ECONOMIST IMPACT

Next-gen supply chains

The current and future use of gen-AI in supply chains

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Contents

About this report

'Intelligent supply chains' is an Economist Impact report sponsored by GEP. It explores the current and future use of gen-AI in procurement and supply-chain operations. The report is based on a survey conducted between January and March of 2024 of 400 executives in the US and Europe who were familiar with their organisation's supply-chain strategy and operations.

Economist Impact is solely responsible for the views expressed in this report, and the content does not necessarily reflect the perspectives of the sponsor.

Economist Impact would like to extend its thanks to the following interviewees for their time and insights:

- **A.K. Karan**, global senior director for advanced engineering and integrated supply chain at Baxter International
- **Christopher Tang**, distinguished professor and Edward W. Carter chair in business administration at UCLA
- **Steve Armato**, vice-president of transportation services and technology at Amazon

The report was produced by a team of Economist Impact researchers, including:

- **John Ferguson**, project director
- **Oliver Sawbridge**, project manager
- **Eddie Milev**, analyst

Sponsor foreword

In 2024, strategic discussions in corporate boardrooms increasingly address the balance of managing risks while optimising operational performance. This happens as the amount and types of risk have proliferated. Geopolitical tensions have escalated, supply chains are being reshaped to reduce dependency on countries like China and disruptions due to Covid-19 continue to affect commodity markets. According to the latest Economist Impact survey, a notable 55% of executives anticipate significant supply-chain disruptions, highlighting the need for a proactive and innovative approach to operational strategies.

Amidst these challenges, however, a substantial 68% of surveyed executives acknowledge the imperative role of sophisticated digital solutions in empowering operational efficiencies, enhancing visibility, and fostering supply-chain collaboration. This underscores the role of technology in fortifying supply-chain resilience, with a parallel emphasis on digital transformation initiatives — both aimed at augmenting operational capabilities. In view of this, the significance of AI assumes prominence. Generative AI emerges not only as a tool that helps fortify resilience but also as a means for heightened supply-chain efficiency and sustainability.

Yet, to transform supply chains, more than mere technology adoption is needed. While AI and digital tools are enabling, their efficacy is optimal when complemented by human insight and strategic foresight. When skilled professionals use sophisticated technology, business performance is optimal: strategic decisions are informed by cutting-edge analytics alongside deep industry acumen. This equilibrium between technology and people is indispensable, as evidenced by the 41% of executives who say that AI integration creates new job opportunities. In turn, this results in a need for a workforce adept at navigating technological advancements and business management alike.

This research programme explores these themes comprehensively, offering data-based analysis and forward-looking strategies on harnessing the full potential of AI and technology in supply-chain management. As you engage with it, consider the potential of embedding advanced AI and technological solutions into your supply-chain operations to ensure that resilience, growth and innovation remain central tenets of your strategy.

Santosh Nair
Chief Product Officer,
GEP

Executive summary

1. **While a significant majority of executives express support for AI investments—78% are somewhat supportive and 16% are even more supportive—prudence should guide the technology's adoption.**
   With a strong 78% of executives showing support for AI-related investments in 2024, it is clear that the technology is seen as a vital component of future procurement and supply-chain strategies. This enthusiasm is grounded in the potential of the human-like computer intelligence to substantially enhance the efficiency of operations, providing a competitive advantage to businesses that adopt it early. In fact, a notable 65% of the chief supply-chain officers surveyed anticipate that generative AI (gen-AI) could optimise or automate between 26% and 50% of their current procurement and supply chain-operations over the next three years. Yet, it is also important for businesses to recognise that such high levels of optimism may also reflect a degree of over-excitement about AI's capabilities. Plans to adopt the technology need to be tempered with a recognition of the practical challenges with gen-AI, and some of its flaws.

2. **AI-driven resilience is the top priority for adopting the technology among surveyed executives, highlighting its role in managing procurement and supply-chain disruptions. Yet, the reliability of AI predictions must also be considered.**
   In light of the unending disruptions and growing complexities in procurement and supply-chain operations, the top priority for using gen-AI is enhanced resilience and security, with 63% of executives selecting it as their motivation. The technology's ability to quickly analyse vast amounts of data and generate predictive insights could be crucial for pre-emptive planning and rapid response to both procurement and supply-chain disruptions. However, the occasional inaccuracies of gen-AI systems could lead to misguided decisions if careful human oversight is not exercised.

3. **Gen-AI could enhance sustainability in procurement and supply chains, with a strong focus on reducing carbon footprints and improving resource efficiency. However, the accuracy of AI-generated estimations on sustainability metrics and the consistency of resulting actions must be monitored closely.**
As businesses increasingly prioritise environmental responsibility, gen-AI emerges as a key enabler for enhancing sustainability within procurement and supply-chain operations. By analysing vast amounts of data, the technology can identify inefficient practices and suggest improvements, minimising waste and optimising resource use. AI capabilities are especially valuable in logistics, where the technology can optimise routes to reduce fuel consumption and cut carbon emissions. The use of gen-AI not only supports environmental goals but also aligns with growing consumer and regulatory demand for greener procurement and supply-chain operations. Despite these promises, AI remains a tool and its sustainability-related estimations—and the consistency of subsequent actions—demand ongoing human supervision.

4. **Gen-AI is seen as a catalyst for job creation by 49% of procurement and supply-chain officers, but it will also likely necessitate upskilling across the sector.**
Nearly half (49%) of the procurement and supply-chain officers surveyed see gen-AI as a source of new job opportunities. This is further supported by 15% of respondents from all business functions who anticipate a transformation in traditional procurement and supply-chain roles, suggesting AI could steer these functions towards more analytical and strategic engagement. Additionally, 11% of respondents believe that AI's integration into business operations will necessitate accelerated in-house training to improve data literacy. Despite the relative optimism, 16% express concerns about potential job displacement due to automation, highlighting the complex impact of AI on employment within the procurement and supply-chain sector.

5. **Data security and privacy are a top concern for executives seeking to integrate gen-AI into procurement and supply-chain operations.**
Despite 73% of executives rating their company's procurement and supply-chain data as good, data security and privacy stand out as the highest-ranked concern, with 32% ranking it among their top two challenges. This highlights the importance of deploying AI systems with security measures built-in, to protect sensitive information from cyber threats. Another challenge is the need to comply with strict data protection regulations, especially as supply-chain data often includes personal details protected under laws, such as the EU's General Data Protection Regulation (GDPR). What's more, 53% of executives express concerns about adhering to rapidly-evolving AI standards and regulations.

