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Achieving Manufacturing Excellence: Data-Driven Transformation Across Factory, Supply Chain, Sustainability, and Customer Operations

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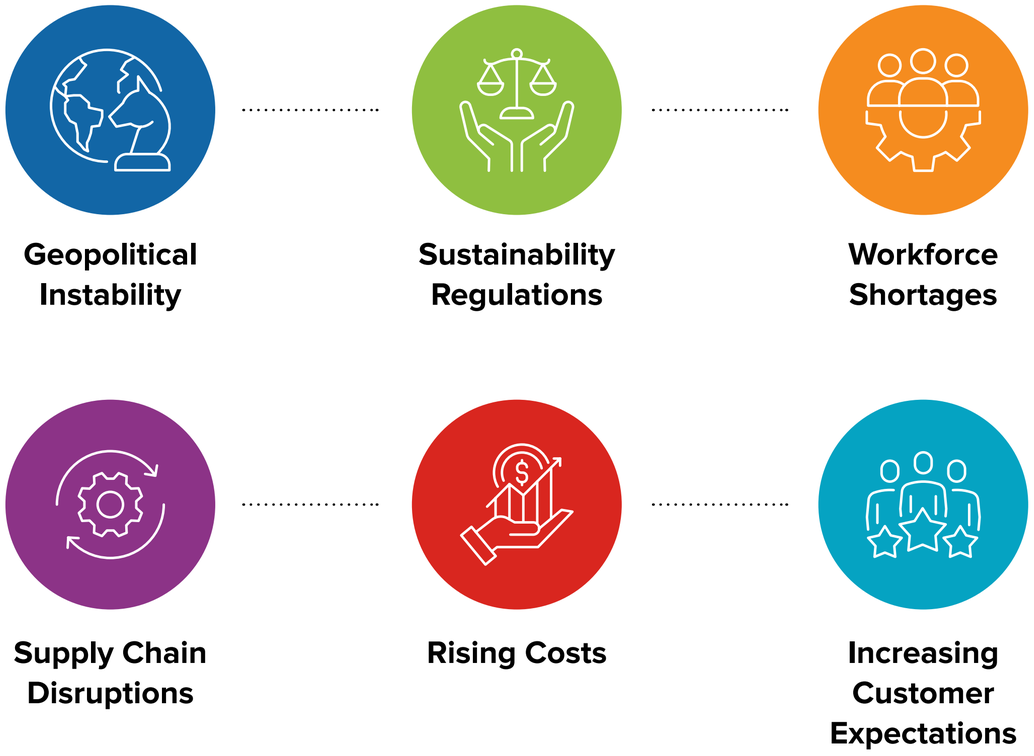
Forces Affecting Manufacturing

In 2025, macroeconomic challenges and geopolitical uncertainty will continue to affect manufacturing organizations worldwide, driving the need for operational resilience, cost optimization, and digital transformation to enhance efficiency, agility, and long-term competitiveness.



Market dynamics are changing rapidly, increasing pressure on manufacturers.

- **Macroeconomic challenges** such as inflation, supply chain disruptions, and geopolitical uncertainties complicate operations.
- **Regulatory compliance** is becoming more complex, with new and evolving regulations, like the EU Corporate Sustainability Reporting Directive (CSRD) and the EU Supply Chain Act, impacting manufacturers worldwide. Noncompliance can lead to fines, operational risks, and exclusion from supplier lists and tender requests.
- **Labor shortages and skills gaps** persist due to an aging workforce and shifting job market demands, requiring greater digital expertise amid more automation.
- **Rising costs** — materials, logistics, wages, energy, and interest rates — are squeezing profit margins, forcing manufacturers to optimize operations and rethink pricing strategies.
- **Global competition** is intensifying, making it crucial for manufacturers to streamline operations, innovate, and adopt agile business models to meet changing customer and market demands.

Source: IDC's *Manufacturing Industry Core Survey,* July 2024, manufacturing companies worldwide (N = 800)

Navigating Market Forces to Drive Strategic Execution

Manufacturers invest in various initiatives to respond to market volatility, economic pressures, regulatory changes, and disruptions, ensuring they address major business challenges and effectively execute their strategic priorities.

1

Factory Operations

Ensuring the operational excellence of factory operations to improve factory key performance indicators (KPIs)

For **36%** of consumer-packaged goods (CPG) companies, **38%** of engineering-oriented firms,* and **39%** of asset-oriented manufacturers,* this will be among the top business priorities for the next two years.

