



From just-in-time to just-in-control

India's manufacturing supply
chains in the age of AI

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Executive summary

For global sourcing, low cost might open the door, but reliability and resilience are what keeps it open.

India's manufacturing ambition has rarely had more behind it: sustained policy support, rising investment, and a global appetite to diversify sourcing away from single-country dependence. Yet ambition and momentum are not the same as competitiveness. The countries and companies that win the next decade of global sourcing will be those with supply chains that perform reliably when conditions are difficult, not simply those that can produce at the lowest cost. For India, the decisive question is no longer whether manufacturing can scale, but whether the supply chains around that base are ready to compete.

In this article, developed in collaboration with the CII Institute of Logistics, we make the case for a deliberate change of posture from just-in-time efficiency to just-in-control: supply chains that stay lean where it pays to be but are also fast, governed, and resilient by design.

Five arguments structure this shift:

Readiness is not a single national story. India's headline manufacturing sectors sit at very different points on supplier depth, localization, logistics, and export compliance, and competitiveness is migrating from plant-level efficiency to value-chain productivity. A world-class factory can still lose the order to weaknesses upstream and downstream of it. Low cost opens the door; reliability is what keeps it open.

Lean supply chains need adaptive resilience.

Volatility in demand, freight, tariffs, and geopolitics has become a permanent planning input rather than an occasional shock. The answer is not to add buffers everywhere but to segment: lean where variability is low, protected where the cost of failure is high, and flexible where uncertainty dominates. Optionality, not inventory alone, becomes the resilience that counts.

The digital frontier has moved from visibility to decision velocity. Most large manufacturers can now see disruption coming; far fewer can decide and act quickly enough to contain it. Control towers must become decision engines, supported by clear decision rights and thresholds.

AI belongs in the supply chain by decision, not by slogan. Value comes from applying machine speed and pattern recognition to specific, well-chosen decisions while keeping human judgment where context and accountability matter, and governing the whole system so that autonomy never outruns control. Practical autonomy, not maximal automation, is the goal.

Trade readiness, logistics competitiveness, and sustainability are converging into a single network-design decision. Carbon, cost, speed, reliability, and risk now move together, and the manufacturers that design for all of them at once will capture a disproportionate share of global value chains.

The connecting thread is that competitiveness lives in decisions, not assets. The article that follows develops each argument in turn and closes with an agenda for building these capabilities over the next three to five years.

Converting manufacturing momentum into competitiveness

India has opened a decisive manufacturing window. Cumulative Production Linked Incentive investments have crossed ₹2.16 lakh crore, generating ₹20.41 lakh crore in sales and [14.39 lakh jobs](#), while foreign direct investments in manufacturing grew 18 percent to [\\$19.04 billion](#) in FY2024–2025, part of a broader global shift away from single-country dependence, with China's share of US goods imports falling from 21.6 percent to [13.4 percent](#) between 2018 and 2024 as India and others gained. This builds on a sharp macro rebound. GDP growth swung from -5.8 percent in 2020–2021 to 9.7 percent in 2021–2022 and has held at [6.5 to 9.2 percent](#) since. Forecasters expect this to continue. The International Monetary Fund projects FY2027 growth at [6.2 percent](#) and the World Bank at 6.6 percent, keeping India as the world's fastest-growing major economy.

But momentum isn't the same as competitiveness. The companies and countries that will win the next decade of global sourcing decisions will be the ones with supply chains that perform reliably under real-world conditions. For India, the central question is no longer whether manufacturing can scale. It's whether the supply chains around that manufacturing base are ready to compete.

From manufacturing scale to supply chain readiness

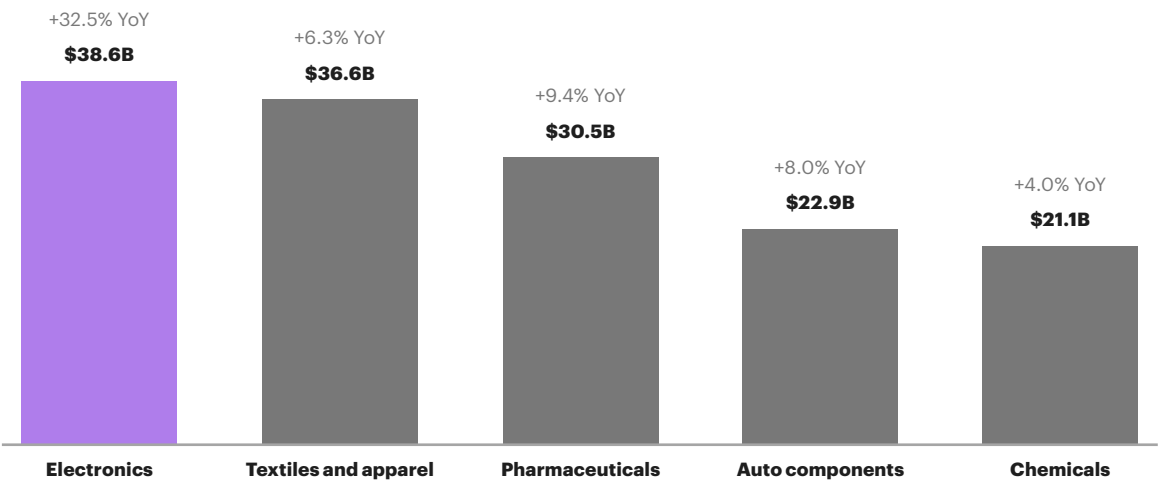
India's manufacturing story is often told as a single national narrative, but in practice, it is different stories with very different readiness levels (see figure 1 on page 3):

