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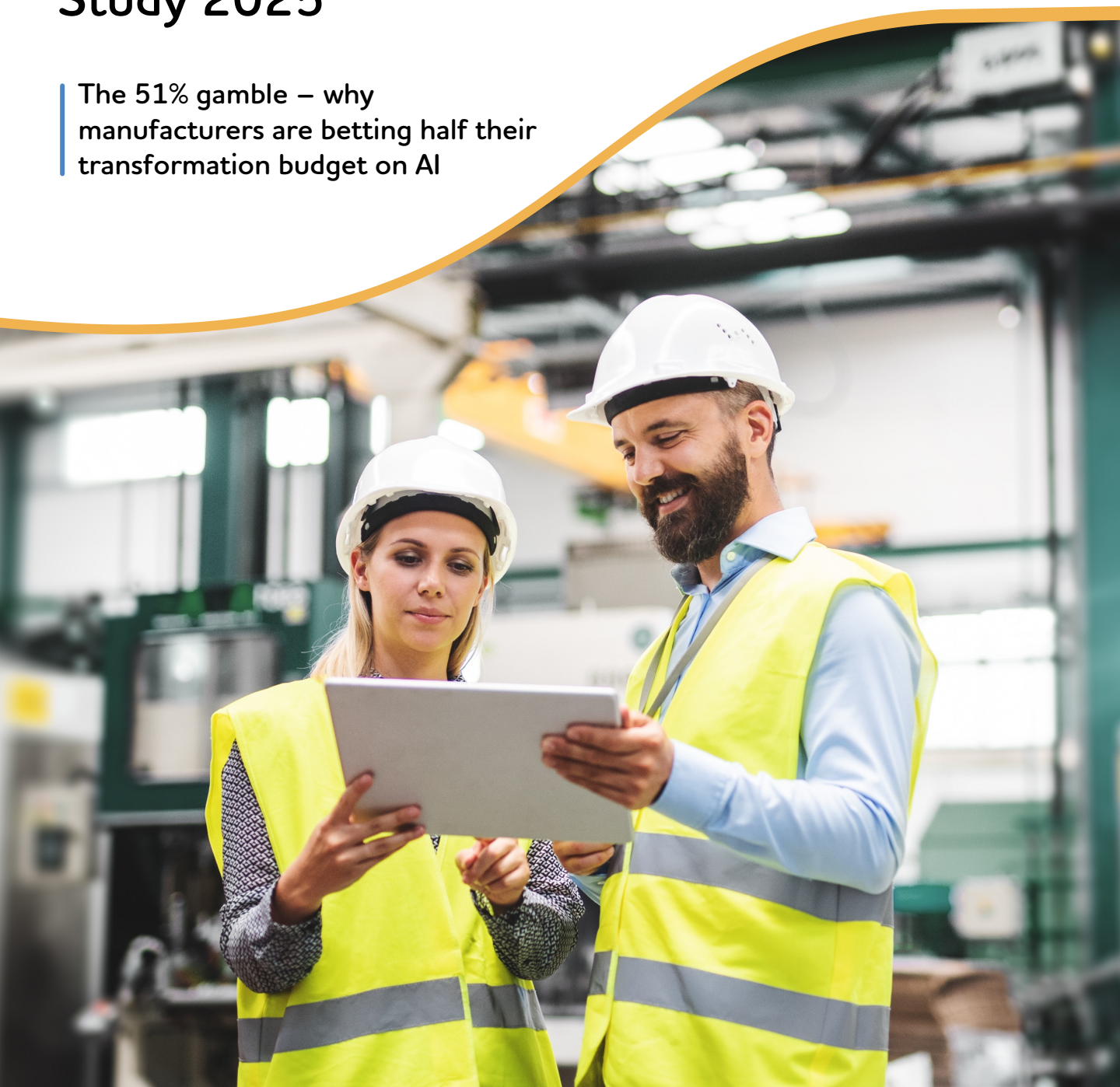
Future-Ready Manufacturing Study 2025

The 51% gamble – why manufacturers are betting half their transformation budget on AI



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Foreword

Building the Future-Ready Manufacturing Enterprise

Anupam Singhal

President – Manufacturing,
Tata Consultancy Services

Manufacturing today operates with the complexity of an air-traffic-control system — many moving parts that demand clarity, coordination, and timely decisions. AI is beginning to offer enterprises the same level of visibility and control, helping them run their enterprises with greater confidence and fewer unexpected slowdowns. Our Future-Ready Manufacturing Study reflects the speed at which this shift is taking shape:

Key signals from the study:

- **67%** → report improved real-time supply-chain visibility, helping protect top-line performance
- **75%** → expect AI to be a top-three contributor to operating margins by 2026
- **88%** → anticipate AI will capture at least 5% of operating margin; **1 in 4** expect returns above 10%
- **51%** → of transformation spending is now being directed toward AI and autonomy
- **30%+**→ expect 8–10% productivity gains from AI-led modernization

These signals point to a clear direction: enterprises are turning to AI because it delivers transformational business outcomes — and real operational gains such as stronger margins, higher productivity, and more stable, predictable performance. Leaders also recognize what must be strengthened next: data foundations, workforce skills, and the partnership between people and intelligent systems.

At TCS, we believe this is a defining moment. AI is giving manufacturers the ability to run operations with more predictability, more stability, and more control than ever before. As the industry moves forward, I hope these insights offer a clear view of how manufacturing is evolving — and how your enterprise can stay ahead of this change.

Executive Summary

Manufacturing stands at a **transformational inflection point** where artificial intelligence (AI) has evolved from an emerging technology to an essential profit driver. In November 2025, we conducted a survey of 200+ manufacturing respondents across North America, UK, and Continental Europe. The research reveals a sector in the midst of a **margin revolution**, with **75% of manufacturers expecting AI to be a top three margin contributor within the next year** and **88% anticipating AI will capture at least 5% of operating margin**.

The financial commitment matches the ambition: Manufacturers are allocating **51% of transformation spending** to AI and autonomous systems, representing a **strategic pivot** where organizations are betting their competitive future on AI as the primary engine of margin expansion.

However, **significant implementation gaps persist**. While manufacturers are actively deploying AI in IT operations and quality inspection, the majority lack fully AI-ready data infrastructure, and security concerns remain the primary scaling barrier. The workforce transformation reveals a preference for **human-AI collaboration over replacement**, yet talent development struggles to keep pace with technological advancement.