2

Supply Chain Operations

Improving supply chain resilience and performance to ensure uninterrupted supply

For **40%** of CPG companies, **48%** of engineering-oriented firms, and **40%** of asset-oriented manufacturers, this will be among the top business priorities for the next two years.

3

Sustainable Operations

Enhancing operations with products manufactured to meet sustainability goals

Consumers are willing to pay more for sustainable products, with approximately **30%** of organizations charging higher prices for such goods.

4

Customer Experience-Centric Operations

Improving customer experience to stay relevant while increasing customer lifetime value

30% of consumers are willing to share their data when the brand ensures transparency and shows the benefits they will receive, such as personalized offers or improved services.

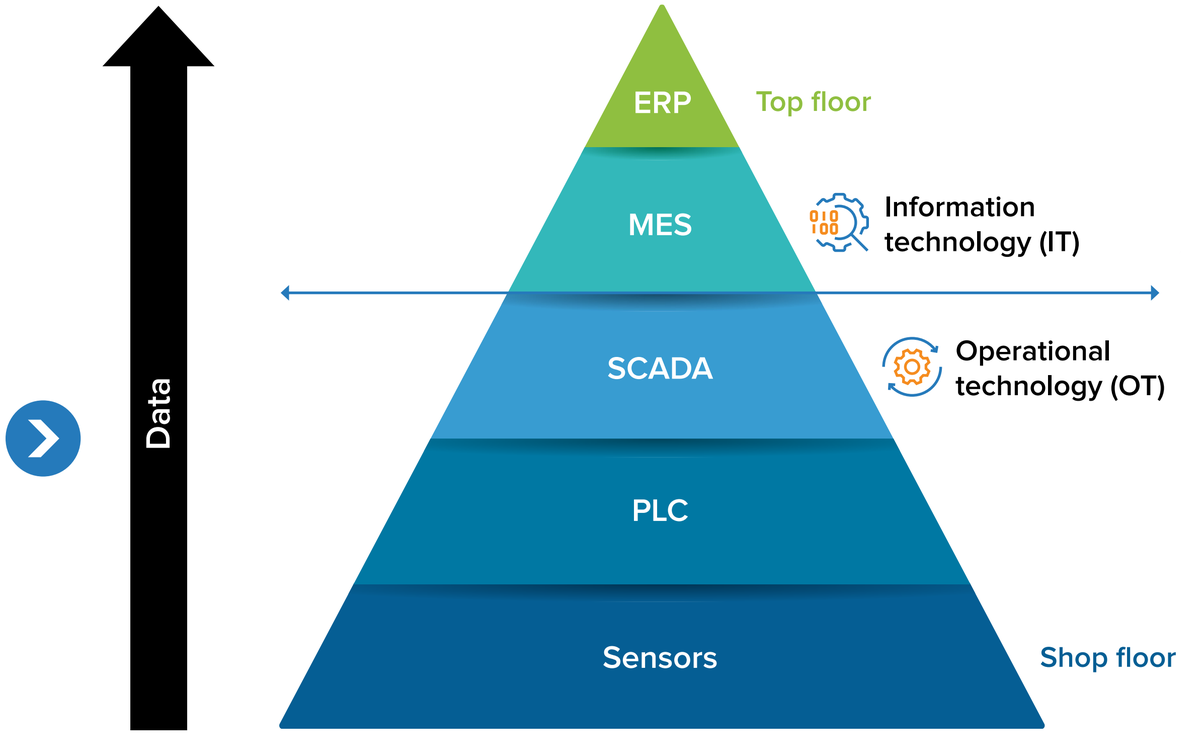
**Engineering-oriented companies include automotive, industrial machinery, and asset-oriented manufacturers (e.g., paper and pulp, mining, and metals production).*

Sources: IDC's *Manufacturing Industry Core Survey,* July 2024, manufacturing companies worldwide (N = 800); IDC's *Consumer Sentiment Survey, 2024* (N = 1,256)

Harnessing the Power of Data in Factory Operations

As market forces evolve, factory operations must stay adaptable. End-to-end visibility is key to efficiency and resilience. A data-driven approach enhances shop-floor IT, optimizes KPIs, and enables predictive maintenance to reduce downtime and boost productivity.

- Factory operations must be efficient, safe, and adaptable to meet changing customer demands.
- Many factories lack the transparency and data needed to handle today's challenges effectively.
- Providing workers with accurate real-time information improves decision-making, enhances safety, and boosts efficiency while driving the adoption of digital technologies.



Manufacturing Technology Stack
Purdue Reference Model

IT-OT integration is key to moving data from assets to the enterprise level, providing real-time visibility and ensuring better access to relevant OT data for proactive decision-making.

