



# INTELLIGENT SUPPLY CHAINS TO NAVIGATE TARIFF VOLATILITY

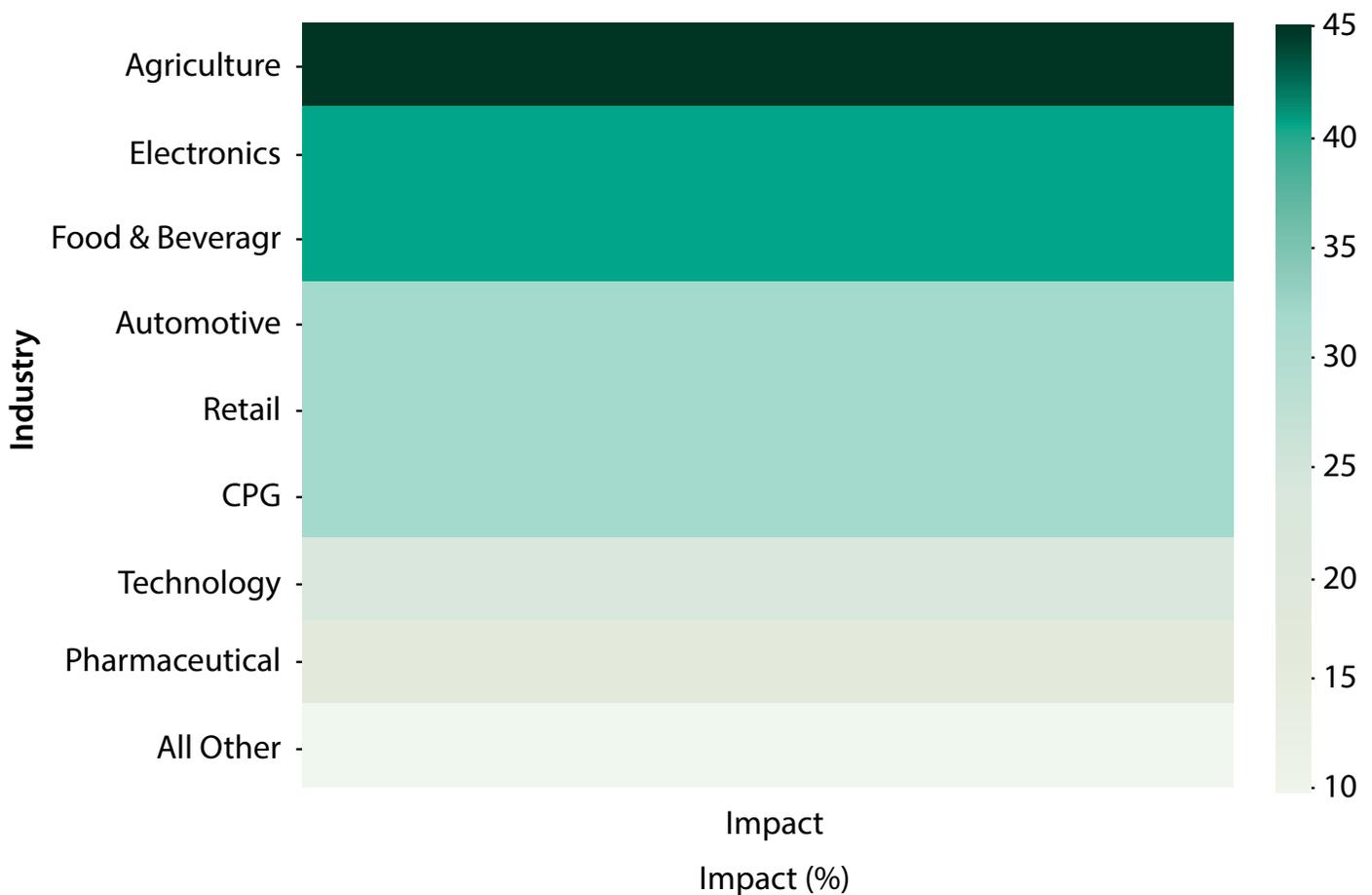
## Executive Summary

Global supply chains are critical for the movement of goods and services to get the right product to the right customer at the right time at the right location in the right quantity, in the right condition, and at the right cost. In 2022 alone, the US spent \$2.3 trillion on moving goods in and out of the country, highlighting the critical role that supply chain plays in maintaining economic stability and growth. There is a heightened level of stress on the system due to the rapid increase in tariff regimes, driven by changing geopolitical interests and rising protectionism. This is undermining the long-standing notion of fluidity of global trade. According to some estimates, tariffs may lead to a 1% to 5% increase in total supply chain spending for the U.S.<sup>1</sup> Broader economic impacts include a potential reduction in U.S. GDP growth by up to 0.4% and consumer price increases of 0.2 to 0.5%.<sup>2</sup> Manufacturing and retail are more vulnerable to these shifts, as they rely heavily on efficient global supply network and cost-effective operations. For instance, a 25% tariff on automobiles and a similar percentage on steel and aluminum, could result in a sharp increase in the price.

