



# Generative AI in supply chain: A path to better returns

ROI for AI has never been more critical



▶ 50/100 ▶ 152/85

21:45 TOTAL 96.021KM



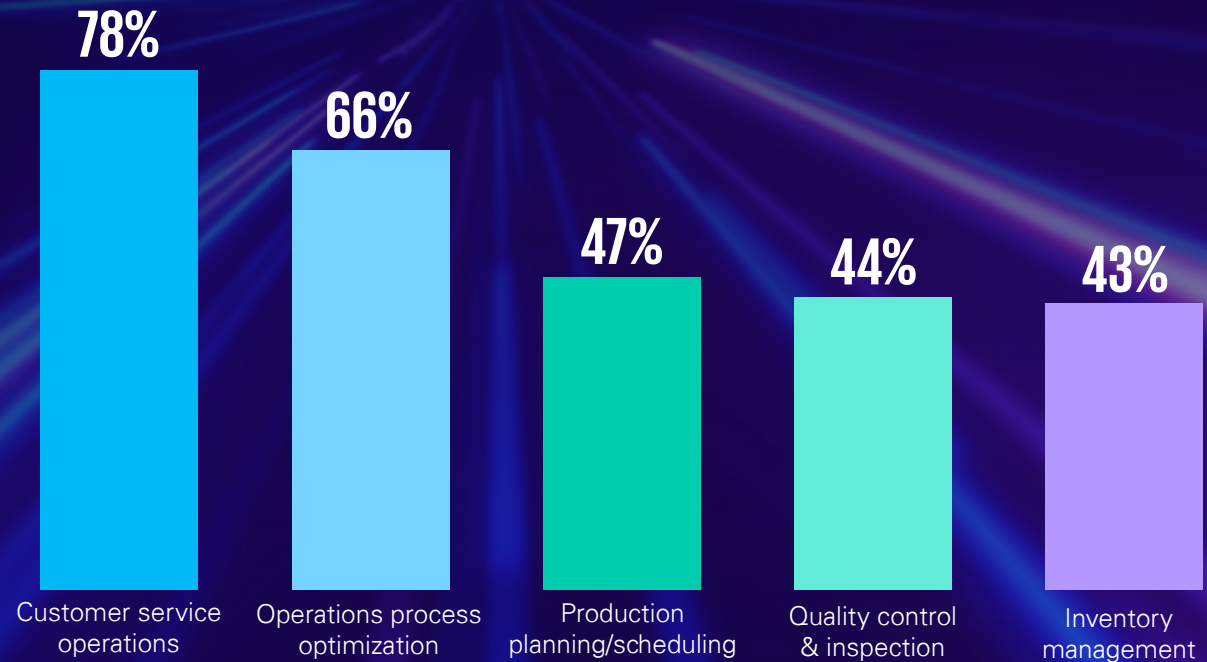
# Introduction

The advent of generative artificial intelligence (AI) is timely for companies willing to invest in emerging technologies to address emerging priorities of the post-pandemic era. Many of these priorities are based on expected impacts across the supply chain over the next 12–18 months. When considering the challenges faced in delivering products and services to customers, operations leaders have identified some top areas of concern as labor (71 percent), network resilience (70 percent), and customer expectations (67 percent).<sup>1</sup>

Based on our March survey on generative AI, 77 percent of executives agree that it is the most impactful emerging technology to boost productivity and enhance collaboration. And more than half of our respondents prioritized operations as a top function for adoption, with immediate opportunities in areas like customer service, manufacturing, and inventory management.<sup>2</sup>

Despite the promise of AI, recent investments across the enterprise have been heavily scrutinized in what can be described as a rolling recessionary market. Companies in the U.S. are feeling the pinch after experiencing the most rapid rate hike cycle from the Federal Reserve since the early 1980s. Supply chains remain fragile, labor markets remain tight, and the global economy continues to fracture.<sup>3</sup>

