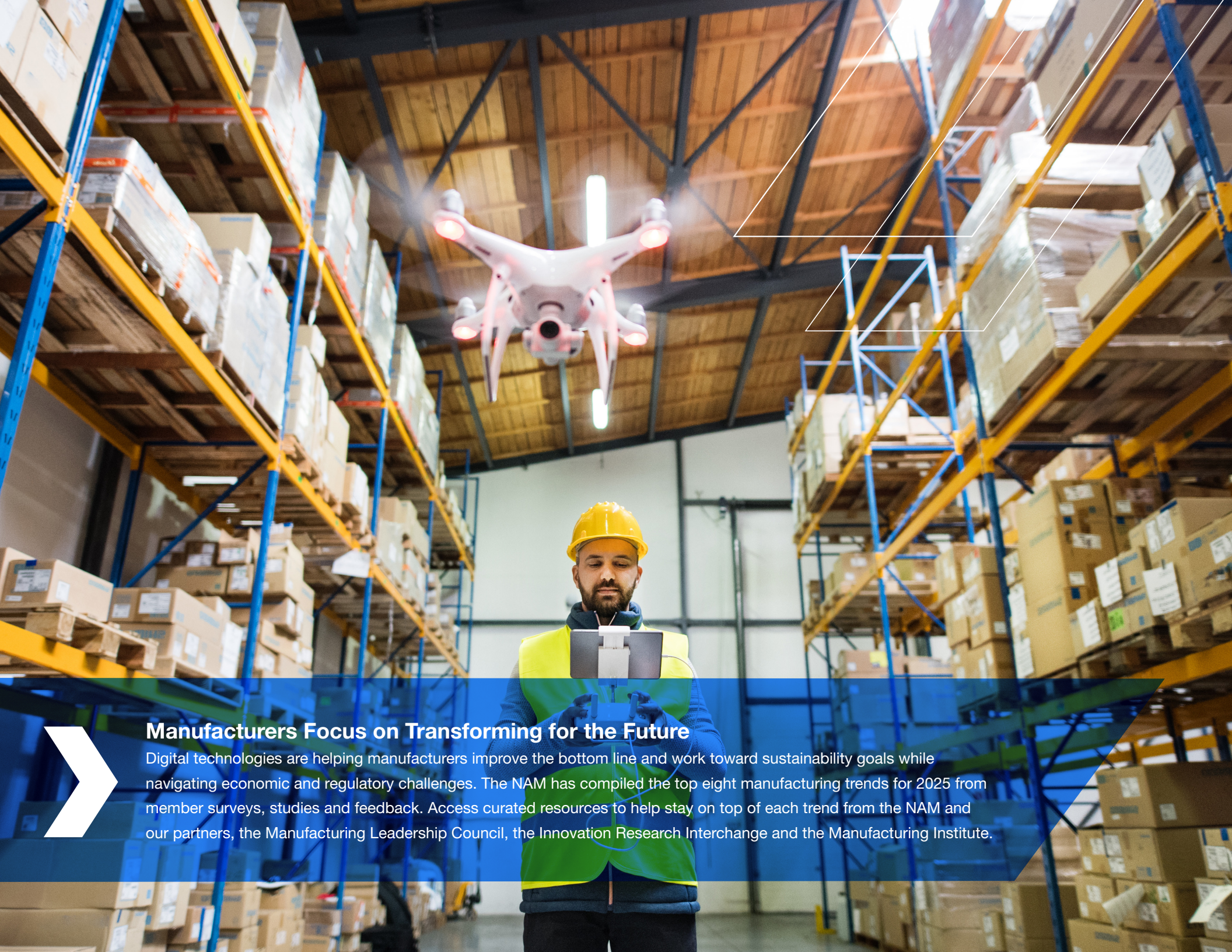
MANUFACTURING TRENDS 2025

Transforming for the Future

NATIONAL ASSOCIATION OF Manufacturers



Manufacturers Focus on Transforming for the Future

Digital technologies are helping manufacturers improve the bottom line and work toward sustainability goals while navigating economic and regulatory challenges. The NAM has compiled the top eight manufacturing trends for 2025 from member surveys, studies and feedback. Access curated resources to help stay on top of each trend from the NAM and our partners, the Manufacturing Leadership Council, the Innovation Research Interchange and the Manufacturing Institute.

1. Incorporating Smart Factories as Business Imperatives

THE TREND:

Manufacturers will continue to get better at leveraging digital tech and vast amounts of data to develop factories that intuitively respond to customer and market needs. These advancements will also increase efficiency, speed time to market, reduce costs and improve the bottom line. Manufacturers will need to develop a roadmap for transformational change and future skills needs to stay competitive. Leadership must remain educated on current data and technology best practices. Building agile organizational structures will be critical to short- and long-term success.