Q: How important are these smart factory initiatives for your organization? (Top 5)

57%	Asset instrumentation and integration on the shop floor
51%	Quality inspection and analysis
50%	Real-time process visibility and analytics
50%	Production execution and optimization
50%	Energy and environmental management, worker safety, and health tracking

Source: IDC's *Manufacturing Industry Core Survey,* July 2024, manufacturing companies worldwide (N = 800)

Transformative Supply Chain Orchestration

Siloed systems limit data visibility and supply chain agility. A well-orchestrated supply chain leverages data to adapt dynamically, ensuring resilience to disruptions and market changes.

Supply chain resilience =

Visibility
Ability to see

+

Intelligence
Ability to understand

+

Agility
Ability to execute

Q: What are the most important priorities for your supply chain over the next 12 months? (Top 5)

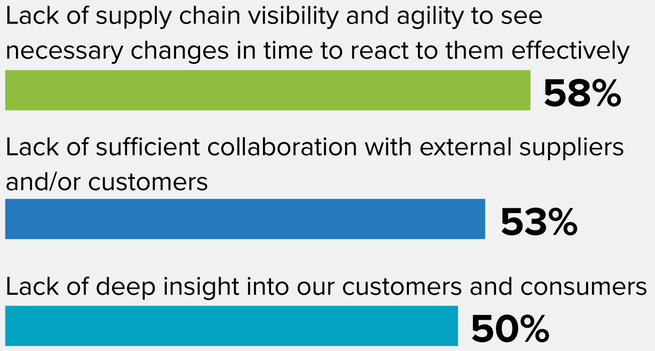
- **22%** To reduce costs and drive efficiency
- **21%** To continue to modernize/update IT-related supply chain infrastructure
- **20%** To improve product compliance, quality, and safety
- **20%** To improve supply chain resilience (visibility/agility)
- **18%** To operationalize sustainability

Resilient supply chains depend on seamless data sharing across stakeholders to enhance visibility, decision-making, and execution, leading to measurable benefits, including:

- Greater agility and flexibility
- Lower costs
- Faster delivery and fulfilment times
- More accurate shipment and delivery forecasting
- Enhanced product quality

However, unaddressed supply chain gaps can disrupt efficiency and hinder seamless collaboration with partners, suppliers, and logistics providers — ultimately, impacting the customer experience.

Q: What current gaps in your supply chain will likely be most problematic if not addressed in the next three years? (Top 3)

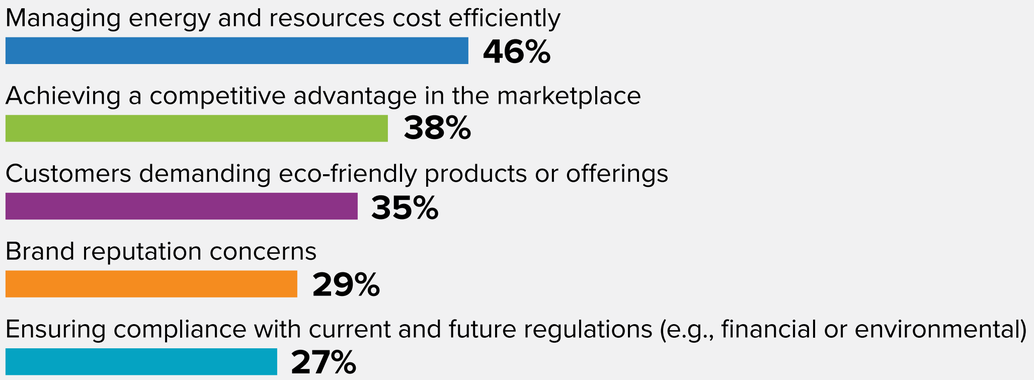


Source: IDC's *Supply Chain Survey, 2024*, manufacturing organizations worldwide (N = 672)