## Top areas ranked by executives of where to apply generative AI in operations



Source: KPMG Generative AI Survey, March 2023

<sup>1</sup> Global Supply Chain Trends Survey, KPMG, November 2022

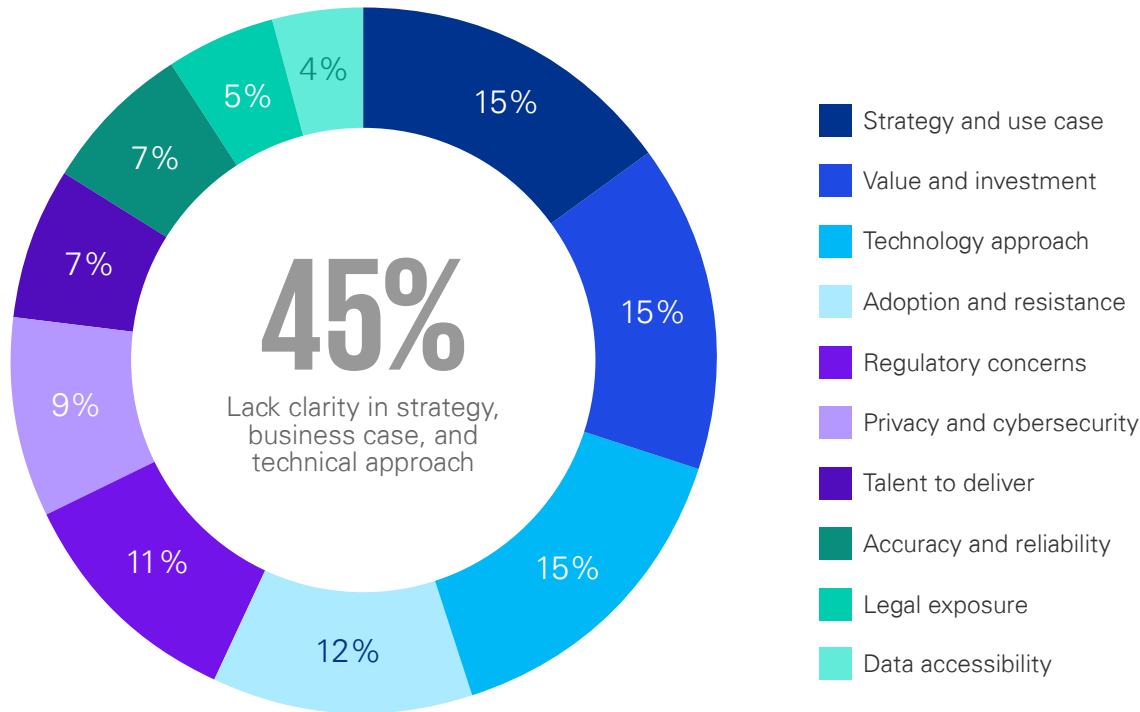
<sup>2</sup> KPMG Generative AI Survey, March 2023

<sup>3</sup> Insights on Inflation Survey – Wave 4, KPMG, June 2023

Investments in emerging technology are not immune to these challenges. Unsurprisingly, 45 percent of the largest barriers to implementation of generative AI center on its ability to deliver return on investment (ROI). From opportunity value and use case selection to investment cost and technical requirements, ROI for AI has never been more critical.

Fortunately, supply chain organizations have experience in attaining value from digital and physical assets. Much can be gleaned from nearly a decade of investments made in machine learning, a form of AI used to predict a range of outcomes from supplier lead times to customer out-of-stocks. Leveraging the lessons learned from past AI and attuning them to the context of generative AI can help navigate a better path to healthier returns.

### Key barriers to generative AI implementation



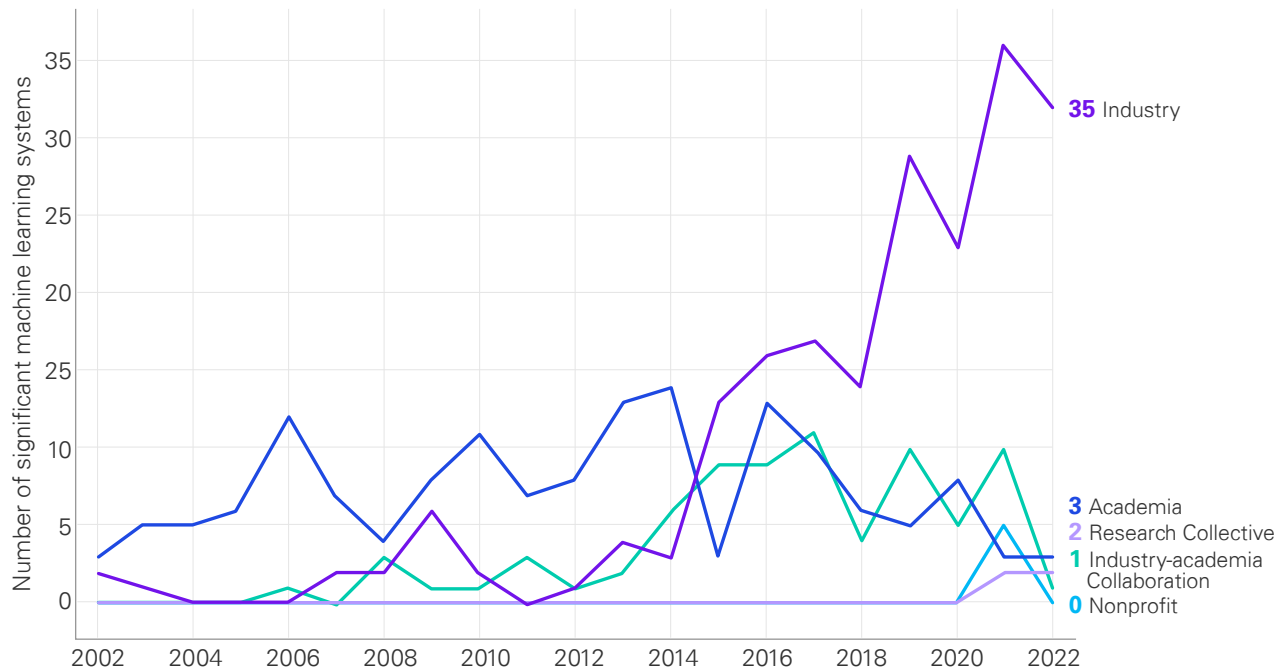
Source: KPMG Generative AI Survey, March 2023