SMART FACTORY RESOURCES

NAM Incentives Locator

Connect with an expert to identify, apply and comply with incentives available at the federal, state and local level that can reduce above-the-line operating costs and below-the-line tax burdens for capital plans, including training and job creation.

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Smart Factories and Digital Production Survey

Discover how manufacturing leaders answered 13 key questions about their planned tech investments, the potential for AI and the opportunities and challenges of Manufacturing 4.0.

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Future of Manufacturing Project

Understand key trends unfolding in manufacturing that will help you realize a better future. Explore how generative AI, machine learning and other future AI methodologies will reshape factory floors, supply chains and the manufacturing workforce in the years ahead.

EXPLORE ❯

How Smart Factories Affect Manufacturers

- Forty percent of manufacturing leaders hope to realize cost reductions and great customer satisfaction by embracing a smart factory strategy, according to the Manufacturing Leadership Council's 2024 Smart Factories and Digital Production Survey.
- The same survey found that 50% plan to use new tech, such as artificial intelligence, machine learning and Industrial Internet of Things sensor networks in production facilities by 2026.
- Capital expenditures to incorporate new digital equipment, implement transformative processes and upskill workers for the digital era can qualify for incentives, including tax credits and grants.
- NAM Incentives Locator powered by Atlas Insight connects manufacturers with an incentives expert who can assist in the entire incentives process.

2. Positioning Sustainability Efforts as Differentiators

THE TREND:

Manufacturers should be ready for changing customer requirements, new regulations and environmental, social and governance issues. Consider the cost of scrambling to meet new sustainability rules and regulations versus being proactive. A better approach will be to view sustainability as an opportunity for differentiation, innovation and creation of new business models. Manufacturers will need to learn how to work up and down the value chain to see maximum benefits and minimum burden from sustainability efforts.

How Sustainability Affects Manufacturers

- Sustainably advanced technologies will help manufacturers reduce their environmental impact through renewable energy, improved waste management and recycling, better carbon capture and more.
- Compliance issues will continue into 2025 and may relate to reducing waste and emissions, implementing renewable energy solutions, operating more efficiently, participating in the circular economy and more.
- Manufacturers need to be aware of “greenwashing,” or overexaggerating sustainability practices, to avoid legal troubles.
- Manufacturers are making strides in sustainability by partnering with early career scientists at universities.
- Scientists, in turn, have the opportunity to commercialize their innovations to benefit manufacturing companies and greater society.

SUSTAINABILITY RESOURCES

Profitability and Sustainability Insights from PPG

Dr. Ed Rakiewicz, a recipient of the Innovation Research Interchange Leadership Award, discusses how PPG has driven commercial growth successfully while advancing its sustainability agenda in this podcast. Rakiewicz offers practical insights for businesses aiming to achieve both sustainability and profitability. He also shares advice for early career professionals looking to make an impact in this space.

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NAM Legal Referral Service Powered by Meritas

NAM members can access world-class attorneys from full-service law firms to help answer questions from contracts to labor and employment, environmental compliance, product safety, trade and intellectual property. Get a personal introduction to a qualified law firm and a 30-minute courtesy advice call.

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Greenwashing and Corporate Sustainability

Manufacturers looking to boast about sustainability practices need to be aware of implications and various legal claims that can arise from misleading statements. This IRI podcast with legal experts explores how product development and R&D teams can mitigate risks and ensure claims are backed by reliable data.

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EXPERT INSIGHT

Author: Nate White, CPA, Director, Forvis Mazars

Preparing for the Future: How Manufacturers Can Be Ready for a Changing Sustainability Landscape

Between innovation, competition and regulation, the only constant in manufacturing is change. With increased stakeholder engagement, the topic of sustainability has come to the forefront of company executives. With global manufacturing accounting for one-fifth of the world's emissions,[1] it cannot be ignored. So, it is not surprising manufacturers are embracing sustainability more than ever, with many company executives considering it crucial to their future success.[2]

A strong sustainability strategy helps companies reduce risk and stay ahead of increasing regulations, stakeholder requirements and expectations. So, planning ahead is key. Manufacturers that take a reactive approach can be a costly risk, in that reacting to an environmental issue only when it becomes critical can lead to expensive fixes, potential fines and loss of company reputation.