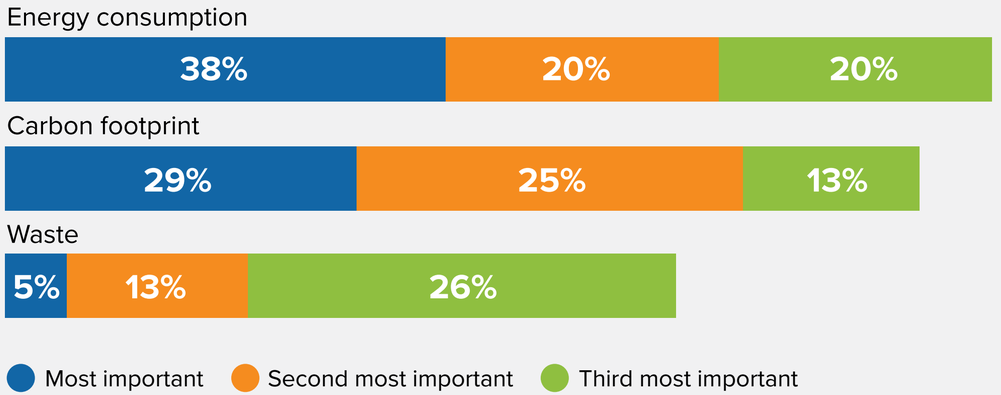
Sustainable Operations

Manufacturers invest in sustainability for cost efficiency, energy savings, and waste reduction, driven by consumer demand and regulatory requirements. However, data gaps hinder compliance, CO_2 tracking, and waste management.

Q: What drives investments in ESG/sustainability as a strategic business priority for your company? (Top 5)



Q: What are the key metrics your organization seeks to monitor?* (Top 3)



Manufacturers' top operational challenges in their sustainability transformation journeys

1. Lack of accurate, trusted data and actionable insights
2. Lack of sustainability expertise/capabilities within the organization
3. Lack of IT tools to report and measure impacts

CPG companies struggle to track the environmental impact of ingredients, packaging, and logistics. Poor data quality, limited expertise, and resource constraints hinder ethical sourcing, waste reduction, and sustainability. Similarly, automotive manufacturers face challenges tracing raw materials like steel, aluminum, and lithium. Incomplete data and resource/expertise limits make measuring emissions, optimizing materials, and meeting environmental regulations difficult.

Sources: IDC's *Manufacturing Industry Core Survey*, July 2024, manufacturing companies worldwide (N = 800); *IDC's *Sustainability Software Survey*, June 2024, EMEA, manufacturing organizations (n = 94)

Customer Experience-Centric Operations

Delivering superior CX goes beyond offering quality products. It involves providing accurate product data, simplifying the product configuration and quoting process, and ensuring a seamless customer journey across multiple touchpoints.

Improve business-to-business (B2B) and business-to-consumer (B2C) customer experience (CX) to increase loyalty, collaborative processes, and revenues.

Top priority:
Manufacturers prioritize **worker enablement** via knowledge management for sales, marketing, and support.

Digital shift:
B2B commerce and self-service portals (e.g., for reordering, tracking, and providing product info) are key focus areas.

Growing trend:
Loyalty programs are gaining traction, with 23% of manufacturers emphasizing their importance in **B2B** commerce.

Improve **customer experience** to stay relevant amid global competition.

Q: Which of the following key use cases/programs does your company employ for B2B and B2C customer experience? (Top 5)

39%	Knowledge management platforms for sales, marketing, and support staff
36%	Customer self-service portals
32%	B2B digital commerce
29%	Field-service optimization
23%	Loyalty programs and rewards

Manufacturers face significant challenges in digital commerce initiatives, primarily centered on ROI, data availability and management, and skills gaps.

Q: What are the main barriers to executing your company's digital commerce initiatives? (Top 3)

45%
Difficulty justifying spending/Unclear ROI

42%
Lack of skills in the workforce

34%
Lack of consistent data (e.g., organizational silos hindering a holistic view of customers, products, and processes)

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Source: IDC's *Manufacturing Industry Core Survey,* July 2024, manufacturing companies worldwide (N = 800)

Executing Manufacturing Priorities

Data and **digital technologies** drive manufacturing efficiency, agility, and growth by enabling real-time insights, process optimization, and informed decision-making.

Manufacturing decision-makers require relevant data for continuous improvement and operational resilience. They also need data to:

- Understand **what** is happening: Data from connected assets, devices, and workers must be captured, stored, and managed to provide real-time visibility.
- Analyze **why** it is happening: Applying analytics and AI helps identify root causes and recommend next best actions.
- Drive automation and efficiency: Accurate data and **actionable insights** enable automated decision-making, enhancing operational speed and quality.

Data-Driven Operational Excellence

Data is fundamental to tracking and measuring KPIs. Regular KPI monitoring uncovers inefficiencies and enables improvements and quick decisions to minimize disruptions, optimize resources, and enhance output.