The impact of tariffs varies across industries, as illustrated in the heatmap. Estimated impacts suggest that agriculture faces the highest impact at approximately 45%, followed by electronics and food & beverages at about 35%. Automotive and retail industries both experience an estimated 30% impact, while consumer packaged goods (CPG) are affected by roughly 25%. Technology and pharmaceutical industries see lower impacts at approximately 20% and 15%, respectively. The "All Other" category, encompassing various smaller sectors, faces an estimated 10% impact. Please note that these figures are directional and subject to change based on evolving market conditions and regulatory updates.

These challenges underscore the urgent need for companies to move beyond linear, cost-reduction-focused supply chain models and instead embrace more agile, responsive, and resilient networks. To stay competitive in a volatile global trade environment, organizations must integrate advanced technologies, real-time data, and enhanced collaboration across the supply chain to rapidly adapt to cost fluctuations and regulatory disruptions.

### Impact on Industries Due to Latest Tariffs



# Operational Complexities Arising from Tariff Uncertainty

The volatility associated with trade and tariff negotiations continues to destabilize global supply networks. What once were linear, predictable flows of goods are now subject to abrupt recalibrations, driven by policy reconfigurations and shifting geopolitical alliances. Companies are increasingly forced into reactive postures—juggling expedited sourcing shifts, logistics rerouting, and cost reconciliations that erode both margins and long-term planning stability. Traditional supply chains, built for lean efficiency, now expose fragilities. A sudden change in duty structure can render existing supplier agreements nonviable,

disrupt transit through tariffed corridors, and trigger unanticipated inventory surpluses or deficits. These challenges are due to the absence of agility and flexibility in conventional supply chain design. Organizations are forced to rethink their supply chain strategies and invest in building a resilient and adaptable system that can withstand stress, adjust in real-time, and maintain competitiveness in an unpredictable environment. Considering the situation that the cross-border trade, once an enabler of scale, is now a vulnerability to tariff uncertainties. Key operational challenges include:

Supply routes optimized for speed and cost become suboptimal or unviable overnight. Rerouting via non-tariffed geographies leads to increased transit times, warehousing requirements, and logistics costs—escalating operational overheads by up to 25%<sup>3</sup>.

Customer demand becomes unpredictable as tariff-driven price hikes shift demand patterns, affecting production and retail forecasts.

Logistics network fragility

Demand unpredictability

Procurement agility under duress

Inventory risk exposure

Siloed response mechanisms

Teams must rapidly qualify alternate suppliers, often facing extended lead times, unvetted partners, and the renegotiation of contracts rendered obsolete by tariff-driven cost shifts.

Excess inventory, while a buffer, inflates holding costs—especially for tariffed SKUs. Conversely, lean strategies invite fulfillment failures. A Swiss Re analysis estimated that inventory disruptions can cost firms \$184 million annually in lost revenue<sup>4</sup>.

Fragmented coordination across procurement, logistics, finance, and compliance limits cohesive responses. In the absence of shared visibility, misaligned decisions compound inefficiencies.

To restore operational efficiency and effectiveness, organizations must adapt to becoming agile, responsive, and intelligent – going beyond being laser-focused on cost cautious and lean. Their ability to adapt sourcing, inventory, and logistics strategies while meeting service and financial goals, is crucial to maintain a competitive edge and weather the disruptions and stress imposed by the current geo-political situation.



## Technical Complexities and Limitations Adding to Challenges

Operational disruptions are often driven by deeper technical limitations that prevent effective adaptation to challenges like tariff uncertainty. Many companies' data systems, analytics, AI, planning tools, and compliance solutions are not equipped to handle the speed and complexity of modern geopolitical and trade changes. Key limitations include:



### Disparate and fragmented data ecosystems:

Key information like product codes and supplier data is often scattered across outdated systems. This makes it hard to get accurate, real-time insights into costs or quickly respond to tariff changes.



