



Driving AI in Transportation Management

AI is driving logistics into a smarter, safer, and sustainable future

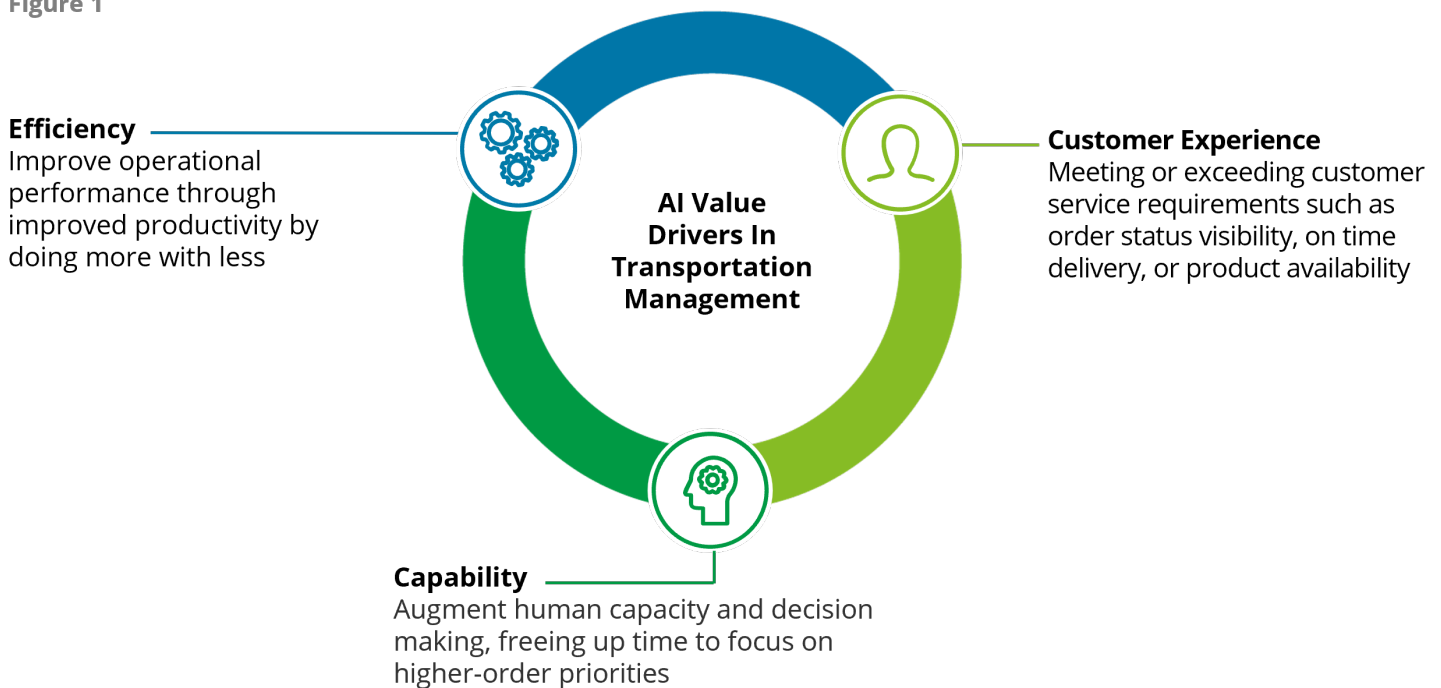
Impact of AI in logistics

In today's volatile supply chain environment, disruptions are no longer rare exceptions; they're part of the norm. To stay competitive, organizations must navigate a complex landscape where agility, resilience, and efficiency aren't trade-offs but co-existing imperatives. Agility enables proactive decision-making in the face of complexity, while resilience provides the structural capacity to absorb and adapt to uncertainty without compromising performance. Efficiency keeps operations sustainable and scalable. The challenge lies in striking the right balance across all three. One-way leading companies with a large transportation function are doing this is by embedding proven AI capabilities into their day-to-day operations. These tools are not just enhancing visibility or automating tasks, but they're helping build signature capabilities that differentiate companies in a crowded market. Leading organizations are building processes that rely on analytics and AI to tailor responses to specific disruptions or market conditions, rather than applying broad, one-size-fits-all solutions. This article will explore how organizations can embed AI in transportation management to create differentiated capabilities, solve real world problems, and leverage practical steps to get started.

