MIT Technology Review
Insights

Produced in partnership with

Infosys cobalt

Rapidly advancing technologies are building the modern supply chain, making transparent, collaborative, and data-driven systems a reality.

Building a more reliable supply chain

In 2021, when a massive container ship became wedged in the Suez Canal, you could almost hear the collective sigh of frustration around the globe. It was a here-we-go-again moment in a year full of supply chain hiccups. Every minute the ship remained stuck represented **about $6.7 million** in paralyzed global trade.

The 12 months leading up to the debacle had seen countless manufacturing, production, and shipping snags, thanks to the covid-19 pandemic. The upheaval illuminated the critical role of supply chains in consumers' everyday lives – nothing, from baby formula to fresh produce to ergonomic office chairs, seemed safe.

For companies producing just about any physical product, the many "black swan" events (catastrophic incidents that are nearly impossible to predict) of the last four years illustrate the importance of supply chain resilience – businesses' ability to anticipate, respond, and bounce back. Yet many organizations still don't have robust measures in place for future setbacks.

In a poll of 250 business leaders conducted by MIT Technology Review Insights in partnership with Infosys Cobalt, just 12% say their supply chains are in a "fully modern, integrated" state (see Figure 1). Almost half of respondents' firms (47%) regularly experience some supply chain disruptions – nearly one in five (19%) say they feel "constant pressure," and 28% experience "occasional disruptions." A mere 6% say disruptions aren't an issue (see Figure 2). But there's hope on the horizon. In 2024, rapidly advancing technologies are making transparent, collaborative, and data-driven supply chains more realistic.

Methodology

MIT Technology Review Insights polled its global panel of executives in 2023 about their current concerns and future plans for data-driven supply chains. Of the 250 respondents, about 80% were C-suite executives or directors. They represented a broad range of industries, from retailing to transportation, with a slightly larger number of respondents in consumer goods and manufacturing. Although respondents came from all regions, the bulk of them were from North America (51%), Europe (39%) or Asia-Pacific (28%).

Key takeaways

1. The journey toward modernized supply chains is underway. Emerging technologies are building transparent, collaborative, and data-driven supply chains. This will help businesses facing operational challenges and market events to anticipate, respond, and bounce back.
2. Supply chains face mounting pressure to comply with environmental, social, and governance goals; rising customer expectations; increased security needs; and the imperative to run a lean, cost-effective business.
3. Top focus areas for executives around supply chain include increasing agility, reducing costs, using data for forecasting and product offerings, boosting productivity, and complying with sustainability goals.

"Emerging technologies can play a vital role in creating more sustainable and circular supply chains," says Dinesh Rao, executive vice president and co-head of delivery at digital services and consulting company Infosys. "Recent strides in artificial intelligence and machine learning, blockchain, and other systems will help build the ability to deliver future-ready, resilient supply chains."

Challenges to modern supply chains

The Suez Canal and covid-19 events highlight how profoundly a single incident can impact the flow of goods, services, and information around the world. Other historical examples that threw supply chains for a loop include the 9/11 terrorist attacks, which drastically altered global logistics and security protocols, and the Fukushima nuclear disaster, which disrupted electronics and automotive supply chains worldwide. The ripple effects of such events take many forms: production delays, cost increases, and reputational damage, to name a few.

But the supply chain challenges facing modern enterprises go beyond black swans – they also encompass more mundane, everyday issues like mounting pressure to show progress on environmental, social, and governance (ESG) goals. "Sustainability is primarily about protecting the environment by reducing waste and using sustainable materials – but there's also an increased demand from informed and socially aware consumers for products made in a sustainable way," says Rao. Attracting these customers often means proving a company's supply chain is as sustainable as its mission statement suggests.

Evolving expectations about where and how to find products – and how quickly consumers can get them – is another challenge. In the post-pandemic landscape, customers want the flexibility of virtual shopping experiences, even within traditionally brick-and-mortar industries. Speedy delivery times are no longer simply a nice-to-have, but an expectation. As a result, there's a greater need for real-time visibility and robust data analysis to streamline logistics planning and track inventory.

Evolving security concerns add yet another layer of nuance. As edge environments become more complex and more critical to everyday business operations, companies are seeing **a rise in cyberattacks**. Securing digital infrastructures at every stage in the tech stack and link in the supply chain requires sophisticated technology integration.

