Unlocking the AI Edge for MSMEs

March 2026

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Executive summary

The India AI Impact Summit 2026, held in New Delhi from 16 to 20 February, concluded with the adoption of the New Delhi Declaration on AI Impact. Rooted in the civilisational ethos of 'Sarvajan Hitaya, Sarvajan Sukhaya' (welfare for all, happiness for all), the declaration articulates a unifying vision: The benefits of AI must be equitably shared across humanity while respecting national sovereignty and promoting multistakeholder cooperation.[1]

At the summit, Prime Minister Narendra Modi articulated the MANAV vision for AI, a human centric framework grounded in Moral and ethical systems; Accountable governance; National sovereignty; Accessibility and inclusion; and Verifiable, lawful, and transparent AI. These principles reinforce India's call for 'AI for All', positioning AI as a multiplier of human aspirations, ethics, and dignity.[2]

With over 100 million weekly users of an AI chatbot in India,[3] it is clear that AI has been consumerised at scale in the country. This also demonstrates how AI adoption can be accelerated when access barriers are lowered and digital readiness is high.

India's Digital Public Infrastructure is enabling AI solutions to scale rapidly and affordably across healthcare, education, agriculture, and governance. Platforms such as MeghRaj GI Cloud and the IndiaAI Compute Portal are democratising access to shared computing resources including graphics processing units (GPUs) and tensor processing units (TPUs), significantly lowering entry barriers for startups, researchers, and institutions. IndiaAI Kosh provides datasets and AI models across sectors, while the AI Data Labs Network and the National Supercomputing Mission are strengthening grassroots skills and high-performance computing capacity nationwide. Collectively, these initiatives are ensuring that AI innovation in India remains broad-based, affordable, and inclusive, aligned with the spirit of the New Delhi declaration.[4]

With consumers actively adopting AI and government platforms firmly in place, the pivotal question is how will AI be consumerised and scaled across India's industrial economy? The answer lies in how effectively the AI advantage is unlocked by India's 7,59,56,661 MSMEs—including informal micro enterprises (IMEs)[5]—which form the backbone of the country's industrial and employment landscape.

The report takes that question head-on with a **focus on manufacturing MSMEs**, which accounted for approximately 35.4% of India's manufacturing value added in FY23–24 and nearly 48.58% of exports in FY24–25.[6]

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1 PIB, Government of India, 21 February 2026. AI Impact Summit 2026 concludes with adoption of New Delhi Declaration.

2 PIB, Government of India, 19 February 2026. M.A.N.A.V | PM Narendra Modi's Human-Centric AI Odyssey.

3 India Today, 16 February 2026, OpenAI CEO Sam Altman says Indians top ChatGPT users in Asia, over 100 million use it every week.

4 PIB, Government of India, 19 February 2026. M.A.N.A.V | PM Narendra Modi's Human-Centric AI Odyssey.

5 The number of MSMEs registered on the Udyam Portal as of 29 January 2026.

6 Ministry of Finance, Government of India, 29 January 2026. Economic Survey 2025-26. Footnote 59 states the financial years against each of the numbers stated in the paragraph.

Algebra of opportunities

The question around diffusion of AI across MSMEs demands attention, given the sheer magnitude of the opportunity ahead. **If India succeeds in increasing manufacturing's share of GDP to 25%, and MSMEs raise their contribution to India's manufacturing gross value added (GVA) from 35.4% in FY 2023–24 to 50% by 2047, they stand to unlock growth opportunities in the range of USD3.13–3.21 trillion by 2047.**[7]

Achieving this exponential 19x leap in value creation will be possible if MSMEs adopt AI on their shop floors and leverage it to become active partners across global value chains (GVCs).

This is because, by reducing capability barriers across design, quality, precision manufacturing, compliance, and decision-making, AI can enable MSMEs to:

- leapfrog structural and operational constraints

- escape the low-productivity trap, and

- reposition themselves as competitive value creators rather than cost-based suppliers.

From predictive maintenance, vision-led quality control, and intelligent inventory management to AI-enabled credit assessment, generative design, multilingual customer engagement, and low-cost analytics, AI could help MSMEs scale operations, enrich quality, and reinvent business models over time. Importantly, AI, together with India's new local language models, could bridge some of these gaps by simplifying interfaces and reducing the need for technical expertise, anytime, anywhere.

AI can deliver these outcomes by playing three distinct roles as:

- **Scaler**—decreasing processing times and/or increasing resource capacity

- **Enricher**—enhancing human capabilities by providing tools that augment decision-making, creativity, and innovation

- **Reinventor**—transforming how MSMEs create, deliver, and capture value.

Our analysis, drawing on PwC's 'Value in motion' research, indicates that AI could contribute between USD135.6 billion and USD149.9 billion to manufacturing MSMEs' growth as early as 2035, if they were to account for 50% of India's manufacturing value added.

Importantly, AI's potential contribution to MSMEs is not limited to the supply-side alone.

With AI expected to contribute USD1.7 trillion to the economy by 2035 as per Niti Aayog's estimates,[8] the total investment required in AI infrastructure to realise this potential could conservatively be around USD500 billion.[9] Interviews reveal that non-tech-intensive capital goods account for 20–30% of capex on such projects—an area where MSMEs are already active.

If MSMEs can capture this market by supplying harnesses, chambers, cooling equipment, and other non-technical manufacturing products required by AI-infrastructure companies and chip manufacturers, the total demand-side opportunity that MSMEs could tap would be in the range of USD100–150 billion.

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7   MSMEs accounted for 35.4% of manufacturing gross value added in FY24. Using the World Bank data on manufacturing GVA for annual year 2024 as a proxy for the financial year, the MSME contribution to manufacturing GVA during 2024 is roughly around USD0.174 trillion. The Indian government's National Mission on Manufacturing (NMM) specifically aims for manufacturing to reach a 25% share of total GDP by 2035. If this share is maintained in a future USD30 trillion economy projected for 2047, it would translate into USD7.5 trillion in manufacturing GDP. Manufacturing GVA in 2047 would be in the range of USD6.60–6.75 trillion (assuming that manufacturing GVA will be approximately 88–90% of manufacturing GDP, provided that taxes and subsidies remain at their current levels.). If MSMEs were to increase their share of manufacturing GVA to 50% in 2047, they would roughly account for USD3.30–3.38 trillion of India's manufacturing GVA in 2047. The growth opportunity that MSMEs are therefore looking up at is to the tune of USD (3.30-0.174) = USD3.13 trillion to USD (3.38-0.174) = USD3.21 trillion.

8   PIB, Government of India, 7 March 2024. Cabinet approves over Rs 10,300 crore for IndiaAI Mission, will empower AI startups and

9   As per interviews

Geometry of challenges

While the algebraic scale of opportunities is compelling, realising them requires confronting the geometry of challenges that MSMEs face on the ground. This report therefore goes beyond outlining high level constraints to identify firm-level challenges that hinder the readiness of MSME founders and their workforce to build value with AI.

The questions raised and challenges articulated are striking, when heard directly from the stakeholders themselves. For example, when asked about his enterprise's data readiness, the owner of a machine-component manufacturing MSME candidly admitted, "I don't know if my enterprise is ready to benefit from AI." Frustrated with the vague assurances of vendors "selling digital transformation", another MSME promoter remarked, "Show me the real value AI will deliver and the time frame within which I can realise it." Meanwhile, reflecting a more personal concern, an MSME worker posed a simple question about the future of his work: "Will the machine still need me once it becomes smarter?"