Value Drivers in Transportation

AI is unlocking transformative value across the transportation sector; third party research firms suggest the global AI in transportation market size is estimated to reach \$34.8B USD in 2034, representing a 22.7% CAGR over the next decade.¹ This will drive significant improvements in efficiency, customer experience, and organizational capability. AI enhances efficiency by streamlining processes and optimizing resource use, enabling organizations to achieve greater productivity with fewer resources. AI can also elevate the customer experience by providing real-time visibility, ensuring on-time deliveries, and improving service reliability. Additionally, AI augments human capability by automating routine decisions and analytics, allowing staff to focus on strategic initiatives and complex problem-solving.

Figure 1

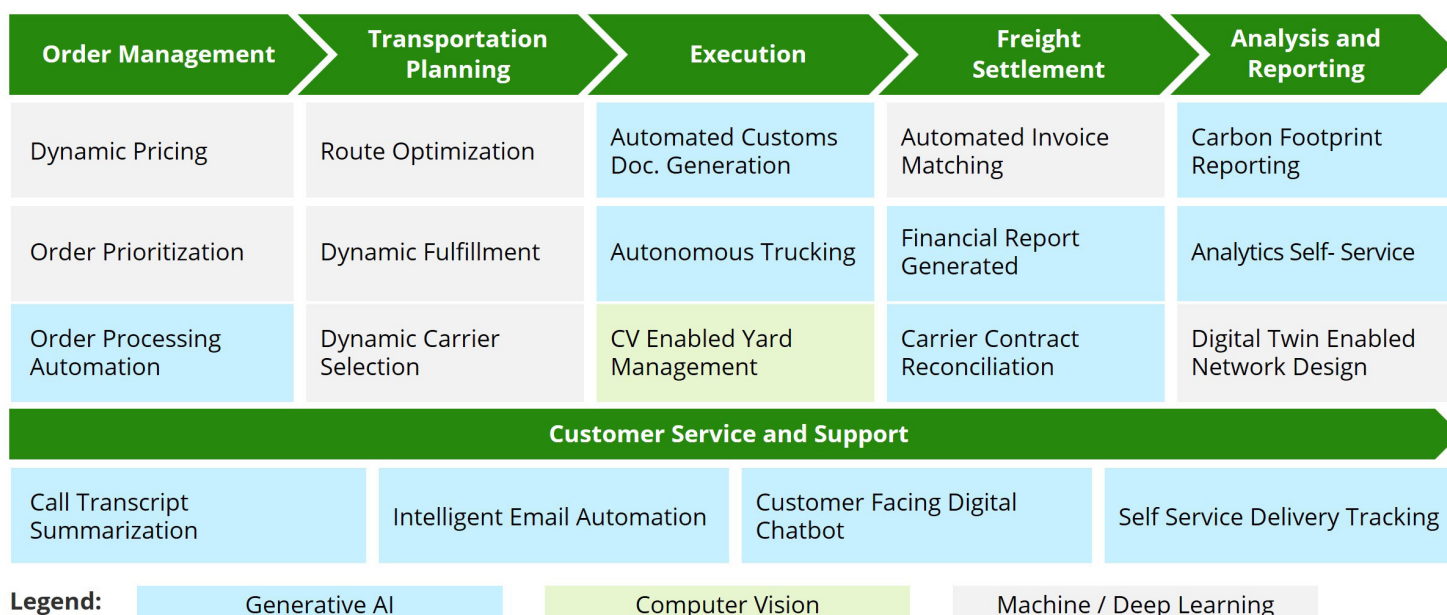


Integrating AI into the Transportation Value Chain

AI is reshaping every stage of the transportation value chain, unlocking both near-term gains and long-term capabilities. From the moment an order is placed to the final mile of delivery and beyond, it is changing how decisions are made, and actions are executed. Its reach extends past core planning and execution into freight settlement, analytics, reporting, and customer service, functions that shape the overall customer and operational experience.

AI can be applied across the transportation value chain; Figure 2 maps applicable use cases from order management through planning, execution, freight settlement, and analytics. Along the bottom illustrates customer service and support capabilities that cut across all stages, showing how AI improves visibility, communication, and responsiveness throughout the journey. This end-to-end view highlights where AI is already delivering measurable impact and where it holds the greatest potential for future value.