The survey exposes a fascinating paradox: manufacturers are simultaneously investing in innovative AI capabilities while still relying on traditional risk mitigation strategies. The winners will be those that **bridge this gap the fastest**, moving from reactive safety measures to proactive AI-driven systems.

Looking ahead, **74% of manufacturers expect AI agents to manage up to 50% of routine production decisions by 2028**, with **66% already allowing or planning to allow AI-approved work orders within 12 months**. This reflects a measured, risk-aware progression toward autonomy.

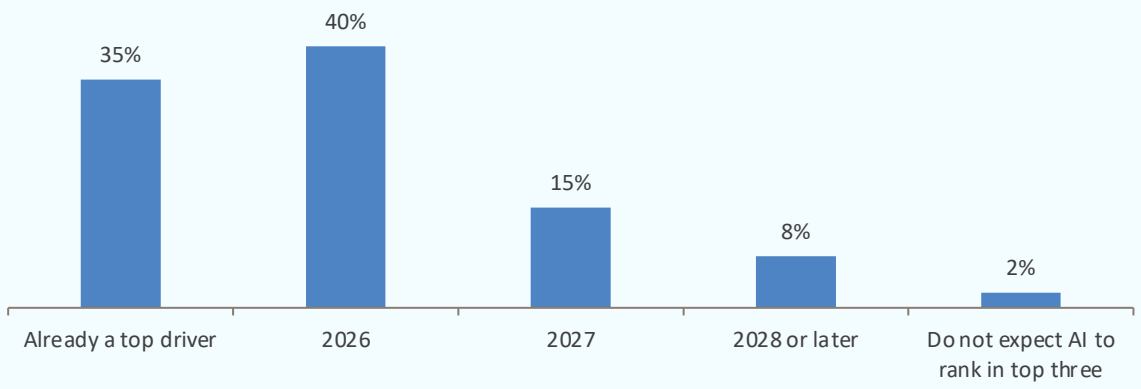
The strategic imperative is clear: AI transformation is no longer optional; it is the defining competitive advantage of the next decade.

The AI Business Case in Manufacturing

As global competition intensifies and operational efficiency becomes paramount, manufacturers are discovering that AI is not just enhancing their margins; it is fundamentally redefining them. The survey reveals a sector in the midst of a margin revolution, where AI adoption has accelerated beyond early experimentation to become a cornerstone of financial strategy. The following results demonstrate how manufacturers are not only embracing AI as a critical margin expansion tool but are also making unprecedented investment commitments to secure their competitive advantage in an AI-driven future.

AI has crossed the threshold from promise to profit driver, with **more than a third** of manufacturers say it's already a top margin contributor and **another 40% expect** it to be one in the next year

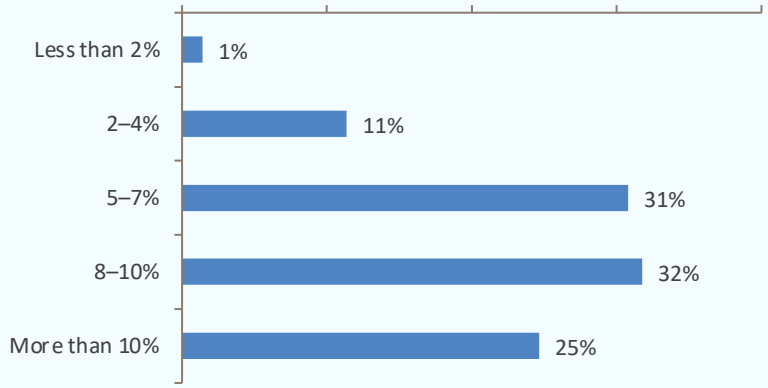
When do you expect AI to be one of the top three drivers of margin expansion in your organization?



Source: Omdia

The financial stakes are substantial: **88%** anticipate AI will capture **at least 5% of operating margin**, while a **quarter** project double-digit returns **exceeding 10%.**

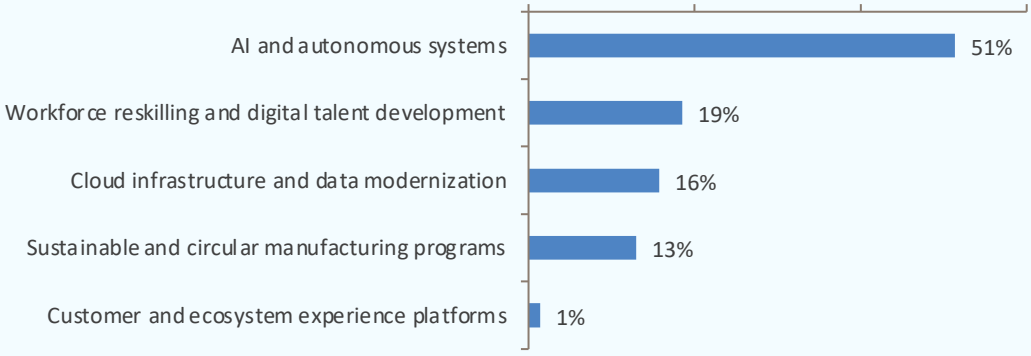
What share of operating margin do you expect AI to achieve?



Source: Omdia

Manufacturers are backing these bold expectations with equally bold investments: **AI and autonomous systems command 51% of transformation spending over the next two years**, dramatically outpacing workforce reskilling and digital talent development (19%) and cloud infrastructure and data modernization (16%).

Over the next two years, where will your organization primarily increase its investments to accelerate transformation?



Source: Omdia

The Current State of AI

While manufacturers envision AI's transformative potential for margin expansion, the immediate reality reveals a sector grappling with persistent operational challenges and seeking practical solutions.

