

TRENDS REPORT

Develop Your Vision For Agentic AI In Supply Chain Management

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Summary

Global supply chains — still groggy from COVID-19 — are reeling from geopolitical instability that continues to undermine established patterns of trade. Simple rules-based automation struggles to cope with the complexity of supply chain exceptions. Agentic AI has the potential to solve supply chain challenges; however, to capitalize on these new opportunities, tech leaders need agents with a tightly defined scope to deliver reliable, explainable processes that are grounded in a common semantic model. They also need to elevate their enterprise governance and security and drive sufficient awareness to escalate exceptional cases to humans in the loop or on the loop.

Agentic AI Will Scale And Accelerate Your Response To Supply Chain Volatility

While Forrester has catalogued [AI and generative AI supply chain](#) use cases, these were all examples of AI alerts to critical conditions and suggestions for resolution. In earlier research, we imagined the leap from alerts and suggestions to [autonomous actions](#), but the frameworks and protocols to orchestrate agents were still lacking. In the meantime, supply chain management has induced headaches at enterprises struggling with geopolitical challenges, sustainability mandates, and the sheer volume and velocity of decisions they must take to win, serve, and retain customers. While not yet realized in the wild, agentic AI offers the prospect of boosting supply chain resilience and sustainability. Most agentic deployments are still being established, but agents in the supply chain will help to:

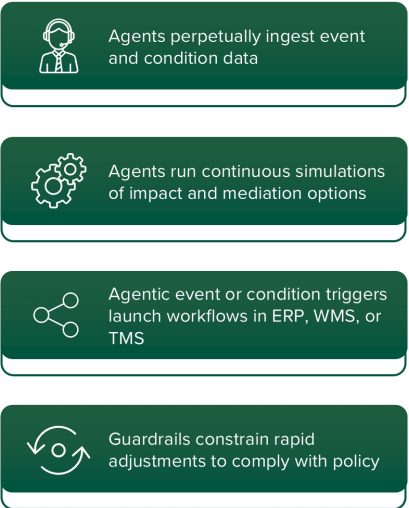
- **Scale the insights of supply chain analysts.** Supply chain analysts monitor the balance between anticipated demand and expected supply by stock-keeping unit (SKU) and fulfilment location for each period in the planning horizon. Enterprises that offer more product options to serve [long-tail](#) customers, value propositions like direct to consumer, or product as a service risk overwhelming analysts desperately rebalancing stock across proliferating SKU/location combinations — not to mention generating frequent scenario analyses for executives to assess risk. Enterprises that fail to seize the opportunity to deploy agents for scaling supply chain insights risk stockouts that fail customers and overstocks that fail shareholders (see Figure 1).
- **Reduce the burden of mundane logistics tasks.** Supply chain resilience depends on a combination of [capacity or inventory buffers](#) and [sourcing and transportation options](#). But the exercise of options is often surprisingly labor intensive. According to Logistics Management's [DispatchTrack Benchmark Survey](#) a typical dispatcher in an enterprise transportation office makes 120 to 200 calls in an 8-hour shift. We've all heard stories about the scramble for alternate carriers and routes during recent crises, such as the [port congestion](#) on the US West Coast or the [Ever Given](#) ship stuck in the Suez Canal. Fortunately, there are already live examples of agents finding and negotiating rates with carriers.
- **Rescue the back office from an avalanche of paperwork.** The flow of documents should match the flow of goods in every supply chain: for example, purchase orders, purchase order acknowledgements, advanced shipping notices, and bills of lading (see Figure 2). Customer expectations about supply chain carbon footprint transparency — together with multitier supply chain visibility mandates,

such as the [EU's Supply Chain Due Diligence Law](#) — only add to the mountain of documents that supply chain professionals must parse and match to file the correct customs declarations, remit the correct tariffs, and authorize carrier or supplier invoices. Missing data elements or mismatched data inevitably lead to delays in customs clearance or invoice settlement, so agents that can reduce discrepancies are essential. Global shipping giant [Maersk](#) uses AI agents to streamline documentation and supplier interactions, while [Schneider Electric](#) uses AI agents for document validation and sustainability tracking.