- **Electronics** has scaled rapidly in final assembly, but component-level depth, including semiconductors and precision parts, is lagging.
- **Textiles** retains scale but is constrained by fragmentation and logistics cost relative to Bangladesh and Vietnam.
- **Pharmaceuticals** leads in generics exports but has further to go in specialty APIs and the regulated packaging that higher-value markets demand.
- **Automotive** has a deep, multi-tier supplier base, yet localization in EV-critical components (battery cells, power electronics, and thermal systems) is shallow.
- **Chemicals** has strong base capacity but needs deeper hazardous-logistics, testing, and specialty-infrastructure capability.

Treating these exports as one undifferentiated "manufacturing push" risks misapplying policy attention and corporate investment alike.

Figure 1
India has an array of manufacturing exports

Export value, FY2024–2025
(\$ billion)



Sources: Press Information Bureau, Department of Commerce, Ministry of Textiles, Automotive Component Manufacturers Association of India, India Brand Equity Foundation; Kearney analysis

From plant efficiency to value-chain productivity

A factory can run at world-class overall equipment effectiveness and still lose the order. Global buyers evaluate the full chain, not the plant in isolation. Tier 2 and tier 3 supplier delays, high logistics cost, import dependency on critical inputs, weak demand-signal integration, and slow export documentation each erode competitiveness before a unit reaches the port. India needs not just better factories, but a clearer view of where value leaks out between the factory gate and the customer’s dock.

What global customers expect from India

China+1 strategies, regional supply chain redesign, tariff volatility, and buyer resilience mandates have opened a genuine opportunity for India, but it converts to sustained order flow only if India is seen as dependable, not merely cheaper. Cost advantage opens the conversation; reliability closes the deal. Customers are asking whether India can deliver consistent quality at scale, hold committed lead times, meet export-compliance standards without friction, and absorb demand volatility without breaking.

India’s ambition converts into durable competitiveness only when companies build supply chains that are localized where necessary, globally compliant, planned with real demand visibility, logistics efficient, supplier resilient, and export ready.

Why lean, low-cost supply chains need adaptive resilience

For decades, supply chains were optimized for efficiency: lean inventories, single-source contracts, and least-cost freight delivered strong cost and working-capital outcomes while the world stayed predictable. That assumption no longer holds. Supply chains must be designed for cost and volatility together, and Indian manufacturers that haven't made this shift carry more risk than their balance sheets show.

Volatility as a planning assumption

Demand swings, supplier disruptions, tariff changes, freight-rate spikes, climate events, port congestion, and regional conflict are no longer exceptions. They are now part of the baseline planning environment. Figure 2 (on page 5) shows how unevenly these shocks land across industries. These shocks force a common trade-off across sectors: absorb margin compression or pass through costs, and invest in resilience (dual-sourcing, hedging, redundancy) even where it works against lean-inventory efficiency. The most exposed channels, including logistics, financial tightening, and sanctions, are also the ones where waiting to react is costliest. Moreover, container rates have swung in a 7x range since 2019, and even "calm" periods now sit 2x to 3x above the pre-pandemic baseline. Freight cost has become a volatile planning variable, not a stable input.

For Indian manufacturers in electronics, automotive, chemicals, and pharmaceuticals sectors with import dependency and long logistics corridors, planning, sourcing, inventory, and network design must treat disruption as a recurring input, not a tail-risk scenario.