Compounding these readiness gaps are challenges that force MSMEs to be heavily dependent on solutioning ecosystems. "Who will bail me out if I am stuck with a sub-optimal solution due to the fault of the tech provider?" captures a deep-seated anxiety among MSMEs that have lived through half-implemented ERP systems, unused software, or automation initiatives that delivered only partial value. Frustrated with perpetual pilots, an MSME owner had a simple question, "Who can guide me in making use cases scalable?" "Everyone is trying to sell; no one is willing to stand with me" emphasised another MSME promoter. It's important to recognise that unlike large firms, MSMEs typically lack a supportive ecosystem that can help them make informed choices, validate technology decisions, and intervene when course correction is required.

The absence of such guardrails often leaves MSMEs feeling unsupported in their AI adoption journey.

So how can MSMEs overcome these challenges and consumerise AI—creating value not only with AI but also from AI?

Our approach and 'fit-for-MSME' solutions

Rather than offering high-level pointillistic solutions to these challenges, this report leverages a comprehensive proprietary approach outlined in PwC India's 'AI Edge for Viksit Bharat'* report.

The 3A2I framework

This systemic, action-oriented 3A2I framework, built around elements of access, acceptance, assimilation, implementation, and institutionalisation, can enable MSMEs to overcome readiness and ecosystem constraints, manage firm-level risks, and translate AI adoption into time-bound, measurable value.

The framework is grounded in the premise that AI adoption is not a one-time technology purchase but a long-term capability-building journey that requires coordinated and sustained action across government, civil society, and large enterprises. It recognises that MSMEs operate on thin margins and, more often than not, prioritise survival over experimentation. It takes into account that while software may begin as 'freemium', scaling its use inevitably entails paid subscriptions, system integration, and workforce training. Further, limited digital skills, uneven infrastructure, and solutions that are not fully tailored to regional contexts or informal business practices can significantly slow the adoption and impact of AI initiatives.

Our recommended solutions are actionable from day one — not only by MSMEs, but also by governments, civil society, and large companies committed to support them in the journey of AI diffusion. Moreover, these solutions are not 'one-size-fits-all'; where required, they are calibrated to the size and digital maturity of each enterprise. The objective is to position India as a global hub of AI use cases — similar to the way UPI has been taken from India to the world.

Consider the example of use case prioritisation and application of AI to generate time-bound measurable value across diverse MSMEs—a challenge identified earlier in the discussion. While identifying appropriate potential use cases is important towards securing meaningful and timely returns, such prioritisation cannot follow a one-size-fits-all approach, particularly for AI use cases, given the different levels of digital maturity within the MSME cohort.

Drawing on the success stories gathered, the report recommends that small and micro firms with limited prior exposure to AI begin with adopting relatively accessible use cases—such as using GenAI to respond to RFPs or draft project proposals. For MSMEs with emerging levels of digital maturity (including manufacturing units that rely on spreadsheets to capture data, or have some level of ERP and CRM systems in place, particularly in customer-facing functions) the report recommends adopting AI in sales and marketing to design social media content and product catalogues from simple text inputs or product images, as well as experimenting with auto-translation tools to convert product descriptions and marketing material into multiple Indian and export-market languages.

For digitally mature MSMEs equipped to use sensors and the IOT, the report recommends the deployment of AI to drive better quality control and reduce defect rate—one of the key barriers in integrating MSMEs across GVCs.

The following example illustrates how the report applies the 3A2I framework to enable digitally mature MSMEs to adopt AI for quality control with coordinated support from governments, civil society, and large enterprises. Similar detailed analyses are provided in a simple-to-read grid-based format throughout the report to help MSMEs build an AI-ready workforce, enhance their data readiness for AI, and adopt AI across functions such as sales and marketing.

Access: The journey begins with identifying specific quality pain points and relevant use cases such as eliminating surface defects or preventing incorrect labelling. Once the use case is identified, the MSMEs can access simple smartphone-based computer vision applications for basic visual inspection and define rule-based and AI-assisted checklists to support quality control.

Governments—either at the state or Central level—can set up AI-enabled quality labs/common facility centres (CFCs) in clusters with shared vision inspection setups, sensors, and demonstration lines. MSME chambers and local skilling associations can create multi-lingual brochures to explain relevant concepts such as computer vision and its uses, as well as hold sessions with businesses to encourage them to use the centres. For interested MSME suppliers, large enterprises can provide trial access or light versions of the required AI quality tools for experimentation.

*PwC India, 2026. AI Edge for Viksit Bharat.

Acceptance and Assimilation: To make the workforce accept such solutions, it's essential to communicate how AI-enabled inspections help detect defects earlier and avoid rework, penalties, and customer complaints, lowering their stress while improving productivity. By supporting seamless operations, these solutions enable production lines to deliver consistent on-time value without compromise. Capturing worker success stories and organising dialogues among employees who have successfully used AI-based technologies can further promote peer-to-peer learning and accelerate assimilation.

Complementing MSME efforts in this phase, governments can actively engage with businesses to issue simple guidelines on 'AI + human' quality systems with a focus on safety. Skilling organisations can handhold MSMEs by helping structure workforce discussions through case study-led approaches, and by connecting them with peer enterprises that have implemented similar initiatives successfully. Large businesses, drawing on their extensive experience in skilling and technology diffusion, can help MSMEs develop multilingual audiovisual 'how-to-use' and published guides.

Implementation: While implementing this initiative, MSMEs should define a clear roadmap with simple measurable milestones and embed AI directly into production planning rather than treating it as a standalone implementation exercise. In close collaboration with the workforce that works on such initiatives, KPIs must be built that are measurable and showcase the incremental impact of AI tools/platforms in comparison to existing ones. Integrating lessons learnt from the earlier phases, MSMEs should then invest judiciously in hardware with a focus on ROI.

To incentivise MSMEs to move in the direction of execution, governments could offer performance-linked incentives, especially for micro units that demonstrate measurable quality improvement (such as lower defects, higher exports). MSME chambers and cluster secretariats can support cross-learning within clusters—for instance, factory visits can enable a micro unit to share practical insights on how it has used AI with another unit. These MSME chambers and cluster secretariats could also help micro enterprises document and present improvements to financial institutions and government bodies to secure desired financial support/incentives to scale AI adoption. For MSMEs that are suppliers to larger enterprises, the latter must offer plug-and-play integrations with commonly used platforms wherever possible.

Institutionalisation: During the institutionalisation phase, MSME units must include AI checks in formal SOPs and work instructions as well as make AI reports part of daily/weekly review meetings. They must gradually start training multiple operators and supervisors on using and maintaining AI tools while giving them the freedom to interact with vendors supplying solutions, if any. They must also start planning for software and other upgrades and begin allocating funds for it in a systematic manner.

The government should put in place long-term standards and guidelines for data privacy and the ethical use of AI in production systems while also ensuring that the public infrastructure supporting micro enterprises at scale is protected against cyberattacks. Chambers of commerce and other relevant bodies should conduct periodic studies on the impact of AI quality tools on income, inclusion, and working conditions at MSMEs to identify the best practices and emerging next practices. Large enterprises should start establishing structured partnership programmes that enable MSME suppliers to extend AI adoption across other use cases within the manufacturing domain.

AI navigator

To address ecosystem challenges impacting the ability of MSMEs to effectively scale and be integrated into the AI infrastructure and relevant GVCs, the report recommends establishing an AI navigator. This is a robust, inclusive, seven-layered validation and resolution mechanism that both supports and validates MSMEs' approaches and solutions along their AI adoption journey.