Key Strategic Priorities

Select KPIs

Improving the operational excellence of factory operations

- Overall equipment effectiveness (OEE) — availability, performance, and quality
- Throughput — numbers of units produced within a given period
- Capacity utilization — the percentage of the factory's potential output being used

Enhancing supply chain resilience and efficiency

- Perfect order index — the percentage of orders delivered on time, in full, and without errors
- Order fill rate — the percentage of orders fulfilled from available stock without backorders
- Inventory turnover — the frequency of inventory being sold and replaced within a period

Enhancing operations and products manufactured to meet sustainability goals

- Carbon footprint (CO_2 emissions) per unit — greenhouse gas emissions generated
- Energy consumption per unit — the energy efficiency of operations
- Water usage per unit — water consumption to optimize resource use
- Waste diversion rate — the percentage of waste diverted from landfills through recycling or reuse

Improving customer experience to stay relevant amid global competition

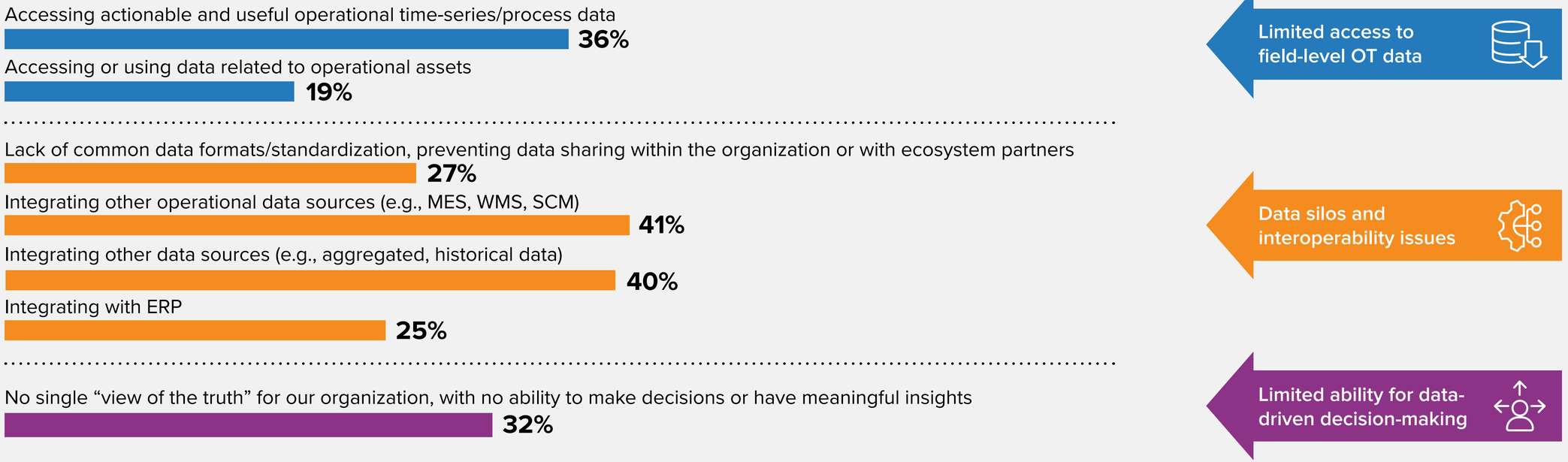
- Order fulfillment and service efficiency — on-time delivery and Net Promotor Score (NPS)
- Logistics and fulfillment — order accuracy, delivery speed, and return rate
- Personalization and engagement — customer lifetime value and social media engagement rate

- KPI monitoring drives manufacturing processes by providing data-driven insights to optimize performance, efficiency, and quality.
- Without KPI data, manufacturers face inefficiencies, increased downtime, and poor resource utilization, leading to operational setbacks.
- A lack of insights not only hinders growth; it also makes tracking progress, improving processes, and staying competitive difficult.

Challenges in Creating Value from Data

Manufacturers struggle to integrate data, ensure quality and standardization, manage third-party access, and turn data insights into actionable strategies that drive new revenue-generating business models.

Q: What are the biggest challenges for your organization in creating value from data for decision-making?