"Recent strides in artificial intelligence and machine learning, blockchain, and other systems will help build the ability to deliver future-ready, resilient supply chains."

Dinesh Rao, Executive Vice President and Co-head of Delivery at Infosys

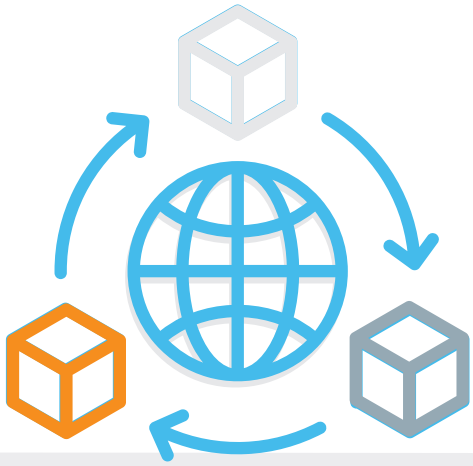
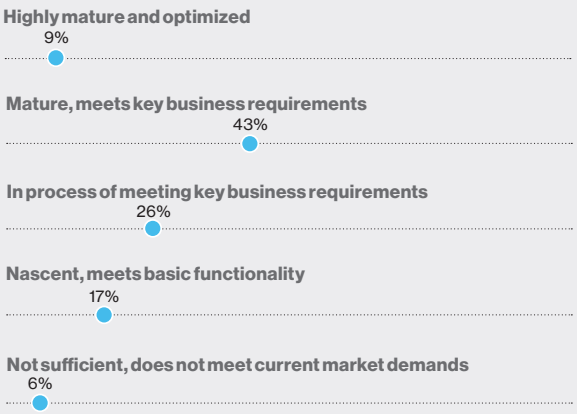


Figure 1: Few executives say their supply chains are fully optimized

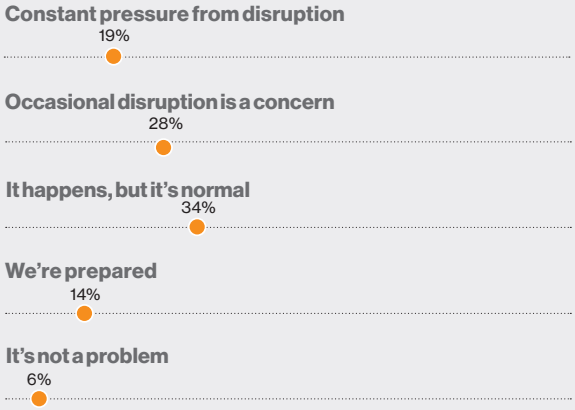
How would you best describe the state of your company's overall supply chain management given today's market conditions?



Source: MIT Technology Review Insights survey of 250 business leaders and decision-makers, 2023.

Figure 2: Firms experiencing pressure from supply chain disruption

How focused is your company on supply chain disruptions and their consequences?



Source: MIT Technology Review Insights survey of 250 business leaders and decision-makers, 2023.

All of these factors are growing expectations for the global supply chain management, including a forecast by Polaris Market Research that the market will reach nearly **$60 billion by 2030**. The 2023 MIT Technology Review Insights poll also suggests there's room for growth in this sector. Only about half of executives (52%) report their supply chain management currently meets or exceeds key requirements. Just 9% say their systems are "highly mature and optimized."

Part of this disconnect may be due to the perceived cost of modernization. "Getting supply chains to work efficiently with optimized cost and simultaneously achieving resiliency can be a contradictory mission," says Rao. "There's a tradeoff between a lean and cost-effective supply chain that provides the most competitive services, and building in redundancy with additional reserves of inventory, overcapacity in partners, and supply routes to deal with sudden challenges."