- In the first layer, the navigator supports MSMEs in identifying AI solutions tailored to their unique business challenges, enabling effective adoption.

- The second, sandbox-based piloting layer is where MSMEs can experiment with AI in a controlled environment using government and private support or grants.

- The third is the technical verification and validation layer that ensures that the AI solutions to be scaled are secure, compliant, and technically sound.

- As part of the fourth scaling guidance layer, MSMEs are mentored to effectively industrialise and monetise validated AI solutions.

- The fifth—AI infrastructure and GVC integration layer—facilitates MSMEs' access to GVCs and AI infrastructure industries through matching partnerships.

- The final two layers of the AI navigator focus on continuously improving system performance by integrating structured feedback and governance, with particular emphasis on supporting MSMEs operated by women and persons with disabilities.

Complemented by AI-enabled export hubs and hub-and-spoke models such as Dak Ghar Niryat Kendras (DNKs) and e-commerce export hubs, this ecosystem approach can help MSMEs plug into AI infrastructure buildouts and GVCs—in foreign geographies too.

To build a more gender-balanced MSME manufacturing services ecosystem in India, the report recommends expanding the role of women entrepreneurs beyond the establishment of manufacturing units alone. Women entrepreneurs can anchor specialised data, analytics, and AI-service MSMEs that support hardcore manufacturing units with solutions in areas such as predictive maintenance, quality analytics, supply-chain optimisation, ESG tracking, and workforce planning. Industry associations, incubators, and cluster development programmes can play a catalytic role by integrating women-owned data/AI service providers into existing manufacturing clusters and vendor ecosystems.

The journey ahead for MSMEs, as discussed in this report, is clearly a marathon, not a sprint—one that demands trust, coordination, execution, and sustained ecosystem alignment. However, it holds the promise of elevating manufacturing-MSMEs to AI-enabled drivers of an inclusive Viksit Bharat.

01

The manufacturing opportunity for Indian MSMEs

MSMEs form the backbone of India's industrial economy, accounting for approximately 35.4% of manufacturing value during FY23–24 and around 48.58% of exports in FY24–25.[10] With over 7.5 crore enterprises employing over 33 crore people as of 29 January 2026, MSMEs are the second largest employers of this nation after agriculture.[11]

In a federal economy like India's, MSMEs remain central to driving regional development. Often originating in rural and semiurban geographies, they act as significant employers to local communities, particularly in industries such as handicrafts, light manufacturing, and food processing. They absorb both skilled and semi-skilled labour, helping reduce income inequalities and regional disparities. More importantly, they provide employment opportunities to women. Of the total workforce employed by registered MSMEs as of 29 January 2026, 39.5% comprises women.[12]

MSMEs have traditionally been present across manufacturing industries in India, including auto components, basic metal (iron and steel), chemicals, cotton textiles, drug and pharmaceuticals, electrical equipment, fabricated industrial metal products, food processing, gems and jewellery, general purpose machinery, leather, paper and paper products, plastics and plastic products, readymade garments, and sanitaryware.[13] Out of the nearly 7,59,56,661 MSMEs, including informal micro enterprises (IMEs), registered on the Udyam Portal as of 29 January 2026, nearly 1,59,21,361 were registered in the manufacturing category,[14] accounting for nearly 21% of the total number.

Besides operating in these traditional industries, manufacturing MSMEs have now started participating in many sunrise and tech-intensive industries (see Table 1).

Table 1: MSMEs driving value for sunrise and tech-intensive industries

Industry	Manufacturing presence of MSMEs
Electronics	Connectors, wire harnesses, enclosures, mechanical parts
Renewable energy	Towers, fasteners, small castings, small wind turbines, and parts of auxiliary equipment
Electric vehicles	E-two-wheeler components (frames, harnesses, plastics, small electronics), chargers, and low-capacity power electronics
Batteries and energy storage	Casing, connectors, busbars

Source: Discussions with experts and MSME manufacturers

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10   Ministry of Finance, Government of India, 29 January 2026. Economic Survey 2025-26. Footnote 59 states the financial years against each of the numbers stated in the paragraph.

11   Ministry of Micro, Small and Medium Enterprises (MSMEs), Government of India. Performance Smartboard (dashboard)

12   Ibid.

13   World Economic Forum (WEF) and Ministry of Electronics and Information Technology (MeitY), Government of India, 2005. Transforming small businesses: An AI playbook for India's SMEs. Geneva: World Economic Forum.

14   Ministry of MSMEs, Performance Smartboard (dashboard).

However, MSMEs must recognise the scale of opportunity emerging as India advances towards Viksit Bharat—and its strategic imperatives.

Calculations reveal that manufacturing must expand nearly 15-fold over the next two decades to reach the aspirational Viksit Bharat-target of contributing 25% to India's projected USD30–35 trillion economy by 2047. This would place manufacturing value added at around USD7.5 trillion. **If our nation fulfils its goal of raising manufacturing's share of GDP to 25%, and MSMEs increase their contribution to India's manufacturing gross value added (GVA) from 35.4% in FY 2023–24 to 50% by 2047, they stand to unlock growth opportunities in the range of USD3.13-USD3.21 trillion by 2047.**[15]

While this projected manufacturing opportunity for MSMEs is enormous, India's MSMEs, as presently configured, are poorly placed to capture it. Most remain locked in low-tech, low-margin activities—job-work machining, basic fabrication, stitching and assembly, simple food processing—competing largely on cheap labour and thin margins. Even across advanced industries such as electronics, they mostly supply casings, cables, and packaging rather than printed circuit board (PCBs), sensors, or design services; in renewables, they fabricate mounting structures instead of making inverters, power electronics, or battery systems; in automotive, they supply brackets and fasteners rather than telematics, advanced driver assistance systems (ADAS) components, or advanced materials. If they continue in these roles, they will remain stuck at the lower end of global value chains (GVCs), easily displaced, as technologies and standards evolve.[16]

One way to understand the strategic cost of remaining trapped in low-value activities is through the lens of economic complexity.[17] Economies grow more competitive and resilient when they can produce and export a broader range of knowledge-intensive, capability-rich products—a signal of deep productive know-how embedded across firms, supply chains, skills, and institutions. For India, therefore, the imperative is not merely to expand manufacturing output, but to upgrade its sophistication by moving decisively into products and processes that embed advanced capabilities.[18]

To break out of this trap, manufacturing MSMEs must shift from being passive recipients of technology and buyer-driven specifications to becoming firms that actively shape value-led conversations and actions grounded in innovation and expertise.