ESG stands for environmental, social and governance and encompasses various topics and involves multiple teams and stakeholders. And a company's ESG performance can drive business success, influence investor decisions, and impact supplier and regulatory compliance. Its metrics are nonfinancial in nature and difficult to measure; the data are often fragmented, incomplete, inaccurate or simply unavailable. Disclosures are often reliant on estimates.

For our manufacturing clients, integrating ESG principles means unlocking growth opportunities, mitigating risks and aligning strategies with evolving societal expectations. Between international regulations, such as the European Union's Corporate Sustainability Reporting Directive, the stayed Securities and Exchange Commission's climate disclosure rules and California's new climate reporting laws, required reporting is prevalent.

LEARN MORE ›

Use the checklist on the following page to start using sustainability as a competitive edge.

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forvis mazars

Source:

1. https://www.weforum.org/impact/carbon-footprint-manufacturing-industry/
2. https://nam.org/sustainability-is-a-top-manufacturer-priority-survey-shows-19992/?stream=business-operations

Looking for your competitive edge? Consider the following:

- Evaluate regulatory compliance and required reporting—which of CSRD, SEC, California, etc., applies to your company?
- Consider your competitors and peers—what is the depth and breadth of their reporting?
- Evaluate where sustainability should be owned in your organization—office of the CFO and CEO are common, though compliance, risk and environmental departments have been seen to take ownership of sustainability.

  Be sure to include your finance and accounting team—given considerations of asset listings and organizational structure can impact the completeness of data significantly.
- Do not underestimate the effort level—data collection and reporting are analogous to a new enterprise resource planning system, so be sure to budget the appropriate dollars and resources to support the implementation.
- Completeness—ensure you are not missing locations, assets or emissions sources from your data set. This is a common error we find.
- Once reporting, consider the value of external assurance—increased stakeholder confidence and improved data quality are just two of the benefits of obtaining third-party assurance.

provided by Forvis Mazars

3. Creating Comprehensive Digital Transformation Strategies

THE TREND:

Investment in digital transformation continues to grow as manufacturers see more and more benefits. In 2025, the focus will be on the Internet of Things—connected devices, AI and machine learning, 5G, cybersecurity and data privacy—as well as developing a tech-savvy workforce that can make the most of these technologies. It's imperative to build a capability for change and adaptability in both skills and infrastructure. Manufacturers need to be aware of all the opportunities that come with digital transformation as well as the risks and costs.

DIGITAL STRATEGY RESOURCES

NAM Cyber Cover

Ensure your manufacturing business and reputation are protected with risk mitigation, including automated alerts of vulnerabilities, and cyber insurance specifically for manufacturers, with policies that cover industrial control systems, SCADA, bodily harm and pollution liabilities.

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Embracing OT Cybersecurity as a Transformative Culture Shift

In a Manufacturing Leadership Journal article, learn how to create a cybersecurity vision with clear and strategic goals to mitigate the new challenges posed by IT and OT integrations.

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Top Digitalization and AI Focuses for Manufacturers

Gain insights from industry experts on the transformative role of AI in workplace productivity, data management and innovation. See top focus areas for creating a digital strategy in 2025.

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How Digital Transformation Affects Manufacturers

- AI is changing the manufacturing landscape dramatically already.
- Manufacturing leaders who don't want to get left behind will need to understand the challenges and strategies of integrating AI tools to drive efficiency, enhance decision-making and manage data in complex environments.
- Managers and executives will need to level-up their digital leadership skills for successful digital transformation. They will also need to create a future-ready workforce empowered to leverage digital tools.
- Cybersecurity risks will continue as advanced manufacturing and smart factories increase the attack surface and vectors for bad actors.
- Information technology and operational technology integrations further underscore the need for manufacturing leaders to have a cybersecurity vision with clear and strategic goals to mitigate risks.
- Cyber insurance and proactive monitoring will move solidly from the "nice to have" category into "must have" operations tools.

EXPERT INSIGHT

Authors: Jeremy Price, Managing Director, CBIZ Risk Advisory Services & Mark Phander, Senior Risk Advisor, CBIZ Insurance Services, Inc.

Prioritize Your Infrastructure: A Critical Step for Digital Transformation

In today's fast-paced industrial landscape, OT is the backbone of automation, productivity and data-driven decision-making. But as these technologies evolve, so do the threats targeting them. Cyberattacks on manufacturers and distributors have become more frequent and sophisticated, putting critical infrastructure at risk. For industries that rely on unbroken production lines and timely delivery, the consequences of a successful attack can be catastrophic—leading to financial losses, reputational damage and even threats to public safety. Protecting your OT systems is no longer optional—it's imperative.