Maximizing Business Impact with Better Data Management

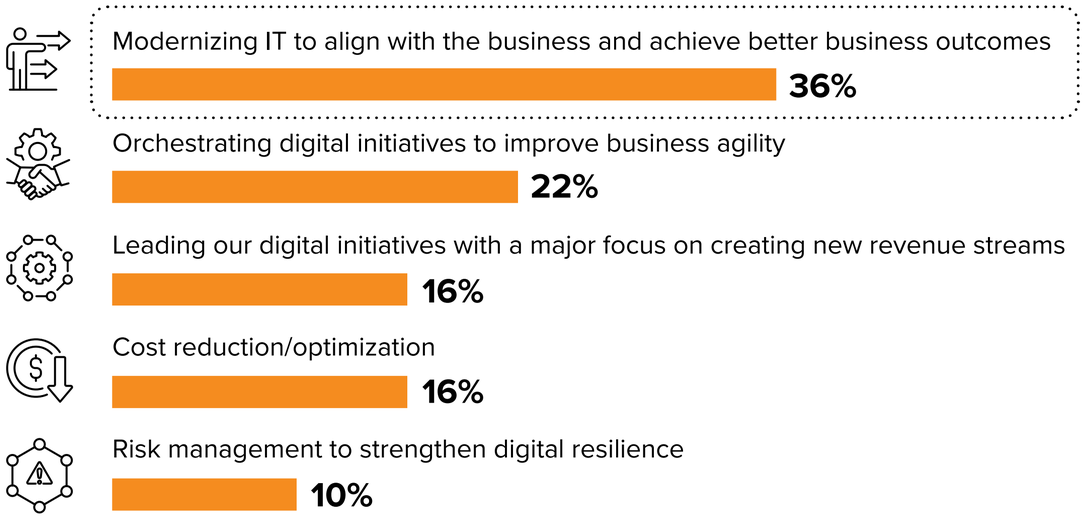
Effective decision-making starts with **robust data management**. Manufacturing organizations can build a strong data foundation by improving data aggregation, integration, standardization, contextualization, and normalization. This leads to **greater business impact** and **operational success**.

Source: IDC’s *Manufacturing Industry Core Survey*, July 2024, manufacturing companies worldwide (N = 800)

Modernizing Manufacturing Technology Infrastructure to Drive Growth

Whether driven by a cloud migration strategy, the end of support for legacy systems, or the need for more modern IT systems, many manufacturers are reviewing their technology infrastructure, including enterprise resource planning (ERP) systems.

Q: What statement best describes your CIO's role in advancing digital initiatives?



An Example of ERP Modernization

ERP modernization, such as migrating from SAP ECC to S/4HANA, is essential for manufacturers aiming to **scale technology adoption and expand business**.

With SAP ECC support ending in 2027 and early versions losing support in 2025, manufacturers must prioritize SAP modernization.

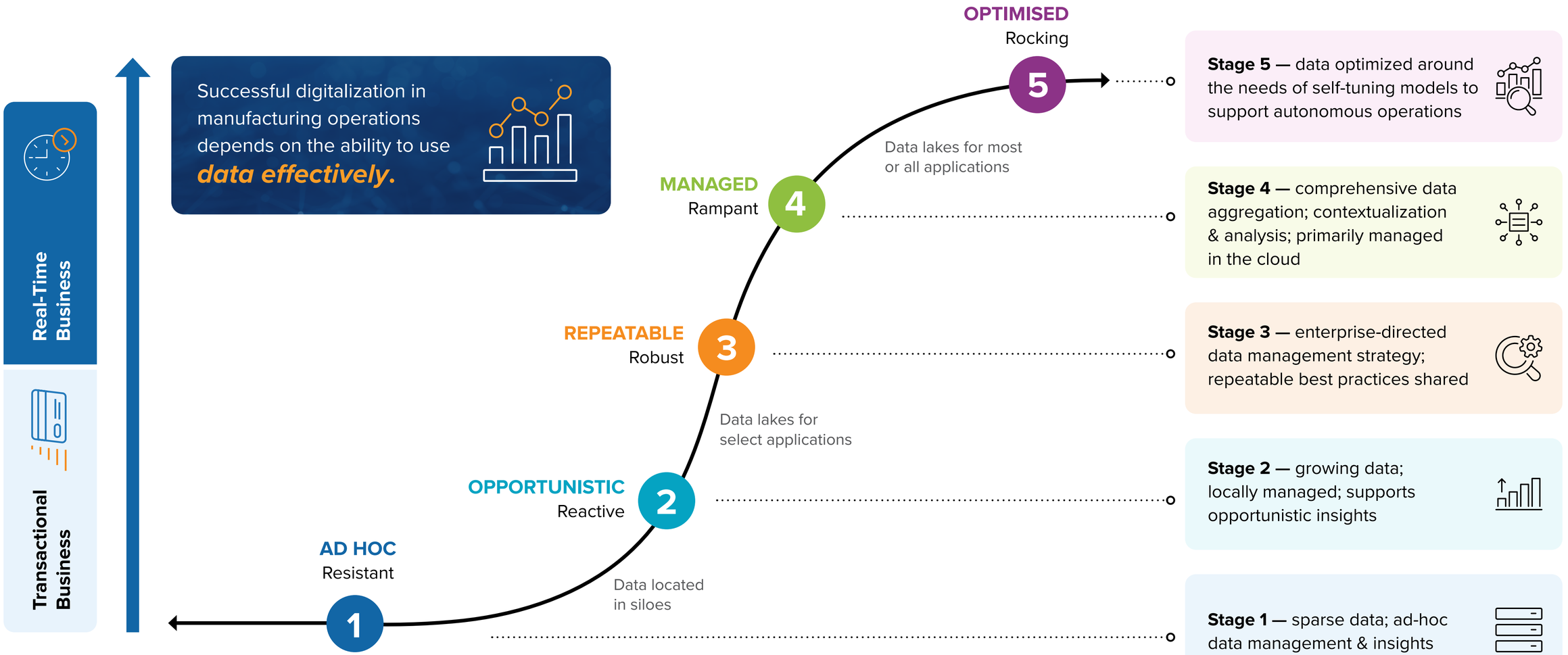
However, **delays due to complexities, lack of skills, budget concerns, or an unclear business case** are disrupting operations and reducing competitiveness.