This transformation is possible if they adopt advanced technologies—particularly AI—to develop new products and services while driving efficiency and productivity with relevant technologies (such as nano-tech and blockchain) that complement AI. At the same time, they must become active partners with larger businesses, building at least three—energy, infrastructure, and chips—of the five layers of AI,[19] which includes two additional layers: large language models and applications. AI can accelerate this shift for MSMEs by lowering the capability barriers to precision, repeatability, quality assurance, design iteration, and standards compliance, which are the operational foundations needed to participate in higher-complexity manufacturing networks and upgrade within global value chains.[20]

15   MSMEs accounted for 35.4% of manufacturing gross value added in FY24. Using the World Bank data on manufacturing GVA for annual year 2024 as a proxy for the financial year, the MSME contribution to manufacturing GVA during 2024 is roughly around USD 0.174 trillion. The Indian government's National Mission on Manufacturing (NMM) specifically aims for manufacturing to reach a 25% share of total GDP by 2035. If this share is maintained in a future USD 30 trillion economy projected for 2047, it would translate into USD 7.5 trillion in manufacturing GDP. Manufacturing GVA in 2047 would be in the range of USD 6.60-6.75 trillion (assuming that manufacturing GVA will be approximately 88%–90% of manufacturing GDP, provided that taxes and subsidies remain at their current levels.). If MSMEs were to increase their share of manufacturing GVA to 50% in 2047, they would roughly account for USD3.30-3.38 trillion of India's manufacturing GVA in 2047. The growth opportunity that MSMEs are therefore looking up to is to the tune of USD (3.30-0.174) = USD 3.13 trillion to USD (3.38-0.174) = USD 3.21 trillion.

16   Based on interviews

17   Economic complexity treats development as a network problem, which implies that an economy's underlying capabilities are inferred from a bipartite network linking places to the products they competitively produce and export. Economies are 'more complex' when they are diversified across many products, and the related 'product space' idea suggests that upgrading is easier when economies move into capability-nearby, higher-complexity products rather than attempting large jumps. See here: The Atlas of Economic Complexity, 'Glossary: Economic Complexity', Growth Lab at Harvard

18   Bhowmick, S. 15 September 2020. Towards a more 'sophisticated' Indian economy, ORF Expert Speak.

19   Bhati, D., 21 January 2026. India is not second-tier in AI, Ashwini Vaishnaw rebuts IMF chief at Davos on AI ranking. India Today.

20   Bhowmick, S. 15 September 2020. Towards a more 'sophisticated' Indian economy, ORF Expert Speak.
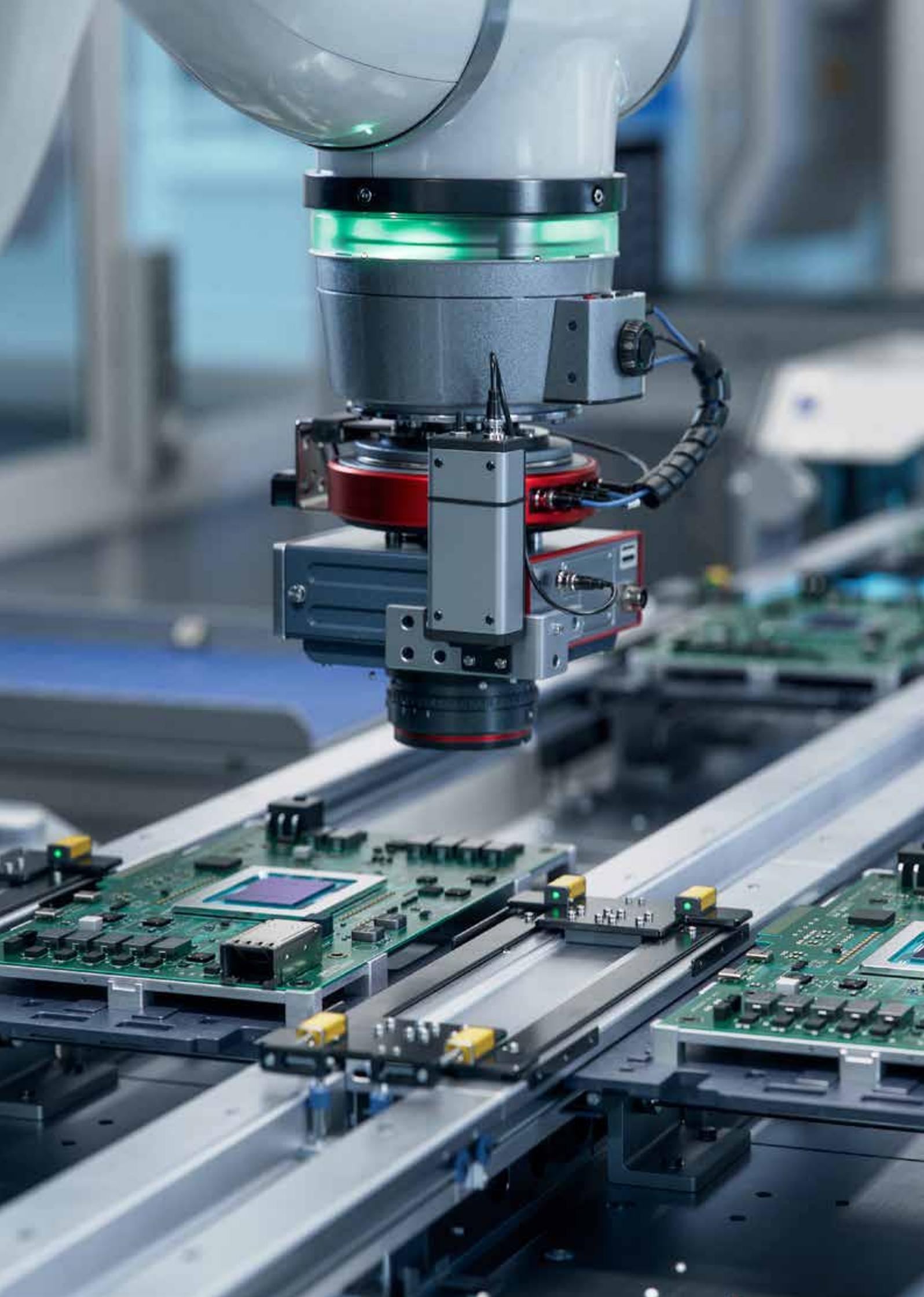
The Economic Survey 2025–26's framing of India's AI trajectory as a bottom-up strategy—centred on frugal AI, application-specific small models, and digital public goods—closely aligns with the needs of manufacturing MSMEs to upgrade capabilities without triggering disruptive employment shocks. Rather than treating AI as a labour-replacing 'frontier race', a frugal, use case–led diffusion model lowers fixed costs, widens access, and makes adoption incremental. In this articulation, the employment-preserving logic is straightforward: When AI is adopted as a co-pilot and embedded into MSME workflows via shared digital infrastructure, it improves unit economics and competitiveness. This is the most reliable route to sustain and expand labour demand over time through scale, new orders, and entry into higher-value supplier networks.[21,22]

Importantly, the imperative for MSMEs to adopt AI extends beyond firm-level productivity; it is a matter of national strategic importance. As detailed in a previous PwC–Observer Research Foundation (ORF) report, 'The India opportunity: Developing resilient electronics supply chains', Indian MSMEs are pivotal in building a self-reliant electronics system design and manufacturing (ESDM) ecosystem.[23] This vision creates a powerful virtuous cycle. As manufacturing and service MSMEs adopt AI, they will generate significant demand for AI-enabling hardware such as IoT sensors, processors, and edge computing devices. This demand, in turn, can be met by a burgeoning domestic ESDM sector powered by other Indian MSMEs, thereby strengthening India's technological sovereignty and reducing import dependency.

However, this is not a journey MSMEs can undertake alone. It will require the support of a strong manufacturing-services ecosystem, alongside targeted government interventions that enhance competitiveness, build new capabilities, and deepen integration with global value chains.

