Industrial Machinery and Component Manufacturers in India

Benchmark on digitalization 2025

SIEMENS

Preface

The Industrial Machinery and Component (IM&C) manufacturing industry in India is in the middle of a digital transition that is sharpening the competitive landscape. This transformation encompasses both products and processes.

Design and Manufacturing processes are becoming smarter. For instance, advanced software is used in the design phase for virtual prototyping or simulation, which runs parallel to physical construction. This enables machine designs to be tested and made ready for production sooner – crucial as time-to-market and product lifecycles get shorter. Machines are being equipped with sensors and software, and by connecting them, can be monitored and controlled.

The impact of these developments is growing rapidly. Machine builders and component manufacturers who are digitally ready can respond to market trends and customer demand faster, better, and at a lower cost. Innovators are creating new business models, such as providing remote services and offering machines on a performance-based or pay-per-use basis, in addition to traditional sales.

How far are Indian Industrial Machinery and Component (IM&C) manufacturers in the adoption of smart industry technologies? What is the status of the different digital processes and products? Where do we find the greatest opportunities and barriers for change in 2025 and beyond? And how can companies enhance their digital strategy and governance to support smart industry initiatives?

Based on these questions, we conducted a benchmark study among IM&C manufacturers operating in India. The findings provide you with a clear understanding of the opportunities and challenges identified by your industry peers. We wish you wisdom and inspiration in utilizing the information in this report to refine your business and digitalization strategies. Finally, we sincerely thank the participants in the survey for their contributions.

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Aspects that determine smart industry readiness

1. **Vision and strategy**
   A clear defined vision, strategy, plan, budget, use case with ROI
2. **Culture**
   The right people with the right skillset and attitude
3. **Infrastructure**
   Tech architecture and processes
4. **Ecosystem**
   Horizontal integration, cooperation in the supply chain
5. **Technology**
   Adoption of technology building blocks
6. **Data intelligence**
   Ability to handle and interpret large datasets, make predictions
7. **Customer intimacy**
   Focus on the customers' needs, understanding the customer

Contents

Executive summary

The benchmark study

This benchmark study in the IM&C manufacturing industry in India was based on the following initial questions:

- How far are the companies in adopting new smart technologies?
- How well developed are individual digital processes and products?
- What are the greatest opportunities and boundaries for change in 2025 and beyond?

The average size of participating companies is 721 full time employees (FTE), and the majority of respondents are responsible for the digital transformation in their organizations.

Business strategy, expectations and challenges

- More than half of the manufacturers will focus on product leadership and operational excellence in the next 3 years.
- The biggest challenges are increasing productivity and cost reduction.
- Most companies (62%) mention shortening the time-to-market as the dominant value of their digitalization efforts. The second place (46%) is for integrating physical and virtual product environments. Think, for example, about building digital twins.

Digital transformation strategy

- Over 70% of companies have set a strategy for advancing their digital transformation, yet many struggle to define clear objectives & outcomes, allocate requisite budgets and resources
- Key ambitions include reuse of data, integrating business functions, accelerating product development cycles, and enhancing design quality. Breaking down departmental silos is essential for achieving data reuse and business integration.
- The primary hurdles to meeting these digital targets are resistance to change and a lack of an innovative mindset, with additional challenges stemming from skill shortages and budget limitations.

Adoption of digital innovations

- The average digital adoption score is just a 6.2 on a 10-point scale, indicating that most of the machine industry in India still operates quite traditional.
- For high adoption companies faster time-to-market, IoT integration and optimizing cybersecurity are key goals
- Low adoption companies focus on reducing data silos and they yet have to establish an innovative culture.
- Even digitally advanced companies struggle with defining comprehensive digital strategies. Almost no companies report clear and specified digital objectives.

Digitalized product development and manufacturing

- Digitalization in design and prototyping drives the most value for most organizations. Digital planning is also a key enabler.
- The biggest technology stack is used for manufacturing, engineering and operations management. Technology for IoT and Edge Computing is also quite often present.
- The average self-score for all steps of product development is just a 6.36, leaving room for big improvements.

Smart and connected machines

- Most companies innovate with smart and connected machines for end users or their own assets. Half of the rest is planning to realize this within two years.
- However, there is still a lot of untapped potential: most assets have the capability for a connection, but it has not been established yet.
- Companies rate their innovative strength to create smart and connected assets with an average of just 6.1.

New business models

- Roughly two-thirds of machine builders are creating additional value and generating extra revenue through digital services.
- Companies recognize significant advantages in advanced digital product development, as modern design tools can shorten time-to-market and elevate quality.
- The most common sustainable practices focus on boosting energy efficiency, reducing waste, and enhancing recycling efforts — all with the dual aim of minimizing environmental impact and improving financial performance.

Introduction

This report highlights the key findings from a benchmark study conducted among Industrial Machinery and Component Manufacturers in India. The research was carried out via an online survey fully completed by 124 participants. The strong response indicates that the shift toward a Smart Industry is thriving in India.

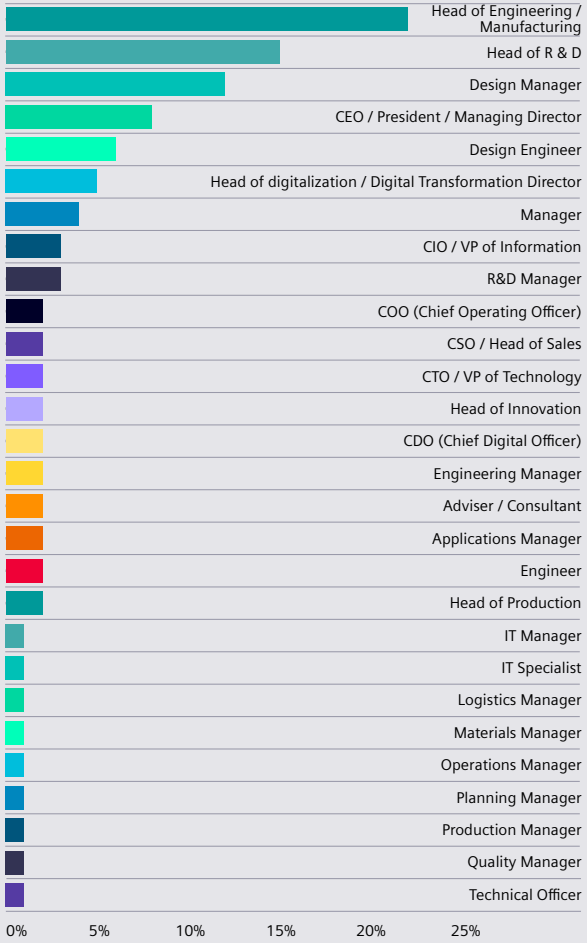
Below, you will find further details about the participating companies, the respondents, and their impact on digital transformation.

Job Levels of the Respondents
When reaching out to IM&C manufacturers, the focus was on individuals responsible for driving digital transformation within their organizations. Nearly two thirds of the respondents hold management positions. Engineering, Manufacturing, and Production play a dominant role, with nearly 23% serving as Head of Engineering/Manufacturing alone. R&D roles make up over 15% of the sample, underscoring the strong impact of innovation and product development in digital transformation. Digital, IT, and Technology roles account for a smaller yet significant segment (12%), with a similar share for Design/Innovation roles (11%). In contrast, positions in Operations/Logistics and Sales/Business Development are less prominent.

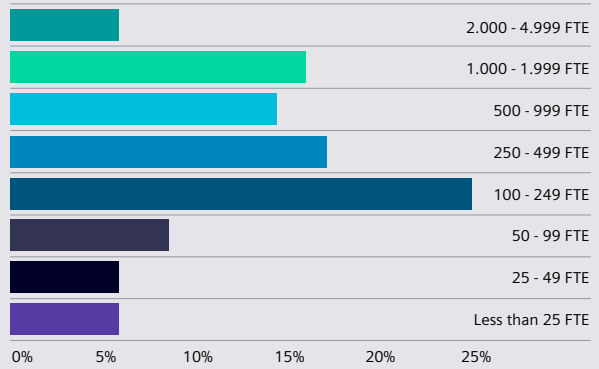
Size of participating companies
The average company size in this sample is 721 FTE (Full Time Employee). The respondent group displays a good distribution in company size, ranging from small to medium/large businesses. The largest group (25%) employs between 100 and 249 Full-Time Employees. The majority (55%) is more than 250 FTE.

Responsibility for digital transformation
It's striking that only 13% of respondents see themselves as ultimately responsible for digital transformation in processes, products, or services. In contrast, a much larger segment of 36% act as co-decision makers, while influencers make up 22%. This pattern suggests that within many companies, no one is stepping forward to take full ownership, leaving a gap when it comes to championing change. Such a void could very well be why the adoption of new technologies is often sluggish.