Figure 2



Building on this framework, six practical examples come from real-world AI deployments that solve specific challenges and deliver measurable results. These AI-driven solutions optimize operations, enhance decision-making, and help create transportation networks that are more agile, efficient, and resilient:

- 1. Dynamic Pricing** enabled by Uber Freight's Lane Explorer publishes live, AI-priced quotes. Shippers can lock a rate up to two weeks before pick-up, insulating themselves from daily volatility and eliminating much of the ad-hoc bid/spot cycle that clogs traditional TMS workflows.²
- 2. Route Optimization** implemented by UPS, through its ORION system, leverages AI to optimize delivery routes. The system analyses over 200K routes per minute, helping drivers find the most efficient paths, reducing travel time, and cutting fuel consumption.³
- 3. Computer Vision Enabled Yard Management** with CargoEzye is Deloitte's cloud-based solution that uses computer-vision to detect, identify, track and locate shipping containers at your site. Use cases can extend to automating gate, yard, and loading dock activities using existing camera infrastructure.⁴
- 4. Automated Invoice Matching** with Siemens' NextGen Purchase-to-Pay applies document-understanding AI to match POs, receipts and invoices, achieving near-touchless purchase-to-pay processing while slashing manual AP work.⁵
- 5. Digital Twin Enabled Network Design** allows users at BHP mining to use natural language to create additional what-if queries and get scenario results instantly.⁶
- 6. Self-Service Delivery Tracking** with Geotab Ace combines a Large Language Model (LLM) with telematics data, allowing dispatchers to access routine fleet analytics in minutes—rather than hours—through plain-English chat within the MyGeotab dashboard.⁷

The following diagram builds upon the high-level overview by providing a detailed breakdown of the technologies behind each use case and the specific business challenges they address. This granular view demonstrates how targeted AI applications tackle distinct issues across the transportation value chain. By identifying the

problems solved, from reducing delays and empowering planners with on-demand insight to reducing payment errors, leaders can start to develop a clear business case to assess AI's potential impact and supports informed decision making around strategic investments.