This report accordingly examines how AI can enable this transformation for manufacturing MSMEs by:

(a)   Mapping the digitalisation journey of MSMEs and identifying key challenges encountered along the way that can be addressed through AI tools and platforms

(b)   Examining the 'input-side' support provided by the government to manufacturing MSMEs in order to strengthen their readiness to capture the emerging 'output-side' opportunities aimed at making them a part of global value chains and Viksit Bharat

(c)   Estimating the value to be captured by MSMEs from AI-linked opportunities across products, processes, and partnerships

(d)   Discussing the challenges—both current and prospective—that MSMEs face/will face in their AI-led transformation, along with the broader risks that may arise in the journey

(e)   Recommending targeted actions, based on PwC India's proprietary 3A2I framework, to be taken by MSMEs, governments, and associations/civil society to help MSMEs overcome these challenges and create sustained value with AI

21   Ministry of Finance, Government of India, 29 January 2026. Economic Survey 2025-26, 'Evolution of the AI ecosystem in India' (Chapter 14).

22   Press Information Bureau (PIB), Government of India, 29 January 2026. The Economic Survey 2025–26 envisions the way forward for India's AI ecosystem.

23   PwC India and ORF, February 2023. The India opportunity: Developing resilient electronics supply chains.

02

Advantage AI

Manufacturing MSMEs have progressed through two broad phases of digitalisation over the past decade. While these phases made them more connected and visible, they largely stopped short of driving deeper transformation or achieving productivity gains at scale—outcomes that characterise a more advanced, third phase of digital maturity.

The **first phase** can be described as the ICT era. During this period, MSMEs adopted low-cost smartphones, computers, email, and messaging platforms to communicate, coordinate operations, and showcase their products. However, these technologies were used largely as enablers of existing ways of working. Business models remained mostly unchanged, as MSMEs did not leverage digital tools to fundamentally transform processes or disrupt traditional operating structures.

The **second phase**, centred on e-commerce, online presence, and digital payments, began to unfold around 2016. Its adoption accelerated significantly during the COVID-19 pandemic, driven by expanding internet penetration in Tier-2 and Tier-3 cities due to affordable data,[24] deeper reach of the Digital India Stack into rural areas, GSTN-based compliance trails, and the rapid scaling of UPI-enabled payments. Together, these forces pushed MSMEs to actively reshape elements of their business models using digital technologies. In this phase, MSMEs increasingly built websites, joined e-commerce platforms and B2B marketplaces, and adopted digital payments at scale.

This shift transformed how many small firms managed customer discovery, order processing, and payments. As digital marketplaces and payment systems became routine, even micro and small units in Tier-2 and Tier-3 locations began responding to customers faster and

maintaining more consistent digital records of transactions. Over time, these records created a foundational data trail that made subsequent upgrades—such as inventory planning, cash-flow monitoring, and credit assessment—more feasible, even before MSMEs invested in full-scale ERP systems or shopfloor automation.

A survey of more than 1,500 MSME manufacturing units conducted by the Indian Council for Research on International Economic Relations (ICRIER)[25] revealed that in 2020–21, online sales accounted for 27% of total sales compared to 19% in 2019–20 and barely 12% in 2018–19—more than doubling in just two years. Moreover, there was an 80–90% increase in seller registration with large e-commerce companies in the second half of 2020, almost all of which were manufacturing MSMEs in smaller cities and remote areas. The survey further revealed that despite the COVID-19 shock, MSMEs that integrated with e-commerce platforms experienced an increase in sales, turnover, and profits.

While formal MSMEs moved towards near-universal usage of phones and messaging apps, **far fewer have integrated ERP systems, customer relationship management (CRM) tools, advanced analytics, or shopfloor automation into their core processes**—capabilities that define the third phase of digitalisation focused on deeper transformation and productivity at scale.

This gap persists for several reasons. Long-standing constraints such as informality, small scale, and capability gaps have created a low-productivity equilibrium in which limited access to capital and skills reduces the appetite for technology investments. Large numbers of MSMEs continue to operate informally or semi-formally (see Table 2), leading to weak bookkeeping and data trails, making software and analytics tools less useful.

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24   PIB, Government of India, February 1, 2025. Digital infrastructure in India.

25   Goyal, T. Kukreja, P., and Kedia, M., March 2022. MSMES Go Digital: Leveraging Technology to Sustain During the Covid-19 Crisis. New Delhi: ICRIER.

Another key issue is mindset. As one MSME manufacturer interviewed for this research put it, "Our short-term, survival-oriented mindset de-prioritises long-gestation digital projects." Low levels of digital literacy among many owners and employees—particularly in small and micro enterprises—have further limited the development of complementary managerial capabilities required to deploy ERP systems and software as engines of scalable growth. MSME functionaries also voiced concerns about their "inability to finance rising subscription fees and hidden integration costs", as well as the "risk of being locked into unsuitable or inflexible technology stacks".

Table 2: Extent of formalisation within key MSME manufacturing sectors[26]

NIC code	Description	Share
10	Manufacture of food products	18.58
13	Manufacture of textiles	8.83
14	Manufacture of wearing apparel	7.65
20	Manufacture of chemicals and chemical products	2.38
27	Manufacture of electrical equipment	2.13
21	Manufacture of pharmaceuticals, medicinal chemical and botanical products	0.90
29	Manufacture of motor vehicles, trailers and semitrailers	0.81
11	Manufacture of beverages	0.87
30	Manufacture of other transport equipment	0.59

Access to capital, a well-known challenge cited by current studies,[27] is increasingly undermining the technological competitiveness of MSMEs. A survey-based study conducted by the Small Industries Development Bank of India (SIDBI)[28] found respondents citing high competition and technology adoption as the biggest obstacles to their growth. India's rapidly evolving business landscape has intensified competition, making it increasingly difficult for MSMEs to stay ahead of the curve. At the same time, the need to adopt new technologies to remain competitive presents a major hurdle, as many MSMEs lack the financial resources and technical expertise required to effectively leverage these technologies.

Charting MSMEs' digital transformation

The emergence of AI offers an opportunity to fundamentally reshape how India's MSMEs address long-standing challenges that have constrained their digital transformation—particularly high financing and operating costs, gender-related barriers, and weak internalisation of technology.

On the financing front, AI-driven credit assessment and alternative data analytics have the potential to expand access to formal credit for MSMEs, which have traditionally been excluded due to lack of collateral or credit history. Using machine learning models, FinTech lenders and banks can evaluate transaction data, GST returns, e-commerce sales, and digital footprints to generate more accurate risk profiles, lowering the cost of credit for viable 'thin file' MSME borrowers.[29] Moreover, AI-based underwriting and automated loan processing can reduce turnaround time and administrative costs, enabling smaller ticket loans to be offered more sustainably and at scale, especially to micro enterprises.

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26   NITI Aayog and Institute for Competitiveness, March 2025, Enhancing MSMEs competitiveness in India.