1. What is your position in the organisation?

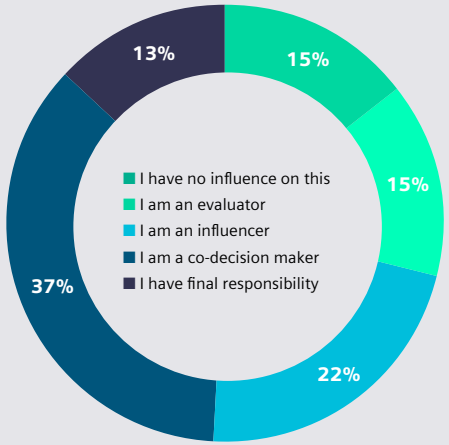


2. How large is your organisation in terms of FTEs?

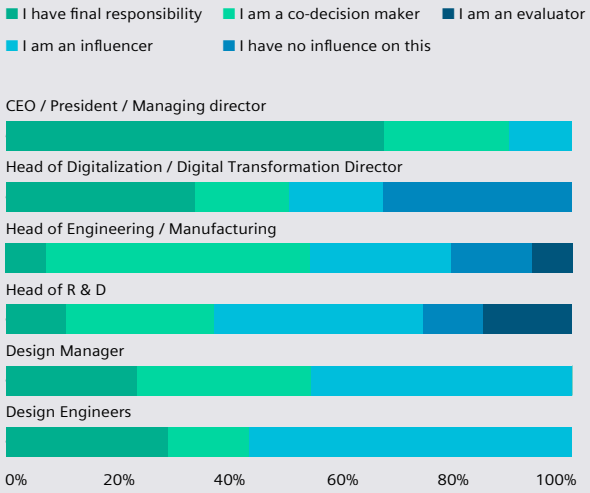


"The ultimate accountability for digital transformation is often ambiguous, which leads many respondents to identify themselves as co-decision makers.

3. To what extent are you responsible for digital transformation of processes, products and services within your company?



4. Job position related to responsibility for the digital transition.



Influence on transformation by job category

We also cross-referenced respondents' job categories with the influence they exert on digital transformation. The analysis reveals that two-thirds of CEOs and one-third of Digital Transformation Directors hold ultimate responsibility. This is understandable, as digitalization decisions have become increasingly strategic and require solid technological expertise. The largest group of co-decision-makers consists of Heads of Engineering/ Manufacturing (46%), followed by Design Engineers (29%) and Heads of R&D (26%).

CHAPTER 1

Business strategy, expectations and challenges

The competition in IM&C manufacturing is fierce. What key themes will drive the strategic focus in the coming years? What challenges do companies face when it comes to retaining customers and ensuring continuity? Digitalization could be the decisive factor. What should a digital strategy ultimately deliver, and might expectations be set too high? We've mapped out all of these insights for you here.

Strategic focus in the next years

The top two strategies are delivering the most innovative products (59%) to achieve product leadership and quality improvement & standardization (56%) to stimulate operational excellence. They account for more than half of organizational focus. This highlights a dual approach to achieving competitive differentiation while ensuring operational reliability and cost efficiency. This is the holy grail of Industry 4.0.

Emphasis on speed and agility, achieving a shorter time-to-market is a critical priority for more than half of the companies. This shows the need to adapt quickly to changing market demands and reduce product development cycles.

Diversification and digital transformation to explore new markets and digital transformation is a mid-level priority. This indicates a recognition of the need for future-proof operations and leverage digital technologies to enhance efficiency and growth.

There is far less focus on implementing sustainable practices and collaboration in the ecosystem. Internal optimization is considered more important. The is also a limited focus on servitization. The low priority on building revenue streams from services suggests that most organizations remain product-centric rather than service-oriented.

5. Which strategies will your organization focus on in the coming 3 years?	
Delivering the most innovative products (product leadership)	59%
Quality improvement and standardization (operational excellence)	56%
Speed of delivery, achieving a shorter time-to-market	52%
Further diversification (new markets with new or existing products)	42%
Digital transformation	36%
Customization and differentiation of products from customer specifications (customer intimacy)	32%
Implementing sustainable practices	26%
International expansion	20%
Strengthening partnerships and collaboration within the ecosystem	12%
Building revenue streams from services (servitization)	16%

> Machine builders focus on product leadership and operational excellence but don't aim at new revenue streams that servitization offers.

Biggest strategic challenges

More than two-thirds of companies view boosting productivity and efficiency as their greatest challenge – a notion that hardly surprises, given customers' increasing demand for faster deliveries. Cost reduction comes in as the second major hurdle. In the machine manufacturing sector, where bespoke solutions are common and highly labor-intensive, not all costs can be fully passed on. One promising remedy is shifting from an Engineering-to-Order (ETO) model to a Configure-to-Order (CTO) approach, which also helps speed up time-to-market—a concern currently affecting 28% of companies. Additionally, while innovation and technology receive moderate attention – with challenges such as new product development (27%), digital transformation (23%), and integrating new technologies (15%)—these areas remain secondary to more pressing operational issues.

Challenges in relation to strategies

We have also investigated the specific challenges for the different strategies. It is notable that no matter which strategy a company chooses, increasing productivity/ efficiency is always the biggest challenge. The focus is obviously on operational excellence. Companies are too focused on their day to day operational challenges thereby investing very little time for strategic innovation. Therefore, there could not be enough time to work on product leadership which is the number one strategic goal. The third strategy - customer intimacy - requires shortening the time-to-market and a solution for the shortages in labor and skills.

6. What are your organization's top 3 biggest challenges?	
Increase productivity / efficiency	67%
Cost reduction	60%
Lowering time-to-market	28%
New product development and introduction process	27%
Digital innovation / transformation (digitizing product, processes, and/or services)	23%
Labor or skills shortages	16%
Integrating new technologies (e.g. AI, IoT, AR)	16%
Developing new revenue streams and/or service models	14%
Increasing scalability	12%
Business and IT alignment	8%
Implementing sustainable practices	7%
Sustainability and compliance of ESG (Environmental, Social, and Governance)	6%
Building and maintaining an innovation ecosystem	6%
Ensuring cybersecurity and data protection	4%
Customizing and/or customer intimacy	3%

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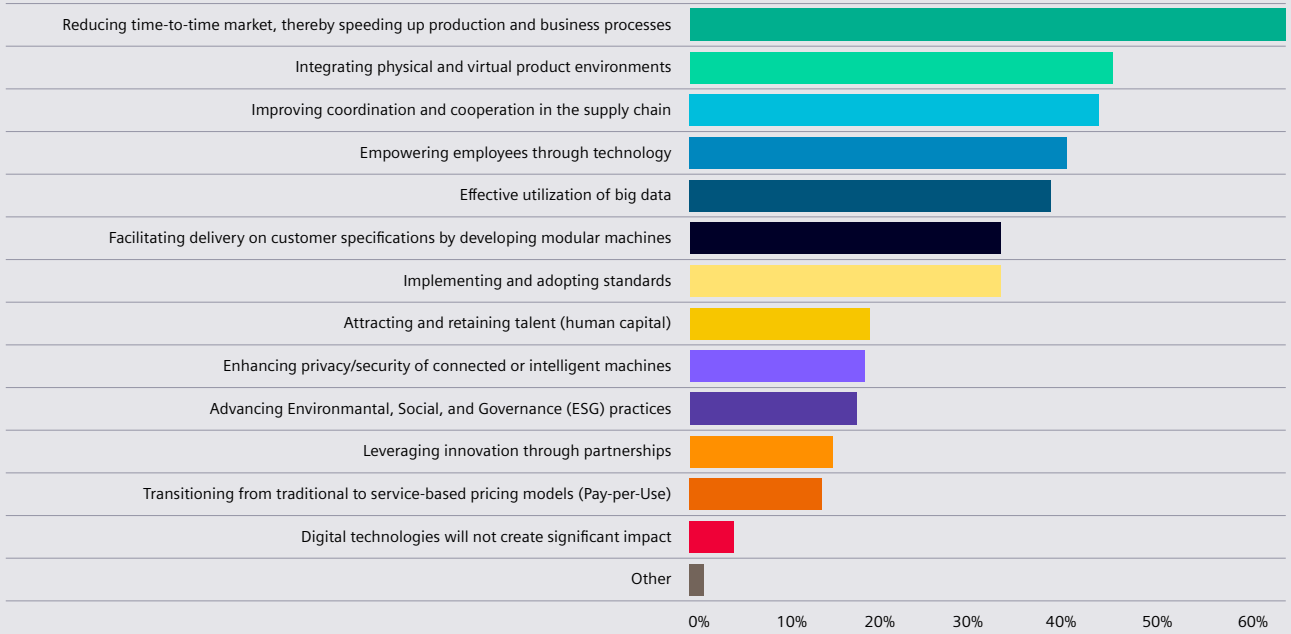
More than two-thirds of companies see boosting productivity and efficiency as their greatest challenge.

Expected value of digitalization

Agility is the key driver of competitiveness. That's why 62% of the companies mention that shortening the time-to-market is expected to be the dominant value of their digitalization strategy. Modular production on client specification also speeds up production. This is mentioned by one third of the companies.

The second place (46%) is for integrating physical and virtual product environments. Think, for example, of building digital twins. On number 3 on the list of expected digital value we find improving coordination and cooperation in the supply chain (44%). This has a direct link with shortening the time-to-market.

7. Where do you see your digital strategy providing the most value for your organization?



Workforce enablement for digitalization needs more attention: despite 40% focusing on empowering employees, only 19% prioritize talent attraction and retention. This signals a misalignment between workforce readiness and digital goals. The advantages of using Big Data are clear for 38%.

Environmental, Social and Governance (ESG) and security are also underprioritized: With only 17% focusing on ESG practices and 18% on privacy/security, organizations risk falling behind in areas increasingly critical for compliance, trust, and sustainability.

Collaboration and servitization are missed opportunities: just 15% mention the value of partnerships and 14% sees that service-based pricing models offer new ways for recurring revenue streams.

> Most companies believe that shortening the time-to-market will be the dominant value of their digitalization strategy.

Survey Question: *The promise that smart industry technologies revolutionize business operations is overstated and unrealistic.*

Only 27% of the study participants agree with this statement, while 64% disagree. The remaining 9% have no firm opinion. Here are some responses from the different camps.