Figure 3

Order Management	Transportation Planning	Execution	Freight Settlement	Analytics and Reporting	Customer Service and Support
Dynamic Pricing	Route Optimization	CV enabled Yard Management	Automated Invoice Matching	Digital Twin Enabled Network Design	Self Service Delivery Tracking
Technology: Machine learning analyzes real-time demand, capacity, and competitor rates; Generative AI recommends optimal prices with margin visibility.	Technology: Graph Neural Networks combine real-time traffic, weather, and telematics to update routes and ETAs dynamically.	Technology: AI-powered computer vision automates yard management by tracking assets, automating gate operations, and monitoring vehicles and trailers as they move through the yard.	Technology: Computer vision and Natural Language Processing (NLP) match freight bills to rate cards and proof of delivery (POD) documents, automatically flagging potential overcharges.	Technology: A digital twin simulates millions of "what-if" scenarios, while Generative AI enables planners to explore options and ask questions in natural language.	Technology: A Generative AI assistant translates natural language queries (e.g., "Where's truck 123?") into secure database searches, instantly providing ETAs, risk, and carbon statistics.
Problem Solved: Helps sales teams act quickly with accurate, competitive pricing, improving win rates and protecting margins.	Problem Solved: Reduces delays and manual re-routing, improving delivery reliability and driver efficiency.	Problem Solved: Eliminates manual yard checks, reduces dwell time, and improves yard throughput and visibility.	Problem Solved: Prevents payment errors, reduces audit workload, and shortens payment cycles.	Problem Solved: Enables faster, more informed decisions on network changes and investments. No programming required.	Problem Solved: Reduces call volume by enabling customers and planners to get real-time answers directly.
Order Prioritization	Dynamic Fulfillment	Customs Document Generation	Carrier Contract Reconciliation	Analytics Self-Service	Call Summarization & Email Generation
Technology: ML models score orders based on SLA risk, inventory status, and customer value; priorities feed orchestration logic.	Technology: A real-time optimization engine selects the best fulfillment node for every order using inventory feeds, carrier lead times, costs and promise dates.	Technology: Rule-based NLP repurposes shipment master data to auto-populate country-specific declarations, creates digital documents and transmits them to border systems.	Technology: ML auditors cross-match shipment events, rated invoices, and accessorial claims to proactively flag discrepancies and auto-approve bills in seconds.	Technology: An embedded conversational analytics layer translates natural-language questions into SQL, executes them against the TMS data store and visualises results instantly.	Technology: Speech-to-text models transcribe service calls; generative summarization distils intents and promised actions, feeding ticketing workflows and auto-generated email replies.
Problem Solved: Ensures critical orders are prioritized, protecting service levels and profitability.	Problem Solved: Improves service and margin by making adaptive sourcing decisions.	Problem Solved: Accelerates cross-border clearance and reduces compliance errors.	Problem Solved: Closes cost leakage gaps and accelerates freight settlement with confidence.	Problem Solved: Empowers planners with on-demand insights without relying on BI developers.	Problem Solved: Speeds up post-call actions and improves consistency in service follow-through.
Order Pressing Automation	Dynamic Carrier Selection	Autonomous Trucking	Financial Report Generation	Automated Carbon Footprint Reporting	Customer Facing Digital Chatbot
Technology: Document-understanding AI ingests purchase orders, extracts structured line-items, validates them against master data and triggers API calls that create sales orders, ASNs and invoices in ERP/TMS.	Technology: AI pricing and capacity models query live spot and contract markets, rank eligible carriers by predicted acceptance, cost and carbon score, then auto-award loads via EDI/API tender.	Technology: Sensor fusion, HD maps and reinforcement-trained control software pilot driverless tractors along approved corridors, negotiating traffic and weather variables.	Technology: Natural-language-driven RPA queries TMS and ERP ledgers, compiles period freight costs, accruals and KPIs into formatted dashboards and distributes them automatically.	Technology: Emission calculators ingest shipment legs, mode emission factors and carrier fuel-efficiency scores to back-calculate Scope 3 CO ₂ .	Technology: A conversational AI integrates shipment-tracking APIs and policy knowledge bases to resolve routine queries, capture delivery issues and escalate exceptions.
Problem Solved: Eliminates manual data entry, reducing errors and speeding up order processing.	Problem Solved: Replaces manual tendering with smarter, faster carrier decisions.	Problem Solved: Extends operational hours, improves road safety, reduces delays, and lowers costs.	Problem Solved: Reduces manual effort and shortens month-end close cycles.	Problem Solved: Provides granular, auditable Scope 3 emissions data for sustainability reporting.	Problem Solved: Provides 24/7 support, reducing agent workload and improving responsiveness.