27   SIDBI, 13 May 2025, Understanding Indian MSME Sector: Progress and Challenges.

28   Ibid.

29   World Bank and International Finance Corporation, 18 May 2022. Fintech and SME Finance: Expanding Responsible Access. Washington, DC: World Bank.
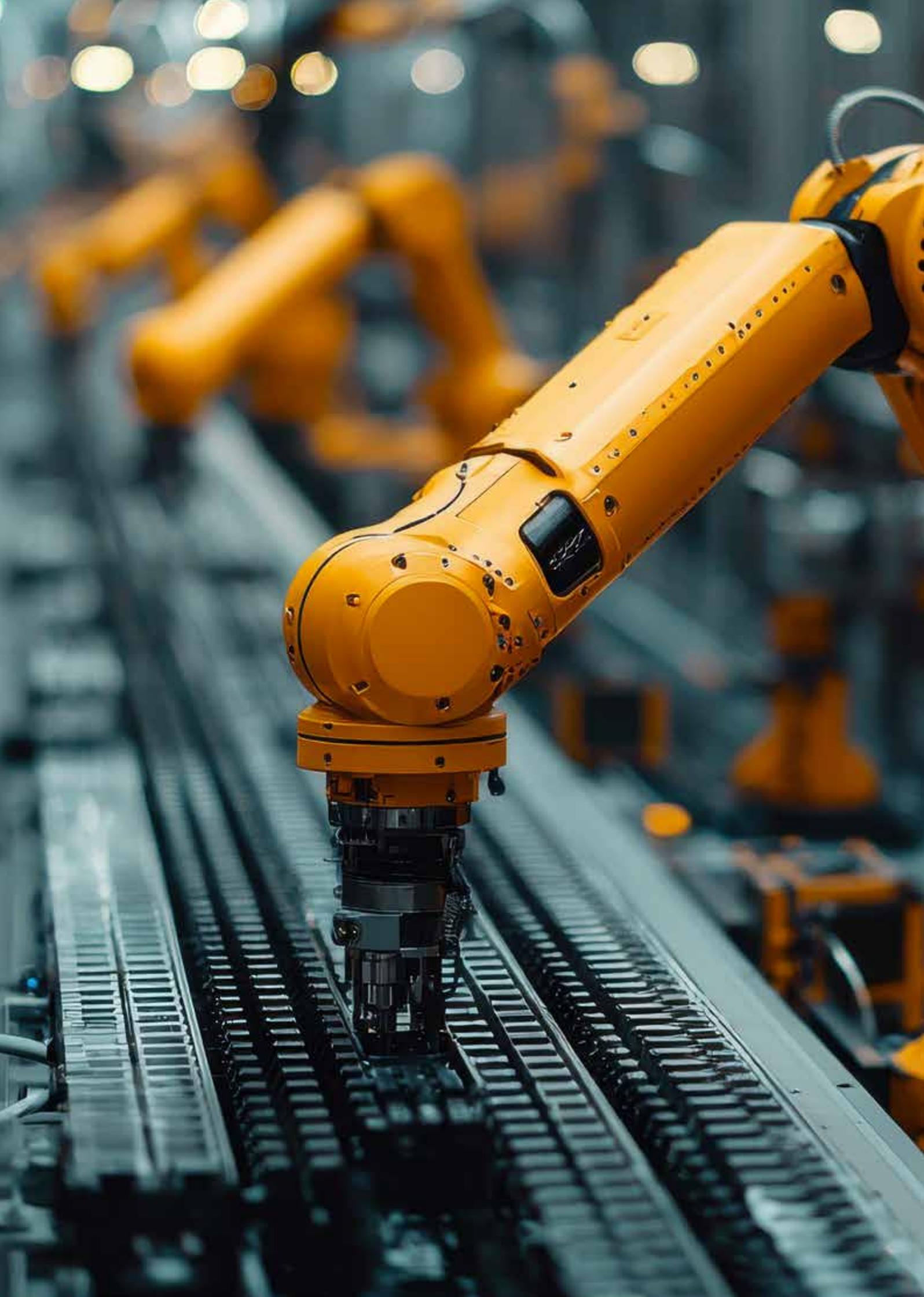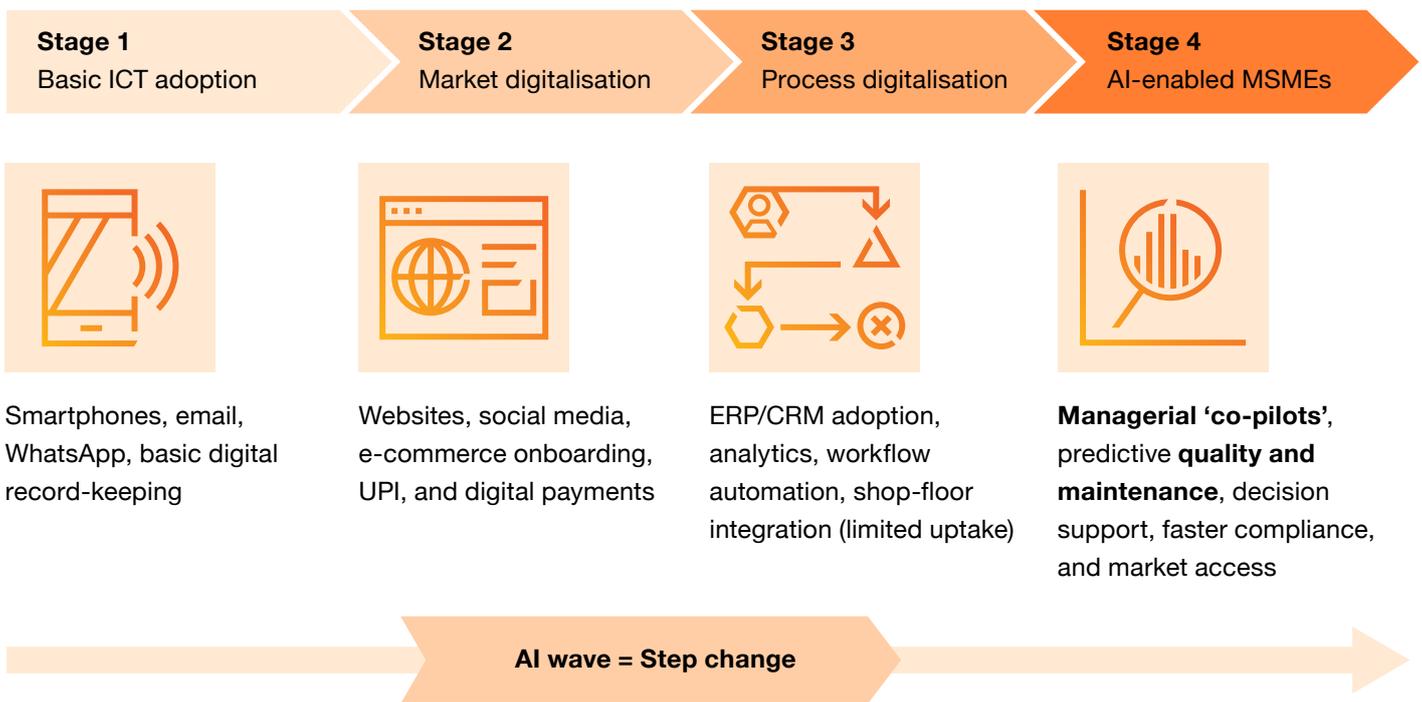
Figure 1: The digital journey of MSMEs in India

Stage 1	Stage 2	Stage 3	Stage 4
Basic ICT adoption	Market digitalisation	Process digitalisation	AI-enabled MSMEs
Smartphones, email, WhatsApp, basic digital record-keeping	Websites, social media, e-commerce onboarding, UPI, and digital payments	ERP/CRM adoption, analytics, workflow automation, shop-floor integration (limited uptake)	**Managerial 'co-pilots'**, predictive **quality and maintenance**, decision support, faster compliance, and market access

AI wave = Step change

Source: ORF

On the operational side, AI tools such as predictive maintenance, intelligent inventory management, demand forecasting, and process automation can significantly reduce operating costs and improve productivity. For example, AI-enabled supply chain optimisation can help MSMEs manage volatile input prices and demand fluctuations, while conversational AI and chatbots can deliver low-cost customer support and sales, particularly for small firms selling via digital marketplaces.[30] AI-powered language technologies and interfaces in Indian languages can make digital solutions accessible to entrepreneurs with limited English proficiency or digital literacy. Generative AI (GenAI) solutions can assist MSMEs in tasks such as product descriptions, marketing content, basic accounting support, and documentation—functions many small firms cannot afford to staff.