# Lessons from machine learning

Up until 2014, the most significant machine learning models were driven by academia.<sup>4</sup> Soon thereafter, the industry took over in a race to deploy discriminative AI, where machine learning models such as logistics regression and decision trees were used to help predict outcomes across the enterprise. By 2016, it had quickly become an \$8 billion market,<sup>5</sup> and supply chain organizations had launched a number of proof of concept (POC) experiments to better understand market drivers of demand or anticipate equipment failures on production lines.

## Number of significant machine learning systems by sector, 2002–2022



Source: Epoch, 2022 | Chart: 2023 AI Index Report

It was early days for discriminative AI, and an estimated 85 percent of projects were projected to fall short of expectations.<sup>6</sup> While marketing and revenue management initiatives progressed to scale, supply chain efforts were often experimental and challenged by an inability to consistently achieve positive returns.

The “fail fast” mentality to rapidly learn from project failures often plagued organizations when prioritizing POC volume over opportunity value. Scalability was not sufficiently addressed until after POC completion, introducing risk at a later stage. And supply chain adoption suffered from fear of what was poorly understood in terms of explainable reasoning behind AI output.

But memories can be fleeting. Faced today with similar pressures to extract value from generative AI, supply chain and digital leaders have the opportunity to learn from past missteps and execute a more value-oriented approach to AI in what is currently a less-forgiving investment environment.

<sup>4</sup> The AI Index 2023 Annual Report, Stanford University, April 2023

<sup>5</sup> Worldwide Artificial Intelligence Spending Guide, IDC, October 2016

<sup>6</sup> Gartner Says Nearly Half of CIOs Are Planning to Deploy Artificial Intelligence, Gartner, February 2018

# Implications for the supply chain

The lessons learned from discriminative AI serve as guideposts for the supply chain. The principles of value, scalability, and adoption all continue as key success criteria for generative AI, where deep learning models are used to understand and create new content.

AI-generated content can prove to be quite valuable depending on the use case. Generative pre-trained transformer (GPT) models can increase logistics productivity by formulating responses to shipment inquiries, helping to mediate between customers, carriers, and third-party logistics providers (3PLs). Generative adversarial network (GAN) models can increase warehouse productivity by creating synthetic data to train robotics in how to handle packages more accurately.

While criteria for success remains the same, the tactical implications to generative AI are quite different. As organizations make progress on their generative AI journey, there are key considerations that help facilitate a better return.

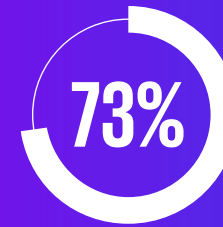
## Different implications for different AI

	Discriminative AI	VS	Generative AI
<b>Supply chain impact</b>	Improve service, cost, and inventory	<b>Value</b>	Improves productivity of employees
	Spans products, assets, and network locations	<b>Scalability</b>	Spans employees, robotics, and network partners
	Relies on interpretability of results—AI explainability	<b>Adoption</b>	Relies on dependability of results—AI hallucination
<b>AI characteristic</b>	Finds patterns and predict outcomes	<b>Function</b>	Understands and creates content
	Trains periodically on GBs of structured data	<b>Approach</b>	Pre-trains predominantly on TBs of unstructured data
	Requires model build and dashboard incorporation	<b>Delivery</b>	Requires model tuning and application integration
	Same criteria		
	Different implications		

# Do the math to articulate productivity value

Discriminative AI often provides a direct line-of-sight to benefits such as how higher demand prediction accuracy leads to reduced days of inventory. Generative AI, on the other hand, tends to center on employee productivity, which alone may not be enough to justify a supply chain investment.