### Rigid ERP infrastructures:

Many systems are unable to support dynamic reconfiguration. Hardcoded sourcing rules, static BOM structures, and delayed update cycles inhibit agility.



### Inadequate forecasting tools:

Traditional models struggle to integrate real-time tariff scenarios, often relying on backward-looking trends that fail to capture non-linear interdependencies across sourcing, demand, and cost structures.



### Absence of digital twins:

Without digital replicas of supply chains, organizations are unable to simulate tariff scenarios, trace cascading effects, or evaluate mitigation strategies before disruption takes place.



### Static BOM visibility:

Tariff impacts ripple through the full hierarchy of a multi-tier BOM. Few systems have the intelligence to model how upstream component changes affect downstream cost and compliance metrics.



### Under-leveraged AI ecosystems:

Most AI deployments are confined to narrow functions—demand sensing or anomaly detection. Strategic, agent-based, or generative AI applications remain untapped, limiting predictive and prescriptive agility.



### Manual compliance and regulatory workflows:

Rapidly changing trade regulations are still managed through spreadsheets, human interpretation, and manual intervention—introducing compliance risk and undermining audit readiness.

Addressing these technical issues require a shift towards a more integrated, AI-first digital architecture that can act, rather than react, to navigate disruptions and become more resilient.



# AI-Powered Supply Chain Resilience Amid Tariff Uncertainty

In managing tariff uncertainties and building resilient supply chains, advancements in technology and data management play a critical role in enabling informed decisions and optimized resource allocation. These capabilities foster adaptability, operational agility, and continuous improvement—key elements for long-term sustainability. AI-first solutions that leverage generative AI, advanced analytics, and intelligent automation can enhance operational efficiency by enabling organizations to simulate disruptions, forecast outcomes, and automate key decisions. By integrating these technologies, companies can transform their supply chains into a strategic advantage, capable of responding rapidly to volatility and uncertainty.

## Dynamic forecasting and scenario simulation



Advanced machine learning and generative models simulate the downstream impact of tariff changes across sourcing, lead times, and customer demand. For example, organizations can model the impact of a 20% tariff on raw materials to assess potential, enabling informed and timely decision making.

## Digital twin deployment



Virtual replicas of the end-to-end supply chain ecosystem facilitate risk visualization, bottleneck detection, operational stress-testing, and test alternative strategies before implementing in the physical network.

## Automation of supply workflows



AI-driven tools streamline trade classification, update cost structures, and generate documentation for customs and regulatory compliance, minimizing human error and reducing time to compliance.

## Dynamic BOM and Product Cost Intelligence



By mapping multi-tier component dependencies, AI systems enable organizations to simulate cost-to-serve impacts and substitute tariffed components dynamically, especially in industries where BOM complexity is high. By mapping supplier dependencies and component relationships, organizations can simulate changes, evaluate alternative suppliers, and substitute non-tariffed components where necessary.

## Building Product and Supplier Master



AI-driven systems centralize and structure product and supplier data across the organization, ensuring consistency and real-time updates. This enables faster decision-making, better alignment across teams, and reduces errors by keeping product and supplier data accurate and up to date.

## Cross-functional intelligence synthesis

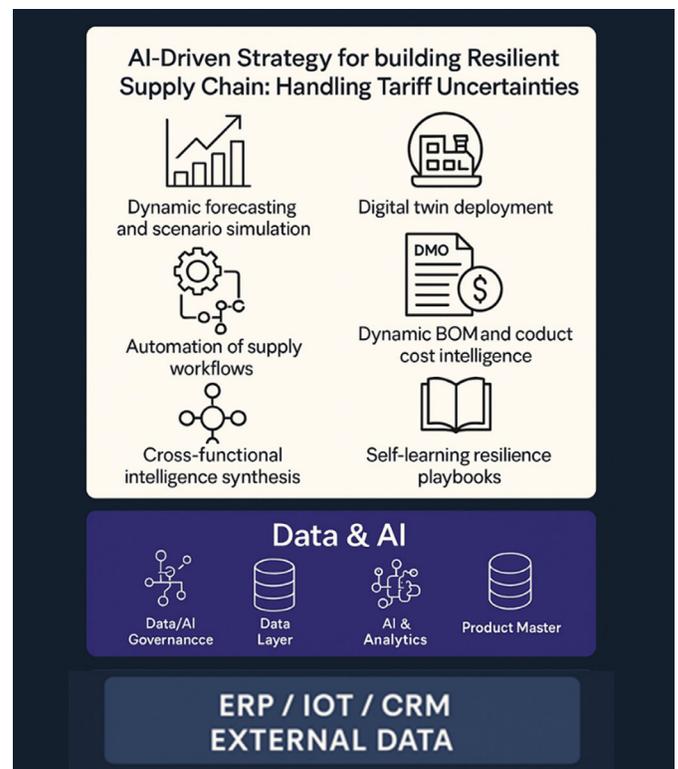


Generative AI solutions contextualize disruptions and deliver executive-ready insights, supporting coordinated responses across planning, finance, and compliance.