6. **Ethical considerations are undervalued, with only 17% of executives focusing on using gen-AI ethically, despite regulatory pressures. Human oversight remains indispensable for responsible AI deployment.**
Despite the significant potential for regulatory impact, just 17% of executives consider the ethical use of AI a concern, which contrasts with the 53% worried about regulatory compliance. This discrepancy underscores a gap between the recognition of ethical AI practices and their relevance for responsible use of gen-AI. Given the evolving regulatory landscape, such as the EU's proposed AI Act, integrating ethical considerations into AI strategies is crucial to align with legal frameworks and societal expectations, ensuring responsible and compliant AI deployment.

Intelligent supply chains

The world is at the dawn of the generative artificial intelligence (gen-AI) era. Yet, the 'foundation' models that power the technology are already bringing opportunities for businesses. The realm of supply chains, an increasingly important part of business strategy, has not been left behind. Gen-AI is optimising inventories and logistics, simplifying procurement processes and helping supply-chain managers better understand daily inputs. Still, the full potential of AI systems that process and analyse large amounts of data, generate human-like text, convincingly answer complex questions and interpret visuals is not fully realised. Future supply chains will leverage content-generating AI to enable entirely new sourcing and organisation strategies, and near-live supply-chain visibility. The opportunities are immense, but so are the challenges. Even if businesses have the right data, they need to use gen-AI responsibly, build the right capacities and safeguards, anticipate inherent flaws and, ultimately, prepare for regulatory challenges.

While AI technologies, such as machine-learning algorithms, have been used in supply chains for over a decade, the public release of highly-capable foundation models has ignited excitement–and, in certain cases, overstatements–of gen-AI's potential impact. Businesses see gen-AI as a source for growth, whereas some workers see it as a potential threat. In reality, AI-induced change is likely to be more gradual. Businesses will likely need time to implement gen-AI in their supply-chain operations, while supply-chain and procurement jobs that seem replaceable with deceptively human-like computer intelligence are likely to last. Steve Armato, vice-president of transportation services and technology at Amazon, corroborates this. In his view, a more probable scenario is a 'hybrid' approach, where existing operations and jobs are aided by gen-AI, not replaced by it.

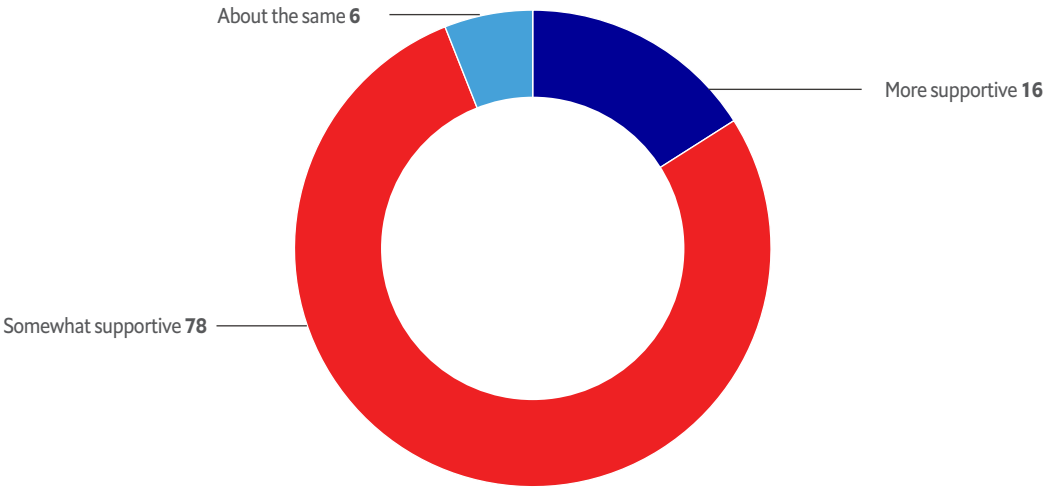
While gen-AI won't change everything overnight, businesses would be short-sighted to ignore the potential of such systems in supply-chain management and strategy. Leveraging existing gen-AI functions and preparing for its future application is quickly becoming an avenue for a competitive supply chain. Businesses know it and are ready to invest. Our survey indicates that executives' approach towards AI-related investments is largely positive–roughly 78% indicate a somewhat supportive attitude when compared with other tech investments, and 16% are very supportive (see figure 1). Clearly, expectations for the role of gen-AI in supply-chain and procurement operations are high.

These expectations, however, coupled with occasional over-enthusiasm, can lead to businesses misplacing efforts and capital. This paper aims to help navigate the use of gen-AI in supply-chain and procurement operations. It explores how businesses are using such systems, what parts of their current operations will benefit from them most and what implementation challenges lie ahead. It then draws on our current understanding of gen-AI to hypothesise how businesses will use it to devise entirely new procurement and supply-chain strategies and operational techniques.

Figure 1: Executive support for AI investment relative to other technologies

Question: How does management's approach to AI-related technology investments compare with other technological investments?

% of respondents



Source: Economist Impact survey 2024

Part one: Gen-AI enters today's supply chains

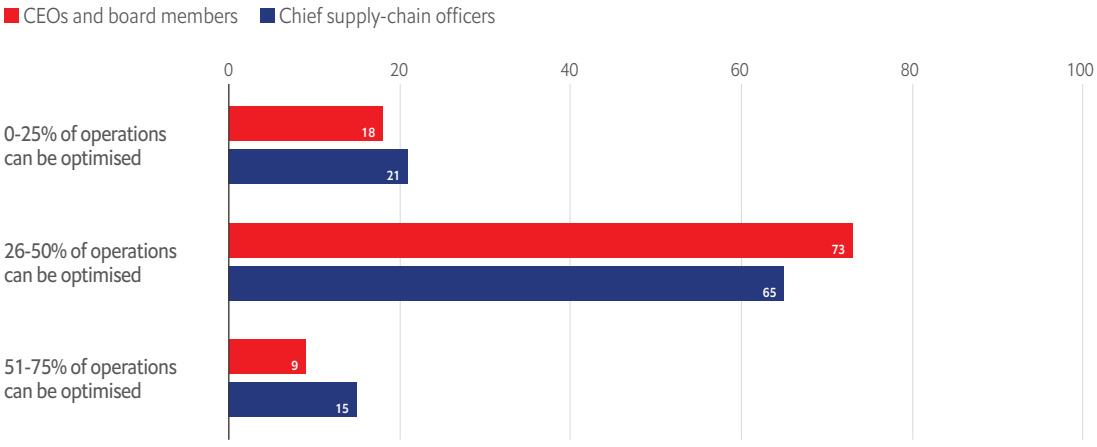
No recent technology in the realm of procurement and supply chains has received as much attention as gen-AI for its potential to improve existing operations. Our survey results underscore this interest: 65% of chief supply-chain officers (CSCOs) believe that gen-AI could optimise or automate between 26% and 50% of their current procurement and supply-chain operations over the next three years (see figure 2). The percentage of board members and CEOs who believe the same is eight points higher, at 73%, signalling unquestionable optimism but, simultaneously, revealing that those in charge of strategy might be overstating gen-AI's role in supply chains.[1]