To justify a proposed investment, quantify how a proposed initiative increases employee productivity and articulate attributable impacts to key performance indicators (KPIs), be it service level, cost, or inventory. For example, a generative AI-powered chatbot that creates forecast reports might improve productivity for a demand planner. But would it improve order fill rate beyond the planner’s ability? Or would it merely provide the planner with more time to focus on other value-added activities? In this case, there is a clear difference in productivity value. Determining this upfront along with performing periodic validation helps cut investment losses sooner rather than later.



**73%**  
of executives say that generative AI plays an important role in increasing productivity

## Value map for AI-enabled supply chain productivity

Value	Value driver	Operations KPI	Productivity opportunity (examples)
Profit	Revenue growth	Order fill rate On-time delivery	Handle order fulfillment exceptions
	Cost to serve	Variable mfg. cost Variable logistics cost	Evaluate network and market conditions
Position	Inventory turn	Raw, Pack, and WIP Finished goods	Monitor and replenish physical inventory
	Asset efficiency	Equipment availability Space utilization	Maintain devices, equipment, and vehicles
Purpose	Environmental	Carbon emission Energy and waste	Inspect product, placement, and packaging
	Social impact	Human rights Safety and health	Audit operations for regulatory compliance

## Shift your mentality from proof of concept to proof of scale

At its core, generative AI is built on the premise of scalability. A large language model (LLM) for example, can be tuned to serve multiple cognitive use cases. The advantage for a supply chain is the ability to scale how its workforce interacts with multiple parties, products, and assets.

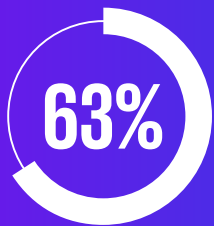
Set scalability as a key objective for every project by setting AI targets to achieve high volumes of interaction among supply chain functions, network partners, operating equipment, or physical inventory across locations. A generative AI project that drives productivity at considerable scale is proof of success.

## Deploy with—not for—operations

Generative AI relies on deep learning models or “black box systems” with inputs and outputs that are known but with inner workings that are opaque. This makes it difficult for supply chain professionals

to interpret AI reasoning and reliability. Compound this with a fear of job security stemming from tech-enabled automation, and AI adoption is at risk of becoming AI opposition.

Recruit subject matter experts from the supply chain organization to validate and endorse data inputs and outputs. Given the lack of model explainability and potential for “AI hallucinations,” the quality of input used to tune AI and the output generated by AI becomes paramount, more so than is the case with discriminative models. To build competence in validation, the supply chain organization must develop a deeper understanding to help demystify generative AI and its technical impact on the workforce. Broadening the organization’s role and responsibilities in this way helps improve reliability and foster acceptance.



**of leaders need to hire and train employees in generative AI implementation**



# Navigating AI with ROI

Generative AI represents a paradigm shift from discriminative AI. Stark differences in technology underpinning and user experience highlight the need for a value-driven approach to AI implementation. Key options at each stage of delivery become critical investment decisions that hinge on the value case of a supply chain opportunity.

Large language and vision models are types of foundation models—deep learning algorithms that are pre-trained on a large volume of data. Foundation models may be commercially purchased, open source licensed, or custom built

for private use. Selection depends on the objective of the use case and the cost to buy or build the model. For reference, it is estimated to cost Google more than \$8 million to train its PaLM LLM, which scaled to 540 billion parameters in 2022.<sup>7</sup>

Once a foundation model is established, fine-tuning is required for its results to meet quality expectations. There are multiple options for tuning the model—from minimal data configuration to training an entirely new model—and each has a different impact on the quality of results produced and the level of effort incurred.

Finally, discriminative AI output is often delivered through visualization dashboards to share data-driven insights with users. Generative AI, on the other hand, relies on application development and integration to help orchestrate tasks. Software applications may be commercially purchased, custom built with open source toolkits, or integrated into an organization’s current landscape of IT systems. Again, the cost of investment will vary based on scope of the supply chain opportunity.