The limits of a lean system when variability rises

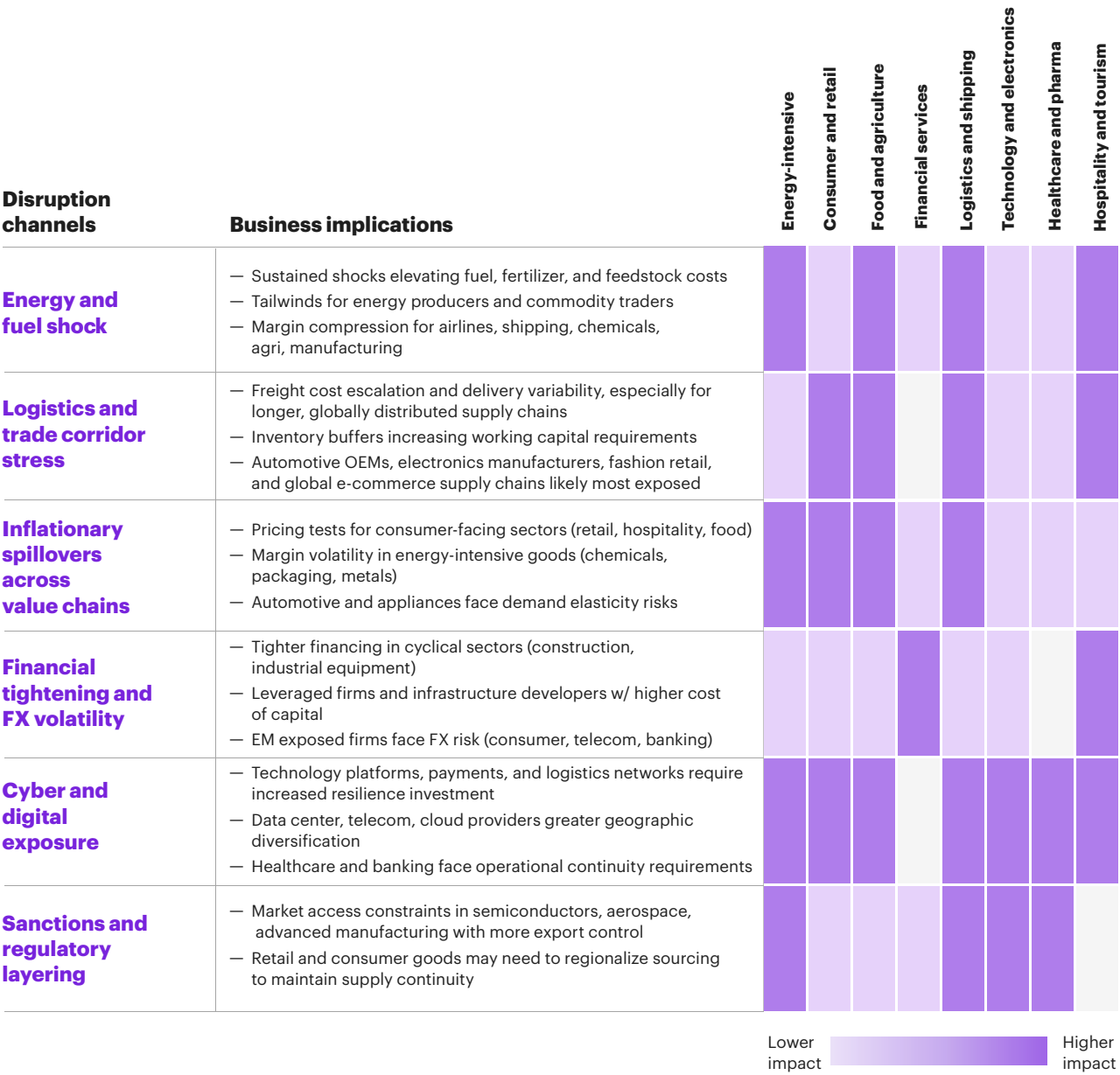
Lean is not the problem. Unmanaged variability is. Lean systems work when their underlying assumptions hold: reliable delivery, stable demand, predictable lead times, and assured input availability. Fragility appears when those assumptions break with no slack to absorb the shock: single sourcing turns a supplier's problem into a line stoppage, long-lead imports create exposure windows, minimal safety stock turns a delay into a customer-facing failure, and tightly coupled schedules lose their efficiency edge the moment one input is late. This isn't an argument against lean design; it's an argument for knowing exactly where its assumptions will be tested and building deliberate slack there.

Segmented resilience

The instinctive response to volatility—add inventory everywhere—is usually wrong. Resilience has a cost, but so does disruption, and that cost varies enormously by SKU, supplier, customer, and lane. The right question isn't "how much buffer?" but "where does the cost of failure exceed the cost of protection?" Critical SKUs with no substitution path, capacity-constrained suppliers, strategic customers, and high-risk lanes deserve differentiated resilience. Low-risk flows should stay lean. Treating every part of the chain identically is itself a planning failure (see figure 3 on page 6).