TMS: The Foundation for Scalable AI in Transportation

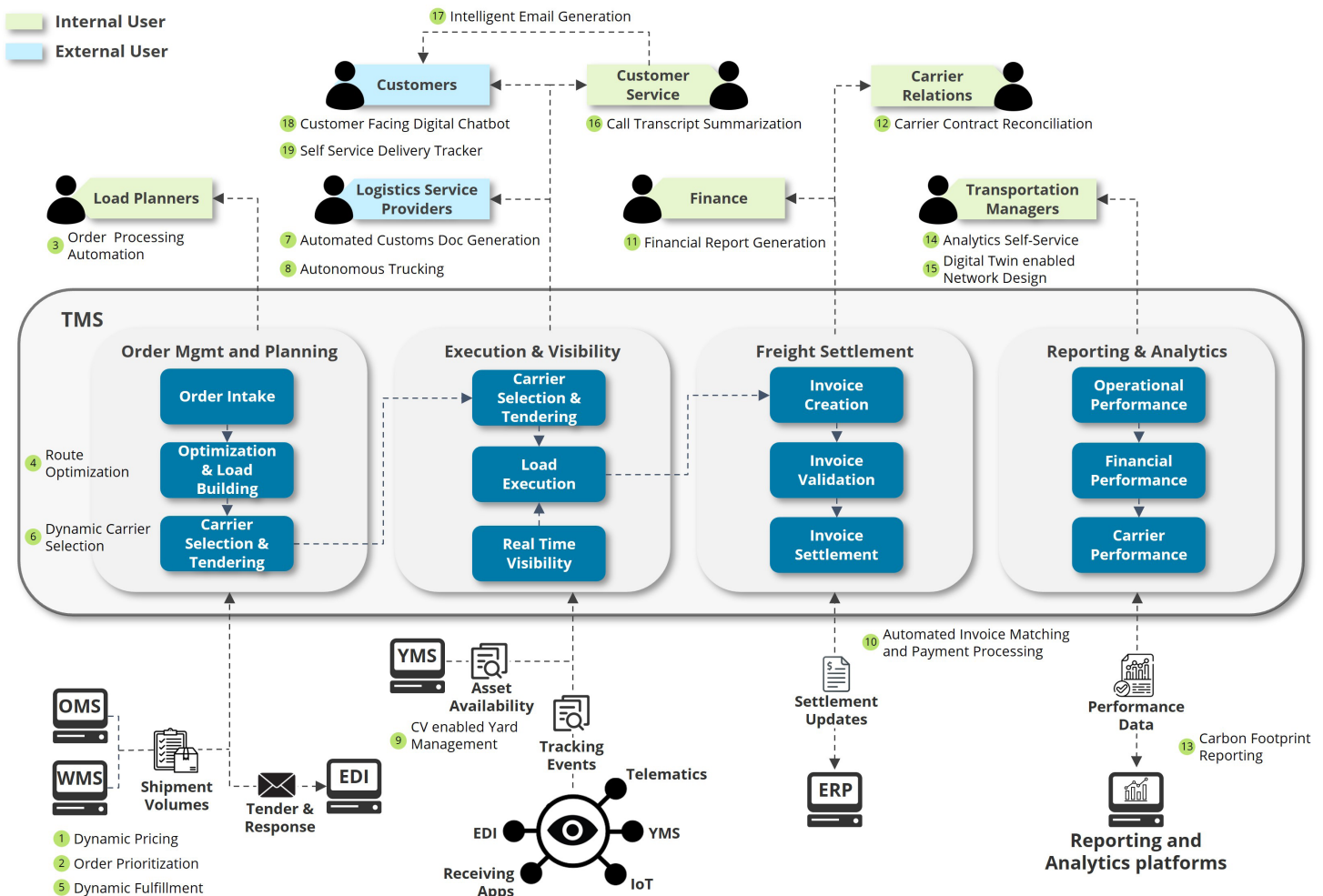
Artificial Intelligence applications in Transportation leverage the transactional data of the Transportation Management System (TMS) to increase the ROI of your technology investments while improving the decision-making and execution capabilities. Whether you are a shipper or a logistics service provider (LSP), a TMS is central to running core transportation functions.

Use cases such as dynamic order pricing or automated order processing are more applicable to couriers and LSPs. However, many use cases apply broadly across both shippers and LSPs. Moreover, certain use cases can operate directly within the TMS, such as dynamic routing optimization and automated carrier selection, while others interact with the TMS as an integration point. For example, analytics self-service tools rely on data produced by the TMS, whereas contract reconciliation solutions often feed data back into it.

AI-powered use cases span multiple stages of the transportation process and impact a wide range of roles, including load planners, transportation coordinators, customer service teams, finance, and others. For example, automated invoice matching addresses one of the most time-intensive aspects of freight audit and settlement. By applying AI to this area, organizations can minimize billing errors and accelerate payment cycles, freeing up working capital and enabling teams to dedicate more time to higher-value activities.

Whether it's predictive appointment scheduling, intelligent route optimization, dynamic pricing, or automated invoice matching, the TMS acts as the integration hub that connects enterprise systems such as OMS, WMS, YMS, and ERP. This enhances visibility, automates workflows, and improves operational responsiveness. The result is a more data-driven, efficient, and resilient transportation network. Figure 4 illustrates how these use cases map across the transportation value chain, highlighting both the key roles involved and the systems required to enable them.

Figure 4



Key decisions across the Enterprise will need to be made when implementing AI ambitions

Implementing AI in transportation starts with identifying and pursuing high-impact use cases, not waiting for a perfect, all-encompassing strategy. The pace of technological change means organizations that experiment early, learn quickly, and scale what works will capture value sooner. Focus should be on where AI can deliver measurable gains, then refining and expanding adoption based on proven results.

Key decisions must be made around where AI will have the most impact, how ROI will be measured, and whether to centralize capabilities through AI Centres of Excellence or adopt decentralized models to ensure investments are aligned with value drivers, and implementation is aligned with the company's long-term AI strategy.