Figure 1
Use Agentic AI To Scale And Accelerate Your Response To Supply Chain Volatility

Capability	Scaling mechanism	Business impacts
Real-time monitoring	Multiple agents across regions	Continual visibility at every node
Dynamic rerouting	Auto-scaling compute clusters	Up to 30% lead time compression
Predictive analytics	Distributed model training and serving	Early alerts to potential stockouts (or overstocks)
Self-correcting workflow	Reinforcement learning orchestration	Automated exception resolution with fewer human interventions

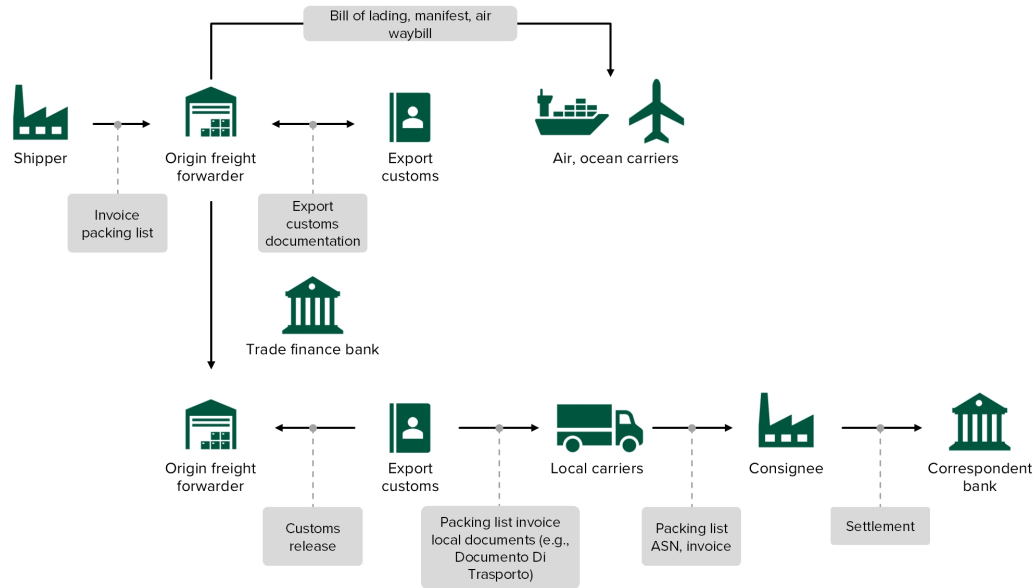
Source: Adapted from "Lead time reduction from: Transforming Supply Chain Management with Agentic AI," TensorLearners
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Figure 2

Apply Agentic AI To Your Supply Chain's Document Disharmony



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Seize The Agentic AI Opportunity

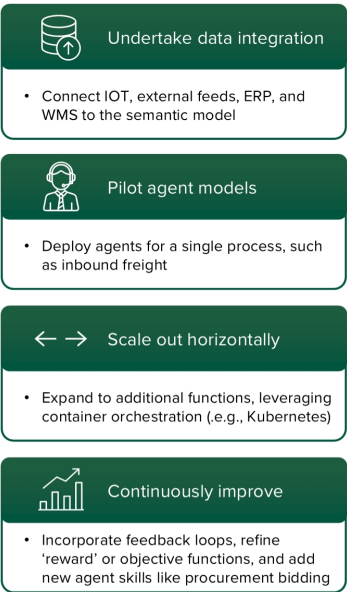
Agentic AI offers the prospect of mitigating supply chain instability and managing supply chain complexity by automating some analysis and supplying imbalance remediation interventions. But to seize the opportunity, technology and innovation leaders must lay the policy and planning foundation for agentic AI success and focus on data preparation, protocols, and standards for execution success. To set the foundation for their agentic AI journey, technology and innovation leaders must:

- **Estimate the size of the prize.** Supply chains break down when the volume, velocity, and complexity of decisions overwhelm decision-makers. [Supply chain decision complexity](#) depends on factors like the combination of SKUs and supply chain nodes, as well as the level of institutional and market uncertainty. Savvy technology and business leaders keep track of growth in SKU/fulfillment channel combinations and layers in the supply chain and regulations — such as supply chain traceability — carefully noting the potential or actual financial impact of rushed or poorly informed decisions (see Figure 3).