I don't agree with the statement because of the...

Proven Benefits:
- Smart technologies can help in automation of various tasks which human resources are incapable of doing.
- It reduces time, gets detailed reports, and makes compilation easy.
- Digitization reduces errors and increases productivity.
- Converting manual to automatic processes will help reduce errors and cycle time.

Real-Life Impact:
- Companies that have embraced the smart industry are experiencing increased efficiency, reduced operational costs, and improved product quality.
- It can improve the synergy between design, production, and value chain.
- Smart technologies have created new business models and ideas in the market.
- AI & ML technologies automate routine tasks and provide data-driven insights.

Strategic Importance:
- The transition to a smart industry is essential to grow in the current world.
- Today, every industry's basic need is to automate, monitor, and grow.
- Data-driven decision-making will revolutionize the business.

I think the smart promise it's truly overstated because...

- there is a lack of readiness in the workforce to adapt to changes in the MSME sector.
- The high initial investment costs and insufficient budget for the implementation of smart industry technology.
- End users are not demanding this need and are not ready to invest.
- Promises are made by organizations providing digital services who do not properly understand the challenges of manufacturing.
- We have shortage of intelligent manpower to make the transition to smart technology.
- We focus on IoT but don't see many successful business cases.
- We fear implementation challenges, caused by data overload and security concerns.

CHAPTER 2

Digital transformation strategy

To maintain and strengthen their competitive edge, machine builders must effectively navigate their digital transformation. How comprehensive are their strategies? What goals have they set, and what hurdles do they face in achieving them? Moreover, how confident are they in the ROI of their digital investments? You'll find the answers to these questions in this chapter.

Strategic planning of digitalization

Seventy-two percent of companies have a strategy in place to guide their digital transformation. For 44%, the roadmap is confined to outlining goals, budgets, and resource allocations. In 36% of cases, the strategy also includes plans for future innovation in product and service propositions, while 26% extend it to creating value in collaboration with customers and partners. Further analysis shows that fewer than half have a comprehensive roadmap covering all strategic aspects.

8. Does your organisation have a digital strategy?	
Yes, it contains our goals, budgets and resources for our transformation journey	44%
Yes, it states our roadmap for future innovation in machinery and service propositions	37%
No, we do not have a strategy / plan	28%
Yes, it describes how we explore new ways of creating value with our partners and customers	26%
Other	2%

> More than 70% of companies have a strategy or plan for advancing their digitalization efforts, yet the goals, budgets, and resources often remain unclear.

Specific aims of the digitalization

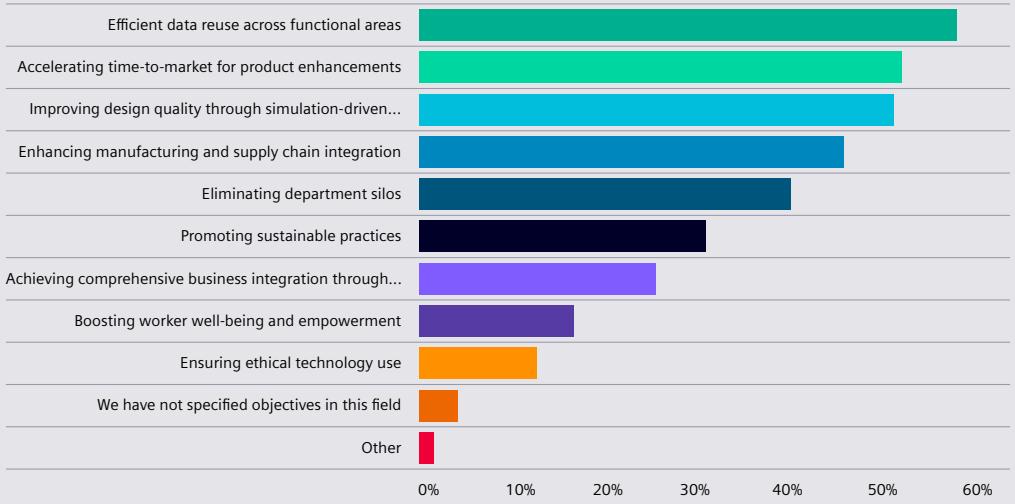
The digitalization is largely aimed on operational efficiency and agility. Data reuse, faster product cycles, and improved design quality are dominant goals. The reuse of data and business integration require eliminating departmental silos which is mentioned quite often. Sustainability has a midtier priority. This aligns with the former and broader observation that sustainability is still secondary to operational priorities.

Barriers in achieving digital goals

The companies cite various reasons that hinder achieving strategic digital goals.

- *Resistance to change and lack of an innovative mindset* is the biggest barrier for 41% of the companies. This highlights the need for leadership to drive change and foster a culture of innovation.
- *The skills gap* is a critical challenge for 31%. This lack of in-house expertise aligns with earlier mentioned.

9. On what specific areas does your digital strategy aim to make the biggest improvements in your organization?



challenges related to shortages in expertise for the digital transformation.

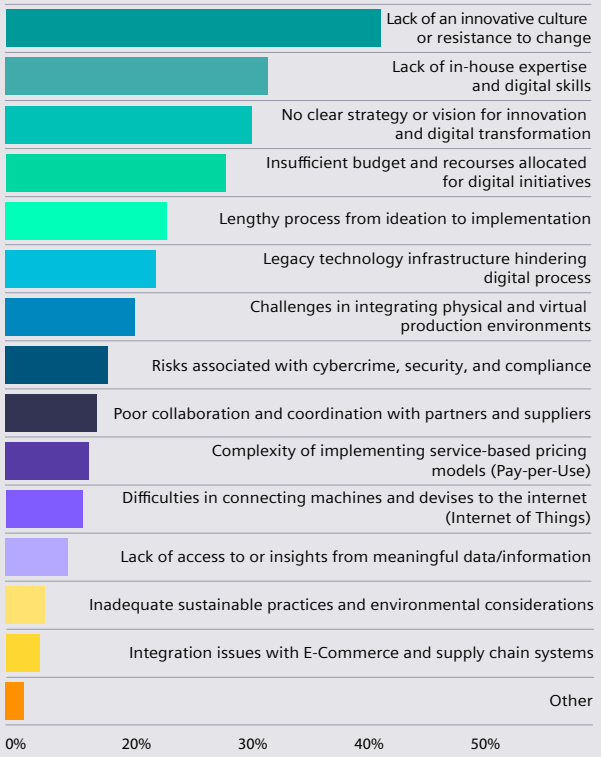
- *Budget constraints* hamper progress for 29% of the companies. So they need to allocate resources effectively for transformation.
- For 23% *legacy technology* slows integration and modernizing systems to facilitate IoT, A, and AR.
- Poor *collaboration with partners* (14%) reflects a gap in leveraging ecosystems, despite the potential to accelerate innovation and digital progress.

> Innovation is a top priority for almost 60% of the companies but 48% report resistance to change and 41% say they lack expertise.

(Un)certainty about the ROI of digitalization

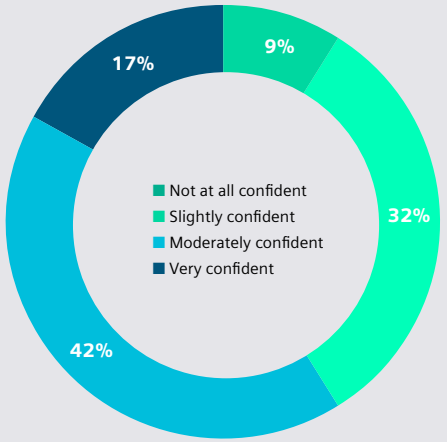
Only 17% of companies are very confident that they can accurately measure the return on investment in digital technology and skills for their manufacturing processes. Meanwhile, 42% are moderately confident, 32% are only slightly confident, and 12% are not at all confident. This distribution suggests that many organizations are still grappling with the advanced analytics and systems needed to effectively track the outcomes of their digital investments.

10. What do you foresee as the main barriers to realising your digital strategy?



The low confidence levels may also be due to a lack of robust metrics to capture the broader, less tangible benefits of digital technology – such as workforce empowerment, customer satisfaction, and environmental gains. Additionally, without a clear strategy and well-defined goals for digital initiatives, evaluating ROI becomes subjective and overly complex. Other contributing factors to this uncertainty include resource and budget constraints (32%) and limited data utilization (38%).

11. How confident are you that your organisation can measure the return of your investment (ROI) in digital technology and skills?



CHAPTER 3

Adoption of digital innovations

Companies are not all equally advanced in adopting new digital technologies and capabilities. Which phase of the production chain have they progressed the most? Where is their strategic focus when it comes to improvement opportunities? What do they identify as the main barriers to implementing their strategies? What does their current technology stack look like, and how does this all relate to their overall digital maturity? In short, this chapter clarifies the opportunities and bottlenecks that companies face at various stages of digitalization.