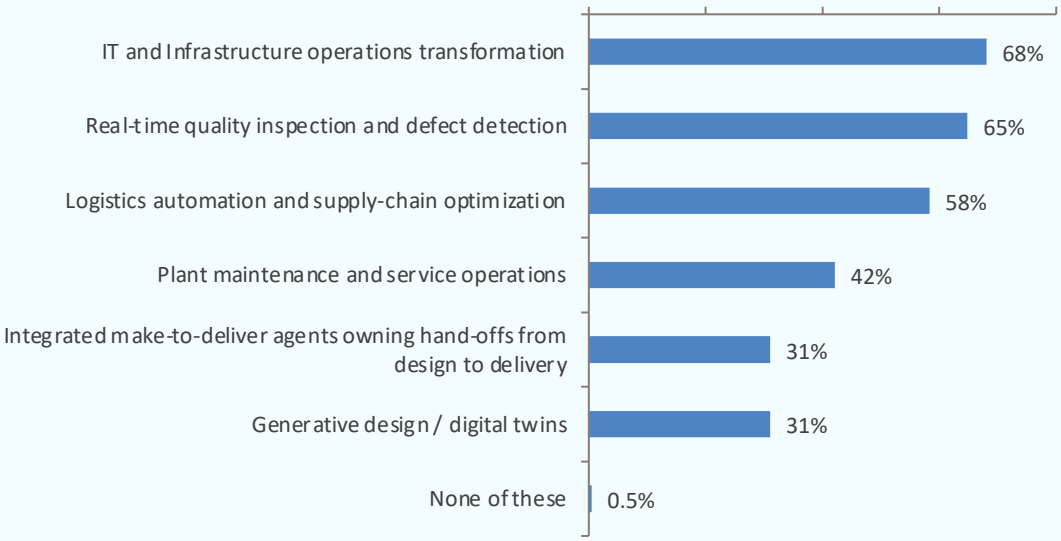
Current AI deployments are being shaped by urgent business needs—from quality control failures that erode margins to supply chain disruptions that threaten continuity.

This reveals a notable gap between ambition and execution—AI investments are accelerating, yet operational responses still lean on traditional safeguards.

The following survey data reflects this gradual shift from intent to impact, indicating where agentic AI is contributing measurable value and the operational demands guiding its deployment.

Manufacturers are moving beyond AI experimentation to practical deployment, with IT and infrastructure operations transformation leading adoption at 68%, followed closely by real-time quality inspection and defect detection (65%).

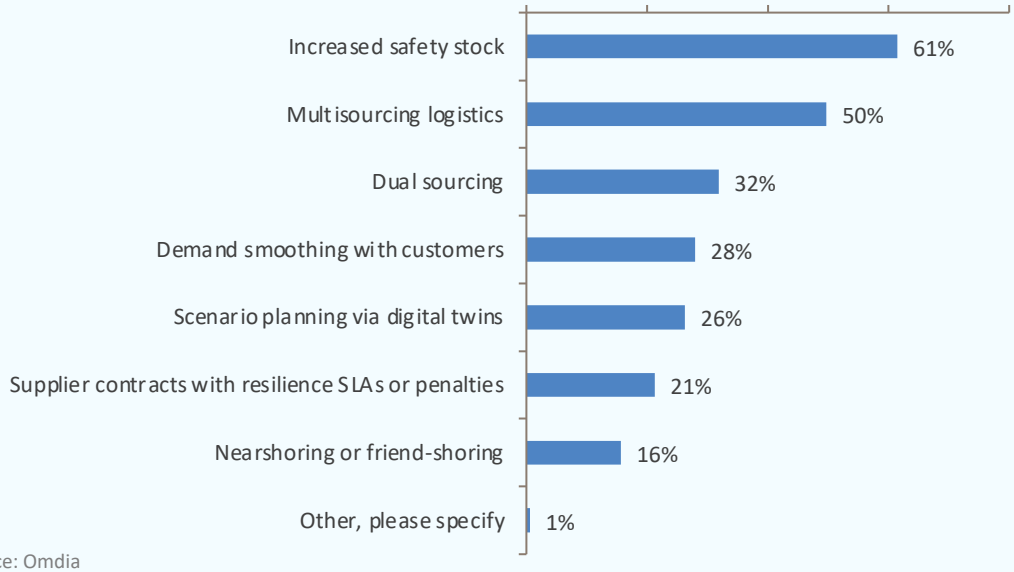
Which agentic AI use cases are you currently piloting/scaling?



Source: Omdia

In response, **manufacturers are defaulting to conventional risk mitigation strategies** like increased safety stock (61%) and multisourcing (50%), highlighting the gap between disruption frequency and adaptive capability.

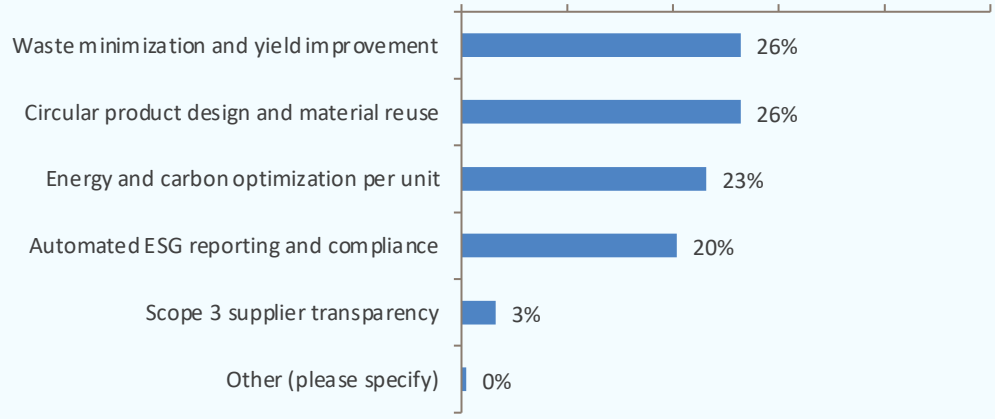
Which actions did you take after your organization's most recent disruption?



Source: Omdia

Meanwhile, AI is already delivering measurable sustainability impact through circular product design (26%) and waste minimization (26%), suggesting that environmental and operational excellence are converging through intelligent automation.

Where is AI delivering the greatest sustainability impact today?