There are two main implications of these findings. First, given their specialised knowledge, procurement and supply-chain officers–who are presumably better equipped to understand the impact of gen-AI on their work–should be more involved in business decision-making. This aligns with a wider business trend, amplified by the increasing significance of resilient and efficient procurement and supply-chain operations during turbulent times (see paper one of this research programme). Second, with business leaders overly-excited about gen-AI, there is a need to be prudent with the tech and avoid hyperbole with its potential. This paper aims to explore the main practical uses of gen-AI in optimising and automating current procurement and supply-chain operations, while highlighting AI-related changes and challenges.

Figure 2: Projected AI optimisation in procurement and supply-chain operations within three years

Question: What percentage of your procurement and supply-chain operations do you feel can be optimised or automated by AI in the next three years?

% of respondents



Source: Economist Impact survey 2024

[1] Another possible explanation of the survey results in Figure 2–that CSCOs are cautious in their adoption of AI as opposed to board members and CEOs due to vested interests–can be ruled out. This is because only 14% and 13% of the same CSCOs and CEOs, respectively, stated that they anticipate displacement due to AI-enabled automation.

Precision in prediction optimises procurement and supply-chain operations

Matching supply with demand perfectly—the aspiration of procurement and supply-chain managers—will never be achieved. Yet the gap can be narrowed with gen-AI: previously inconceivable data analysis and extrapolation is now performed by powerful foundation models that 'understand' and 'interpret' diverse inputs. This advanced capability is enabled by gen-AI's ability to work with data creatively compared with less 'intelligent' older systems that can only process labelled data types that they have been made familiar with. With gen-AI, procurement and supply-chain managers can input complex and often unstructured data–such as inventory levels, supplier performance and costs–and expect the foundation model to identify gaps in the data, make sense of incoherent variables, and 'grasp' and credibly interpret unfamiliar inputs. Speaking about the integration of gen-AI into diverse data environments, A.K. Karan, global senior director for advanced engineering and integrated supply chain at healthcare company Baxter International, comments: "We no longer require strictly structured data. Gen-AI can work with unstructured data, like videos or audio notes. This flexibility allows us to leverage much more data for insightful decision-making."

What happens next, however, is more impressive. Once familiar with vast amounts of data from the past and present, gen-AI can predict market trends long before they come about. Indeed, the tech can discern patterns in consumer behaviour, consider complex economic indicators and even factor in more distant clues, such as social media trends, to predict when demand might spike or dip, with fair accuracy.[2] In turn, having such information can increase supply-chain efficacy and enhance procurement strategies by enabling proactive sourcing and optimising supplier selection and engagement. Indeed, an early understanding of demand through using gen-AI can address pressing challenges related to inventory management, assist in aligning procurement with production levels, and lay the groundwork for more effective communication and collaboration with suppliers—a cornerstone of resilience (further discussed in paper one of this research programme). Mr Armato emphasises how AI enhances Amazon's ability to match inventory with geographic demand through a process called "regionalisation." By segmenting the US into regions, he notes, Amazon leverages historical buying behaviours to forecast demand, enabling the "predictive placement of inventory". This approach ensures that specific products are close to the customers likely to buy them–even before they do.

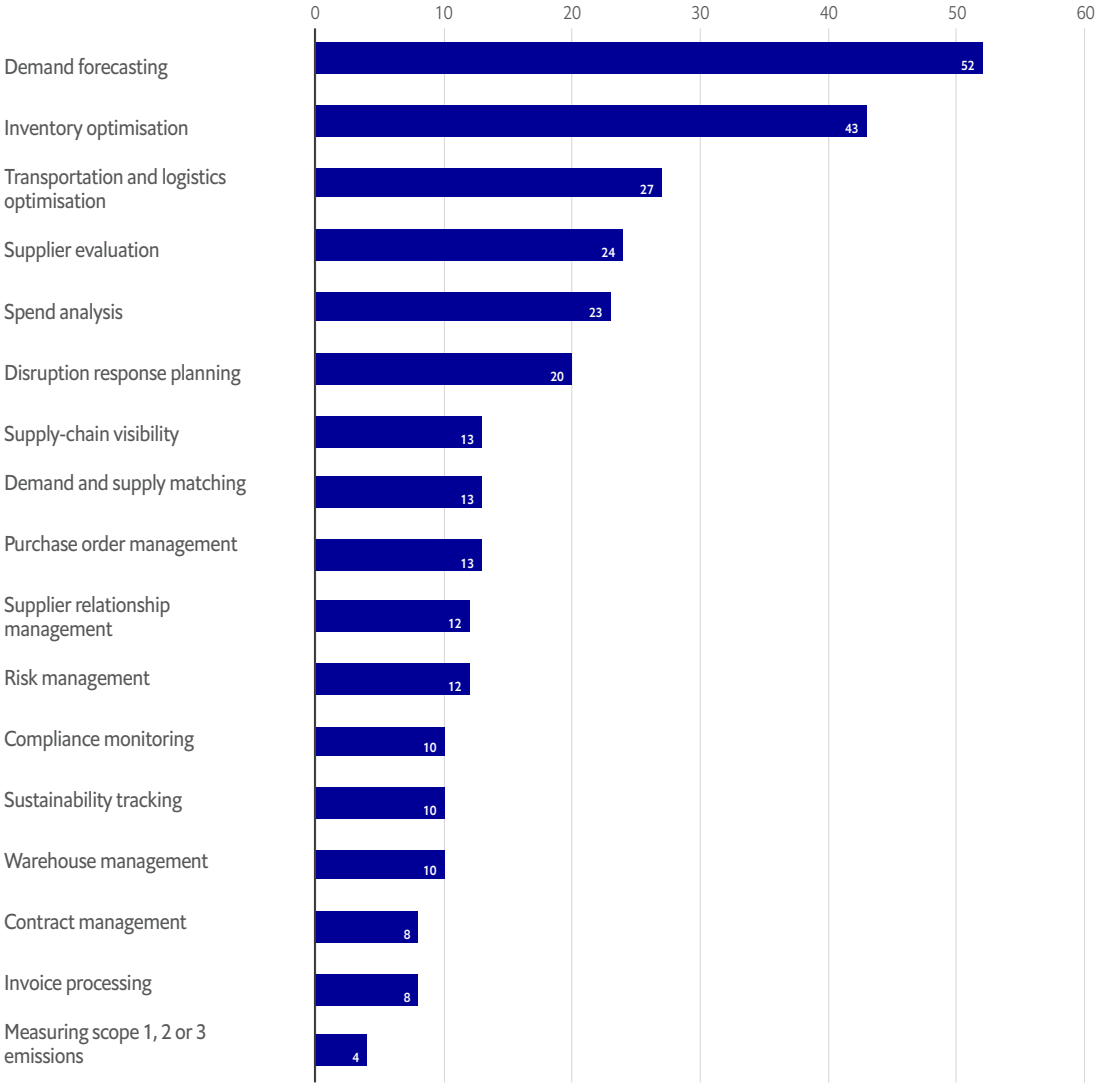
[2] Wamba, S F, et al. 2023. "ChatGPT and generative artificial intelligence: an exploratory study of key benefits and challenges in operations and supply chain management." International Journal of Production Research. Available at: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=gen-Ai+supply+chains+inventories%2C+demand&btnG=#d=gs_cit&t=1712331653341&u=%2Fscholar%3Fq%3Dinfo%3ALBwW6eH6z8kJ%3Ascholar.google.com%2F%26output%3Dcite%26scirp%3D1%26hl%3Den