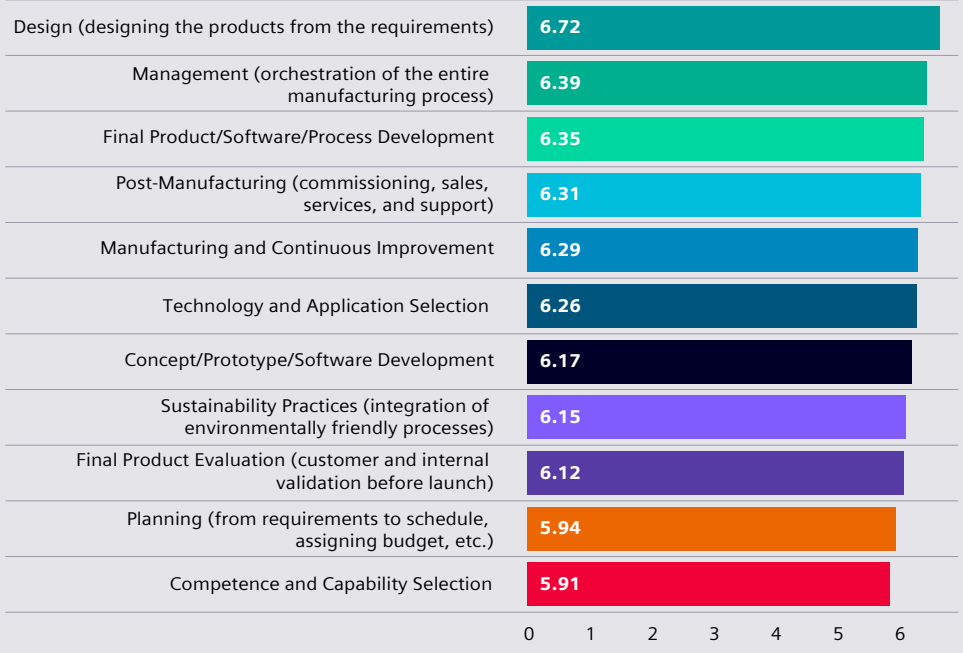
Digital adoption per activity field
Design is the most digitally advanced area with an average score of 6.72. So companies have made significant progress in digitizing early-stage product development, aligning with its strategic importance.
Planning lags despite its importance: the score is a meager 5.49. This reveals a gap in leveraging digital tools for resource allocation and scheduling.

The score for digital sustainability practices is a little higher (6.15), but workforce is underdeveloped: digital competence and capability selection scores a 5.91 indicating limited integration of human-centric and environmental goals, misaligned with Industry 5.0 principles.

Post-manufacturing (6.31) and final product evaluation (6.12) also needs greater focus. They show relatively low digital adoption, despite the importance of customer satisfaction and validation. There is also room for improvement in technology integration and application selection. The score of 6.26 reflects moderate adoption, consistent with earlier findings on challenges in integrating IoT, AI, and other advanced technologies.

Present technologies related to digital maturity
Digital adoption should be higher in companies with strong tech stacks (IoT, AI, robotic automation). If digital adoption is low despite having Industry 4.0 tech, this suggests underutilization of technology. Let's see if this presumption is right.

12. How would you rate the digital adoption of your company in the below fields on a 10-point scale?



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The average digital adoption score is just a 6.2 on a 10-point scale, indicating that most of the - IM&C manufacturers in India still operates quite traditional.

- *IoT and cloud adoption* strongly correlate with the digital adoption scores. Cloud computing (19%) and IoT (34%) are higher in high adoption companies, reflecting greater use of real-time data processing and automation. Companies with low adoption need stronger cloud integration to support scalable smart manufacturing.
- *Automated logistics (AGVs)* are more common in low adoption companies. 15% of them use AGVs, compared to only 6% of high adoption companies. This is an unexpected finding.
- *Cybersecurity investments* are not scaling with digital adoption. Despite increased IoT and cloud use, cybersecurity adoption remains nearly identical in both groups (17% vs. 16%). Security risks will increase with digital transformation since companies must invest more in cybersecurity as adoption scales.
- *Smart factories* are more developed in high adoption companies (21%) than in low adoption companies (15%). High adoption companies however should optimize AI and real-time analytics to further improve smart production.
- *Digital twins* show unexpected results. They are less common in high adoption companies (3%) than in low adoption companies (9%), which is counterintuitive for Industry 4.0. High adoption companies may rely on alternative simulation methods rather than full digital twin implementation. Furthermore, digital twins may be more industry-dependent and not yet widely scaled.
- *Collaborative platforms* are also higher in low adoption companies (11%) then in high adoption companies (4%).

13. Which technologies and capabilities are present in your organization		
Edge Computing / IoT	25%	35%
Additive manufacturing / 3D Printing of parts and/ or products	12%	22%
Augmented Reality / Virtual Reality	10%	16%
Automated Guided Vehicles	6%	10%
Parallel product development – digital design parallel to physical product production	15%	25%
Cloud computing	10%	18%
Smart digital factory	6%	15%
Cyber Physical Systems	3%	12%
Machine learning, Deep Learning / Big Data and Data Analytics	6%	20%
Manufacturing Engineering and Operations Management	28%	45%
Robotics (RAAS robotics as a service)	10%	28%
Transparent operation of machines	8%	18%
Digital twins for simulation and optimization	7%	15%
Collaborative platforms and ecosystems	13%	10%
Real-time data analytics and decision-making	16%	25%
Energy management and optimization	18%	28%
Cybersecurity measures and compliance	20%	30%

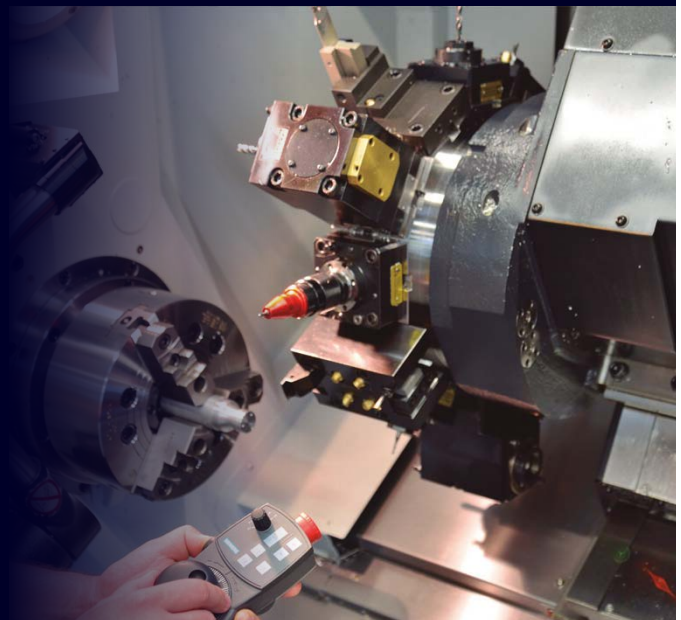
Digital Adoption average low 6-
Digital adoption average high 6+

The impact of AI and ML on the machine industry

Digital maturity is a critical prerequisite for the successful adoption of transformative technologies such as Artificial Intelligence (AI) and Machine Learning (ML). As - IM&Cs organizations seek to harness the power of AI / ML, they must first ensure that their underlying digital infrastructure, data management practices, and technological capabilities break functional silos and enable data re-use.

In the realm of industrial machinery, AI /ML is poised to play a transformative role. There are demonstrable cases of Generative AI helping reduce product development processes. As machines become increasingly connected and data-rich, AI-powered solutions can optimize maintenance schedules, predict equipment failures, and enhance overall operational efficiency. By integrating AI into industrial systems, organizations can unlock new levels of productivity, reduce downtime, and make more informed decisions about their assets.

Without a strong digital foundation, AI initiatives are likely to face significant challenges. Achieving digital maturity involves fostering a data-driven culture, integrating cross-functional processes and its digitalization. This lays the groundwork for AI models to thrive, drawing on high-quality, accessible data to generate meaningful insights and drive tangible business outcomes.



Improvement goals in relation to digital maturity

We asked the companies on what improvements their digital strategy aims and combined that with their present average digital maturity.

- Digital adoption for faster *time-to-market* is a key driver for 56% of the high digital adoption companies and 46% of low adoption companies. So digital maturity correlates with a stronger focus on agility and responsiveness.
- *Reduce organizational silos* is the aim of 51% of the low adoption companies (average adoption scores under six) and just 33% of the high adoption companies (scores over six). The first group obviously struggle most with full business integration.
- Digital adoption to *improve sustainability* has little priority: only 23% of low adoption companies and 36% of high adoption companies focus on improvement in this area.
- Digitally mature companies use data-driven sustainability tracking (e.g., energy efficiency, waste reduction). High digital adoption companies focus more on ethical technology use than low adoption companies (18% versus 3%).
- *AI, automation, and cybersecurity risks* are more visible at advanced digital maturity levels.

Even digitally advanced companies struggle with defining comprehensive digital strategies. Almost no companies report clear and specified digital objectives. So a high level of adoption does not guarantee a well-defined strategy for further growth.

14. On which improvement opportunities does your digital strategy focus most strongly?		
Efficient data reuse across functional areas	55%	55%
Eliminating departmental silos	45%	35%
Accelerating time-to-market for product enhancements	38%	45%
Improving design quality through simulation-driven design	35%	40%
Achieving comprehensive business integration through a unified platform	33%	38%
Enhancing manufacturing and supply chain integration	40%	45%
Boosting worker well-being and empowerment	10%	18%
Promoting sustainable practices	15%	28%
Ensuring ethical technology use	5%	20%
We have not specified objectives in this field	50%	0%

Digital Adoption average low 6-
Digital adoption average high 6+

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Even the majority of digital mature companies don't have formulated specific digitalization objectives.

Implementation barriers in relation to digital maturity

We also asked the companies what barriers they see when implementing their digital strategy and again combined that with their present digital maturity.

Resistance to change and lack of vision are major barriers for low digital adoption companies (average scores under six). Almost half of them struggle with cultural resistance, compared to 36% of high adoption companies. Furthermore 41% of the low adoption companies lack a clear digital strategy, while this percentage for high adoption companies is just 21%.