Source: Omdia

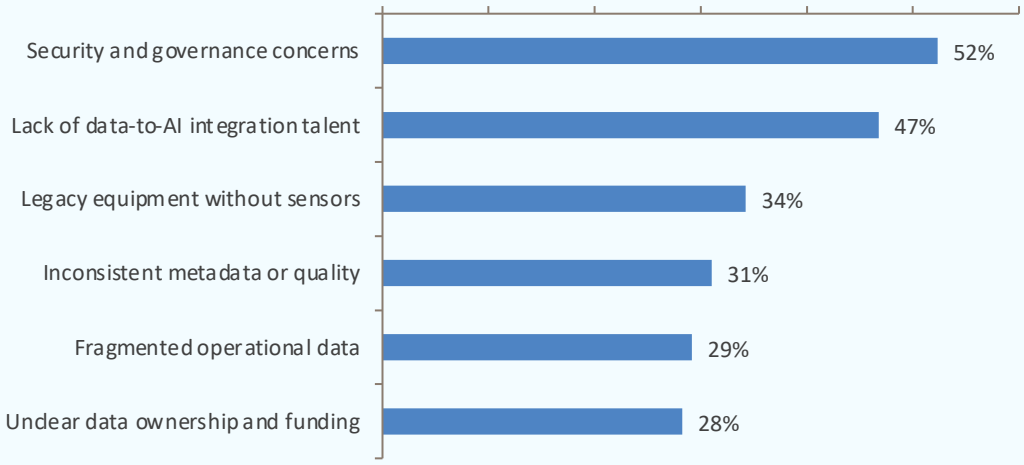
AI is already shaping sustainability outcomes, with 26% reporting gains in circular design and waste minimization—signaling tangible operational benefits. Yet manufacturers remain caught between reactive risk management and proactive AI transformation. The manufacturers that bridge this gap fastest will emerge as margin leaders, making the pace of their shift from safety stock to smart systems a defining competitive advantage.

Implementation Challenges and Barriers

Despite AI's proven value, manufacturers face a sobering implementation reality that helps explain why transformation remains uneven across the industry.

Security and governance concerns top plant-level obstacles at 52%, reflecting the high-stakes nature of manufacturing operations, where AI failures can cascade into safety incidents, production shutdowns, or regulatory violations. The talent gap follows closely at 47%, highlighting how AI's technical complexity collides with manufacturing's traditionally mechanical skill base—a mismatch that creates bottlenecks even when technology is available.

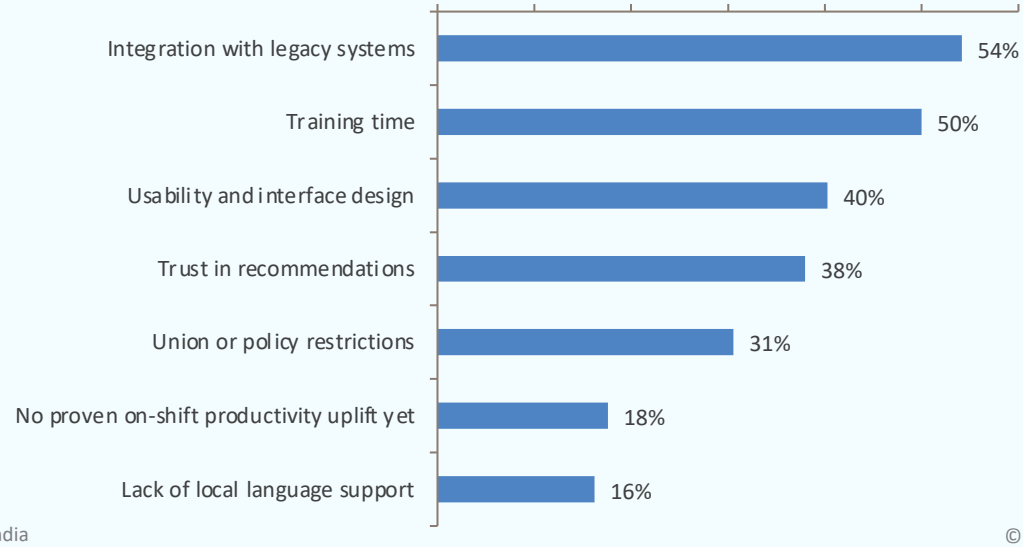
What are the biggest obstacles to scaling AI across plants?



Source: Omdia

At the enterprise level, legacy system integration challenges emerge as the primary barrier (54%), revealing the technical debt accumulated over decades of manufacturing digitization. Training time follows as a close second (50%), underscoring that AI adoption is not just a technology deployment but a fundamental workforce transformation requiring sustained investment in human capability development.

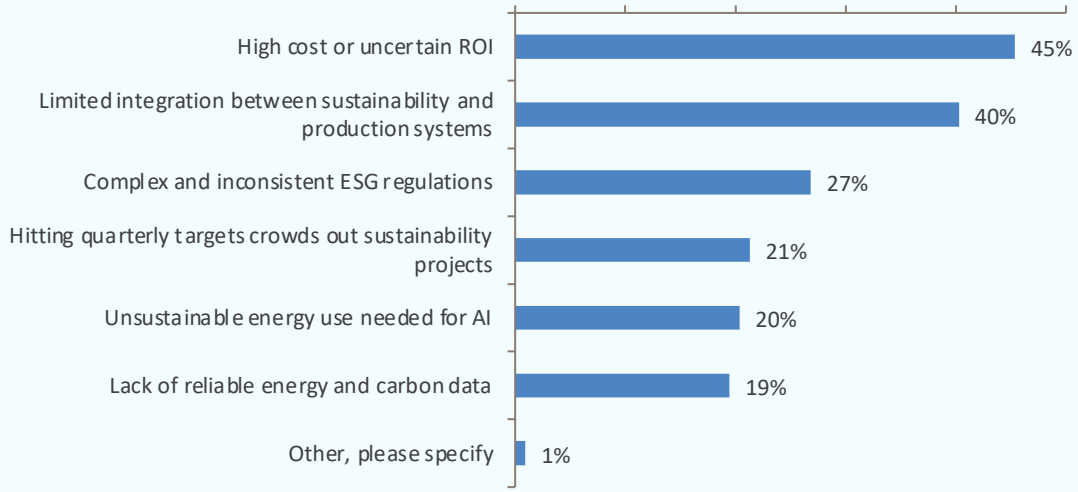
What do you consider the biggest barriers to scaling AI adoption across your enterprise?



Source: Omdia

Sustainability applications face their own unique barriers, with uncertain ROI (45%) and system fragmentation (40%) pointing to the nascent state of ESG-AI integration. These findings collectively explain why AI's margin potential remains untapped: Success requires simultaneous advances in security frameworks, talent development, system architecture, and organizational change management.

Which are the biggest barrier(s) to achieving sustainability goals through AI?