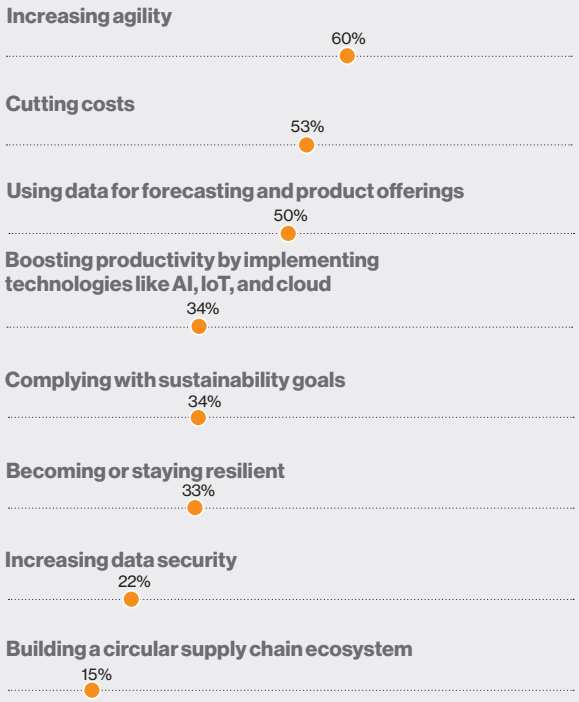
Chris Caplice, executive director of the MIT Center for Transportation and Logistics (CTL), likens investing in supply chain resilience to carrying an expensive umbrella around at all times – which can be a tough sell when there are no imminent clouds overhead. "It's great when it rains, but on sunny days, you're carrying it around at a cost," Caplice says. "That can be a hard justification to make on face value."

Leveraging innovation to mitigate supply chain pain points

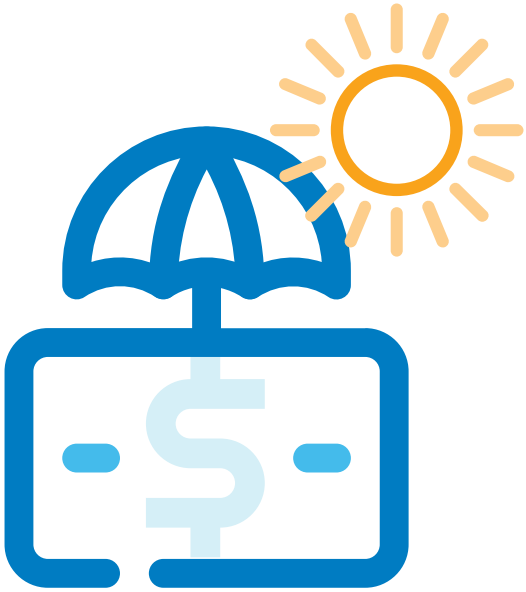
The 2023 MIT Technology Review Insights poll highlights several focus areas among enterprises eager to improve supply chain management systems – the top five being increasing agility (60% of respondents), reducing costs (53%), using data for forecasting and product offerings (50%), boosting productivity (34%), and complying with sustainability goals (34%) (see Figure 3).

Figure 3: Executives are focused on increasing agility

What are the three key areas your company needs to focus on when it comes to improving your supply chain management systems?



Source: MIT Technology Review Insights survey of 250 business leaders and decision-makers, 2023.



"It's like carrying an umbrella around. It's great when it rains, but on sunny days, you're carrying it around at a cost."

Chris Caplice, Executive Director of the MIT Center for Transportation and Logistics

Business leaders are already making moves to realize these goals. The poll found that the journey toward innovation-driven supply chains is well underway, with a majority of businesses (58%) actively transitioning toward data-driven, cloud-enabled operations – either with a roadmap (33%) or by experimenting with solutions (25%) (see Figure 4).

Besides cloud, other technological solutions include elements of AI/ML, 5G, 3D printing, and augmented/virtual reality (AR/VR) – all of which can contribute to faster, more dynamic responses to potential supply chain threats or inefficiencies. "The ability to sense, reason, and respond to changes in supply and demand caused by internal and external factors is quintessential for enterprises to thrive and grow – just as living organisms do," says Rao.

There are both hypothetical use cases and concrete, real-world examples of how these technologies can impact global supply chain management. When it comes to sustainability, AI can leverage historical data, enable

Figure 4: Most supply chains are being prepared for full integration

Would you consider your company's supply chain to be in a modern state in that it uses data, cloud-enabled technologies, IoT, AI, etc.?

Fully integrated	12%
Working on it with a roadmap	33%
Experimenting with solutions	25%
Piloting use cases	19%
Not at all	11%

Source: MIT Technology Review Insights survey of 250 business leaders and decision-makers, 2023.

bp uses technology to centralize control over data

bp's approach to modernizing its supply chain hinges upon robust data infrastructure, including a recent migration to the cloud and consolidation of procurement departments. The company's control tower centralizes data and makes it more readily usable.