Budget constraints and outdated tech are also the biggest obstacles for low adoption companies: 37% of them cite budget as a key barrier, compared to only 23% of high adoption companies. Furthermore 28% of low adoption companies are limited by legacy systems, while high adoption companies have largely overcome this (19%).

Lack of collaboration with partners is another bigger issue for low adoption companies. 19% of them struggle with external collaboration, compared to 10% of high adoption companies. Stronger partnerships can accelerate digital maturity by enabling shared data and automation.

Digital skills shortages impact both groups but are worse for low adoption companies: 41% versus 24%. Upskilling and hiring digital talent is crucial to driving transformation.

15. What are the main barriers preventing your organization from fully implementing its digital strategy?		
Lack of an innovative culture or resistance to change	45%	30%
Insufficient budget and resources allocated for digital initiatives	40%	25%
No clear strategy or vision for innovation and digital transformation	35%	20%
Lengthy process from ideation to implementation	30%	18%
Complexity of implementing service-based pricing models (Pay-per-Use)	25%	16%
Legacy technology infrastructure hindering digital progress	20%	12%
Challenges in integrating physical and virtual production environments	18%	10%
Difficulties in connecting machines and devices to the internet (Internet of Things)	15%	20%
Integration issues with E-Commerce and supply chain systems	10%	18%
Lack of access to or insights from meaningful data/information	12%	15%
Risks associated with cybercrime, security, and compliance	8%	12%
Inadequate sustainable practices and environmental considerations	6%	10%
Poor collaboration and coordination with partners and suppliers	30%	10%
Lack of in-house expertise and digital skills	38%	15%

Digital Adoption average low 6-
Digital adoption average high 6+

"

41% of the low adoption companies lack a clear digital strategy, while this percentage for high adoption companies is just 21%

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The average score machine builders give for their overall degree of digitalization is just 5.8 out of 10.

High digital adoption companies struggle more with *IoT, cybersecurity, and integration*. IoT integration challenges are reported by 16% of them, compared to 7% of low adoption companies. Cybersecurity concerns are higher for advanced companies (17%) than for lower adoption ones (11%). As digital adoption increases, companies must strengthen IoT security and system integration.

Thresholds for smart and connected machines

- The biggest barrier to smart machine adoption is a lack of in-house digital skills. 63% of low adoption companies cite skills shortages, compared to only 29% of high adoption companies. Companies must prioritize upskilling, training programs, and hiring digital talent to scale digital transformation.
- Low adoption companies also struggle more with system integration and legacy infrastructure: 33% versus 19% of the high adoption companies. Both groups should invest in middleware, APIs, and system interoperability to accelerate smart machine adoption.
- Budget constraints are as well a bigger obstacle for low adoption companies: 41% compared to 26% for high adoption companies. Better financial planning, phased investments, and modular adoption of smart technologies can help overcome cost barriers.

16. What has or will hinder the development of smart and connected machines?		
We have difficulty dealing with big data	65%	30%
We do not have the necessary in-house skills	60%	28%
We have insufficient resources (budget, people) available	40%	25%
Cooperation with clients, industry partners, and suppliers has not been effective	25%	18%
The technical solution is not yet available and/or found	35%	20%
The smart asset is insufficiently aligned and has no positive business case or strategy	30%	18%
Lack of integration with existing systems and processes	28%	15%
Challenges in ensuring cybersecurity and data protection	18%	10%
Regulatory and compliance issues	10%	8%
Difficulty in implementing sustainable practices	15%	10%
Resistance to change within the organization	22%	12%
Limited access to external innovations and partnerships	20%	10%
Don't see any hinderance	10%	18%

Digital Adoption average low 6-
Digital adoption average high 6+

CHAPTER 4

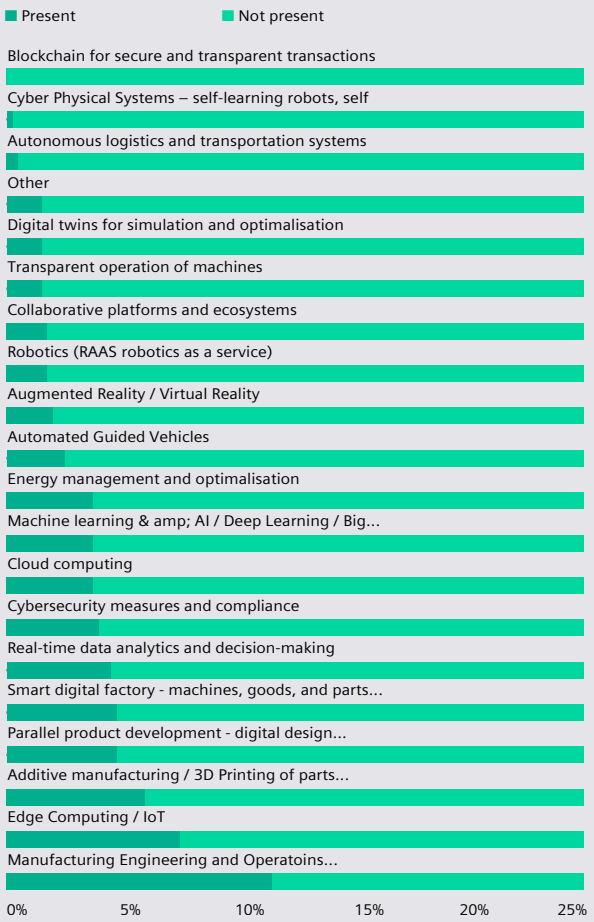
Digitalized product development and manufacturing

Earlier in this report, we saw that most machine builders are not at the forefront of implementing new technology. Which opportunities have they already embraced in the production of machines? Consider building virtual machines (digital twins) to design more effectively. Or think about connecting operational machines with the Internet of Things to receive continuous feedback on performance. At which stage of the manufacturing process have companies advanced the furthest in their digital transformation? And how satisfied are they with their innovation capabilities at each process step?

Present stack of tech and capabilities

- Technology for *manufacturing, engineering and operations management* is adopted by 46%, reflecting that companies prioritize foundational technology for process optimization, consistent with Industry 4.0 goals.
- 30% adoption of *IoT/Edge Computing* technology highlights progress toward connected systems, which are essential for real-time monitoring and smart factories.
- Advanced capabilities like *Digital Twins and AR/VR remain* niche with a low adoption of just 6% and 8%, which points at untapped opportunities to enhance simulation, visualization, and efficiency.
- The adoption of *cybersecurity tech and capabilities* lags despite the growing risks with only 16% adoption, exposing organizations to vulnerabilities in their digital transformation journey.
- *Sustainability technologies* also stay behind: there is a limited adoption of energy optimization (15%) and other sustainability-focused technologies.
- *Core technologies like IoT, 3D printing, and smart factories* are gaining traction, supporting automation, connectivity, and efficiency. However, the adoption of more advanced technologies like digital twins (6%) and real-time analytics (18%) remains low, limiting the full realization of Industry 4.0 capabilities.
- *Human-centric technologies* like collaborative platforms (7%), AR/VR (8%), and energy optimization (15%) are underrepresented, suggesting that organizations are not yet fully embracing the environmental, and collaborative dimensions of Industry 5.0.

17. Which technologies and capabilities are present in your organization?



"A lot of companies use basic tech for manufacturing and operations but don't have advanced capabilities like tools for digital twins and AR/VR.

Digitalization value per process phase

- Digitalization in *Design and prototyping* drive the most value for most organizations (75%), emphasizing the importance of simulation-driven design, prototyping, digital twins and software tools.
- Digital *Planning* is also a key enabler: 65% prioritize this, reflecting the importance of resource allocation, budgeting, and scheduling with advanced tools. Companies should focus on data-driven planning systems to improve resource allocation.
- Continuous improvement in digital *production* is rewarding too:56% focus on this, tying closely to earlier priorities of time-to-market acceleration and operational efficiency.
- *Sustainability and after-sales* are secondary priorities: both score 29%, reinforcing the need to integrate them into more prominently into broader strategies.
- *Supply chain integration* is undervalued: just 33% recognize this. Earlier mentioned barriers like poor partner collaboration (14%) and integration challenges (20%) suggest untapped opportunities to optimize supply chains through digital technologies.

18. Where in the manufacturing process do you create the most value when applying your digital strategy?	
Design / Concept / Prototype / Software Development | Development of the first prototype / program / application	75%
Planning (from requirements to schedule, assigning budget, etc.)	65%
Manufacturing and Continuous Improvement (final product market release and ongoing improvement)	56%
Final Product / Software / Process Development	34%
Supply Chain	33%
After Sales and Service (Commissioning, sales, service and support)	29%
Sustainability Practices (reducing waste, improving energy efficiency etc.)	29%
Final Product Evaluation (customer and internal validation before launch)	27%
Nowhere in our processes	3%
Other	2%

Performance in product development steps
We asked the companies to rate their performance on the consecutive steps of product development on a 10-point scale. The average is just a 6,36

- The relatively high scores for Idea Generation (6.65) and Concept Development (6.54) aligns with earlier findings where 75% mentioned high value in design/prototyping. Organizations seem to excel in the initial stages, where digital tools are heavily leveraged.
- Launch planning (6.01) and market testing (6.15) rank the lowest, mirroring
- earlier findings that planning digital adoption and final product evaluation are weak. This indicates a systemic gap in later stages of the product lifecycle.
- The moderate score for commercialization (6.35) reflects a need for improved market introduction processes, consistent with earlier findings of 33% seeing value in modular machines and 29% focusing on after-sales services.
- The low score for market testing (6.15) aligns with earlier observations that only 19% prioritized customer-centric strategies like customization and differentiation.
- The mid-level performance in business analysis (6.43) and feasibility analysis (6.40) indicates organizations recognize their importance but need better integration with digital tools and data-driven decision-making.