On the people side, success hinges on having the right technical skills in place, a plan for upskilling or hiring, and a structured approach to change management to ensure employees are equipped to fully leverage these new AI-enabled capabilities and maximize potential benefits.

From a process lens, businesses must identify how AI will integrate into existing workflows, experiment with pilots before scaling, and address regulatory, ethical, and IP considerations early. Ongoing monitoring and a clear view of risk tolerance are critical. Effective process planning can accelerate implementation timelines, optimize the use of each AI that is implemented, and facilitate smooth process transitions.

The value of AI grows significantly when organizations take an end-to-end process view rather than approaching use cases in isolation. By treating transportation as a series of connected processes, where the output of one becomes the input for the next, companies can enable stronger data connectivity across systems and establish closed-loop learning. This approach allows AI to not only drive localized improvements but also compound value across the chain. For example, automating order intake and prioritization upstream can directly enhance downstream processes such as customs documentation, real-time invoicing, and automated matching.

Technologically, organizations need to assess data readiness, choose between build vs. buy strategies, and understand the trade-offs between different AI platforms, including the implications for existing architecture. Partnerships, both within and outside the organization, may also play a key role in accelerating adoption and innovation.

 Strategy	 People	 Process	 Technology & Data
How will it we achieve a cohesive AI vision and business case?	Do we have the right technical skills to develop AI solutions?	How will AI be embedded into existing business processes?	Is the data clean, structured, and significantly large for AI training?
How do we execute AI initiatives? Who will be our delivery partner(s)?	How can we roll out AI solutions to ensure positive impact on employees?	How can we experiment with AI through pilots before full-scale deployments?	How can we combine AI Traditional AI and Analytics? Do we have the required data and data science tools?
Which business areas will AI generate GenAI impact the most? What's the expected ROI?	How will employees be trained to work alongside AI?	How do we identify and address new IP legal ethical and regulatory risks?	Should we buy, build or adopt AI solutions and large language models?

How to get started: from exploration to scaled impact

Adopting AI doesn't require a massive upfront investment or a leap into the unknown. The most successful organizations take an incremental approach. They pilot and deliver value initially on a specific scope while minimizing risk and lay the foundation for long-term transformation. AI is not just another technology investment, it's a strategic lever that can eliminate costly inefficiencies, create new sources of revenue, and build lasting competitive advantage. By focusing on these specific problems AI solves and the quantifiable business outcomes it delivers, transportation leaders can make informed decisions that drive real value for their organizations.

Explore.

AI is reshaping how transportation and logistics businesses operate, from optimizing routing and planning to unlocking new levels of customer insight. The first step is to envision how AI can transform your value chain. Focus on identifying high-impact areas where these technologies can drive efficiency, enhance the customer experience, or enable new capabilities. From there, build an AI strategy that aligns with your broader business goals and prepares your organization for what's next.

Experiment.

It's easy to chase every new AI tool and trend, but going too fast can lead to wasted effort and poor adoption. Instead, design a strategy with clear phases and focus areas. Start small by piloting a solution in a real-world environment with real users. These early experiments don't just deliver quick wins; they offer valuable insights that can guide your broader rollout. The right partner can help you avoid common pitfalls and keep your experimentation focused on outcomes that matter.

Scale.

Once momentum builds, it becomes hard to stop. Quick wins fuel confidence, and confidence unlocks bigger opportunities. Scaling AI across your business means standing up cross-functional teams that combine technical skillsets with industry knowledge. Just as important is creating a culture that embraces data-driven thinking and is ready to adapt to emerging technologies. With the right structure in place, you can move fast and stay ahead.



Get in touch

With our experience and expertise, we are committed to helping you navigate the future with confidence

AI is no longer a future investment; it is a present-day differentiator for transportation leaders. By embedding AI across the transportation value chain, top-performing organizations are shifting from reactive operations to adaptive systems. These companies are not trading efficiency for resilience or agility. Instead, they are achieving all three by building tailored, data-driven capabilities that respond to real-world complexity with precision.

At Deloitte Supply Chain & Network Operations, we blend deep industry insights with cutting-edge methodologies and a profound understanding of technology to assist leaders in making these pivotal decisions. Our aim is to help resolve the most critical issues, drive substantial value, and achieve transformational success.

We will work alongside you, fostering collaboration to build resilience and confidently shape a prosperous future.



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Endnotes

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