## Self-learning resilience playbooks



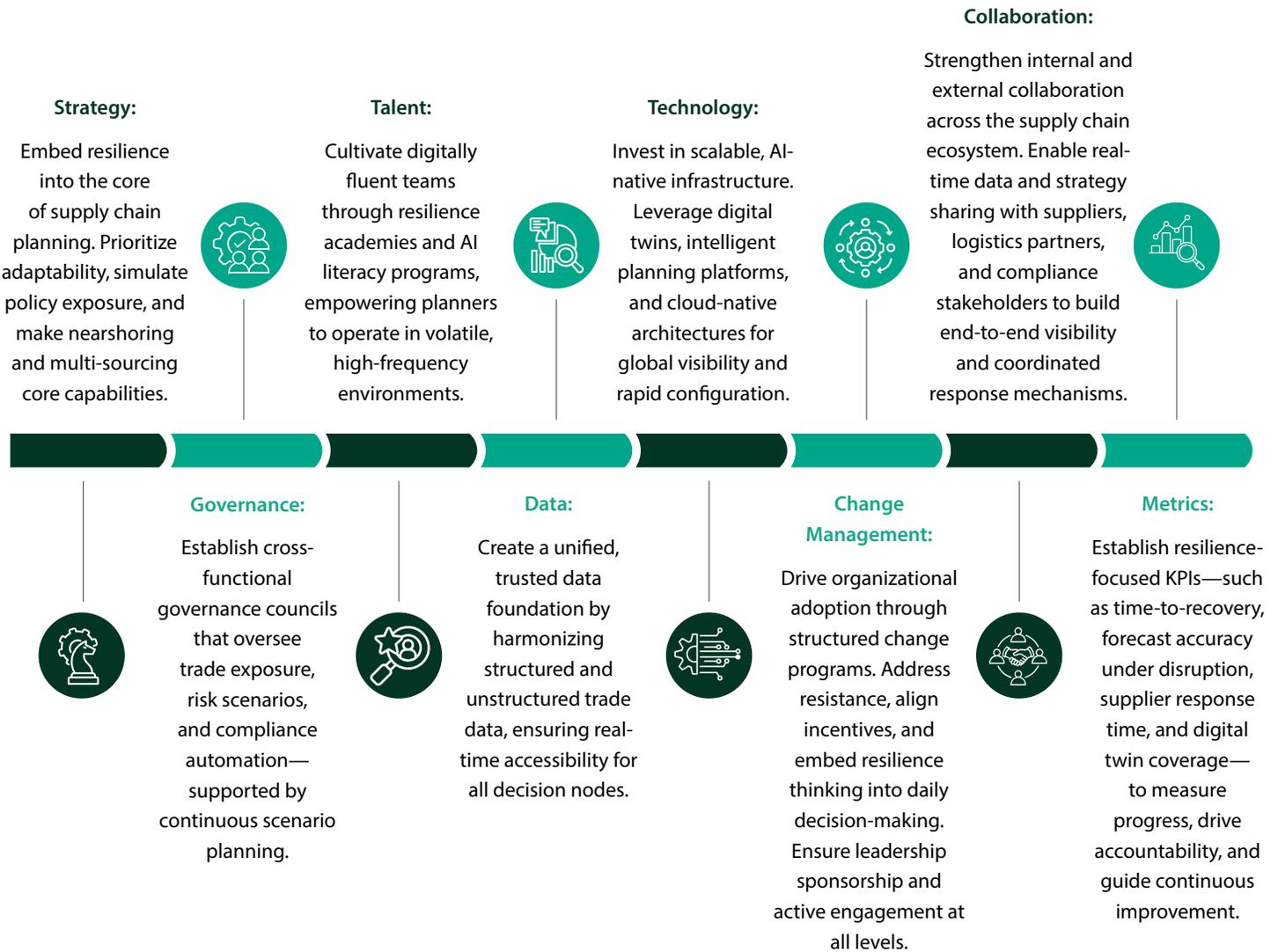
AI systems learn from past disruptions to create institutional knowledge assets—codifying best practices and enabling rapid response to recurring threats.