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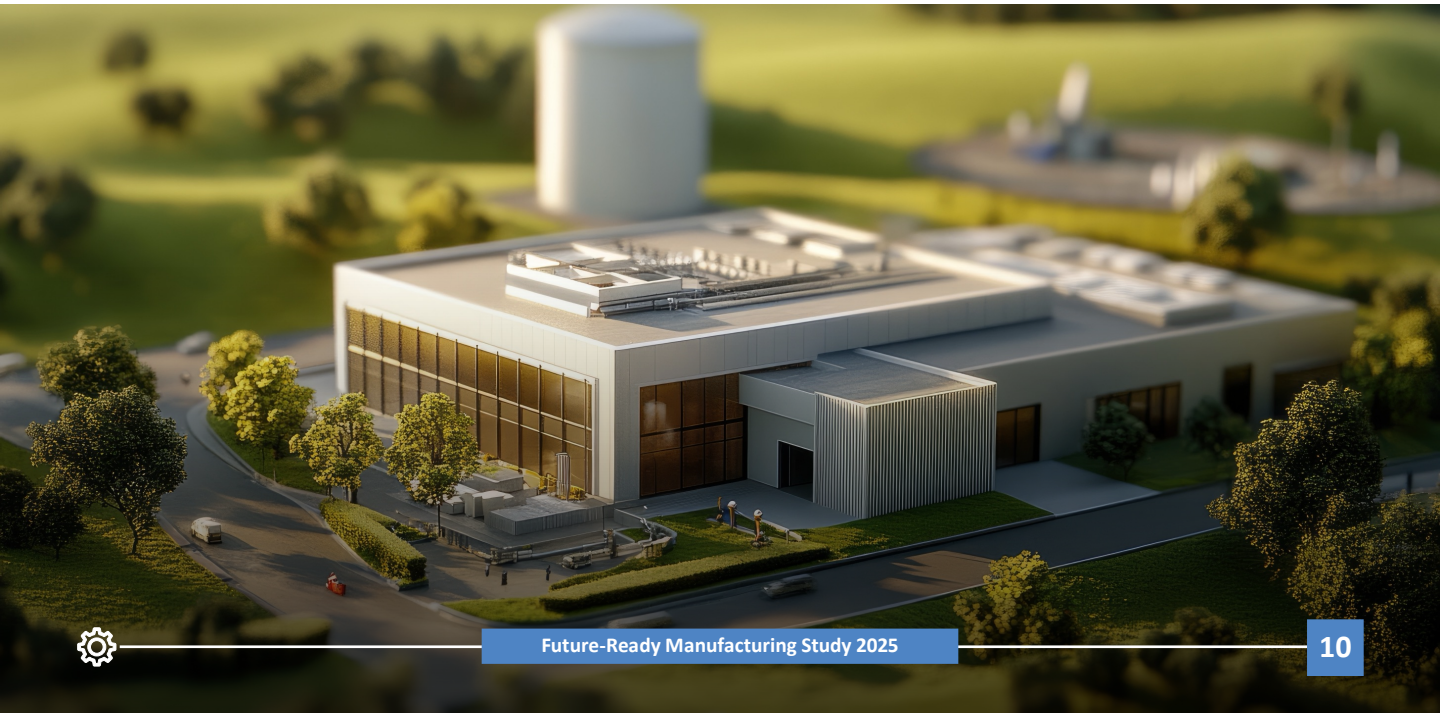


Operational Readiness – Infrastructure and Integration

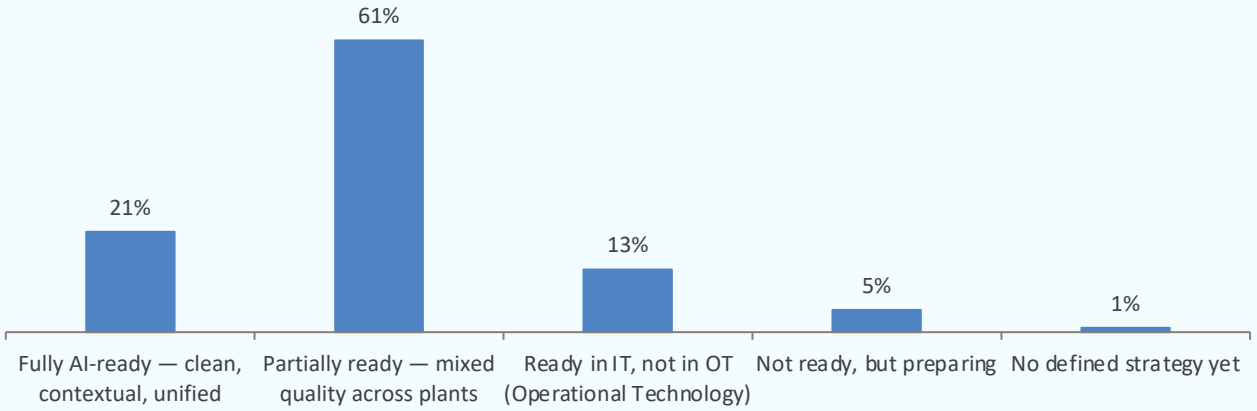
The gap between AI ambition and operational reality becomes more clear when examining data infrastructure maturity.

Only 21% of manufacturers claim full AI readiness with clean, contextual, and unified data—a surprisingly low figure given the widespread deployment plans discussed earlier.

The majority (61%) acknowledge partial readiness with inconsistent capabilities across plants, revealing the fragmented nature of manufacturing digitization, where facilities have evolved independently, creating data silos that undermine enterprise-wide AI initiatives.

The partial readiness across most organizations suggests that successful AI transformation will require substantial infrastructure investment before advanced applications can achieve their promised returns, making data modernization the critical prerequisite for manufacturing's AI revolution.

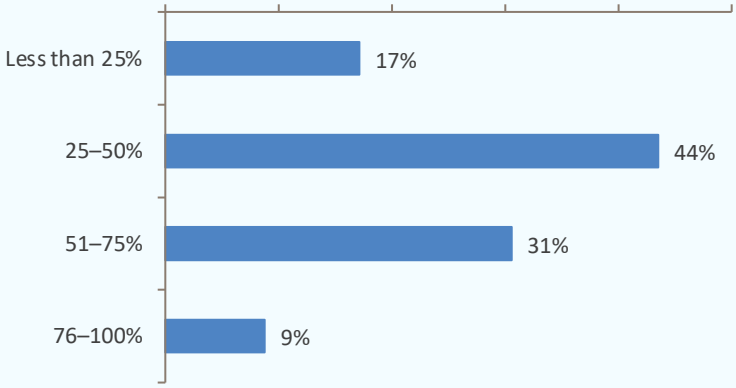
How ready is your operational data for AI integration across plants?



Source: Omdia

The infrastructure immaturity is further exposed in sustainability monitoring, where **only 9% of organizations have comprehensive real-time energy and emissions tracking** across their production assets, and 61% monitor half of their operations or less. These findings help explain why AI scaling faces significant barriers: Without foundational data infrastructure, even the most sophisticated AI algorithms cannot access the quality inputs needed for reliable results.