In short, gen-AI's predictive capacities are reimagining the entire demand-supply equation that underpins the work of procurement and supply-chain managers. Businesses understand this potential. The executives we surveyed cite demand-forecasting as the aspect of their job that will most benefit from gen-AI, with the related aspect of inventory optimisation taking second place (see figure 3). What is more, a significant amount of executives indicate they are ready for the tech when it comes to warehouse management systems. Of those surveyed, 41% say the software for daily warehouse operations they currently use is collaborative with AI, with only 13% stating it is not (47% are neutral).

Figure 3: Functions benefitting from gen-AI in procurement and supply-chain operations

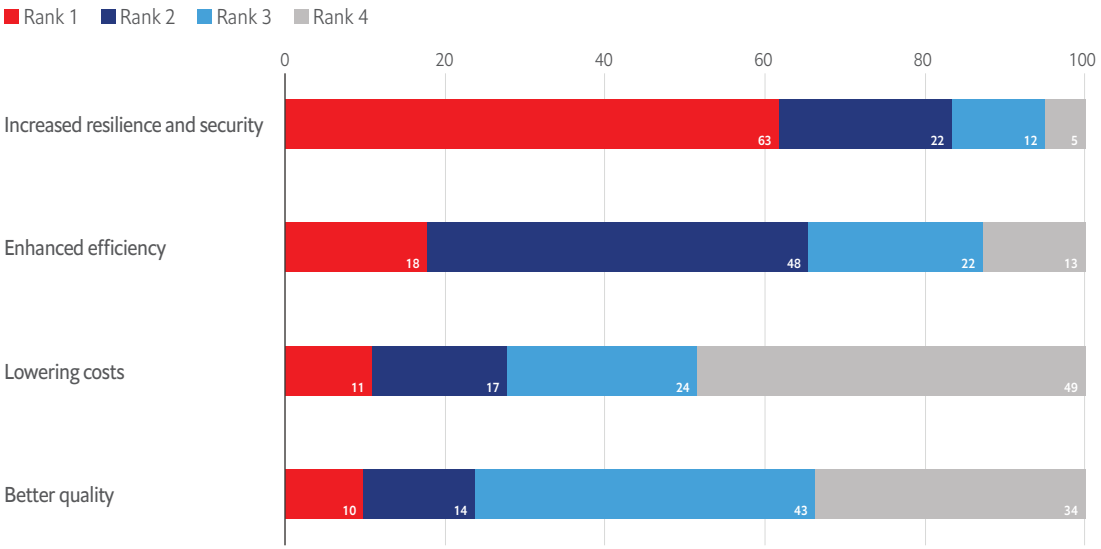
Question: Which procurement and supply-chain functions do you believe can benefit the most from generative AI? Please select up to three.

% of respondents



Source: Economist Impact survey 2024

Figure 4: Business motivations for applying gen-AI in supply-chain processes
Question: What are your main business motivations for applying gen-AI in each of the following supply-chain processes?
% of respondents



Source: Economist Impact survey 2024

Supply-chain res-AI-lience

In times of uncertainty, the capacity of gen-AI to find patterns in vast data and produce informed insights and predictions aids procurement and supply-chain managers in more than understanding market dynamics. It becomes a key tool in managing risks—both before and after they play-out—and adapting to changes imposed by new circumstances.[3] This is why the highest-ranked motivation for applying gen-AI across procurement and supply-chain processes, according to our survey, is increased resilience and security, with 63% of executives ranking it above efficiency (the second-highest motivation), cost and quality (see figure 4). Discussing how gen-AI will impact supply chains, Michael Ströebel, head of process management and digitalisation at BMW Group, notes that in the past, dashboards were "the answer to everything", especially in moments of supply-chain disruption. In his view, however, the future of data querying is in "gen-AI conversations" that allow multiple queries to be posed one after another.[4]

When asked which supply-chain functions would benefit most from gen-AI, a fifth of executives select disruption response planning as one of three options, and a tenth choose risk management more widely (see figure 3). These emerging business intuitions about gen-AI's role in building resilience are not misplaced. In preparing for risks, the predictive capacity of gen-AI, based on identifying patterns and correlations on past and present data, can identify what potential future problems a specific supply chain might face and suggest tailored solutions or devise hypothetical scenarios. Gen-AI's predictive capabilities can similarly empower procurement managers to anticipate supplier risks. By analysing patterns from data on supplier

[3] Chowdhury, M, et al. 2019. Supply chain resilience for performance: role of relational practices and network complexities, Supply Chain Management, Vol. 24 No. 5, pp. 659-676. Available at: https://doi.org/10.1108/SCM-09-2018-0332
[4] Interview with Michael Ströebel by Automotive Logistics Digital Strategies. Available at: https://www.youtube.com/watch?v=3_El7o-FoO9s&t=22s

performance and global market trends, the technology can create risk scores for suppliers, helping procurement professionals adapt their purchasing strategies and enhance collaboration with targeted suppliers to better anticipate risks. The same insights can also be used when identifying new suppliers, to ensure they pose no predictable challenges from the onset.