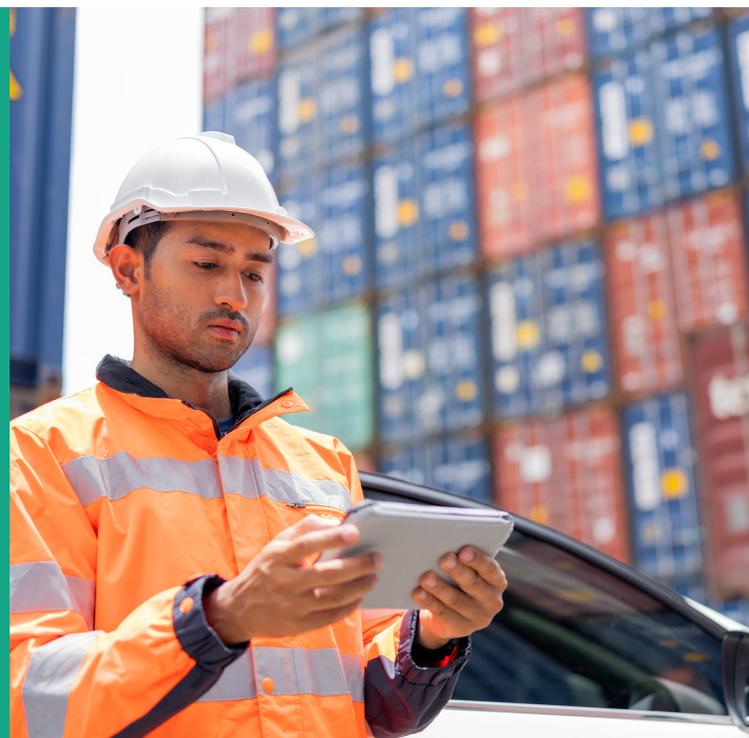
By implementing these AI-powered capabilities, organizations have demonstrated improvements such as a 20–50% increase in forecast accuracy<sup>5</sup>, 30–50% faster decision-making during disruptions<sup>6</sup>, 50–70% improvement in process speed<sup>7</sup>, and able to manage complex rules and regulations linked to tariff and trade barriers<sup>8</sup>. These benefits not only reduce cost and compliance risks but also enable a proactive, resilient supply chain that adapts in real time to global volatility.

## Next Steps: A Strategic Framework

Building a resilient, AI-first supply chain requires organizational readiness across strategic, structural, and cultural dimensions. A five-dimension framework can serve as both a diagnostic tool and a roadmap for action:



Understanding your organization's resilience archetype is essential, as companies typically fall into one of four categories: **Proactive Strategists**, who lead with advanced resilience capabilities; **Cautious Adapters**, who recognize the need for resilience but face execution challenges; **Reactive Responders**, who act quickly during disruptions but lack a cohesive long-term strategy; and **Vulnerable Operators**, who remain exposed due to outdated systems and siloed operations. To accelerate resilience, organizations should focus on five key areas: developing a comprehensive resilience strategy aligned with business goals, implementing strong governance to ensure accountability and risk oversight, investing in talent development to build adaptive capabilities, modernizing data infrastructure for real-time visibility and decision-making, and fostering a culture of innovation through the adoption of intelligent tools and systems. These actions collectively enable the creation of a connected, adaptive, and intelligent supply chain capable of thriving in an increasingly volatile and unpredictable global environment.



## Conclusion

As tariff uncertainty becomes a defining feature of global trade, supply chains must evolve from cost-centric models into resilient, adaptive ecosystems that deliver competitive advantage. This transformation is not merely defensive—it represents a strategic opportunity for organizations to respond with agility, intelligence, and operational flexibility. Emerging technologies such as AI-powered forecasting, digital twins, intelligent automation, and real-time compliance capabilities are key enablers of this shift. In an era of constant volatility, the ability to simulate disruptions, anticipate opportunities, and execute rapidly will distinguish market leaders. Resilience is no longer optional—it's a critical foundation for long-term success in the global enterprise landscape.

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## Author

Ahmad Shahzad

AI Strategist, Infosys

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For more information, contact [askus@infosys.com](mailto:askus@infosys.com)



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