Currently, what percentage of your production assets report real-time energy and emissions data into a central system?



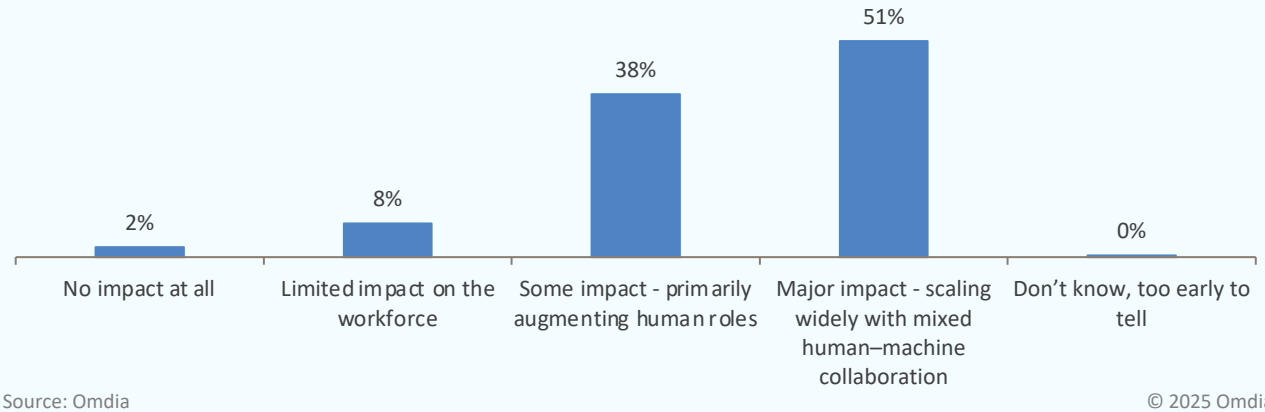
Source: Omdia

Workforce Transformation: Human-AI Collaboration

The future of manufacturing work is being redefined through collaboration rather than displacement, with **89% of manufacturers expecting AI-guided robotics to have at least some impact on the workforce**, primarily through augmentation (38%) and mixed human-machine collaboration (51%).

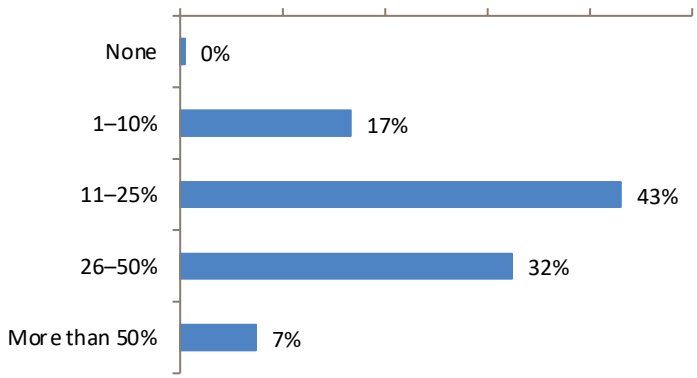
This collaborative vision translates into concrete deployment expectations, with three-quarters of organizations anticipating **11–50% of frontline roles will use AI copilots by 2027**, suggesting selective but substantial integration across operations.

How do you expect AI-guided robotics to impact your workforce?



Source: Omdia

What proportion of your organization's frontline roles will use AI copilots or assistive interfaces by 2027?

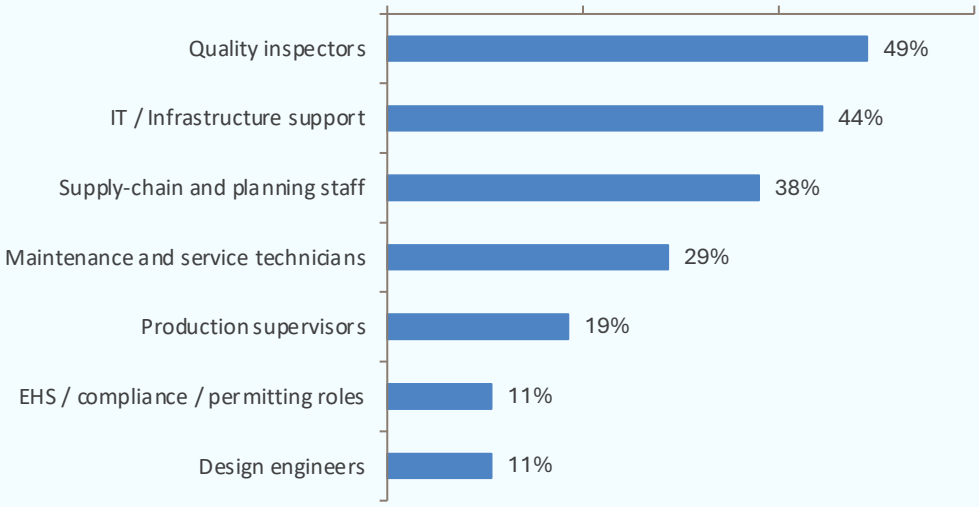


Source: Omdia

Productivity gains are already emerging in knowledge-intensive roles, with quality inspectors leading at 49%, followed by IT/infrastructure support (44%) and supply-chain planning (38%)—areas where AI can process vast datasets and provide decision support while humans retain final authority.

Notably, traditional production roles like maintenance technicians (29%) and production supervisors rank lower (19%), indicating that AI adoption follows a pattern of cognitive augmentation before addressing human coordination and complex troubleshooting.

Which roles within your organization will see the fastest productivity gains from AI copilots by 2027?



Source: Omdia

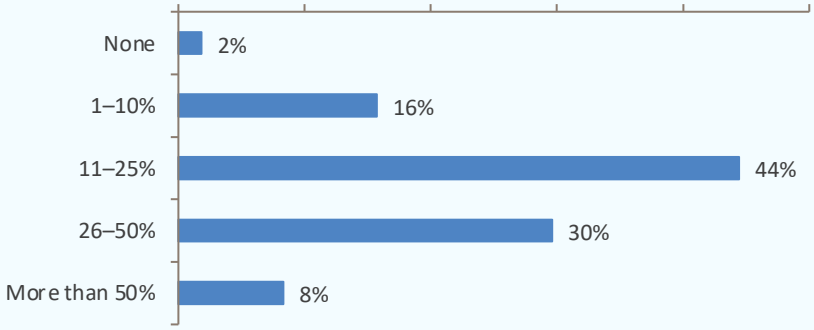
These findings reflect **manufacturing's pragmatic approach to AI integration. Rather than pursuing wholesale automation**, organizations are strategically deploying AI where human expertise can be amplified most effectively.