- **Acknowledge the frustration of rules-based automation.** Enterprises like [Siemens](#) have successfully invested in their own operations and those of their clients' rules-based automation technologies — such as robotic process automation — to [boost supply chain performance](#). However, enterprise applications governance is adapting to accommodate the [changing future of work](#) — rigid rules-based task automation can fossilize the status quo, jeopardizing fluid adaptability to [new business opportunities](#), such as selling through multiple new channels or servitization of assets or products.
- **Establish a framework for agent security and authorization.** Traditional cybersecurity architectures were designed for organizations built around people — agentic AI disrupts this. To deploy goal-oriented, ephemeral, scalable, dynamic agents — where unpredictable emergent behaviors are incentivized to accomplish objectives — enterprises should adopt Forrester's [AEGIS](#) framework, designed to help CISOs secure, govern, and manage AI agents and related infrastructure. Authorization also applies to usage, and enterprises will need to apply [FinOps to agents](#).
- **Obsess about explainability.** Trust is the [primary challenge for AI agents](#) — most supply chain professionals bear the scars of project failures in forecasting and replenishment automation. AI-powered supply chain implementations have a [72% failure rate](#), so savvy technology and innovation leaders applying any technology to supply chain use cases must invest in explainability and compliance: for example, with regional AI regulations like the [EU's AI Act](#).
- **Develop a semantic model that embraces all supply chain processes and apps.** Agentic systems require high quality and consistent data in order to support precise decision-making and accurate actions. Enterprises investing in creating and maintaining a high-quality metadata layer — such as knowledge graphs — to help agents understand the data and business context in which they operate are already seeing more success than those who lag. Building a complete semantic model that connects payments, enterprise resource planning, procurement, and other areas of enterprise logistics management to partners in sales, product, and customer support is essential for building next-gen, differentiated agentic applications.
- **Exercise caution over proliferating agents in an agentic chain.** Technology and innovation professionals should consider factors like latency and performance in real-time or near-real-time applications; cloud pricing models that discourage long chains; error propagation, which amplifies ambiguity or error in agents; context window limitations that depend [on token limits](#) in large language models; and orchestration overhead. Wherever there are multiple agents in a chain, they must

- introduce tooling to verify agent outputs, ensuring the feasibility of results that pass to downstream agents.
- **Establish human-in-the-loop and human-on-the-loop guidelines.** Human agency limits the responsiveness of complex supply chains to frequent shocks. However, autonomous agents always require [human-in-the-loop](#) and human-on-the-loop resolution for exceptions. Agentic systems behave unpredictably, and even [competent AGI](#) requires close supervision. Leaders must govern decision boundaries between humans and AI, using tools like NVIDIA NeMo Guardrails. Companies like Costco use supplier onboarding solutions — from vendors like osapiens — to orchestrate agents [retrieving data that's vital to compliance](#) with regulations, such as the [EU Supply Chain Act](#). However, agents always route ambiguous cases to experts for resolution.

Figure 3
Lay The Policy And Planning Foundation For Agentic AI Success



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Focus On Data Preparation, Protocols, And Standards

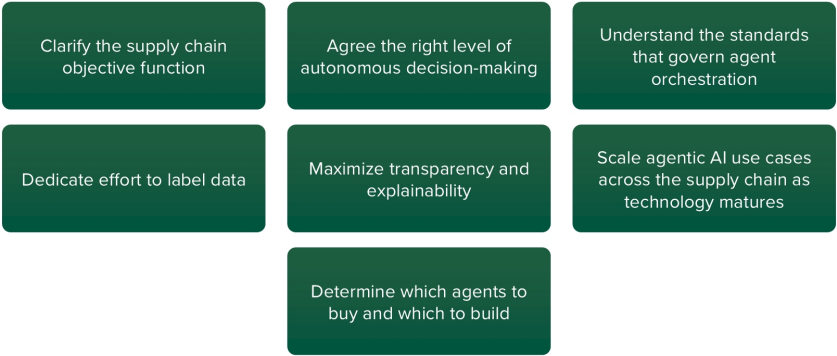
Once tech and innovation leaders have laid the policy foundations technology, they must get busy on the details of their agent AI deployment. They should:

- **Clarify the supply chain objective function.** Success with agentic AI depends on orchestrating internal and external stakeholders by using agreed data exchange syntax and semantics to achieve a mutually beneficial goal. As tech and innovation leaders define the objective function of their supervisory agent, they should ensure their organization invests in [collaboration and transparency](#) to generate the mutual trust that enables a collective response to unexpected supply bottlenecks or peaks in demand (see Figure 4).
- **Agree the right level of autonomous decision-making.** Forrester's earlier research noted the potential for [agents to achieve goals](#) with some degree of autonomy. Agentic AI offers the opportunity to escape the latency of traditional supply chain decision-making — based on a monthly planning cycle — and use intelligent agents to continuously monitor live data in legacy systems for significant trends or events. Each supply chain domain — such as demand planning, supply planning, or transportation — has an agent that relays information to a supervisory agent capable of making decisions and delegating remedial actions to other agents. This keeps the enterprise on track to achieve its combination of customer service, sustainability, and working capital productivity goals — even when labor shortages, port congestion, weather, or geopolitics threaten disruption.
- **Understand the standards that govern agent orchestration and interoperability.** Most agentic systems today are single-agent systems or multiple agents orchestrated in a hardcoded manner. The hope of future agentic interactions is to have complex multiagent communications execute more complex enterprise actions, or eventually across different companies. Emerging protocols and architectures to build more flexible multiagent communication include Agent2Agent (A2A) and NANDA. The model context protocol (MCP) is the most well-known standard for building single-agent systems, with some capabilities for building multiagent interactions; however, both the MCP and A2A protocol lack significant inbuilt capabilities for data security and enterprise security.
- **Dedicate effort to label data.** Supply chain functions like demand planning usually depend on [multiple data sources](#) or demand signals. Technology and innovation leaders should review existing data lakes to remove duplicate records and incomplete rows; engage in [feature engineering](#), adding depth to the raw data