Raimundo Martinez, global digital solutions manager for procurement and supply chain at bp, noted in a recent podcast that one of the primary goals behind the control tower initiative is to streamline data so it can yield more actionable insights. Centralizing the data also helps lay a foundation for technologies like AI/ML to be layered atop—for instance, using generative AI for advanced search query capabilities. "When you think about advanced technology like AI, you first need to focus on your foundational data," he explains.

When it comes to the role of the cloud, Martinez notes bp has used the technology to homogenize data across multiple regions, consolidating everything into a single platform. "All of this data transformation happens in a single spot. That allows our users who need specific data to go to a single source of truth and not be pulling data from multiple systems." The tower also provides a summary of relevant information so users don't have to consult any other system to understand what's driving an alert.

This streamlined approach not only enhances operational efficiency, but also accelerates decision-making. Thanks to the latest integrations, "requests can be completed in seconds instead of in weeks," Martinez notes.

The ultimate goal, he adds, is to transform bp's supply chain strategy from reactive to proactive. "Moving a supply chain from a transactional item to a much more strategic item by leveraging this technology—that, to me, is the ultimate vision."

"When you think about advanced technology like AI, you first need to focus on your foundational data."

Raimundo Martinez, Global Digital Solutions Manager for Procurement and Supply Chain at bp

more accurate carbon tracking, and offer valuable insights for future optimizations. Technologies like 3D printing allow for on-demand production and can reduce waste. Moving to the cloud can also make operations more sustainable: Rao cites the example of a North American juice manufacturer using Infosys' Enterprise Cloud apps, part of Infosys Cobalt, to better plan, monitor, and manage groundwater consumption.

In the logistics arena, cloud technology can provide access to real-time data, as well as improve scalability and collaboration. Meanwhile, 5G promises to revolutionize data transmission speeds, support remote operations, and enable autonomous systems. Infosys points to a delivery and logistics customer using its AI/ML features to predict inventory inaccuracies that significantly improved its on-time-in-full (OTIF) metric, and to a European consumer goods firm that now boasts a **92% accuracy rate** in its weekly demand forecasts, thanks to predictive capabilities fueled by AI/ML and the cloud.

And while upfront development and implementation costs can be daunting, the economic advantages of resilient supply chains are compelling. There can be significant cost reductions associated with adopting innovative supply chain solutions. Another Infosys customer, a hygiene, health, and nutrition brand, slashed logistics costs by 15% by implementing a control tower solution that enhanced last-mile connectivity planning. A different client of Infosys, a telecommunications company, employed digital twin technology combined with AI/ML for real-time tracking of maintenance trucks. The efforts helped the company reduce fleet downtime, meet customer repair orders faster, and complete planned maintenance projects more seamlessly, boosting operational efficiency, customer satisfaction, and the bottom line.

Collaborating to chart the path forward

No supply chain exists in a silo, and one broken link can have devastating downstream consequences. Shared data and joint technological platforms, on the other hand, can provide a unified view, enhance decision-making, and boost responsiveness. "One of

Figure 5: Partner companies are coming on board with supply chain integration

What does collaboration with partners, suppliers, and customers look like in your company's supply chain ecosystem?

Modern circular supply chain	8%
Most parts are integrated with our enterprise resource planning system (ERP)	22%
We're cooperating with partners to engage and collaborate	45%
Many partners hesitate to engage and standardize	13%
Our supply chain has no data collaboration	12%

Source: MIT Technology Review Insights survey of 250 business leaders and decision-makers, 2023.

the important aspects of a resilient supply chain is the ability to communicate and collaborate with different parties like suppliers, distributors, and customers with systems spread across different enterprises," says Rao.

There's some room for improvement on this front. The poll found that while partner companies are coming on board with an integrated supply chain system, full integration isn't yet widespread (see Figure 5). In fact, one in four respondents say their organization has either no data collaboration plan or is currently working with hesitant partners.