Manufacturers need to understand the what, why and how of safeguarding operations. As manufacturers and distributors continue to embrace smart technology, their cybersecurity strategies need to evolve to encompass OT. Reducing the risk of OT-targeted cyberattacks and expensive downtime requires the implementation of a multilayered security strategy that includes 1) breaking down the silos between IT and OT; 2) conducting a comprehensive OT risk assessment; 3) recognizing that OT cybersecurity solutions are different; 4) analyzing the potential business impact and mitigation strategies; and 5) preparing for OT cybersecurity regulations.

According to the Federal Emergency Management Agency, 40% of companies fail to reopen after a disaster, with another 25% closing within one year. These events disrupt operations and inflict severe financial and reputational harm, highlighting the importance of being prepared. Operational efficiency is paramount in manufacturing and distribution, as large-scale disasters can threaten production and profitability. Disruptions and plant shutdowns can result in substantial financial consequences. Business interruption insurance can offer financial protection when manufacturing processes are halted by a covered loss.

You can find more details and statistics like this in the full guide. Now is the time to take action. Dive into this guide for more information to build a robust defense against cyber risks, ensure your operations are prepared for the challenges ahead and stay focused on what matters most: leading your business confidently into the future.

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4. Continuing Focus on Supply Chain Resiliency

THE TREND:

Manufacturers will need to take steps to strengthen their supply chains, guard against volatility and increase transparency. In 2025, resilience strategies will include investing in digital tools, enhancing data and analytics and adding redundancies. Incorporating sustainability into decision-making will also be part of the supply chain resiliency conversation in 2025 and beyond. Manufacturers should expect to work with suppliers on sustainability initiatives soon.

How Supply Chain Resiliency Affects Manufacturers

- Strategies to guard against supply chain disruption in 2025 include expanding the supplier pool and finding suppliers closer to manufacturing facilities.
- Seventy-three percent of supply chain and operations executives are planning to deploy GenAI in a move toward resilient, autonomous supply chains. However, merely 7% have completed implementation, according to a survey conducted by the Manufacturing Leadership Council.
- While GenAI offers promising benefits to the supply chain, manufacturers must also be aware of the technology's risks and challenges.
- Digitally enabled supply chains will have improved resiliency, visibility, planning, agility, predictability and a rapid or autonomous response to disruption.
- Manufacturing as an industry will need to invest in networks, such as digital passports and authoritative identifiers, to track sustainability claims within the supply chain.
- A first step to a more sustainable, and thus resilient, supply chain starts by being a good trading partner—for example, how many miles do your trucks run empty? Do you drive interoperability across your networks? How often do you change purchase orders?

SUPPLY CHAIN RESILIENCY RESOURCES

Connex Marketplace

Ensure you have enough variation in your suppliers to withstand disruption with this manufacturing buyer–seller connection platform. Users can search based on certifications, location, materials and other key details to obtain a clear view of supply chain strengths and potential vulnerabilities.

EXPLORE NOW ❯

Operational Insights

This twice-monthly resource for manufacturers focuses specifically on topics that are part of overall operations, such as environmental, health and safety regulations; energy efficiency and sustainability; workforce and labor management; cybersecurity tactics; risk compliance; supply chain management; product development and more. Find articles on best practices and emerging trends as well as downloadable checklists and assets.

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Thought Leader Interview with Founder of Supply Chain Insights

Lora Cecere, founder of Supply Chain Insights, delves into the evolving landscape of supply chain management in this podcast. She discusses the critical assumptions that have changed in global supply chains and the importance of aligning R&D with supply chain strategies. Cecere's insights provide a roadmap for navigating the complexities of modern supply chains and preparing for future uncertainties.

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EXPERT INSIGHT

Authors: Casey Chapman, Principal, RSM US LLP and Alex Kotsopoulos, Partner, RSM Canada

Proactive Supply Chain Management Is Key for Mitigating Disruptions

A version of this article was published originally on RSMUS.com.

Companies have been adjusting their just-in-time approach to inventories as globalization has shifted in recent years, and business leaders need to explore new tools proactively that can help them maintain operations when critical parts of their supply chain are threatened. For many fragile supply networks, even a small disruption can have outsized effects.

Especially for manufacturers, gaining greater visibility into their supply chains is not only a strategic advantage but also a necessity.

Cascading Effects

Without clear supply chain visibility, businesses risk being caught off guard by delays, shortages and cost increases—whether caused by labor strikes, extreme weather events or a rare bridge collapse like what happened in Baltimore in March 2024. This lack of insight can lead to cascading failures—an unexpected delay in one part of the supply chain can halt production elsewhere, leading to missed deadlines, unhappy customers and financial losses.