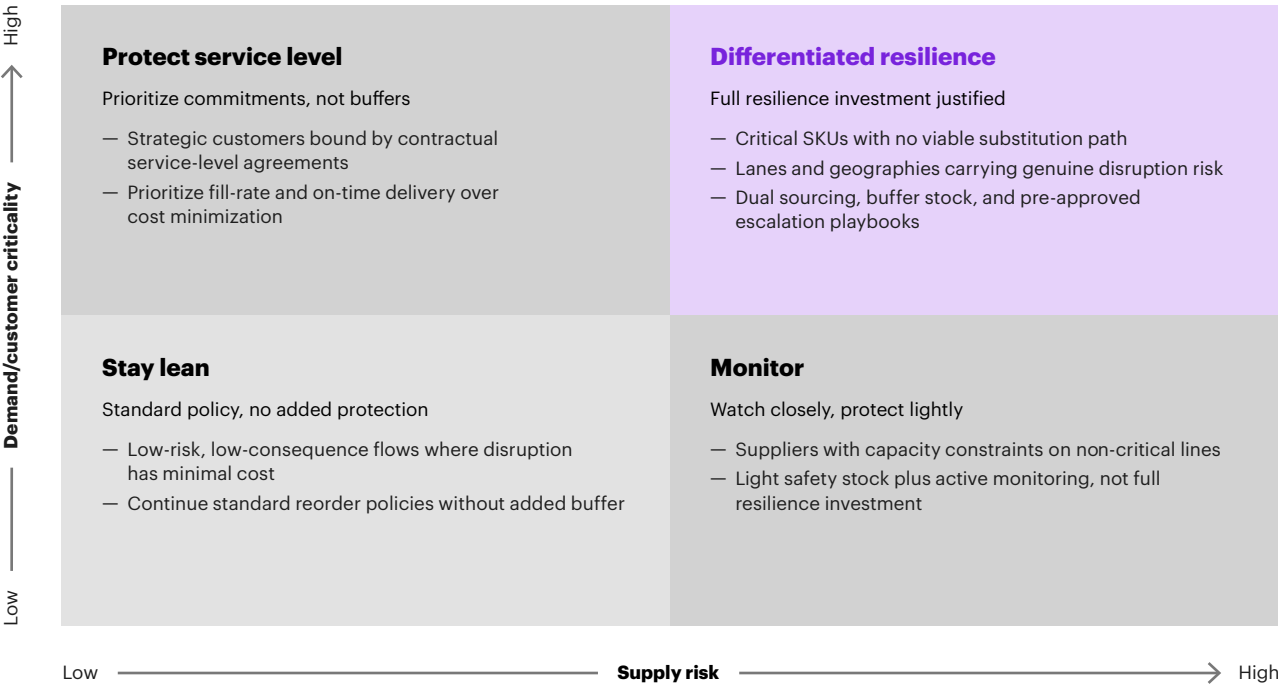
Lean is not the problem. Unmanaged variability is. Lean systems work when their underlying assumptions hold.

Figure 2
Volatility is a core component of today’s supply chain planning



Notes: OEM is original equipment manufacturer; EM is emerging market; FX is foreign exchange.
 Source: Kearney analysis

Figure 3
The most resilient organizations segment resilience rather than treating every part of the supply chain identically



Source: Kearney analysis

The future supply chain leader’s model is segmented, not chosen between extremes: lean where variability is low, buffered where failure is costly, flexible where uncertainty is high, and fast wherever disruption can’t be prevented.

Once resilience is segmented, the real strategic asset becomes optionality: the ability to act differently when conditions change with alternate suppliers, dual sourcing, flexible contracts, regional buffers, postponement, substitution, alternate lanes, premium-freight triggers, and fast decision-escalation playbooks. Companies that have mapped where optionality exists and where it doesn’t are making a different bet than those that simply add inventory and hope for the best.

Moving from supply chain visibility to decision velocity

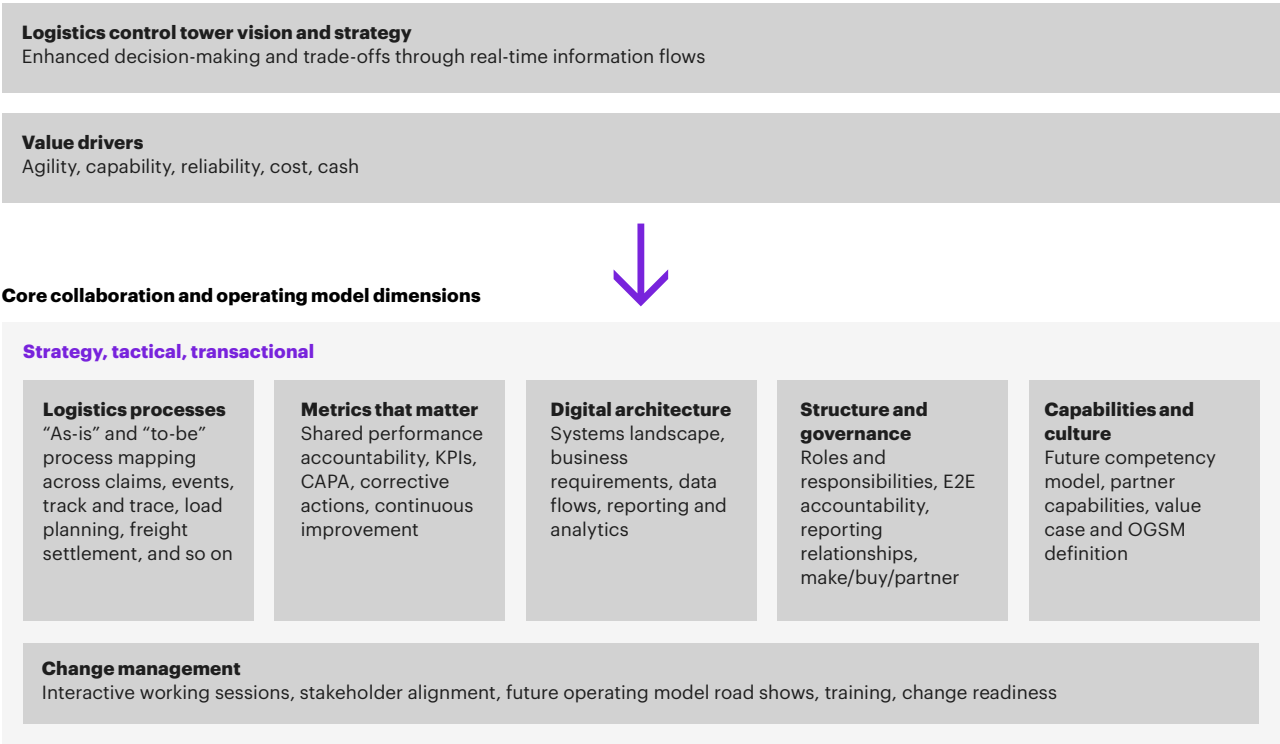
Indian manufacturers have spent a decade buying visibility through track and trace, GPS-RFID feeds, and control-tower dashboards. As a result, visibility has quietly become the baseline and not an advantage. The real challenge isn't spotting a disruption; it's making the right call and acting on it quickly enough to limit the damage. India's supply chains are exposed here because they run lean on single sourcing, and long import lead times and thin buffers leave little room to absorb a slow decision. The instinctive fix is to hold more inventory as a cushion, but that is the expensive option, as carrying inventory costs roughly **20 to 30 percent** of its value every year.