A recent paper uses OpenAI's ChatGPT-4 to demonstrate the potential of the widely—and cheaply—accessible model to bring a substantial improvement over traditional contingency planning in a hypothetical supply chain.[5] The modelled case study concludes that gen-AI streamlines the identification of trends and external factors when provided with vast data, accelerating scenario-generation and uncovering potential contingencies that humans might overlook. Yet, although AI introduces some 'innovative' solutions and strategic alternatives, human creativity and oversight remain indispensable for devising realistic scenarios that deserve actual preparation.

Naturally, specialised gen-AI models, trained specifically to aid procurement and supply-chain management, will likely perform better. They might be equipped with specialised frameworks to assess supplier risk and have a comprehensive understanding of the typical supply chains of specific industries. However, the fundamental conclusion is likely to hold: human input in risk-assessment and contingency planning will, albeit minimised, remain indispensable.

Procurement and supply-chain managers will need to make the final decisions, seek out AI errors and, most of all, assume responsibility. In fact, alongside the increasing use of AI in supply chains, our survey indicates another change in the field: businesses are increasingly seeking different types of skills among procurement and supply-chain managers. Workforce changes spurred by gen-AI are further discussed in Part two of this paper.

[5] Finkenstadt, D J, et al. 2024. Contingency Scenario Contingency Scenario Planning using Generative AI. Available at: https://cmr.berkeley.edu/2024/01/contingency-scenario-planning-using-generative-ai/

As previously stated, gen-AI can support critically-minded procurement and supply-chain managers not only in anticipating risks but also in adapting to disruptions after they occur. A gen-AI tool with sufficient access to real-time data, for example, can immediately begin analysing information about the impacting factor—whether it is the route of a storm or an emergency at a shipping choke-point—and work with data from internal systems to assess the scale of the disruption. Such information at critical moments is likely to prove especially valuable to businesses in navigating a world where unpredictability and disruption is the norm. A future supply chain, with an even greater integration of AI, is likely to be able to do even more, as discussed in Part three of this paper.

New route: AI found it

Another significant leap towards optimisation facilitated by gen-AI in today's supply chains is in the realm of logistics and transportation. Executives select this use of gen-AI systems as the third most promising area for their supply chain (see figure 3). By harnessing its capacity to understand vast amounts of diverse data, gen-AI takes into account factors, such as traffic flows, weather forecasts and historical logistics records, to offer precisely optimised shipping routes and schedules, whether for local deliveries or international freight.

Using the technology with live data inputs allows it to identify the most efficient pathways across regions, countries or continents, avoiding potential bottlenecks that could delay shipments. But the benefits go beyond optimisation. Speaking about how Amazon's transportation operations have wielded computer intelligence, Mr Armato describes a "win-win" scenario: using optimization algorithms based on gen-AI not only ensures fast deliveries and a lower cost to serve (heightening customer satisfaction while also being a good business case), but also contributes to environmental sustainability by minimising the carbon footprint of transportation activities. How gen-AI can make AI-enabled supply chains more sustainable and socially responsible is discussed in Part three of this paper.

Part two: Changes and challenges with gen-AI in supply chains

The benefits of gen-AI to today's supply chain lie in bringing efficiency to existing strategies and operations. Adopting the tech, however, might not prove as efficient, even when applying it to existing facilities, methods and structures. Most businesses will face concerns over data security and privacy, many will find their current systems not directly compatible and likely all businesses will face regulatory hurdles not long from now.

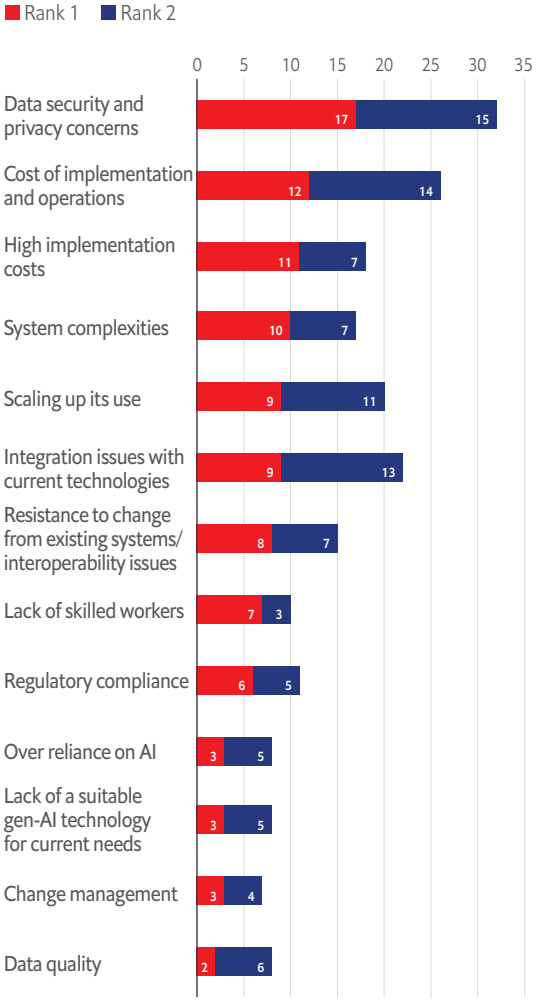
Compatibility

While businesses are generally optimistic about the benefits of gen-AI in supply chains—with good reason—this enthusiasm isn't always shared by IT managers and system administrators, who are cautious about practical readiness to implement the technology. In fact, 88% of the supply-chain managers we surveyed acknowledge that their systems, while somewhat capable, require upgrades to effectively leverage gen-AI technologies. A further 10% admit that their systems are not capable and require significant upgrades or even complete replacements. The gap between optimism at the strategic level and the practical hurdles that need to be overcome at the operational level is significant. Bridging this gap will require expenditure and effort, which will test the otherwise supportive attitude of executives towards AI investment (see figure 1). Yet, integration issues with current technologies is only the third most-ranked challenge in incorporating gen-AI in supply chains today (see figure 5).