The Future of Autonomous Operations

Manufacturing is approaching a tipping point in AI autonomy, with 74% of organizations expecting AI agents to to manage up to 50% of routine production decisions without human approval by 2028—a dramatic shift from today's human-centric operations.

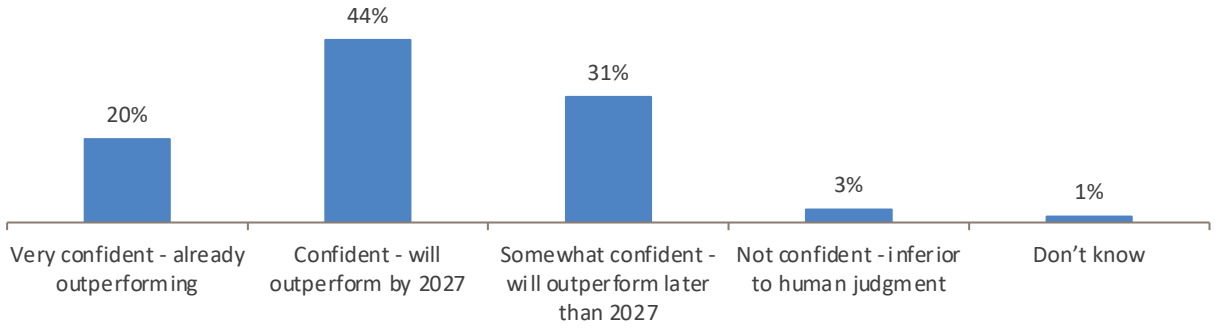
This confidence is backed by performance expectations, where **64% are confident or very confident** that AI agents will outperform human planners by 2027 or sooner, with 20% claiming superior performance already exists.

By 2028, what percentage of routine production decisions will AI agents make without human approval in your organization?



Source: Omdia

How confident are you that AI agents will outperform human planners in supply-chain decisions by 2027?

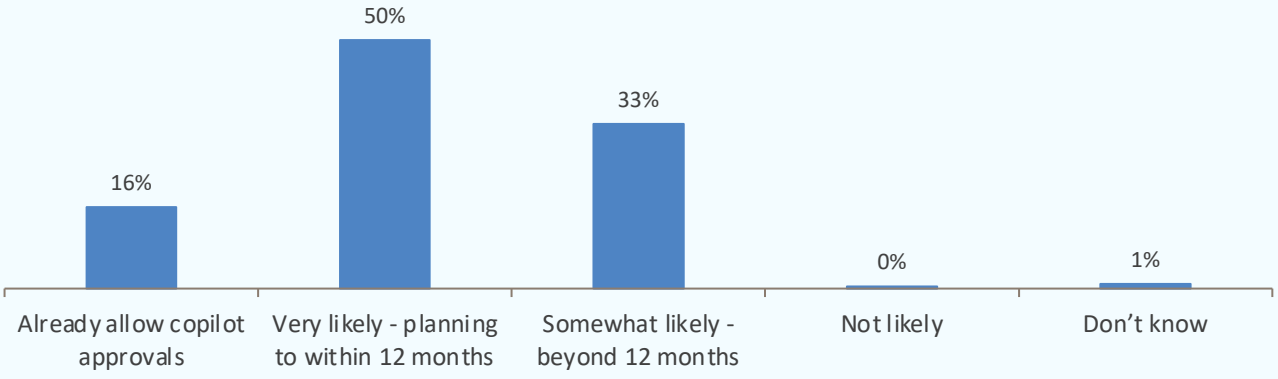


Source: Omdia

The transition is gaining immediate momentum through work order automation, where **66% already allow or plan to allow AI-approved routine orders within 12 months**, suggesting that administrative processes will lead the autonomous revolution.

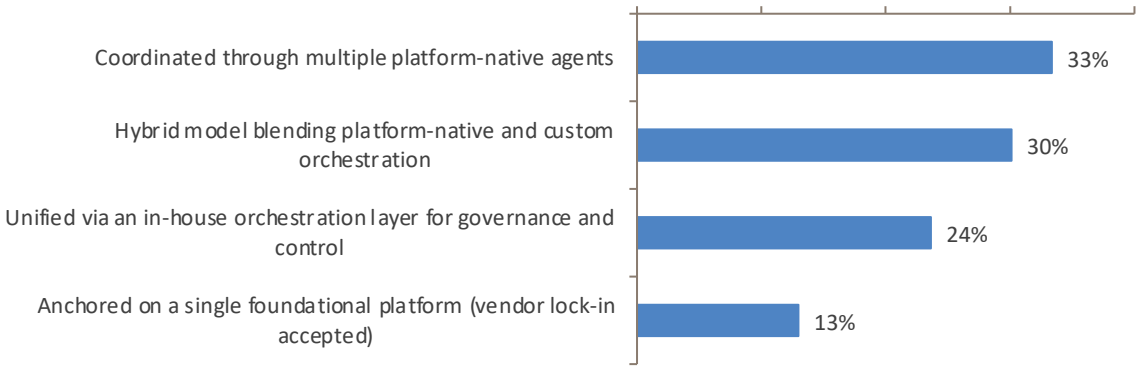
However, manufacturers are taking a pragmatic approach to orchestration, with 63% favoring hybrid or multi-platform strategies over single-vendor solutions, reflecting lessons learned from decades of technology lock-in experiences.

How likely are you to allow AI agents to approve routine work orders without human sign-off?