Greater visibility allows companies to anticipate these disruptions rather than react to them. By understanding where potential bottlenecks exist and identifying alternative routes or suppliers, businesses can maintain continuity and mitigate risk even when primary transportation methods are compromised. This proactive approach transforms a potential crisis into a manageable challenge.

Tools for Transparency

Achieving supply chain visibility starts with data. Companies need to invest in technologies that provide real-time insights into the movement of goods, the status of inventory and the health of supplier networks.

AI-powered solutions can assess suppliers to help organizations ensure business continuity and avoid potential disruptions. Advanced data analytics platforms can track shipments, forecast delays and identify risks across layers of the supply chain before they materialize, including the organization's direct suppliers as well as second- and third-tier suppliers and beyond. These tools allow businesses to create dynamic supply chain models that can adapt to changes in real time.

For example, if a rail strike were to disrupt a key transportation corridor, a company with full supply chain visibility could reroute shipments quickly via alternative methods, such as trucking or air freight. They could also identify suppliers closer to their production facilities or adjust production schedules to align with the availability of materials. This flexibility is only possible when companies have a clear, real-time view of their supply chains.

The Regulatory Imperative

Better supply chain management is not something companies should pursue just to gain a competitive edge; increasingly, regulators are putting forth requirements related to supply chain transparency and fair labor practices.

Canada's supply chain rule, dubbed the Modern Slavery Act, is one of the latest in a series of regulations responding to the demand for fair labor compliance. It follows modern slavery acts enacted in Australia and the United Kingdom, as well as the California Transparency in Supply Chains Act.

Meanwhile, the proposed New York Fashion Act aims to hold fashion companies accountable for their labor practices by requiring transparency and ethical standards in their supply chains. Recent reporting regulations enacted by the SEC on emissions suggest that similar mandates for labor practices in the United States could follow.

Environmental, social and governance issues becoming a greater focus for companies across all industries is another force driving home the importance of supply chain visibility.

The Strategic Advantage

With uncertainty being the new normal, the ability to see clearly through the fog of supply chain complexity and fragility is invaluable. For industrial businesses, the message is clear: Gain visibility now, and you will be better prepared to keep your operations running smoothly.

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5. Enabling Innovation in Manufacturing

THE TREND:

Innovation in manufacturing in 2025 will be essential to increasing competitiveness, guarding against economic uncertainty, enhancing sustainability, strengthening the supply chain and more. One key focus area will be creating business cases that demonstrate the value and return on investments required for new innovations. Many manufacturers will be looking to new tech and AI to unlock innovations. Those who can best adapt to the accelerated pace of change will see the most benefits.

INNOVATION RESOURCES

Innovation Research Interchange

This division of the NAM focuses on value creation and top-line growth through the management of innovation. Explore opportunities for peer-to-peer interactions and a variety of resources and training to assist in all phases of innovation.

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Manufacturing Leadership Council Plant Tours

Get an inside look at how other manufacturers have reshaped processes to advance their businesses. Join an inperson plant tour or peruse summaries of past tours.

LEARN MORE ❯

Input Newsletter

Stay on top of policy and business developments that could serve as catalysts for innovation. The NAM's morning newsletter delivers exclusive insights from across the industry.

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How Innovation Affects Manufacturers

- Collaboration and partnerships among innovation peers, industry, government and academia can accelerate innovation.
- Investing in innovation can be a play against economic uncertainty, as companies that innovate amid economic turmoil are often more profitable than those that do not.
- Increasing innovation ROI includes establishing metrics for Horizons 2 and 3, understanding the importance of nonfinancial metrics and working across functions to adopt and scale new technologies.
- Digitalization can help manufacturers boost the speed and agility of innovations by improving rapid prototyping, iteration, simulation and modeling.
- Innovation contributes to a resilient, transparent supply chain by using AI and data analytics to improve decision-making.
- The rapid pace of innovation and tech adoption means manufacturers must create a future-ready workforce, plan for knowledge transfer and upskill internal teams.

EXPERT INSIGHT

Author: Katie Trauth Taylor, CEO and Co-Founder, Narratize

GenAI Accelerates and Automates Manufacturing Innovation

Today's manufacturers face mounting pressure to innovate faster, but product teams are bogged down by manual, time-consuming documentation, spending up to 30% of their workweek writing rather than developing. This massive documentation burden, coupled with the challenges of coordinating communication across R&D, product teams and marketing, creates hidden barriers to innovation velocity, slowing product cycles and draining vital resources.