Figure 5: Primary challenges in incorporating gen-AI in supply-chain operations

Question: What do you perceive as the most significant challenges in incorporating gen-AI in supply-chain operations? Please rank the top two, with one being the most important.

% of respondents



Source: Economist Impact survey 2024

Data security and privacy

When asked about the current quality and reliability of their organisation's supply-chain data, 73% of the executives we surveyed consider it to be 'good'–an encouraging prospect to effectively use AI systems that require vast information. However, this positive evaluation echoes the most significant challenge executives see in incorporating gen-AI today: data security and privacy (see figure 5). Using far-reaching data, while crucial for high-quality gen-AI use, simultaneously increases risk and operational hurdles. For some companies, protecting data from its vulnerability to cyber threats will make costly security measures a necessity. Mr Karan of Baxter International is explicit: "If you're looking to fully secure your data, building a complete infrastructure within your own data centres is feasible but costly. This approach is about creating an 'iron fortress' around your digital assets, however, it requires a significant upfront investment in both physical and human resources." This reality makes over-excitement around gen-AI implementation potentially dangerous. A recent paper argues that the "hype" around gen-AI and the rush to not fall behind on using it, expose companies to "broad and possibly catastrophic cyber-attacks or breaches", including 'backdoors' in AI models and extraction of the data a model is trained on.[6] The paper concludes that ethical restrictions on AI use are needed.

"Regulators are lagging behind innovation because they still don't quite understand what is happening."

Christopher Tang, distinguished professor and Edward W. Carter chair in business administration at UCLA

While unauthorised access to data is concerning, a greater hurdle in using gen-AI in supply chains is likely to be ensuring compliance with data protection regulations. Indeed, supply-chain-related data will often feature personal information, including supplier details, customer information and employee records that are all governed by regulations, such as GDPR in the EU and California's Consumer Privacy Act.[7,8] These laws require meticulous attention to how data is handled, processed and stored, particularly when using AI systems that can manipulate and generate large volumes of data, and perhaps even spill it when they shouldn't.[9] Mr Karan of Baxter is clear: "where we deal with sensitive information, like patient health details, compliance with HIPAA [the Health Insurance Portability and Accountability Act] is absolute. There are no exceptions." It is a built-in challenge: to use gen-AI effectively, businesses will need to leverage high-quality and sensitive information, which then requires implementing stringent safeguards to protect this data and maintain regulatory compliance.

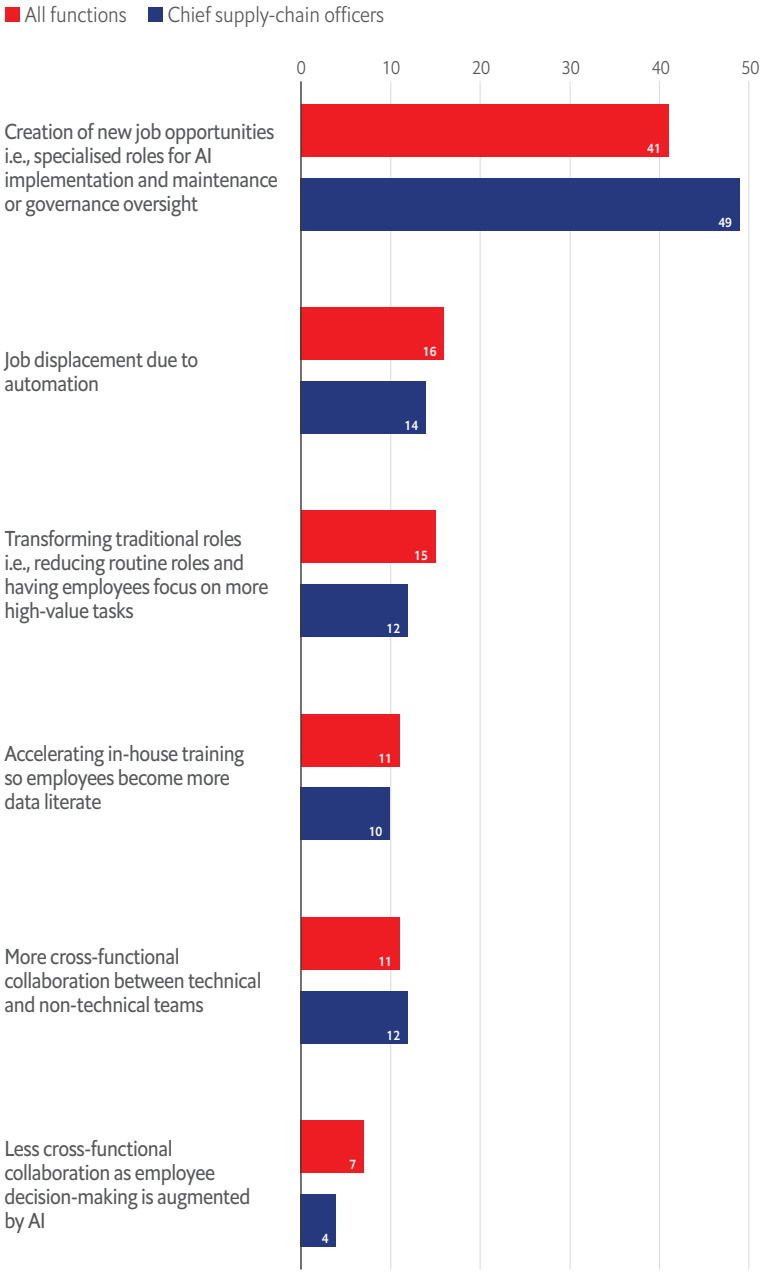
Complying with regulation will get more complicated. Already, uncertainty and evolving standards are the highest-ranked concern for executives when asked about the regulatory aspects of AI implementation in the supply chain (53% select it as one of their two options). These concerns are not unfounded. As Christopher Tang, distinguished professor and Edward W. Carter chair in business administration at UCLA, comments, "regulators are lagging behind innovation because they still don't quite understand what is happening". Without international consensus, supply chains spanning multiple countries may be subject to differing AI-related standards and requirements, significantly complicating the role of supply-chain managers as they seek to comply with all. Further, as gen-AI will be most helpful when using data from across the entire chain, a regulation in one region of operation