A dashboard that flags a delayed inbound but doesn't clarify ownership, trade-offs, escalation, or the next action is an expense, not a capability. Ninety-five percent of supply chains must react quickly to disruption, but only **7 percent** can execute decisions in real time. In this environment, investments in real-time decision execution are expected to rise fivefold by 2028. Supply chain disruptions cost firms an average of **6 to 10 percent** of annual revenue as well as reputational costs in terms of customer complaints and damage to brand reputation.

Control towers must therefore evolve from monitoring rooms into decision engines (see figure 4). A best-in-class control tower saves a shipper 10 to 20 percent of total logistics cost, typically 8 to 12 percent in year one and **4 to 6 percent** annually thereafter. Design of a control tower capability requires comprehensive consideration of multiple dimensions.

Figure 4
Control towers must be decision engines

Kearney's operating model framework for control towers



Notes: KPI is key performance indicator; CAPA is corrective and preventive actions; E2E is end-to-end; OGSM is objectives, goals, strategies, measures.
Source: Kearney analysis

The operating model matters as much as the data. Faster decisions are an organizational design problem before they are a technology problem. They require clear decision rights, quantified thresholds, cross-functional war rooms, exception rules, escalation paths, and preapproved playbooks so that routine disruptions never wait for a meeting. A RACI map (responsible, accountable, consulted, informed) makes this concrete by fixing, for every decision across the disruption value chain from data aggregation and monitoring to crisis response and external communication, exactly who acts, who owns the outcome, who is consulted, and who is informed.

The sequencing implication for Indian manufacturers is clear: companies with weak data shouldn't leap to autonomous execution; they should first close basic visibility and alerting gaps. Companies that already have solid visibility, which is now most large players, should stop investing in more dashboards and instead attack the decision loop: define your north star control dashboard, set thresholds, stand up war rooms for the highest-risk corridors and SKUs, and develop preauthorized playbooks. The shift from visibility to decision velocity is one of the highest-return moves any manufacturer can make, and it is fast becoming a defining capability that separates resilient, competitive supply chains from the rest.

Practically autonomous supply chains: where AI can help and where humans must stay in control