When it comes to technology internalisation, a core challenge for Indian MSMEs has been not merely access to digital tools, but also the capability to integrate them into business processes and translate adoption into tangible value. AI can help here through intelligent, low-code/no-code tools that simplify adoption, automate routine tasks, and guide decision-making via user-friendly dashboards and recommendations.

Over time, AI-based analytics can help MSMEs move up the value chain by providing insights on pricing, product diversification, export opportunities, and supplier selection that were previously available only to larger firms with dedicated analytics teams.

AI can also play a role in addressing gender dimensions of MSME development. For instance, algorithmic credit scoring based on digital transactions rather than collateral can help reduce the gender bias embedded in traditional lending practices. On the other hand, AI-driven training and mentoring platforms can deliver personalised, on-demand entrepreneurship and digital skills support to women entrepreneurs who face time, mobility, and social constraints.

How, then, is the government responding to these opportunities—and what is the value for MSMEs as the AI wave unfolds? The next chapter addresses these questions.

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30   OECD, February 2021. The Digital Transformation of SMEs. Paris: OECD Publishing.

03

Creating value with AI for manufacturing MSMEs

AI is at the core of India's Viksit Bharat vision. Towards this end, the government has already committed USD1.15 billion to the IndiaAI Mission[31] in order to build national capability across infrastructure, data, talent, and adoption, alongside approving ten semiconductor plants to strengthen the electronics ecosystem.

India has also identified several AI startups to develop Indian-language and voice models, a critical priority in a country where millions remain non-literate. The AI Kosh repository, now hosting over 6,200 local datasets,[32] further strengthens this innovation base. A further accelerator for MSME adoption is the language layer being built by Bhashini,[33] which aims to enable Indian-language voice and text capabilities at scale. For small firms, it determines whether AI can be used in the rhythm of daily work: voice-led customer engagement, regional interfaces for basic accounting and documentation, and faster access to shopfloor know-how such as SOP look-ups and troubleshooting guidance. By lowering the language and literacy barriers, the AI stack becomes more usable in areas where MSMEs are concentrated, especially outside large metros. Combined with digital public infrastructure such as UPI and the Account Aggregator, AI can drive inclusion through voice-led access, stronger fraud detection, and affordable, scalable services.

Here, it's important to draw a distinction between 'non-literate' and 'non-formally educated' individuals. A significant portion of the MSME workforce, while lacking formal schooling, possesses functional literacy—the ability to read and understand basic text, numbers, and instructions. This demography represents a massive, often overlooked, pool of potential AI users. For this segment, conversational AI tools, especially those with regional voice and text capabilities, are not just a future possibility but an immediate opportunity. Functionally literate workers can readily adopt and benefit from AI-powered applications that assist with tasks like inventory management, quality checks, and accessing SOPs through simple voice commands or text-based interfaces. Therefore, the focus should not solely be on developing solutions for the non-literate but also on creating intuitive and accessible tools for the functionally literate, who can act as a bridge to wider AI adoption within the MSME ecosystem. Government estimates suggest AI adoption could add up to USD1.7 trillion to India's economy by 2035, making it a defining growth driver of the coming decade.[34] And they believe that this can only be achieved with active MSME participation.

Building on this macro vision, the government is focusing on adopting initiatives that can support MSMEs that often lack the capital, skills, and infrastructure to adopt AI at scale. Recognising that broad-based productivity gains will only actualise if smaller firms can modernise their operations, the focus has shifted towards 'input-side' schemes enabling access to formalised credit, technology, skills, and R&D as well as testing and quality control-related support.

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31   PIB, Government of India, 7 March 2024. Cabinet approves over Rs 10,300 crore for IndiaAI Mission, will empower AI startups and expand compute infrastructure access.

32   IndiaAI, Government of India. AIKosh (IndiaAI Datasets Platform).

33   PIB, Government of India, 24 May 2022. MeitY holds brainstorming with researchers & startups to shape strategy for Digital India BHASHINI - India's AI led language translation platform.

34   NITI Aayog, September 2025. AI for Viksit Bharat: The Opportunity for Accelerated Economic Growth.

Input-side support

Creating formalised access to credit: As acknowledged in the Economic Survey 2025-26, many micro enterprises face numerous constraints in accessing formal credit due to limited collateral and documentation readiness. This is despite expanding credit footprints and growing digital integration.

Recognising this, public sector banks (PSBs) have launched the credit assessment model (CAM) based on digital footprints for MSMEs in 2025. Leveraging digitally fetched and verifiable data to enable automated loan appraisal for MSMEs, this model utilises objective decisioning for all loan applications. It deploys model-based limit assessment for both existing-to-bank and new-to-bank MSME borrowers. Along with improving ease of doing business for MSMEs, this model also integrates credit guarantee schemes such as the Credit Guarantee Fund Trust for Micro and Small Enterprises. Between 1 April and 30 November 2025, MSME loan applications worth over INR 3.2 lakh crore were submitted, of which over INR 41.5 thousand crore (more than USD 4.66 billion) worth of applications have been sanctioned by PSBs[35] under CAM-based credit initiatives.[36]

Table 3: Growth in deployment of gross bank credit to MSMEs (Year-on-Year percent), select periods

Segment	March 2024	August 2024	March 2025	August 2025
Micro and small enterprises	14.7	13.4	8.8	20.9
Medium enterprises	13.3	19.2	18.6	13.1
Total MSME credit	**14.3**	**15.1**	**11.7**	**18.5**
Large industry (comparison)	6.4	7.7	6.2	1.8

Source: Economic Survey 2025-26

In fact, in recent times, growth in the flow of credit to MSMEs has outpaced that to large companies within the private sector (see Table 3).

Making digital technologies, including AI, accessible and affordable: MSMEs—especially micro and small enterprises, which constitute the bulk of manufacturing MSMEs—find it difficult to fund bespoke AI or costly enterprise software, despite recognising their usefulness from a productivity standpoint. A recent survey shows that while 87% expect productivity gains from greater AI use, 91% of MSMEs believe AI must be affordable for them to do so.[37]

Initiatives such as the Credit Linked Capital Subsidy and Technology Upgradation Scheme (CLCS-TUS) provide an upfront capital subsidy of 15% (on institutional finance of up to INR1 crore availed) for induction of well-established and improved technologies, including automation and AI-enabled tools, in the specified sub-sectors/products approved for micro and small enterprises.[38]

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35   INR41.5 thousand crore converted to US dollars at the exchange rate of USD1 = INR89.

36   Ministry of Finance, Government of India, January 2026. Economic Survey 2025–26.

37   Pandey, A., 18 June 2025. Digital divide: MSMEs struggle to tap into AI revolution as high costs block access, The Economic Times.

38   National Institute for Micro, Small and Medium Enterprises (Ni-MSME). Credit Linked Capital Subsidy Scheme for Technology Upgradation.