Successful modernization is not just about migrating to S/4HANA or the cloud; it is also about **aligning ERP transformation with business goals and effectively managing data**.

During ERP modernization, manufacturers must decide how to **handle existing data**. While some historical data is crucial for analysis, compliance, or continuity, modernization is a chance to eliminate obsolete, inconsistent, and unnecessary data. This reduces storage costs and security risks. Manufacturers should evaluate what data to retain, archive, or retire, **balancing data retention with the benefits of cleanup and consolidation.**

Source: IDC's *Worldwide C-Suite Tech Survey, 2024*, manufacturing organizations worldwide (n = 117)

Evaluating Data Journey Progress



Source: Adapted from IDC MaturityScape: Smart Manufacturing 3.0

Accelerating Transformation by Leveraging Data and Digital Technologies — Examples

Transformative Supply Chain Orchestration

Asset- and Engineering-Oriented Manufacturers	CPG Manufacturers
Supplier onboarding: Collect and validate legal, contact, certification, and banking details during onboarding. Simplify processes, ensure compliance, and enhance supplier management, procurement, and supply chain visibility.	**Real-time supply planning:** Optimize supply chain demand planning based on past performance, existing legislation, and customer expectations.

Operational Factory Excellence

Asset- and Engineering-Oriented Manufacturers	CPG Manufacturers
Quality management: Centralize and manage inspection, testing, and compliance data to ensure adherence to quality standards, drive continuous improvement, and enhance manufacturing efficiency.	**Experiential operations:** Execute a composable approach to a data analytics platform for demand forecasting, price optimization, assortment planning, and employee experience.

Sustainable Operations

Asset- and Engineering-Oriented Manufacturers	CPG Manufacturers
Product sustainability data: Track and analyze ESG data for informed decisions, reporting, and compliance. Connect product, supplier, and location data to manage sustainability and maintain assessments.	**Material traceability and compliance:** Connect systems to track a product's journey from sourcing to delivery, ensuring transparency, compliance, quality control, and consumer trust through clear product origin and safety information.

CX-Driven Operations

Asset- and Engineering-Oriented Manufacturers	CPG Manufacturers
Augmented service delivery and aftermarket sales: Enhance aftermarket services with real-time guidance, predictive diagnostics, and optimized spare-parts management. Streamline service processes to improve efficiency, customer retention, and profitability.	**Data-driven CX:** Drive personalization and loyalty initiatives to increase your ability to collect high-quality and accurate customer data.

Customer Use Case Stories

ESSENTRA

CHALLENGE

A global plastics and materials manufacturer struggled with fragmented product data across 32 sites in 28 countries. Disconnected systems and manual processes caused inefficiencies. They needed a centralized solution to unify data, support eCommerce, meet sustainability goals, and streamline ERP integration globally.

SOLUTION

Centralized Product MDM: A unified platform streamlined product classification, enrichment, and validation across global facilities.

ERP Integration/Migration: Automated data migration, ensuring consistent product data through seamless ERP integration.

Sustainability Data Management: Consolidated sustainability data for products, suppliers, and facilities to drive LCA and ESG reporting.

Enhanced Assortment and Content Management: Enriched product data was repurposed for faster assortment expansion and catalog updates across channels.

Traceability and Quality Management: Full traceability of materials and products improved compliance and minimized quality discrepancies.