The acceleration of technological processes during the past two years promises to unlock more collaborative opportunities in the supply chain. Generative AI, for instance, can tap into vast datasets to identify optimal distribution routes that are mutually beneficial for all parties. "With accelerated innovation in AI models and investments in AI solutions, the supply chain will see a lot of use cases powered by this technology," says Rao.

AI won't be the sole innovation charting a course through whatever new, unpredictable waters – or tight squeezes – lay ahead. Just as collaboration among partners plays a crucial role in resilience, so do synergies among emerging technologies. Predictive analytics driven by AI can spot future disturbances and enable early preparation, and IoT devices can provide real-time data, boosting risk assessment and adaptive decision-making. "In the end, it's the combination of these technologies that will improve resilience and agility, and better prepare our supply chains for the future," Rao says.

Scenario planning helps companies prepare for the unpredictable

Scenario planning is a strategic approach that lets companies prepare for unforeseeable disruptions like black swan events, says Chris Caplice, executive director of the MIT Center for Transportation and Logistics. "Scenario planning is a way of getting out of the forecasting game—or at least, complementing it," he says. "You switch from trying to predict events, which is next to impossible, and think instead about the effects that one could have on your company. While there are many, many events that can happen, there are really only a handful of effects."

During scenario-planning exercises, teams simulate a range of possible disruptions and potential repercussions. "Forecasting is like boxing — you look at what's happening, and you project forward and say, 'This is what the future's going to be,'" says Caplice. "Whereas scenario planning is like judo. You say, 'Okay, if X happens, I'm going to react Y way.' It's a little more robust. It's more resilient to think that way than to try to predict and forecast a black swan. Because if someone predicts a black swan, they just got lucky."

As an example of this, in September 2019, a large national trucking firm held a training exercise with MIT. They simulated an incident of workplace violence, exploring several ways in which the company could respond. The company "brought all their senior leaders together and examined what they would do if, for instance, someone came in with a weapon or something similar," explains Caplice. "They worked out a plan."

Five months later, when the covid-19 pandemic hit, the company was able to use those insights to respond more effectively to the early days of the crisis—since the results of both scenarios were the same (a complete shutdown of operations). "Because of the inroads they made by talking and setting up systems [during the exercise], they were able to react faster [to the pandemic]. And so the whole idea is training," says Caplice. "To be resilient, you need to be able to make decisions quickly. Running through exercises and working those muscles pays benefits, even if a totally different disruption happens."

"Building a more reliable supply chain" is an executive briefing paper by MIT Technology Review Insights, in partnership with Infosys Cobalt. We would like to thank all participants as well as the sponsor, Infosys. MIT Technology Review Insights has collected and reported on all findings contained in this paper independently, regardless of participation or sponsorship. Michelle Brosnahan was the editor of this report, and Nicola Crepaldi was the publisher.

About MIT Technology Review Insights

MIT Technology Review Insights is the custom publishing division of MIT Technology Review, the world's longest-running technology magazine, backed by the world's foremost technology institution – producing live events and research on the leading technology and business challenges of the day. Insights conducts qualitative and quantitative research and analysis in the U.S. and abroad and publishes a wide variety of content, including articles, reports, infographics, videos, and podcasts. And through its growing MIT Technology Review Global Insights Panel, Insights has unparalleled access to senior-level executives, innovators, and entrepreneurs worldwide for surveys and in-depth interviews.

From the partner

Infosys is a global leader in next-generation digital services and consulting. We enable clients in more than 50 countries to navigate their digital transformation. With over four decades of experience in managing the systems and workings of global enterprises, we expertly steer our clients through their digital journey. We do it by enabling the enterprise with an AI-powered core that helps prioritize the execution of change. We also empower the business with agile digital at scale to deliver unprecedented levels of performance and customer delight. Our always-on learning agenda drives their continuous improvement through building and transferring digital skills, expertise, and ideas from our innovation ecosystem.

Visit **www.infosys.com** to see how Infosys (NYSE: INFY) can help your enterprise navigate your next.

Infosys cobalt

Illustrations

Cover art and spot illustrations created by Chandra Tallman Design LLC, compiled from The Noun Project and Adobe Stock.

Learn how Infosys Cobalt can accelerate your business with cloud services, solutions and platforms.

www.technologyreview.com/thecloudhub

Infosys cobalt

MIT Technology Review Insights

www.technologyreview.com

insights@technologyreview.com