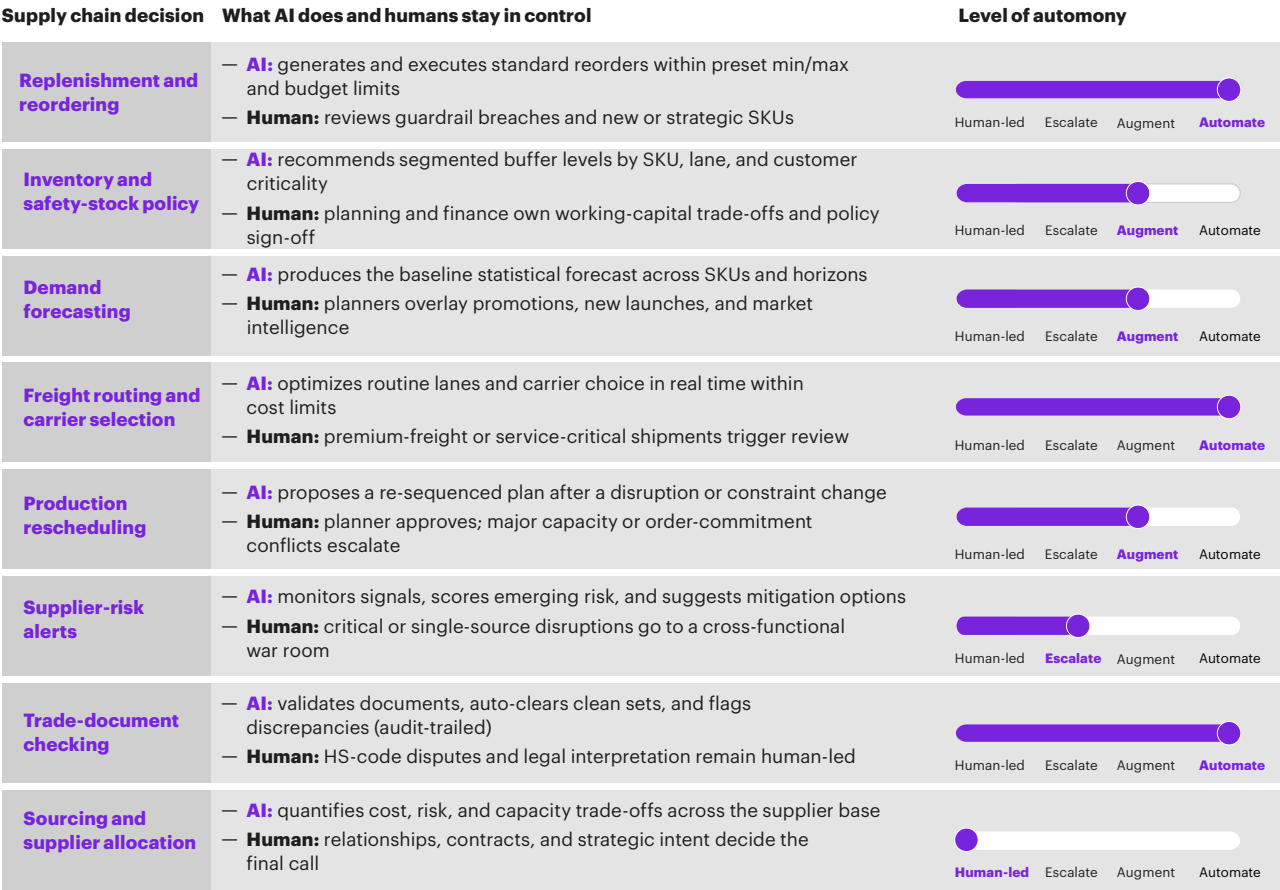
For India's manufacturers, AI in the supply chain has moved from pilot curiosity to competitive necessity. India's AI market is expected to grow at a [25 to 35 percent](#) CAGR over the next three to four years, and manufacturing—led by automotive and electronics—has already advanced to the most mature stage of enterprise AI adoption.

Practically autonomous supply chains aren't about maximizing how much AI does but how much it does together with humans.

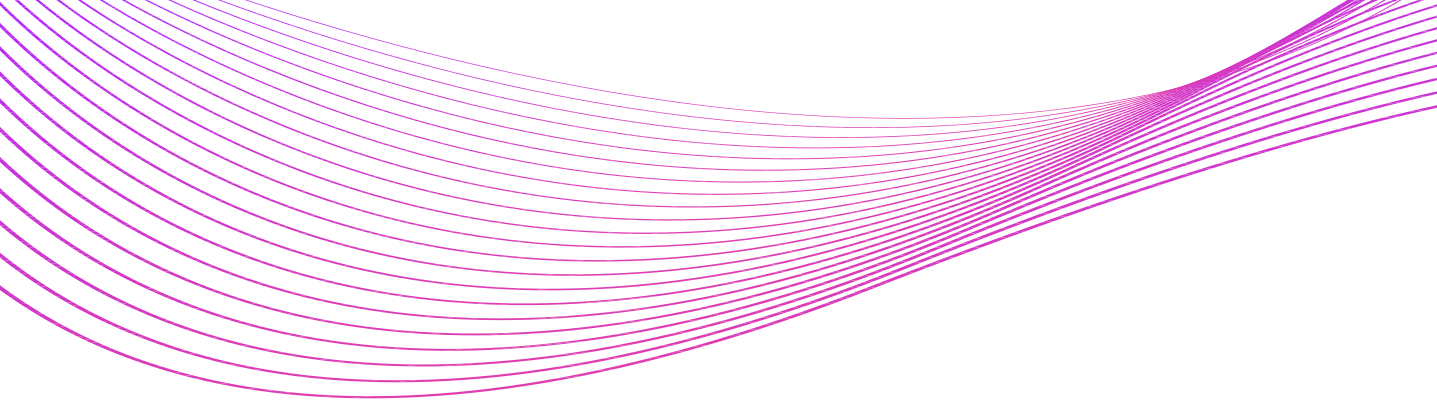
Framing AI around decisions keeps the conversation in the language of operations and outcomes rather than tools and makes benefits measurable. Indian deployments show the prize. At Hindustan Unilever’s Tinsukia plant in Assam, recognized by the WEF’s Global Lighthouse Network, more than 50 digital use cases framed around outcomes, cut the planning “frozen period” from 14 days to one, enabled a threefold increase in unique SKUs, and reduced sustainable-packaging trial time by **84 percent**. Similarly, CEAT’s Sriperumbudur plant in Tamil Nadu deployed more than **30 digital solutions**, from operations-research models that reduce turnaround time to machine-learning-based design, supporting faster order fulfillment and product launches at twice the speed.