IMPACT

Essentra achieved major operational gains, including **50% faster ERP migration, 30% quicker product onboarding**, and **25% fewer data errors**, reducing silos and manual work. They gained **100% traceability** for faster issue resolution, improved **sustainability reporting by 30%** through automated LCA/ESG data, and saw **20% growth in eCommerce assortments**, boosting global revenue.

CHALLENGE

A global automotive and industrial tech leader struggled with decentralized product data across multiple tools. Manual processes caused errors, slowed updates, and hindered collaboration. Configurable products required accurate data and ERP-to-PIM integration. Lack of automation impacted data quality, compliance, and reporting.

SOLUTION

Centralized Product Information: Unified product data into a single source of truth.

Workflow Optimization: Integrated ERP, eCommerce platforms, and teams for better collaboration.

Configurable Product Management: Supported modular products with precise configurations.

Automated Quality Checks: Dashboards and processes to ensure data standards.

Global Compliance Support: Integrated multilingual capabilities for international standards.

Channel Integration: Linked product data with asset systems for consistent communication.

IMPACT

The company achieved **improved data reliability and configurability**, enabling faster time-to-market **(40% reduction)**, **real-time insights**, and global collaboration through **standardized systems**. **Automation** streamlined workflows, reduced risks, and freed up resources for **innovation**.

IDC Guidance

Factory Operations

- Leverage data-driven insights to optimize factory performance and strengthen the operational foundation.
- Invest in AI-enabled solutions that utilize real-time data for predictive maintenance, quality control, and process optimization.
- A strong data foundation will accelerate digital transformation efforts, improve efficiency, and support long-term innovation.

Supply Chain Operations

- Improve supply chain transparency and resilience through cloud-based data management.
- As AI and automation become central to supply chain transformation, ensure data is seamlessly integrated across systems for real-time tracking, demand forecasting, and risk mitigation.
- Utilize AI-powered analytics to enhance decision-making and drive supply chain efficiency.

Sustainable Operations and Product Innovation

- Establish a strong data foundation to drive sustainability initiatives at scale. Leverage actionable insights to track progress, optimize processes, and enhance sustainability performance.
- Implement solutions that facilitate efficient data collection, management, and utilization across the supply chain.
- Adopt tools that streamline mandatory reporting, improve transparency, and turn compliance requirements into strategic opportunities for long-term growth.

CX-Centric Operations

- Leverage digital technologies and AI-driven data analytics to gain deeper customer insights at the B2B and B2C/direct-to-consumer (D2C) levels.
- Unify customer data across touchpoints to tailor offerings, optimize personalized experiences, and improve engagement.
- A data-centric approach will enhance customer satisfaction and drive business growth.

About the Analysts

Gunjan Bassi
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Gunjan Bassi has more than 14 years' experience working in the logistics and transportation sector. Before joining IDC, she worked with Transport Intelligence (Ti), a transportation and logistics research firm based in Bath, England, where she was responsible for vertical sector research covering qualitative and quantitative reports. She was also actively involved in the development of new research capabilities and product features of Ti's flagship market intelligence portal.

More about Gunjan Bassi

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Ornella Urso is the head of IDC's Retail Insights team and leads the Customer Experience research group in Europe. Ornella conducts market research and industry analyses and contributes to thought leadership around business priorities and technology innovation in business-to-consumer and direct-to-consumer strategies. Ornella is responsible for delivering research studies and custom projects, and she offers strategic direction and advice to technology providers and the IT and business executives of global brands.

More about Ornella Urso

Message from Sponsor

STIBO SYSTEMS
MASTER DATA MANAGEMENT

Manufacturers across all sectors — from engineered products to consumer-packaged goods — are facing rising pressure to optimize factory performance, improve supply chain visibility, meet sustainability goals, and deliver better customer experiences. Yet many still struggle with fragmented, inconsistent, and siloed data that hinders decision-making and transformation.

At Stibo Systems, we help manufacturers create a single, trusted view of their operational, product, supplier, and customer data. Our multidomain MDM platform delivers the transparency, governance, and scalability needed to power data-driven manufacturing excellence — from factory floor to end customer.

“The foundation of manufacturing excellence is trustworthy, connected data. At Stibo Systems, we empower manufacturers to gain control over their core data — whether it’s materials, products, suppliers, or assets — so they can drive operational efficiency, build supply chain resilience, and accelerate their digital transformation journey.”

— Damien Fellowes, EMEA Manufacturing Practice Lead, Stibo Systems

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With more than 1,300 analysts worldwide, IDC offers global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries. IDC's analysis and insight help IT professionals, business executives, and the investment community to make fact-based technology decisions and to achieve their key business objectives.

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