GenAI is transforming this landscape by automating and streamlining technical documentation throughout the product development lifecycle. Tasks that once consumed days now take minutes. Advanced GenAI solutions can generate precise technical documentation—from market research reports and project updates to product requirements and white papers. The result? Better cross-functional communication and collaboration across every phase of development—from discovery and viability to build and launch.

In selecting the right GenAI solution, buyers should focus on augmenting human expertise rather than replacing it. Human-led AI methodologies enhance teams' ability to analyze opportunities, translate complex concepts into compelling business cases and think deeply about their innovative work.

With reduced documentation and improved communications, product teams can reallocate their time value-generating work—deeper market research, sharper strategy and accelerated development. With the right GenAI solution, organizations can achieve 4x faster development cycles and launch superior, customer-centric products. This is the future of manufacturing innovation, where product teams innovate at the speed of thought.

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6. Implementing AI and Preparing Future Workforce

THE TREND:

As manufacturers increasingly adopt AI and other new tech, they will need to consider how these technologies will affect their workforce, including hiring, training and upskilling. In addition to creating a business case for AI investment, employers will need to have a change management plan to assure the current workforce of their roles and importance in the adoption of AI. Manufacturers should be prepared to navigate new governance issues and standards and explore the additional opportunity to use AI for knowledge management and next-gen knowledge transfer.

How the Future-Ready Workforce Affects Manufacturers

- New tech-driven manufacturing processes will require a tech-savvy workforce to optimize production. An expanded talent pool that includes women, veterans and others from the military community, apprenticeships and individuals with varying abilities can help manufacturers meet workforce needs of the future.
- For most manufacturers, digital maturity hasn't yet come of age, according to a 2024 survey from the Manufacturing Leadership Council. Many manufacturers either do not have a formal process for digital maturity or do informal benchmarking.
- Cultural and leadership development barriers need to be overcome starting in 2025 and for the foreseeable future for manufacturers to realize success in the digital era.
- Employees increasingly seek better benefits, flexible working arrangements and a better work-life balance when considering positions. Additionally, manufacturers that provide high-quality insurance coverage and financial wellness resources to employees will have a leg up in attracting top talent.

FUTURE-READY WORKFORCE RESOURCES

The Manufacturing Institute

This 501(c)(3) nonprofit workforce development and education affiliate of the NAM builds, diversifies and strengthens the modern manufacturing workforce. Tap into the MI to access resources as well as a talent pool of highly skilled veterans and emerging workers.

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Digital Maturity in Manufacturing

A survey conducted by the Manufacturing Leadership Council revealed that most manufacturing leaders do not yet fully understand how to benchmark or create a formal digital maturity process. However, many acknowledge that there are cultural and leadership development barriers that need to be overcome for success.

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Manufacturers Retirement 401(k) & Savings Plan

Ensure that you offer the benefits desired by employees to attract and retain the workforce needed to succeed. This high-quality multiple-employer plan helps employees feel secure while reducing the amount of time, personnel and money spent managing a retirement plan.

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EXPERT INSIGHT

Authors: John Karren, Principal, Workforce Transformation, PwC US and Mike Lambert, Principal, Industrial Products and Services, PwC US

Creating the Future of Manufacturing Work

AI capabilities to support and upskill a workforce are timely for manufacturers. Many face a pressing need to increase their workforce's productivity, capacity for innovation and career mobility. Enabling experienced workers to pass on their experience and develop the next generation is as critical as it is challenging. AI can help with these imperatives. AI models are scalable and flexible, and they are accessible even to workers without a technology background. AI can make work more productive, meaningful and engaging while providing predictive analytics to support the workforce. This increase in engagement, purpose and career mobility can help manufacturers retain experienced workers and attract new talent.

The future of work in manufacturing will have AI embedded into everything people do, experience and lead. To help their people and organizations thrive in the age of AI, manufacturers should focus on these three areas.

Go Beyond Upskilling

Manufacturing workers need new skills for AI, but skills aren't enough. Manufacturers can create a culture where people will want to work with AI. Otherwise, they'll slow-walk adoption. For this cultural shift, leadership can make clear that the goal is for AI to make people more valuable and productive, not replace them. "AI ambassadors" can serve as mentors and peer coaches, showing colleagues how AI can support their careers and help them learn how to use AI responsibly.

Much of AI's value for manufacturers will come through AI-driven, "agentic" workflows. In an agentic workflow, people and AI agents (entities programmed to perform specific tasks) work together. AI agents can perform simple tasks (such as routine maintenance) under human supervision. They can also help people solve complex challenges, such as supply chain optimization. The result is a workforce where people focus on more meaningful, higher-value work. It can improve their experience, helping to retain workers and attract new ones.