The goal isn’t to substitute human roles; it’s to pair machine speed and pattern recognition with human judgment. Many supply chain calls require context a model doesn’t see: a strategic customer relationship, a supplier’s true reliability, a financial trade-off, a regulatory nuance. India’s [AI Governance Guidelines](#), released by the Ministry of Electronics and Information Technology in November 2025, make this explicit: the People First principle calls for human-centric design and human oversight and for humans to retain final control over AI systems wherever feasible. A practical way to design this is to classify each decision point by the autonomy it warrants: the “automate–escalate–augment–human-led” lens turns autonomy from an ideology into an explicit, reviewable choice (see figure 5).

Figure 5
The supply chain decision autonomy matrix keeps humans in control where judgment matters



Source: Kearney analysis



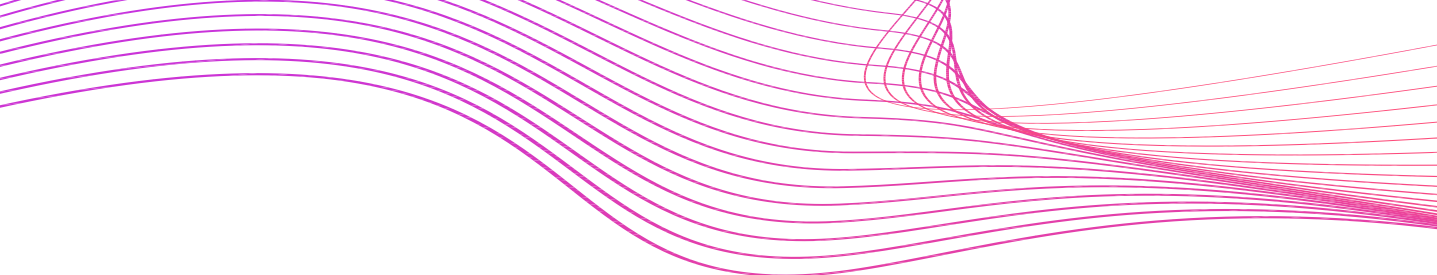
The hardest part of AI in the supply chain is rarely the algorithm; it's the foundation beneath it: data quality, master-data discipline, process standardization, OT/IT integration, clear role ownership, and the change management to make new ways of working stick. The Indian evidence is sobering: while about 60 percent of manufacturers have standardized data at the business-unit or enterprise level, roughly two-thirds still allocate less than 10 percent of their IT budget to AI, and fewer than **40 percent** have built dedicated AI teams. Discrete sectors such as automotive and electronics have moved first because their processes and data are more structured; process industries such as chemicals and pharma are closing the gap through predictive maintenance, yield optimization, and anomaly detection.

Practically autonomous supply chains aren't about maximizing how much AI does but how much it does together with humans. India has made real progress, but value still comes from being deliberate: automating what should be automated, supporting human judgment where it matters, and governing the whole system so that speed never outruns control.

Embedding trade readiness and sustainability into supply chain design

Competitiveness now lies in how quickly and how well a company decides, not in the assets it owns. The data and decision discipline built for demand and supply must extend to the edge of the network. That's where three agendas once run separately—trade readiness, logistics competitiveness, and sustainability—are collapsing into a single design question. For a manufacturer chasing global value-chain share, these are no longer compliance boxes to tick once the plant is built; they are choices to be engineered into the network itself.

Trade readiness has become an operating capability, not a back-office task. The instinct is to treat rules of origin, customs, and carbon reporting as paperwork handled once a shipment is ready. The market has already priced that instinct: as European buyers began favoring lower-carbon suppliers ahead of the EU Carbon Border Adjustment Mechanism, India's steel and aluminum exports to the bloc fell by **nearly a quarter** in a single year. The lesson for supply chain leaders is not that trade is getting harder, but that where and how you build now determines whether you can sell later. The **India-EU trade agreement** removes tariffs but grants no relief from the carbon charge, so a company can win on duties and still lose on emissions it cannot measure. Readiness therefore begins on the factory floor and in the choice of corridors, partners, and geographies, designed for competitiveness rather than assembled after the fact. Practically, it means that visibility and control extend to emissions and origin data so that a market-access question can be answered before an order is at risk.