"

The average score for satisfaction about companies' innovative power to create smart and connected assets is just 5.3 out of 10.

19. How do you rate your performance in the consecutive steps of new product development	
Idea Generation, Identification and Selection	6.65
Concept Development and Testing (developing and testing product concepts with customers)	6.55
Prototyping and Testing (prototyping and testing new products)	6.50
Business Analysis (evaluating the business potential and profitability of new products)	6.45
Feasibility Analysis (conducting feasibility studies for new product ideas)	6.42
Commercialization (launching new products in the market)	6.38
Production Planning (planning the production process for new products)	6.34
Project Management (orchestration of the entire innovation process)	6.30
Market Testing (conducting pilot tests and gathering feedback)	6.15
Launch Planning (planning the launch and distribution of new products)	6.05

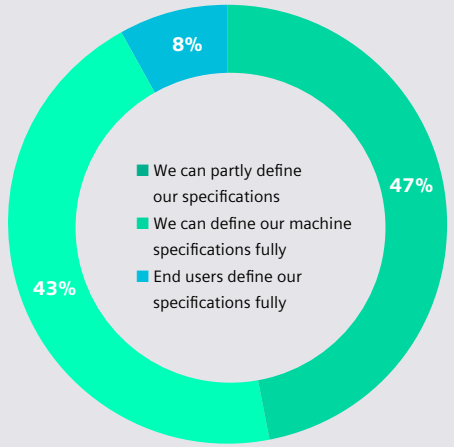
Defining the machine specifications

Almost half of machine builders (47%) can partially determine the specifications of machines themselves, while a slightly smaller portion (45%) can determine them completely. In a very small group of about 8%, end-users define the specifications entirely. Is that surprising? Not really. In engineering-to-order, the customer sets the functional specifications of a machine, upon which the machine builder develops the technical specifications. In configure-to-order, the customer selects from a range of possible machine components, meaning the builder determines all the specifications. And it is almost never the case that a customer possesses enough knowledge in-house to define all the specifications.

How can you deliver faster and still make time for innovation?

Over time, machine builders have delivered hundreds of machines based on customer specifications. This process is time-consuming because each order requires separate drawings and bills of materials. In many cases, machine components will have been made previously, but it is a daunting task to figure out which. Additionally, the number of components per machine grows, and more versions are in circulation, due to the possibilities offered by new technologies, such as replacing mechanical parts with electronic ones. This leads to a backlog of engineering work, leaving less time for real innovation.

20. To what extend can you define the machine specifications?



Making custom machines is not only time-consuming but also undermines profit margins as mistakes are often made along the way. However, companies cannot ignore customers seeking customized solutions, and they don't need to if they choose for standardization and modularization.

CHAPTER 5

Smart and connected machines

Sensor technology and the Internet of Things enable assets to be connected to business systems, unleashing a stream of data to address services in a smarter and more effective way. To what extent do machine builders already possess smart and connected assets, and does this refer to their own equipment or to machines at the customer's site? How satisfied are companies with these developments, and what obstacles do they encounter when connecting assets? This chapter clarifies all of these points.

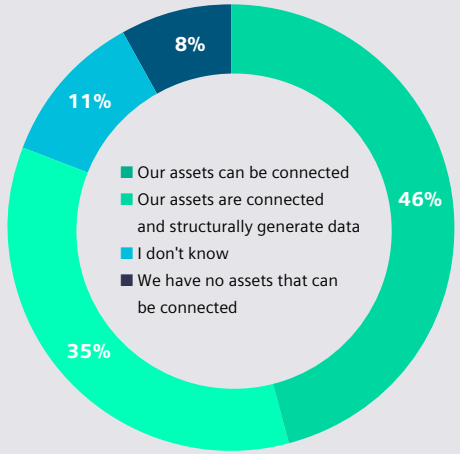
Innovation with smart and connected assets
In total 72% of companies innovate with smart and connected on assets and machines. 37% of them do so for assets of their end-users and 35% for their own assets. On top of that. 24% of the companies are planning to develop smart and connected assets within the next 2 years. Just 24% haven't developed any smart and connected assets and have no plans yet in this direction.

Connectability of internal and external assets
For this, we observed that over 70% of companies already have connected assets, either on-site at the customer's location or for their own use. However, when we take a closer look, it turns out that while most assets have the potential for connectivity, they haven't yet been connected. The potential stands at 46% for in-house assets and 41% for customer assets. This represents a missed opportunity, as connected assets can greatly enhance operational efficiency and customer satisfaction. In terms of connections that are already consistently generating data, the figures are somewhat lower—35% for in-house use and 32% for customer assets. In contrast, 8% state that a connection for in-house assets is not possible, and for customer assets, this figure is 4%.

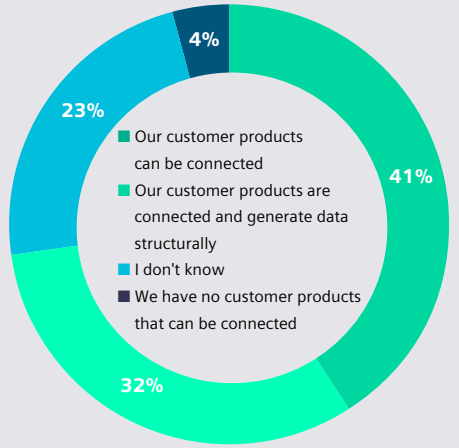
21 To what extend are you innovating with smart and connected assets (products, services or applications)?	
Yes, we are innovating with smart and connected assets for our end-users (products)	37%
Yes, we are innovating with smart and connected applications on our own proprietary assets (own internal machines)	36%
No, but we are planning to develop smart and connected assets within the next 2 years	24%
No, we haven't developed any smart and connected assets	23%
Other	1%

> 72% of the companies innovate on smart and connected assets or machines

22. Which of the following statements best describes your organization's assets?



23. Which of the following statements best describes the assets you provide to your customers?



Satisfaction about the connectivity
We also asked companies about their innovative strength in creating smart and connected assets. The average score is 6.1, and only 27% rate their organization an 8 or higher on a 10-point scale.

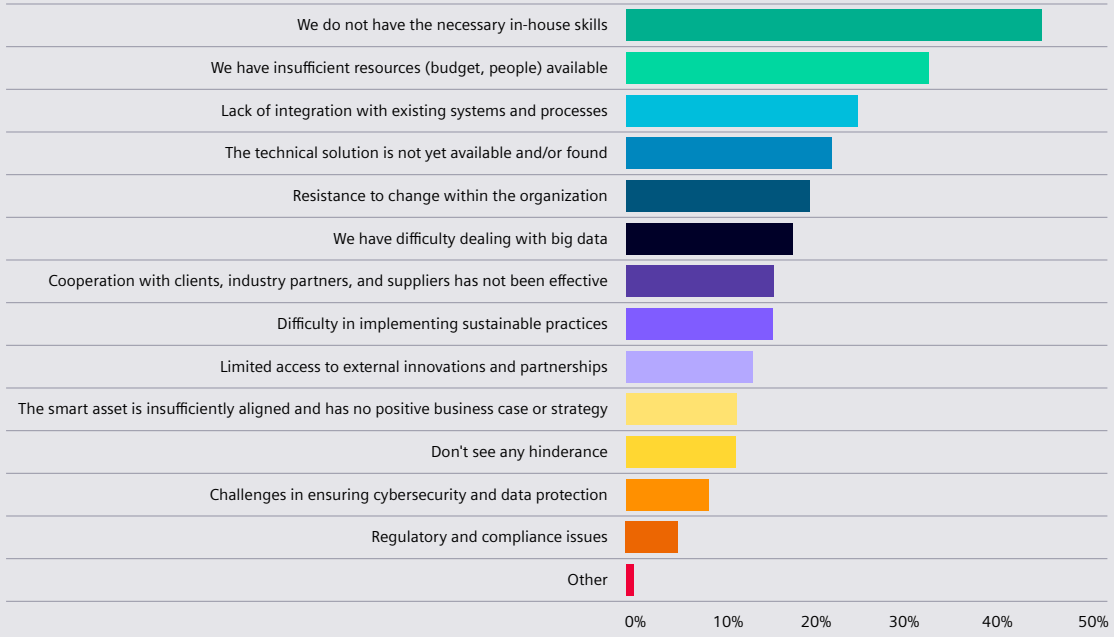
How can you differentiate from competitors in connectability?

In the machine-building industry, it is becoming increasingly challenging to compete based solely on price and product. As a result, the focus is shifting towards service offerings. In the past, the service department would only be called when there was a problem with a machine. Nowadays, regular maintenance is typically scheduled. The next stage is condition-based monitoring, where machines at the customer's site provide a constant stream of digital data about their status. Furthermore, data from components and configurations in all operational machines can be analyzed to predict when problems may occur or when replacement parts are needed. This lays the foundation for predictive maintenance and design optimization.

Barriers in connecting machines

- The most significant barrier is the lack of in-house skills (44%) to create smart and connected machines. This is consistent with earlier findings where 31% cited tech skills shortages and 19% focus on attracting and retaining talent as a priority.
- Insufficient resources (budget, people) is the second largest barrier (32%). This aligns with 29% citing insufficient budgets for digital transformation as a whole.
- Lack of integration with existing systems and processes is the number 3 barrier (25%). This reflects challenges in connecting new technologies with legacy systems, consistent with 23% highlighting legacy infrastructure as a barrier to digital strategy implementation.
- There is low Focus on collaboration and partnerships (15%). This mirrors earlier findings where only 15% prioritized leverage partnerships, highlighting missed opportunities for external innovation.
- More worrying is the underemphasis on cybersecurity. Only 8% see this as a barrier, despite its critical importance for smart and connected machines in mitigating risks and ensuring trust.