Source: Omdia

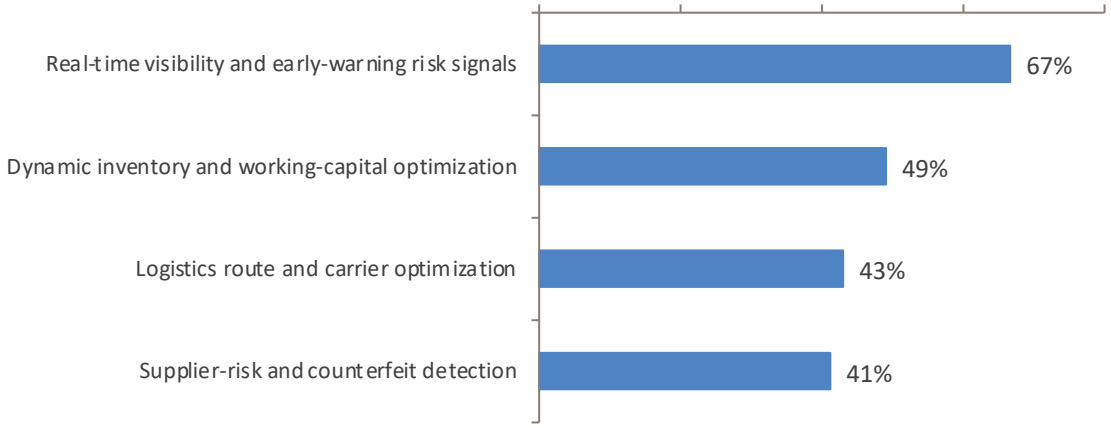
How do you expect manufacturers to orchestrate agent workflows as agentic AI becomes embedded across platforms?



Source: Omdia

The operational benefits are already materializing in supply chain management, with **67% reporting real-time visibility improvements** will be one of the most impacted areas and 49% citing dynamic inventory optimization—areas where AI's pattern recognition capabilities clearly exceed human processing limits.

Which areas of supply-chain visibility/resilience do you believe AI will have the most impact?



Source: Omdia

These findings reveal a manufacturing sector that has moved beyond AI scepticism to strategic deployment, with autonomous operations emerging not as a distant vision but as an imminent operational reality. The measured progression from copilot assistance to independent decision-making reflects manufacturing's risk-aware culture while acknowledging AI's superior analytical capabilities in data-intensive environments.

Strategic Recommendations and Implementation Roadmap

The following recommendations provide a proven roadmap for manufacturing leaders to accelerate AI adoption while avoiding common pitfalls, recognizing that AI transformation requires coordinated attention to infrastructure, security, talent, and operational integration to deliver the competitive advantages that manufacturing leaders expect.

1. Address Infrastructure Gaps Systematically

- **The Challenge** Only 21% of organizations have fully AI-ready data, while 61% report partial readiness across plants.
- **Success Strategy** Prioritize data unification before AI deployment. Organizations with clean, contextual, unified data show significantly higher AI adoption rates.

2. Build Security-First Architecture

- **The Evidence** Security and Governance concerns top implementation barriers at 52%, significantly outweighing other technical challenges.
- **Success Strategy** Embed security frameworks from project inception rather than retrofitting protection.

3. Invest in Human-AI Collaboration Training

- **The Reality** 47% cite talent gaps as major barriers, yet 89% expect AI-guided robotics to augment human roles.
- **Success Strategy** Develop comprehensive upskilling programs that prepare workers for collaborative roles rather than fearing displacement.

4. Start with Proven High-Impact Use Cases

- **The Data** IT operations (68%) and quality inspection (65%) lead successful deployments.
- **Success Strategy** Build credibility and expertise through wins in these areas before expanding to more complex applications.

5. Plan for Gradual Autonomy Transition

- **The Timeline** 74% expect AI agents to manage a meaningful share—up to half—of routine decisions by 2028, with 69% planning to allow work-order automation within 12 months.
- **Success Strategy** Implement staged autonomy increases that build organizational confidence and operational trust.

6. Choose Flexible, Multi-Platform Orchestration

- **The Preference** 63% favour hybrid or multi-platform strategies over single-vendor solutions.
- **Success Strategy** Avoid vendor lock-in while maintaining integration capabilities across diverse manufacturing systems.

7. Measure ROI Through Operational Metrics

- **The Expectation** 75% position AI as a top three margin contributor, with 51% of transformation budgets allocated.
- **Success Strategy** Establish clear performance indicators that demonstrate tangible business impact beyond technology metrics.

8. Partner with Manufacturing-Experienced Integrators

- **The Complexity** Partial readiness across plants (61%) and different stages of maturity in IT and OT creating integration challenges (13%) requires specialized expertise.
- **Success Strategy** Engage partners that understand both manufacturing operations and cloud-native AI architectures.

Executive Champions

This study was guided and sponsored by the following leaders:

- **Anupam Singhal**, President – Manufacturing, TCS
- **Naresh Mehta**, Global Chief Technology Officer – Manufacturing, TCS
- **Subhash Sakorikar**, Global Head – Manufacturing Industry Excellence, TCS

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The executive champions express their appreciation to the following contributors for their expertise and support:

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Acknowledgments

This study was made possible through the dedication and effort of numerous team members. A special thank you to the following leaders for their collaboration and continued support:

- **Abhinav Kumar**, Chief Marketing Officer, TCS
- **Vikrant Gaikwad**, Global Head – Industry Marketing Group, TCS
- **Rohaan Mishra**, Global Head of Marketing – Manufacturing, TCS
- **Ravindra Lalas,** Global Head of Marketing – AWS Business Unit, TCS

Additional appreciation to: **Pravir Kumar Rai**, **Mansha Dhingra**, **Kimaya Nemade**, **Lokesh Rajpoot, Kshitish Satapathy, Geeta Verma, Kartik Korpal, Swarnil Saxena, Laura Rudolph**

Study Demographics

Methodology

This study features data and insights derived from a quantitative survey of 216 participants in North America and Europe across industries, including automotive manufacturing, aerospace/defense, manufacturing/industrial, process industries and chemicals, and heavy equipment/machinery.

Survey executed and analysed by Omdia.

About Tata Consultancy Services (TCS)

Tata Consultancy Services (TCS) (BSE: 532540, NSE: TCS) is a digital transformation and technology partner of choice for industry-leading organizations worldwide. Since its inception in 1968, TCS has upheld the highest standards of innovation, engineering excellence and customer service. Rooted in the heritage of the Tata Group, TCS is focused on creating long term value for its clients, its investors, its employees, and the community at large. With a highly skilled workforce of over 5,90,000 employees across 55 countries and 202 service delivery centers across the world, the company has been recognized as a top employer in six continents. With the ability to rapidly apply and scale new technologies, the company has built long term partnerships with its clients – helping them emerge as perpetually adaptive enterprises. Many oaf these relationships have endured into decades and navigated every technology cycle, from mainframes in the 1970s to Artificial Intelligence today.

TCS generated consolidated revenues of over US $30 billion in the fiscal year ended March 31, 2025.

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