Sustainability is a competitiveness lever, not a reporting obligation. For most Indian manufacturers, [70 to 90 percent](#) of the carbon footprint sits not in their own operations but across the value chain: purchased goods, inbound and outbound transport, and the supplier base. That single fact reframes decarbonization as a sourcing and network-design decision rather than an environmental one. The methods that lower carbon—a modal shift from road to rail and coastal, smarter lane and supplier selection, and tighter network design—are the same methods that lower cost and risk, which is why treating carbon as a design variable rarely forces a trade-off against efficiency. The harder and more valuable move is upstream: the largest gap sits with [tier 2 and MSME suppliers](#) that cannot yet measure their emissions, which makes building supplier capability, not merely screening suppliers, the real source of advantage. Buyers in the European Union, United States, and Japan are already demanding supplier-specific data, and Indian [value-chain disclosures](#) have risen sharply in response. The manufacturers treating this as a design problem rather than a disclosure exercise are converting a looming cost into a reason to be chosen.

Read together, these two ideas point to one conclusion: for India, trade and carbon are no longer separate risks to be managed but a single competitiveness equation to be designed for. Companies that engineer readiness and low-carbon sourcing into the network rather than bolting them on afterward will own a disproportionate share of the value chains now being redrawn, and it is that design agenda, not any single project, that we now turn into a road map.

The supply chain transformation agenda and a three-to-five-year road map

In this article, we've illustrated one underlying shift: competitiveness is moving from physical assets to the speed and quality of decisions. Turning that into action requires three disciplines and a sense of sequence:

Move from projects to capabilities. The natural temptation is to answer each new pressure with a separate initiative—a control-tower pilot, an AI use case, a resilience program, a sustainability project—each sound on its own but collectively fragmented. An agenda built this way rarely compounds. The alternative is to tie every investment back to a common capability model, organized around the decisions the business is trying to improve, so that tools, data, suppliers, and governance reinforce one another rather than sitting in silos.

Prioritize decisions, not technologies. The most useful starting question isn't which platform to buy, but which supply chain decisions—across demand, supply, inventory, logistics, trade, and sustainability—would most improve competitiveness if they were made faster and better. Technology choices then follow from the decisions they are meant to serve, and the degree of autonomy granted to each decision becomes a deliberate, reviewable choice rather than an accident of procurement.

Sequence by maturity. The same move can be right for one company and premature for another. Organizations with weak data and fragmented processes shouldn't reach for autonomous execution; their first task is to build foundations. Those that already have strong visibility should resist buying more of it and instead invest in the decision loop and its governance. Autonomy earns its place only once the data and control beneath it are sound.

These disciplines can be phased across three horizons, each building on the one before. The road map sequences capability building by maturity; each horizon assumes the previous one is in place so that speed and autonomy are layered onto sound data and governance rather than substituted for them (see figure 6).

The destination isn't a fully automated supply chain but a practically autonomous one: fast where speed matters, governed where judgment matters, resilient where failure is costly, and competitive across cost, reliability, and carbon at once. For India, this is how a moment of manufacturing momentum becomes a durable position in global value chains: not through any single technology, but by building the right capabilities, in the right order, moving deliberately from just-in-time to just-in-control.

Figure 6
A three-to-five-year supply chain capability road map

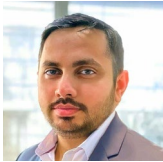
Horizon	Focus	Priority moves
Horizon 1 (0–12 months) Foundations and visibility	Get the data, decision rights, and basics right.	— Master-data and process standardization. — Segment SKUs, suppliers, and lanes by risk. — Define the north-star control dashboard and decision rights (RACI). — Measure emissions at the source for export-exposed product.
Horizon 2 (1–3 years) Decision velocity and governance	Convert visibility into speed.	— Stand up control towers as decision engines with thresholds and pre-approved playbooks. — Deploy AI on targeted decisions—replenishment, supplier-risk, rerouting, document checks—under explicit governance. — Build segmented resilience and optionality where failure is costly. — Optimize network design across cost, speed, reliability, risk and carbon.
Horizon 3 (3–5 years) Practical autonomy and converged advantage	Scale governed autonomy and own the network.	— Expand auto-execution where data and governance allow. — Embed carbon and trade readiness into routine sourcing and network decisions. — Pursue scope 3 leadership as a commercial differentiator. — Institutionalize continuous review as tariffs, corridors, and carbon prices move.

Source: Kearney analysis

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The authors wish to thank Harsh Nahar and Prashant Gupta for their valuable contributions to this article.

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Through its array of services, CII-IL acts as a catalyst, elevating the performance of Indian supply chains to unprecedented levels by establishing a sustainable ecosystem through active stakeholder participation and a global network. This ripple effect not only empowers industries to garner deeper insights into emerging trends, but also enables them to tackle industry specific challenges of national significance while adopting globally recognized best practices in the logistics and supply chain sectors.

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