24. What has or will hinder the development of the smart and connected machines?



"Most significant barrier in the development of smart and connected machines is the lack of in-house skills

CHAPTER 6

New business models

Digitalization enables the development of a wide range of new business models, often related to the expansion of services. How far along are machine builders in developing these models? What strategic and operational value are they creating in the process? And to what extent have they embraced Industry 5.0, which emphasizes collaboration between humans and machines? Business models are also evolving in response to environmental demands. What are the current and future sustainability practices?

Additional service-led revenue streams

More than one third of companies are still not generating any value from services. Nearly 23% limit themselves to delivering and installing machines and components. This is concerning, as it's becoming increasingly difficult in machine manufacturing to compete on price and product, especially with the clear shift from ownership to usage. In the near future, Machine-as-a-Service will become more common. Moreover, data from connected machines form the foundation for predictive maintenance and design improvements. Just over 13% are already creating added value through additional maintenance and process services, and an equal percentage provide integrated solutions focused on performance. Only 12% operate as a full-service organization centered on usage services.

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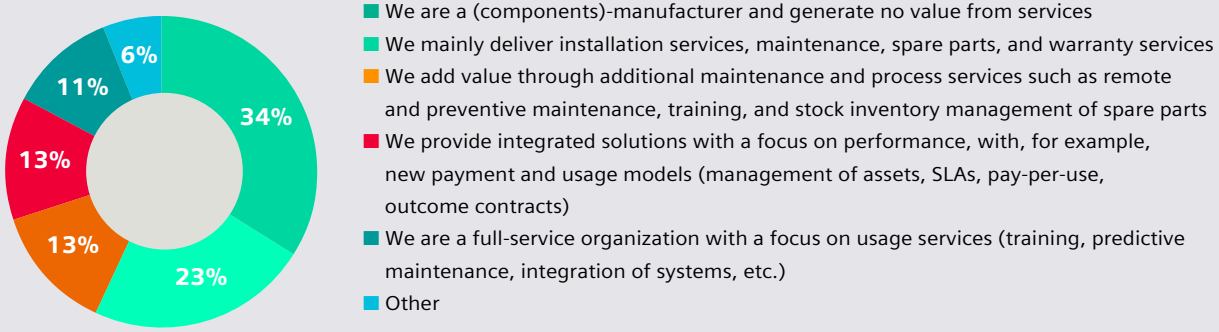
Two-thirds of machine builders generate added value and additional revenue through digital services.

25. Which statement regarding service delivery best describes your organization?



Condition-based maintenance

Condition-based maintenance

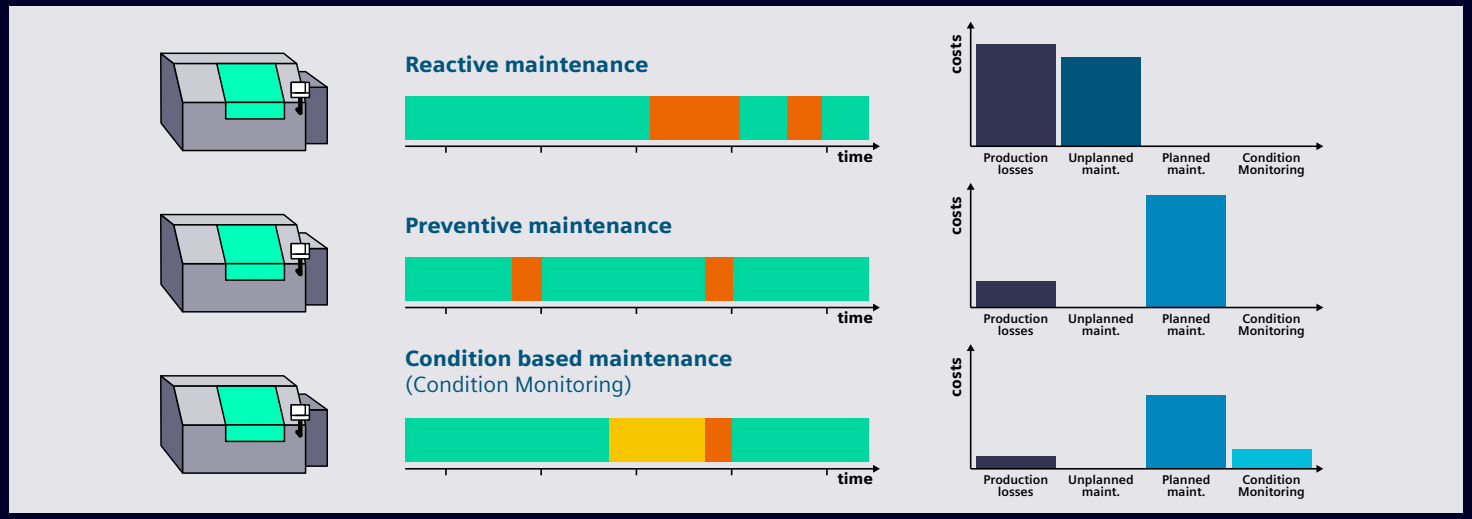
The focus of machine builders is shifting increasingly towards service provision. By establishing digital connections with machines at the customer's site, a constant stream of operational data becomes available. This data can be used for new revenue models based on condition-based maintenance, as well as for design optimization. This lays the foundation for service lifecycle management.

The evolution of services in the machine industry

In the past, service provision was purely reactive: the service department would only intervene when a problem occurred with a machine. To prevent issues, planned maintenance is now almost always carried out. This is known as preventive maintenance. Remote maintenance goes a step further by equipping machines with sensors and connecting them to IoT. This enables potential issues to be detected early, allowing for immediate intervention. For instance, the system can notify the company if a machine component becomes too hot due to overloading. Condition-based monitoring not only prevents problems but also avoids unnecessary replacement of parts. The sensors can even transmit the serial number of a component, enabling the service department to know exactly which spare parts to bring for replacement.

Added value for machine builders and their customers

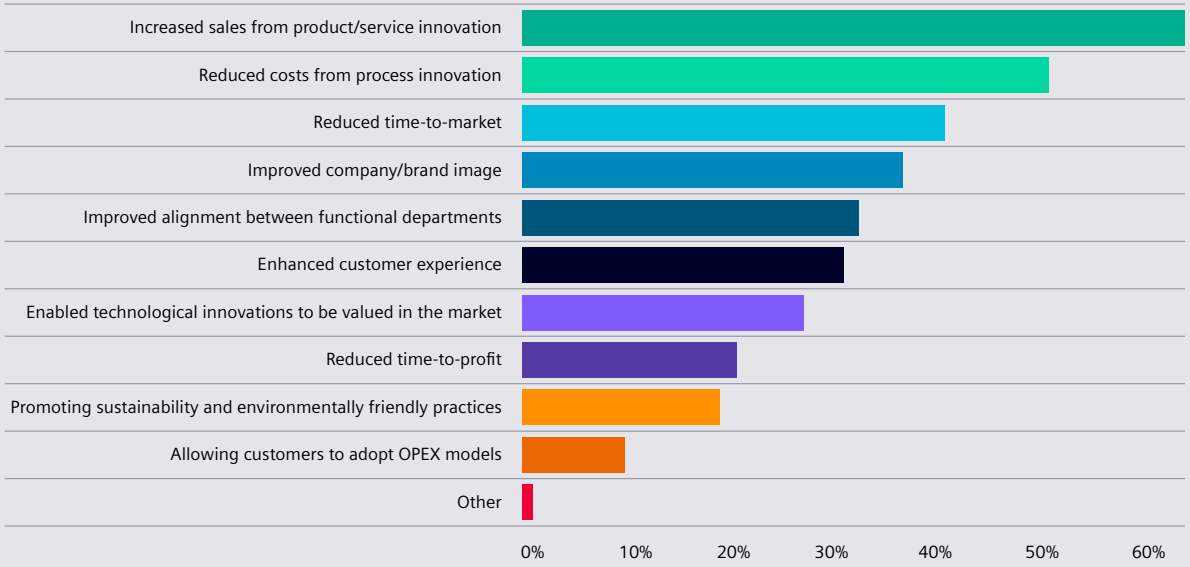
Condition-based maintenance applies to the status of an inCondition-based maintenance applies to the status of an individual machine. By analyzing operational data from various comparable machines, it becomes possible to predict when specific maintenance activities should be performed. This allows for the identification of patterns that occur before an impending failure, as well as better prediction of when a part needs replacement. Moreover, in the case of a recurring issue, it is possible to quickly identify other machines likely to experience the same problem. This approach is known as predictive maintenance. The next step is prescriptive maintenance, where automated action is taken when an imminent issue is detected. For example, transferring workload from an overloaded machine.
Machine data can also be leveraged to optimize the design, further improving uptime and reducing the number of breakdowns. This is also an ideal form of service for customers, as machine downtime can result in significant losses, which is why they increasingly request performance-based contracts. In such agreements, the supplier guarantees a certain uptime percentage for the machine. Some customers even tie the monthly service fee to their production volumes. The ultimate form of service is Machine-as-a-Service, where the manufacturer retains ownership of the machine, and the customer pays a fixed monthly fee for all services: from online monitoring to troubleshooting, repairs, and parts replacement. Instead of a one-time margin on machine sales, this creates a continuous stream of income.