6 Humphreys, D, et al. 2024. AI hype as a cyber security risk: the moral responsibility of implementing generative AI in business. AI Ethics. Available at: https://link.springer.com/article/10.1007/s43681-024-00443-4
7 GDPR. What is GDPR, the EU's new data protection law?Available at: https://gdpr.eu/what-is-gdpr/
8 California Department of Justice. California Consumer Privacy Act (CCPA). Available at: https://oag.ca.gov/privacy/ccpa#:~:text=The%20CCPA%20applies%20to%20for,California%20residents%200r%20households%3B%200r
9 European Parliament. EU AI Act: first regulation on artificial intelligence. Available at: https://www.europarl.europa.eu/topics/en/article/20230601STO93804/eu-ai-act-first-regulation-on-artificial-intelligence

Figure 6: Anticipated impact of AI integration on the procurement and supply-chain workforce

Question: How do you expect the integration of gen-AI in the supply chain to affect the workforce? Please select the top option.

% of respondents



Source: Economist Impact survey 2024

might imply needing to be compliant with it across the entire chain. The EU, for example, is readying its 'AI Act', designed, explicitly, to "make sure that AI systems used in the EU are safe, transparent, traceable, non-discriminatory and environmentally friendly". To be compliant, businesses will likely have to tackle these issues across their entire gen-AI-powered supply chains.[10] In the current early stages of the AI regulatory environment, an ethical approach would help: if businesses adopt the right frameworks to guide their application of gen-AI, it is more likely that their use of the tech will need fewer, if any, modifications to be compliant with future regulations. Businesses, however, do not share that sentiment: when asked about the specific concerns they have regarding the regulatory aspects of AI-implementation in the supply chain, only 17% of executives included the ethical use of AI as one of their top two considerations.

Workforce

Gen-AI is here to help procurement and supply-chain managers, not replace them. Yet, changes to the nature of the roles and a dose of caution are inevitable.[11] When asked about how integrating AI in supply chains will affect the workforce, the majority of respondents to our survey across all business functions foresee the creation of new job opportunities (41%), with the proportion of supply-chain officers sharing that sentiment being larger (49%) (see figure 6). In addition, 15% of respondents across all functions anticipate a transformation in traditional procurement and supply-chain roles, suggesting that AI will steer these functions towards more analytical and strategic engagement. Meanwhile, 11% take this understanding further and state that AI's entry in the supply chain will accelerate in-house training to improve data literacy. Against this relative optimism, however, concerns about job displacement remain: 16% of respondents are wary of the potential negative impacts of automation on employment. These concerns are not to be underestimated; changes to the procurement and supply-chain workforce are likely.

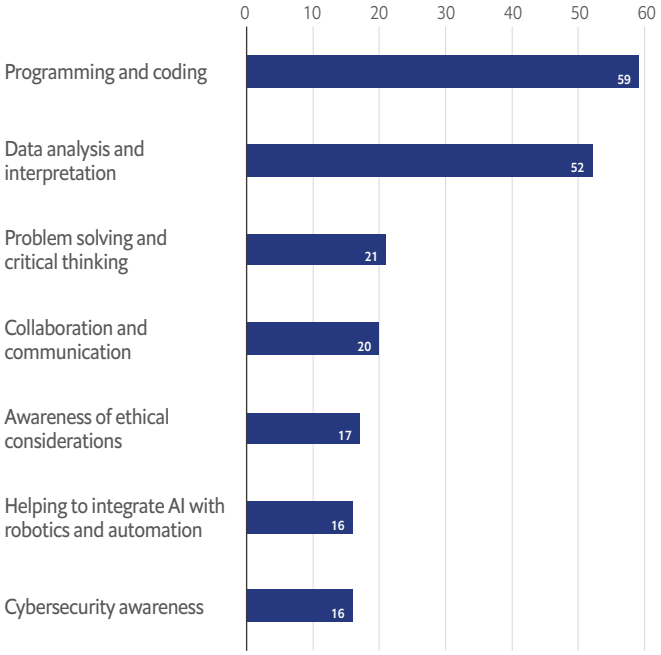
[10] Ibid.

[11] Boute, R. N., & Udenio, M. (2022). AI in logistics and supply chain management. In Global Logistics and Supply Chain Strategies for the 2020s: Vital Skills for the Next Generation (pp. 49-65). Cham: Springer International Publishing. Available at: https://link.springer.com/chapter/10.1007/978-3-030-95764-3_3

Figure 7: Critical AI-related skills in the realm of procurement and supply chains

Question: What specific AI-related skills do you believe are the most critical for the workforce in the realm of procurement and supply chains? Select up to two.

% of respondents

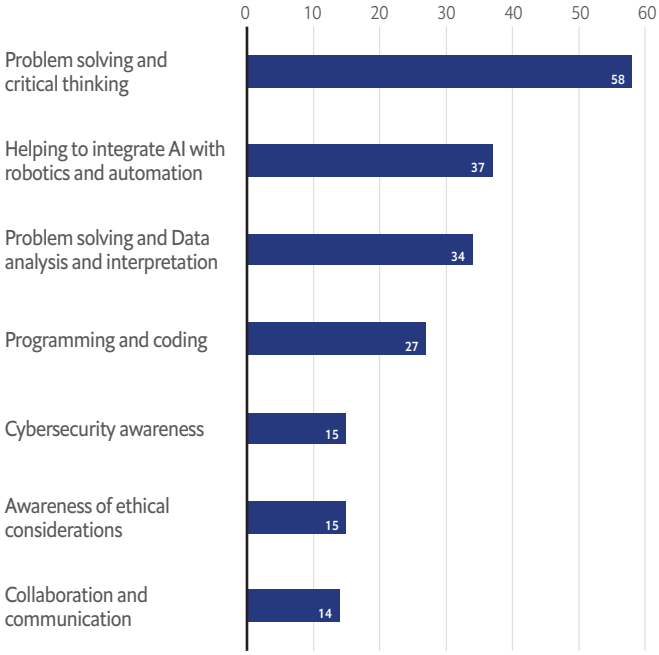


Source: Economist Impact survey 2024

Figure 8: Hardest-to-find AI-related skills in the realm of procurement and supply chains

Question: What specific AI-related skills do you believe are the hardest to find in the realm of procurement and supply chains? Please select the top option.