## Delivery stage

### Deploy foundation

model that best serves the value case



### Employ tuning

method that best meets productivity targets



### Apply application

integration to best orchestrate AI tasks

## Key options



Commercial service



Open-source public



Custom-built private



In-context learning



Parameter efficient



Full layer model tuning



Conversation chatbot



Autonomous task agent



Computer vision system

## Investments at each stage of AI delivery

Each option carries a different level of impact on cost and benefit

<sup>7</sup> Sharan Narang and Aakanksha Chowdhery, “Pathways Language Model (PaLM): Scaling to 540 Billion Parameters for Breakthrough Performance,” Google Research, April 4, 2022



# How to move ahead

AI continues to play a pivotal role in today's modern supply chain, where discriminative AI anticipates key outcomes across a network of operations and generative AI facilitates productive interactions across a network of partners, assets, and inventory. As experimentation with generative AI continues to evolve across industries, three use case archetypes for the supply chain have begun to emerge. Each has the potential to spawn multiple use cases and drive productivity at scale.

## 1 Network service collaboration

High volumes of interactions with suppliers, co-manufacturers, carriers, 3PLs, and customers are often needed to ensure inbound supplier risk is mitigated and outbound customer service levels are met. Here, generative AI helps scale employee ability to handle every query and exception for every shipment with every partner through a network service chatbot. For example, a U.S. consumer goods company employs generative AI to identify market events that impact operations and notify relevant suppliers who might help mitigate the risk.

## 2 Operations excellence and improvement

Complex policies and procedures vary by supply chain function and location, leading to suboptimal resource utilization and throughput. In this scenario, generative AI helps scale a capability around a center of excellence (COE) that institutes practices for supply chain functions, processes, and sites through a continuous improvement assistant. Case in point, a leading industrial equipment manufacturer is applying generative AI to summarize actionable manufacturing performance insights for factory employees.

## 3 Product and inventory evaluation

The labor-intensive task of product inspection and inventory counting across network locations can lead to poor item quality and inventory turn. In this archetype, generative AI helps scale the ability of multiple teams to physically evaluate every product at every location through an inventory evaluation agent. Today, a global high-tech manufacturer is proving out this value by using generative AI to create synthetic data used to train other AI models that inspect finished goods for defects.

Beyond these early-stage archetypes, most market analysts and technology experts agree that a plethora of additional use cases exist, or are on the horizon for development. While opportunities to apply a chatbot interface to just about every part of the supply chain exist, experience shows that not all are worth pursuing as a pilot or even as a POC. In the current economic environment, discerning which use cases deliver the right returns has never been more critical.

Now more than ever, supply chain leadership needs to take part in the larger enterprise-wide conversation around AI. Operations has a significant role to play in steering that conversation toward the right opportunities that deliver the most value. Doing so will not only accelerate the supply chain's journey toward AI, but also deliver tangible operations value in the near-term.

# How KPMG can help

AI transformation for the supply chain can be a complex endeavor. But when done well, benefits can exceed expectations and generate substantial improvements to planning, manufacturing, and logistics operations. KPMG is well positioned to guide your organization through strategy and roadmap, operating model development, and implementation—and provide ongoing support to help you enhance your investment in the long run. Be it discriminative or generative, we employ the right AI to the right problem to achieve the right ROI.

We recognize the challenges that supply chain organizations face in terms of operations complexity and data maturity, and work with you at whatever stage of your AI journey to unlock value across the network.

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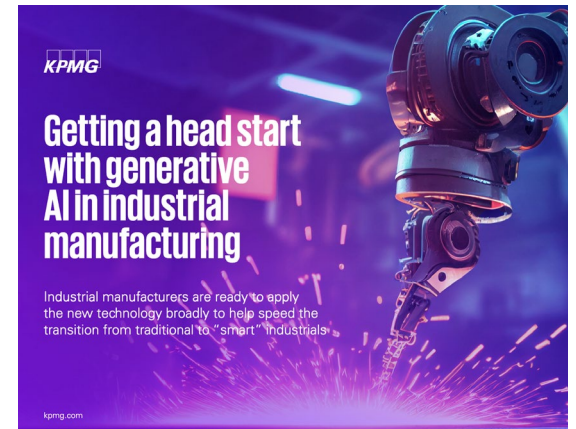
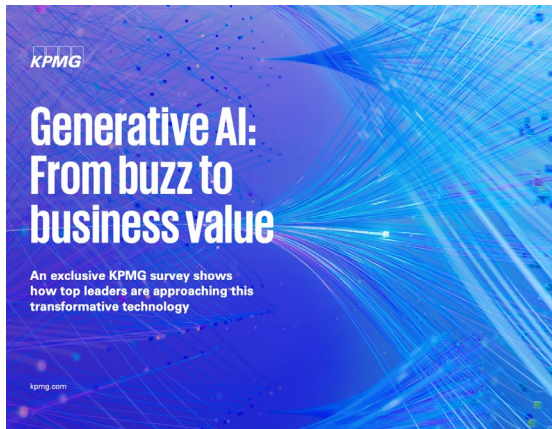
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