Business benefits of innovation
Service and product innovations that drive sales are considered the most valuable by 62% of companies. This includes approaches like preventive and predictive maintenance, which significantly reduce downtime for customers. Given the highly competitive market, a focus on sales is understandable. Second in line is reducing costs through process innovation (52%), with strategies such as digital twins and integrating systems with partners playing a role. Third, reducing time-to-market is noted by 41%, where shifting from Engineering-to-Order (ETO) to Configuration-to-Order (CTO) can be crucial.

Furthermore, innovation positively impacts company and brand image, as noted by 37% of respondents. In addition, 33% point to improved alignment between functional

26. In what way can innovation create value for your business?



departments as a key benefit of innovation—an outcome that requires breaking down data silos and further integrating systems, an area where challenges still exist.

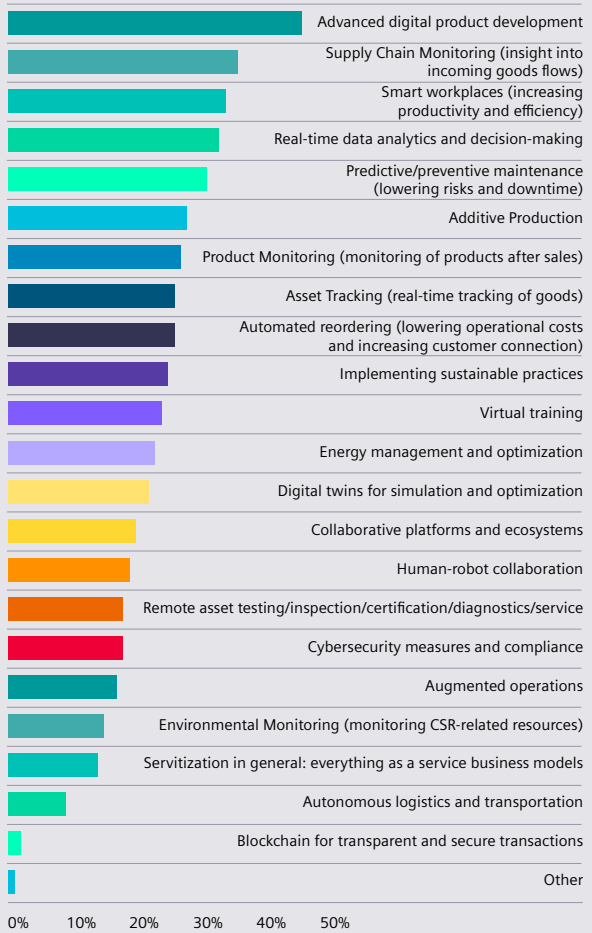
Benefits of innovation concepts

Companies see the greatest benefit in *advanced digital product development* (44%). New tools for product design can reduce the time-to-market and improve quality.
There are also high expectations of improved supply chain visibility (32%). Real-time monitoring of goods flows boosts efficiency and risk management.
Collaboration and Human-Robot Interaction are underdeveloped (15% and 10%): This suggests that organizations are not yet fully embracing the human-centric aspects of Industry 5.0.
Desired investments in *predictive and preventive maintenance* (29%) reflects an emphasis on minimizing risks and downtime, critical for achieving operational excellence.

Only 6% of companies see *servitization* ("everything-as-a-service" business models) as a major benefit. First explanation is that traditional manufacturers are still product-centric: they focus on selling physical machines, components, and systems and are not service-oriented. Servitization requires a fundamental shift in revenue models—from one-time product sales to recurring subscription or service-based revenue.

Besides that, many customers still prefer to own industrial machines outright, rather than using pay-per-use models. Large industrial buyers have established capital expenditure (CAPEX) budgets and may resist OPEX-driven

27. Which of the following innovation concepts could most benefit your company?



(operating expense) models. Furthermore, revenue predictability in traditional sales models is easier. And finally, servitization requires strong digital infrastructure (IoT monitoring, predictive maintenance, smart contracts, etc.) to function effectively.

Sustainability and ESG priorities
The importance of operating sustainable and the attention for Environmental, Social & Governance (ESG) factors is increasing. This is not only due to tightening regulations, but also because the corporate image can be damaged when sustainability matters are neglected. How do Indian companies in the machine industry cope with that in the present and the future?

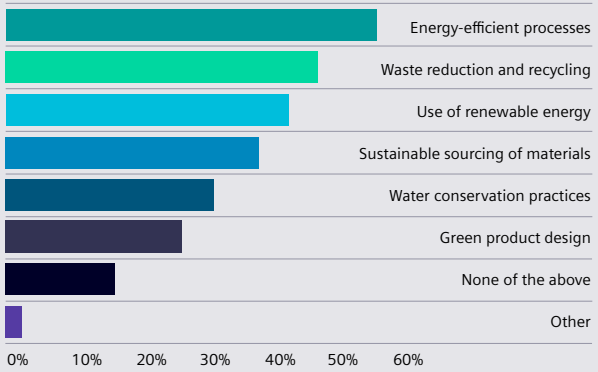
Present sustainable practices
The most common sustainable practice is making processes more energy-efficient (56%). This seems logical because it's is not just good for the environment but also lowers costs.

The second place is for waste reduction and recycling (47%) that also reduce the ecological footprint and improve operational efficiency.

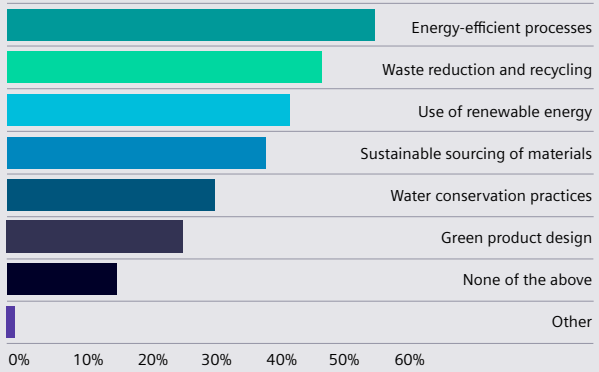
The use of renewable energy 42% is number 3 in the list of sustainable practices. This reduces CO2 emission.

Furthermore, the payback time of investments in solar panels and other renewable energy sources is manageable. Smaller percentages we see for sustainable sourcing of materials (38%), water conservation practices (30%) and green product design 25%.

28. What sustainable practices has your organization implemented?



29. What sustainable practices will your organization address in the next 5 years?



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Sustainability is a priority, but it's not seen as a challenge: 20% of the companies prioritize it in their strategy but only 6% see it as a challenge in their digital transformation.

There is a high correlation between waste reduction and recycling and the use of renewable energy with water conservation practices. Another high correlation we see between green product design and sustainable sourcing of materials.

Future sustainable practices
In the previous section we saw that making processes more energy-efficient already is the most common sustainable practice. When we ask the companies what practices they will address in the next 5 years, enhancing energy efficiency remains the top priority (57%). The second place is for reducing carbon footprint (49%). This is tightly linked to carbon footprint reduction, likely due to their tangible financial and environmental benefits. Broader ecological concerns like promoting circular economy practices (16%), improving waste management (49%) and enhancing biodiversity and ecosystem services (11%) have lesser priority. Possibly reflecting lower awareness, perceived complexity, or lack of immediate ROI. Sustainable supply

chain management (44%) is moderately correlated with both energy and waste practices, highlighting its role as a bridge between operational and ecological concerns.

Preparing for Industry 5.0

Industry 5.0 focuses on the collaboration between humans and machines, aiming to create more resilient, sustainable, and human-centric production processes. It builds on the digitalization foundation of Industry 4.0 by enhancing the role of human creativity and critical thinking in harmony with advanced technologies.

The machine industry in India is not yet ready for this shift: 40% of the respondents is not familiar with the concept of Industry 5.0. Furthermore 23% is aware but have no plans for the transition. Only 19% will start adoption in 1-2 years and just 16% is currently integrating Industry 5.0. Probably most of the machine builders are still busy implementing Industry 4.0 technology like AI, Robotics, and Digital Twins and thus prioritize efficiency, speed, and cost reduction.

30. How do you see your organization adapting Industry 5.0 which emphasizes more resilient, sustainable, and human-centric production processes?

CHAPTER 7

Digitalization: A comparison between early and cautious adopters

Finally, we divided the companies into groups with an overall digital adoption score above or under 6 on a 10-point scale. Next, we examined the key differences between these groups in terms of their priorities, capabilities, and challenges.

What distinguishes digital leaders?

- 36% prioritize sustainable practices (vs only 23% in low adopters)
- They have more focus on ethical technology and worker well-being
- They invest more in IoT, Edge Computing, Cloud, and Smart Factories

What holds low tech adopters back?

- 41% struggle with in-house expertise (vs. 24% in leaders)
- They lack an innovative culture (48%) and have no clear strategy (41%)
- They have limited access to meaningful data (13%) – a key digitalization roadblock.

Companies that are more satisfied with the innovative strength to create smart and connected assets have:

- a digital strategy that contains goals, budgets and resources and describes how to explore new ways of creating value with partners and customers.
- confidence that their organization can measure the return of their investment in digital technology and skills
- technologies for parallel product development (digital design parallel to physical production), tools for real-time data analytics and decision-making and have taken more cybersecurity measures.
- higher performance rates for digital adoption at each of the manufacturing steps and the organization of the work.
- new business models, e.g. creating value from services such as servitization for increased sales.

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