% of respondents



Source: Economist Impact survey 2024

Indeed, amid concerns about AI-driven job displacement, our survey indicates a need for more diverse skills within the procurement and supply-chain sector. Two AI-related skill sets that stand out as central to the modern workforce in the industry are programming and coding, and data analysis and interpretation, recognised by 59% and 52% of the executives we surveyed, respectively (see figure 7). Despite this, there is a significant gap in critical thinking and problem-solving abilities—skills crucial for managing challenges with AI, as identified by 58% of executives (see figure 8). This skills shortage underscores the need for upskilling. By investing in training that bridges the gap between what an AI-ready workforce demands and what the labour market is lacking, companies can ensure that the integration of gen-AI enhances rather than displaces jobs.

Hallucinations

One hard-to-avoid drawback of foundational AI models that will require human attention is that, occasionally, they make things up—a phenomenon known as 'hallucination' or 'confabulation'. This occurrence is more likely when the data a gen-AI model uses is derived from varied and complex sources (as is likely when it comes to procurement and supply-chain information). Incorrect AI outputs, based on hallucinated data, can lead to poor decisions about inventory levels, procurement and distribution, if a human does not notice that the machine has erred. In fact, data bias—the commonplace concern related to the confabulation of foundation models—was the third highest-ranked concern of executives regarding the regulatory aspects of AI

implementation in the supply chain. Continuous monitoring of gen-AI outputs becomes essential to mitigate risks, both in terms of making badly informed procurement and supply-chain choices but also in complying with existing and potential future regulation. Mr Karan offers some advice, based on his experience: "We implement safeguards. If an AI-generated response is based on our internal data, it must provide evidence of its source. If it cannot find a source, it should indicate that it doesn't have an answer rather than making one up. This is vital for ensuring that our employees who rely on AI for daily tasks are not misled by incorrect information."

Part three: AI-enabled future supply chains

Despite all the challenges and hurdles with AI integration, foundation models and the gen-AI systems they power will be an integral part of business operations. There are many ways in which the human-like computer intelligence will enable entirely reimagined procurement and supply-chain strategies in the future.

The AI-to-AI supply chain

One way in which gen-AI could transform supply chains in the future is by enabling near-live visibility through the integration of multiple AI systems. Indeed, gen-AI is likely to evolve from being a tool that aids procurement and supply-chain managers to a human-like agent that manages specific operations within the chain (potentially reducing human labour needs more than shorter-term uses of gen-AI). Multiple 'AIs' across different stages in the chain–including suppliers, retailers and logistics—could achieve an otherwise unattainable level of interoperability. Such AI-to-AI communication would allow for a highly synchronised supply-chain ecosystem with real-time data exchange for optimisation. For example, a retailer's AI system could instantly query a supplier's AI to check the availability of specific products. Such an immediate exchange of information would allow businesses to make rapid decisions, such as placing orders exactly when stock is needed or adjusting sales strategies based on availability. Similarly, a logistics company's AI could interact with both the supplier's and retailer's AIs to optimise delivery schedules and routes based on real-time inventory updates and market dynamics. Mr Tang from UCLA, however, raises a concern with the prospect of full AI-enabled supply-chain integration. In his view, "trust remains an issue", as deep integration between the AIs of different links in the chain might lead to "data contamination"–likely a serious concern for many businesses.

Sustainability and Integrity

Alongside enhancing visibility, the wider adoption of gen-AI in future supply chains will likely enable and promote more responsible and sustainable operations. The technology will help procurement and supply-chain managers not only with identifying sustainable sourcing opportunities but also in finding patterns of resource usage and inefficiencies, suggesting modifications that align with sustainability goals. The capabilities of gen-AI are likely to prove especially important for monitoring and reducing Scope 3 emissions—those that come from supply-chain activities not owned by, but related to, what a business does (such as production of purchased materials). Specifically, the technology could provide more precise estimations of Scope 3 emissions based on proxy measurements, such as analysing transportation logistics to estimate fuel consumption or evaluating suppliers' energy usage to determine associated carbon footprints. By providing such insights, the use of gen-AI would enable companies to rapidly assess and respond to their environmental impact, facilitating more timely and effective climate actions. Still, it is crucial to avoid over-reliance on the sustainability-related estimations of AI models. While they provide valuable insights, the true test for businesses lies in real changes that lead to verifiable environmental benefits, which requires continuous validation and adaptation based on real-world outcomes.

Another particularly impactful prospect of gen-AI for responsible business operations lies in its capacity to identify potential ethical and regulatory violations, such as human rights abuses across links of the chain. Mr Tang discusses how gen-AI can "check whether suppliers are high risk or not", assessing concerns with human rights violations and compliance with labour standards by analysing historical data and identifying concerning associations. Gen-AI can do this at a scale that humans would struggle with, almost immediately. This application of gen-AI is significant in a regulatory context, especially in light of forthcoming legislation akin to the EU's proposed Corporate Sustainability Due Diligence Directive.[12] If passed, this piece of legislation would require that businesses check their entire supply chain—from the sourcing of raw materials to manufacturing processes and delivery—to ensure that all links are acting ethically and responsibly, towards workers and the planet. Without gen-AI, being compliant would likely require new hires, specifically tasked with conducting due diligence and filling in detailed forms.

New possibilities with regulation and customs

While it is likely to be subject to stringent regulation itself, gen-AI in supply chains could present unique opportunities for businesses seeking to better navigate complex regulatory landscapes. In particular, the content-generating abilities of gen-AI could help businesses interpret local regulation and customs practices, enabling not only operational efficiencies but an entirely new geographical reach. This is especially true for parts of the world that were previously difficult to operate in due to complex legal frameworks. By leveraging its ability to understand text and generate new text accordingly, gen-AI, such as large language models, can quickly interpret local laws and automatically fill-out necessary customs forms. This creates a range of possibilities for businesses to extend the reach of their supply chains.

[12] European Commission. 2022. Corporate sustainability due diligence. Available at: https://commission.europa.eu/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en

The AI supply chain: leap forward, with caution

Gen-AI is already, and will increasingly be, a significant part of global supply chains. Integrating it, however, needs to be thoughtful: the benefits of the tech need to be maximised while its risks be minimised. If businesses strike the right balance, they could both enhance their operational capabilities and achieve supply chains fit for an ethically responsible future. The success of the gen-AI era in supply chains will depend on human-machine collaboration, where critically-minded supply-chain professionals leverage the insights of foundational models, while exercising still much-needed oversight.

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