimate the delivery time for each shipment. Continuous analysis improves the accuracy of projected delivery. Data-driven operating models are already helping food distributors such as Sysco, retailers such as Walmart and Tesco, and logistics providers like UPS, DHL, and FedEx provide same-day delivery – the Holy Grail in B2C logistics service.

*Schmitz Cargobull, a German trailer and truck body manufacturer, monitors maintenance requirements, cargo transported, and delivery routes of trailers to minimize vehicle breakdown.*

AI platforms optimize the route of every delivery vehicle in real time. Streams of geographical, environmental, traffic, and shipment data are correlated with designated delivery time windows and vehicle information to sequence deliveries and generate the best route for each shipment. The next best point of delivery or a modified route can be calculated based on constraints / events, and shown on a live map. The most optimal delivery route is shared with the driver via the on-board navigation system of the vehicle – during the journey.

Data-laden dashboards help logistics facility managers take informed decisions by monitoring the performance of drivers, specific facilities, and the enterprise networks. Real-time visibility into key performance indicators such as units moved per hour for each category of product / parcel / pallet, average vehicle speed, and total travel time, help benchmark and improve service planning.

## Network optimization

Since omnichannel marketing is a business imperative for enterprises, the location and layout of warehouses need to be reoriented for anytime, anywhere delivery. Big data helps enterprises, government agencies, and lending and economic development institutions determine the location of the distribution infrastructure. The World Bank is using big data optimization methods to develop a multi-modal transport network in India. Open spatial information helped create and validate a pilot model for identifying locations of multi-modal ports.

AI-driven analytical tools help logistics providers aggregate customer demand and simplify distribution networks, while managing inventory. Intuitive systems optimize the distribution network and ensure smooth warehouse operations by instantly mapping capacity and availability of equipment as well as manpower with workload, and providing visibility across warehouse and transportation processes. An analytical approach improves stow accuracy and maximizes the usage of assets, including conveyors and rack systems.

Logistics companies can improve productivity as well as resource utilization at warehouses and distribution centers by capitalizing on predictive AI algorithms and analytics. Predictive maintenance of trucks, conveyors, forklifts, and trailers rationalizes warehousing and distribution costs.

Real-time data from automated materials handling systems and equipment in the facility enhances operations of large warehouses. Optimizing the route for clamp trucks and forklifts handling inbound and outbound cargo expedites movement, saves fuel, and ensures safety.

Amazon uses big data to manage 1.5 million items sold through a complex network of fulfillment centers, redistribution centers, regional sortation centers, delivery stations, and Prime Now Hubs.

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## Freight consolidation

AI models offer insights into products, and volume and number of shipments – by location, customer, season, mode of freight, preferred delivery time frames, and transport prerequisites such as ambient temperature or humidity. It helps logistics enterprises consolidate shipments to reduce transit time, control costs, and improve customer service. Significantly, it maximizes capacity utilization despite variability in demand for B2B and B2C shipments. Small parcels can be converted into Less-Than-Truckload (LTL) shipments, and LTL freight into minimal stop truckloads.

Advanced logistics applications integrate simulation and AI to help logistics service providers implement cost optimization strategies. Damage claims can be analyzed across delivery routes and modes of transport. It supports rate negotiations for high-risk cargo, and enhances damage mitigation approaches. Rule-based AI solutions detect fraud and errors by tracking supply chain events and documents.

Avnet, a small-parcel distributor of electronic components, leverages more than 250 million data values from 5 million annual shipping transactions to identify carriers presenting invoices with errors, and analyze spend to defer delivery and save costs.

## Resource utilization

Automated systems track pickup and delivery orders, job schedules, and crew availability to assign work, manage the fleet, and streamline the logistics network. Machine learning systems deliver long-term value by predicting constraints in the ecosystem and mitigating process bottlenecks in real time.

AI rules evaluate job priority, cargo type, weather, traffic, and resource capabilities to make business decisions about movement of freight. Load pooling rationalizes pricing as well as the cost of operations. In addition, it helps air, land, and ocean logistics service providers maximize resource utilization, including manpower, cargo handling equipment, transport vehicles, and space. Self-learning systems and AI frameworks will be an integral part of logistics solutions even as autonomous vehicles and drones are adopted for last mile delivery, and alter the distribution landscape.

An AI resource allocation engine optimizes daily schedules and manages engineering as well as maintenance activities for rail lines in Hong Kong. In addition, the Hong Kong Airport Authority deploys an AI scheduling system to allocate parking slots to aircraft based on flight schedules and shifts in operational dynamics.

*Algorithms can help maximize capacity utilization despite variability in demand for B2B and B2C shipments.*

## About the Author

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*Madhu started his career with Infosys in 1996. He has over 26 years of experience in defining strategic business solutions and IT consulting for several companies in Japan, Europe, and North America. Madhu oversees several retail and CPG accounts in the US and has expertise in developing and maintaining strong client relationships. With his collaborative approach to innovation, he has led teams to consistently deliver client delight, in challenging business–technology environments.*

*Madhu has a master's degree in computer applications from the Regional Engineering College, Trichy, India (now a National Institute of Technology). He enjoys cooking and hiking, and is active in the community, teaching at the local university. He also runs a private trust that focuses on education and healthcare for the underprivileged in India and some parts of Africa.*

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