Centralize and Transfer Knowledge

Most manufacturers have critical experience and knowledge locked in places where it's hard to access: within their experienced workers, who are dispersed across the enterprise. AI can help centralize this knowledge, preserve it and transfer it to the next generation.

Today, anyone can interact with AI models in everyday language. If experienced workers have the skills and incentives to help train AI models—correcting mistakes and filling gaps in their knowledge—then these models will contain critical elements of their expertise. Through Q&A chatbots or other guidance tools, these models can transmit this expertise to others. By using AI as a catalyst to help each other grow and to help the next generation add more value, jobs will grow too.

Redefine What Leaders Do

AI will require manufacturing leaders' roles to change. They will have to foster more continuous learning around technology application as well as human-AI collaboration through role modeling and policy changes, such as introducing new metrics and incentives. Leaders will be managing and evaluating teams that include both people and AI agents. They will also have to confirm that they—and their teams—follow responsible AI principles to help unlock AI's value and manage its risks.

Leaders will need to reimagine and redefine the nature of manufacturing work. As AI does more routine and repetitive work, some skills will become more important: empathy, critical thinking, collaboration and creativity. Leaders will also need to make sure that AI isn't used too much. For example, in a customer-facing role, workers may use AI-generated data to better understand client needs, but their communication skills will be crucial in turning the data into exceptional service. The goal isn't to automate everything away, which would lead to errors, lack of problem solving and greatly reduced opportunities for innovation. The goal is to build a human-led, AI/tech-powered manufacturer where people remain in control, and AI helps create a manufacturing ecosystem that enables seamless upskilling, knowledge transfer, innovation, productivity and an engaging employee experience.

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7. Embracing the Importance of Data

THE TREND:

Data offers huge potential for manufacturers to increase efficiency, reduce costs, conduct predictive maintenance, improve quality control, optimize the supply chain and more. For maximum benefits, manufacturers must follow best practices to collect, analyze and leverage data. Ensuring data validity, quality and formatting will also be necessary. In 2025, more manufacturers will focus on building data infrastructure to take advantage of new technologies faster. They will also need to create a corporate strategy for data governance.

How Data Affects Manufacturers

- Manufacturers increasingly recognize that success in the digital era depends on a single foundation: data.
- Data about all facets of operations can help create substantial improvements as well as identify new ways to organize and run factories and plants.
- As operations become more connected electronically, the opportunities for data generation from machines and processes grow significantly. More data means more ways to identify and resolve problems earlier, reduce downtime, raise efficiency levels, cut costs and enhance productivity and time to market.
- "Data mastery" is defined as the ability to gather, organize, analyze and use information from all facets of manufacturing. Data mastery produces step changes in efficiency, cost-effectiveness and productivity.
- There is a gap between data strategy and overall business strategy, though data is essential to remaining competitive, according to the Manufacturing Leadership Council.
- Additional challenges and opportunities exist to align senior leadership responsibilities with business imperatives or incentives.

DATA RESOURCES

NAM SmartBrief

Discover what your peers are doing and gain new ideas from this quick daily summary of relevant articles around new technologies, data, sustainability, supply chain, workforce and more.

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Data Mastery: Key to Industrial Competitiveness

A report from the Manufacturing Leadership Council finds data is key to remaining competitive. However, manufacturers know there is a gap between data strategy and overall business strategy. Additional challenges and opportunities exist to align senior leadership responsibilities with business imperatives or incentives.

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Seventy Percent of Manufacturers Still Enter Data Manually

As companies adopt more advanced technologies, they are often overwhelmed by the quantities of raw data that must be collected, analyzed and put to use. Find out where manufacturers need to improve and how they plan to do it.

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EXPERT INSIGHT

Author: Andrew Wells, Chief Data and AI Officer, NTT DATA

Embracing the Importance of Data in the AI Era

Manufacturers have always needed organized, accessible and high-quality data, from the factory floor to maintenance logs. With the rapid rise of AI—particularly GenAI—this task is imperative. For example, 65% of North American manufacturers say the most important lesson they learned from GenAI deployments is that success requires good data.[3]

Data readiness requires mature data collection, governance and management practices. This may be hard to achieve after years of disruptions and the daily realities of doing business. Beyond conducting a comprehensive data assessment to understand the organization's current state, manufacturers should focus on three best practices:

1. Build a Flexible and Scalable Data Infrastructure

Prioritize the development of a flexible, scalable data infrastructure. Transitioning to cloud environments is essential, as they provide the necessary storage and computational power to handle large datasets and complex AI models. Selecting the appropriate cloud configuration—public, private or hybrid—is crucial for meeting organizational needs. A multicloud strategy can offer additional flexibility and risk management, enabling efficient cost management. Implementing a well-designed reference architecture ensures consistent, efficient analytics and AI deployments.