with lag features (one, seven, 14, or 30 days) or days of the week to spot recurring trends; and track progress with metrics like inventory coverage days or supply/demand ratios. Successful enterprises usually store all the data raw, engineered, and forecasted in a [multimodel graph database](#) like PostgreSQL.

- **Maximize transparency and explainability.** Supply chain professionals have a long history of skepticism about automation. To help allay their fears, successful technology and innovation leaders should connect the raw, engineered, and forecast data to custom dashboards built with tools like Chart.js or Power BI. To simplify transparency for more senior executives, they should plan to include a chatbot assistant — using a tool like [Langchain](#) — that can answer questions such as, “Which products might run short in September in our Southern region?”
- **Scale agentic AI use cases across the supply chain as the technology matures.** Today agentic AI helps in variance analysis, explaining the reason for missing a sales or margin target, and in presenting options for gap fill in the monthly sales and operations planning cycle. Other agents extend the [automation of low risk, frequent decisions](#). PepsiCo uses Auxiliobits’ agentic AI platform to [autonomously issue RFQs](#), evaluate carrier bids, and negotiate counteroffers in real time — delivering a 12% reduction in tender-to-award cycle times and a 5% decrease in freight spend. An automotive group uses Pactum AI to [automate negotiations](#) for components, while Acurride deploys Pando’s AI agents to [reduce accessorial fees and validate freight invoices](#).
- **Determine which agents to buy and which to build.** Leading [supply chain platform vendors](#) offer agents that tech leaders can use in their own agentic processes. For example, earlier this year, Blue Yonder launched agents for inventory ops, shelf ops, logistics ops, warehouse ops, and network ops. Coupa offers analytics and knowledge agents and the ability to orchestrate your own agents too. It offers a Modeling Agent that delivers transparent mathematical reasoning at scale and an agent for onboarding supply chain planners. Earlier this year, Kinaxis introduced AI agents to monitor, predict, and respond to supply chain challenges in real time, automating critical processes like inventory management and disruption mitigation. Bear in mind that 45% of enterprises already run AI for operations in production (see Figure 5).

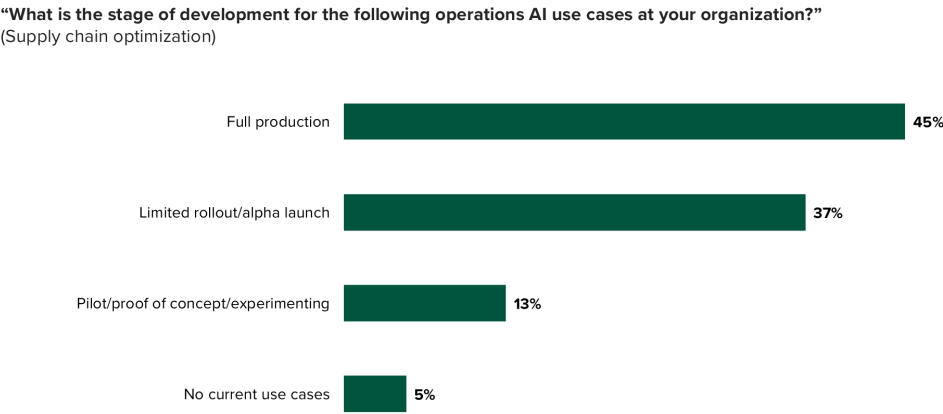
Figure 4
Focus On Data Preparation, Protocols, And Standards For Execution Success



Source: Forrester

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Figure 5
Almost Half Of Enterprises Run AI For Operations In Production



Base: 509 enterprise AI decision-makers whose organizations are working on the development of AI for operations
Source: Forrester’s State Of AI Survey, 2025

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Supplemental Material

Companies We Interviewed For This Report

We would like to thank the individuals from the following companies who generously gave their time during the research for this report.

Anaplan

AutoScheduler

Blue Yonder

causaLens

e2open

EdgeVerve

Genpact

IBM

IFS

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