2. Establish a Strong Data Governance Strategy

Data governance is critical to data integrity, compliance and democratization. Establishing robust data governance frameworks enables effective monitoring, access and normalization of data across all systems and processes. This involves setting up comprehensive policies and procedures to make sure data is accurate, secure and accessible for authorized users. Using AI and automation in data governance platforms improves data management practices and fixes any remaining data quality problems. This will make operations more efficient and save money.

3. Ensure Data Quality and Validity

High-quality data is the foundation of effective data analysis and AI model performance. Focus on ensuring data validity, quality and proper formatting. Establishing a data catalog and lineage increases transparency and provides a comprehensive view of business-critical data. Implementing a master data management strategy helps define

standards, identify systems of record and integrate reference data. Checking and improving data quality every day ensures it is still good for business and helps with long-term improvements.

Getting all data in tip-top shape can be a daunting task. By focusing on these best practices and taking an incremental approach to progress, manufacturers will be able to use their data, and the powerful new AI tools that harness it, to its full potential. The resulting operational capabilities—predictive maintenance, improved quality control, supply chain optimization—can deliver better efficiency, lower costs and improve market competitiveness.

LEARN MORE ❯

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NTT DATA

Source:

3. NTT DATA, Inc. “Global GenAI Report: How organizations are mastering their GenAI destiny in 2025,” Nov. 14, 2024

8. Exploring Energy Options to Power New Technologies

THE TREND:

As manufacturers continue to adopt AI and other new technologies, the huge volume of new tech and data centers will strain an already aging and insufficient power grid. GenAI has the potential to unlock data insights that manufacturers will need to stay competitive, but with one ChatGPT query taking nearly 10 times more energy than a traditional Google search,[4] energy planning is nonnegotiable. Manufacturers must plan for the energy demands of Manufacturing 4.0 in 2025 and beyond as well as future growth and expansion.

Source:

4. https://www.cnbctv18.com/technology/chatgpt-uses-10-times-more-power-than-google-searches-says-goldman-sachs-19435551.htm

ENERGY RESOURCES

NAM Energy

Explore ways to create energy-efficient infrastructures while also managing energy consumption. Speak to an expert to review your business needs and determine how you can leverage data-driven analytics to better ensure you are using the best energy options for your needs.

CONNECT ❯

Grid Expansion

The NAM reported in early 2024 that billions of dollars were being deployed to expand the energy grid and improve transmission.

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NAM Incentives Locator

Connect with an expert to identify, apply and comply with incentives available at the federal, state and local level that can reduce above-the-line operating costs and below-the-line tax burdens for capital plans, including training and job creation.

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ADDITIONAL RESOURCE

NAM Shipping & Logistics

Don't be caught unprepared if your organization experiences a delay in shipments and funds are not received when expected. UPS Capital, offered through the NAM Shipping & Logistics program, provides peace of mind that your cash flow will not be impacted negatively by things out of your control.

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How Energy Affects Manufacturers

- In 2025 and beyond, manufacturers will consider energy-efficient infrastructures while managing energy consumption.
- The NAM Energy program can help manufacturers review their business needs and determine the best energy options.
- Grid expansion is underway. Beginning in 2021 and 2022, billions of dollars in federal aid became available for energy transmission projects, which will likely alleviate grid strain in the near future.
- With investments in renewable energies at all-time highs, now is a great time for manufacturers to evaluate procurement contracts and explore sustainability projects.
- Manufacturing companies could qualify for incentives for renewable energy projects. NAM Incentives Locator is available to navigate the entire incentives process.

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Cyber Insurance and Risk Mitigation for Manufacturers

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NAM SmartBrief
National Association of Manufacturers

CONNEX marketplace
Connecting the Manufacturing Supply Chain

Operational Insights
This biweekly newsletter from the NAM focuses specifically on overall operations, ranging from environmental, health and safety regulations to energy efficiency, from benefits for workforce to cybersecurity tactics. Each issue contains articles, downloadable assets and links to additional information, such as webinars and podcasts. Geared toward small and medium-sized companies, any manufacturing leader in operations will find value.

Input
The NAM's morning newsletter delivers exclusive insights while keeping manufacturers informed on policy and business developments as well as the NAM's activities.

Power of Small
The NAM's exclusive resource network for small and medium-sized manufacturers provides access to trusted advisers and delivers intel and analysis on advocacy, workforce development, legal action, operational excellence and news focused on supporting manufacturers' long-term success.

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