In January 2026, the government announced an ambitious plan to equip 72 million MSMEs with machine monitoring, energy management systems, and shop-floor software to meet stricter compliance, traceability, productivity, and energy-efficiency norms. The first planned pilot in Gujarat will deploy sensors, data analytics, automation, and AI for 750 MSMEs, with each enterprise paired with a startup responsible for installing and supporting plug-and-play digital and AI solutions. Each technology provider will receive INR50,000 per unit, covering hardware, analytics, and one year of support.[39]

Addressing workforce-level skills gaps: AI adoption is often regarded as a 'technology' challenge related to tools, costs, and infrastructure. But it is equally a 'capability' challenge, stemming from limited skills and knowledge. Recognising the need for building an AI-literate workforce for MSMEs, the country's ITIs and NSTIs—both of which are prominent skilling bases for MSMEs—have introduced a course on AI. Trainees of the Craftsman Training Scheme at ITIs undergo a micro-credential AI course delivered in collaboration with industry and academic experts.[40]

Other major national initiatives are well placed to begin incorporating learning components designed for MSMEs. These include the FutureSkills PRIME initiative under the IndiaAI Mission, which aims to reskill and upskill the workforce in emerging technologies such as AI; and the Data and AI Labs set up by the National Institute of Electronics and IT (NIELIT) across India's Tier-2 and Tier-3 cities. These labs are intended to "serve as innovation and learning hubs, giving learners hands-on experience with AI tools [and] empowering them to learn, experiment, and innovate locally."[41]

These regions represent a vast, untapped pool of young aspirational talent. The objective of establishing targeted skilling programmes, innovation hubs, and university partnerships in these areas is to build a sustainable talent pipeline for local MSMEs. This approach is helping democratise access to high-value skills, stimulate local economic growth, and curb urban migration, contributing to a more distributed and resilient national AI ecosystem.

Bridging R&D and solutioning gaps with MSME–academia collaboration: Manufacturing MSMEs often lack in-house R&D capacity, advanced testing facilities, and specialised technical talent for driving AI and other digital projects—a gap that can be bridged by strengthening collaboration with universities and technical institutes of repute. Recognising this, the government has promoted and subsidised collaborative models that bring MSMEs together with technology centres housed within institutions such as the IITs.

Under the MSME Innovative Scheme, businesses can access funding up to INR40 Lakh for manufacturing advancement projects using technologies such as AI, with IITs and NITs acting as host institutes.[42] The Walmart Centre of Tech Excellence at IIT Madras helps MSMEs transform their processes, workflows, and operational efficiency through cutting-edge AI and IoT solutions.[43]

Enabling occupational safety and health (OSH), especially in the textile and apparel industry: OSH risks could manifest as physical risks (e.g. insufficient ventilation, extreme heat, injuries from contact with moving parts of machinery or tools), ergonomic risks (e.g. monotonous, highly repetitive, high-speed tasks, and awkward working positions), psychological risks (e.g. job insecurity, verbal abuse, intensified targets), biological risks (e.g. poor sanitary conditions or contamination in the workplace), and chemical risks (e.g. risks associated with long-term exposure to surfactants, bleaches, acids, dyes, and pigments—especially in industries such as textiles). AI can help identify these risks and minimise their impact (see Table 4).

39 Kumar, D., 20 January 2026. India's MSMEs get a digital makeover to compete with global suppliers. Mint.

40 PIB, Government of India, Ministry of MSME, 21 August 2025. MSME TEAM, PMS, Global Mart and eKhadiIndia digitally empower MSME including SC/ST entrepreneurs for online marketing and e-commerce integration.

41 IndiaAI, Government of India, 6 November 2025. IndiaAI Data & AI Labs: Empowering India's youth for jobs in data economy.

42 Ministry of MSME, Government of India. MSME INNOVATIVE.

43 Indian Institute of Technology Madras (IIT Madras), 28 February 2024. Walmart launches Center for Tech Excellence at IIT Madras.

Table 4: AI applications for OSH risk management

Type of OSH risk	AI application/use case
Physical risks	**Autonomous monitoring systems:** While IoT-based alarm systems monitor factory conditions and send alerts, agentic AI could take this a step further. When unsafe or unhealthy conditions are detected, AI agents could autonomously adjust ventilation systems. They could also autonomously collect data on workplace incidents through voice or sensor input, generate reports, and automatically notify relevant compliance officers. This reduces reporting delays and improves response times, fostering a safer work environment.
Ergonomic risks	**Smart ergonomics:** AI-driven wearable devices could be used to monitor workers' postures and movements in real time, recommending ergonomic adjustments or alerting supervisors when injury risks emerge. Building on this, agentic AI could enable adaptive workload management by dynamically adjusting shifts, task assignments, or workloads based on real-time assessments of worker fatigue, stress levels, or functional capacity detected through biometric sensors.
Psychological risks	**AI-powered health bots:** Employee-facing AI assistants could provide personalised health advice, answer queries on workplace safety, and guide workers on mental health resources. These AI agents could operate autonomously, be available 24/7, and escalate serious health concerns to human supervisors when needed.
Chemical risks	**Automated contaminant detection and hygiene monitoring:** AI agents could detect elevated levels or contamination, and automatically trigger ventilation systems, alert workers, or initiate sterilisation protocols. They could monitor worker hygiene practices through camera feeds or wearable devices, ensuring adherence to protective equipment requirements and sanitation guidelines.

Source: PwC analysis

Output-side opportunity

On the output side, AI-related opportunities present themselves in three distinct ways for MSME manufacturers:

1. Scaling, enriching and reinventing value with AI across the MSME manufacturing value chain

2. Becoming partners with larger players operating in three layers—energy, infrastructure, and chips—of the five layers of AI[44]

3. Integrating themselves across global value chains

Scaling, enriching, and reinventing value with AI

Many MSMEs perceive AI as a technology that drives productivity or efficiency. But it goes beyond that. Unlike many digital technologies, AI can be deployed across the manufacturing value chain to perform three key roles.[45]

AI as a scaler: This refers to the deployment of AI technologies across multiple facets of manufacturing operations to increase the throughput of activities. These capabilities can be leveraged by companies to decrease processing times and/or increase resource capacity.

AI as an enricher: While AI helps to scale up, it can also be used simultaneously to augment the quality of the output. Here, AI's role is to enrich operations. More specifically, AI can enhance human capabilities by providing tools that augment decision-making, creativity, and innovation. This role of AI focuses on complementing human capabilities rather than replacing them.

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44   Bhati, D., 21 January 2026. India is not second-tier in AI, Ashwini Vaishnaw rebuts IMF chief at Davos on AI ranking. India Today.

45   PwC Belgium, 9 January 2025. The game-changer – roles and impact of AI.

AI as a reinventor: Besides scaling and enriching, AI can radically transform how businesses create, deliver, and capture value. In such cases, AI disrupts current operations. Identifying these opportunities calls for outside-the-box thinking, as the challenge is no longer about reworking existing operations, but about fundamentally reinventing them. The following table provides an illustrative overview of AI's contribution in each of these roles.[46]

Table 5: The different roles of AI across the value chain—illustrative use cases relevant to MSME manufacturers

AI as a scaler—near-term opportunities, many of which MSMEs can unlock with AI by leveraging a host of existing government initiatives			
AI-driven predictive maintenance accelerates model development through faster data analysis, detects subtle anomalies traditional methods miss, and continuously improves with real-time data. Together, these capabilities significantly enhance prediction accuracy, enabling earlier identification of equipment failures, reducing unplanned downtime, and extending machinery lifespan while improving overall maintenance efficiency.	**AI vision inspection** combines computer vision and AI models to detect defects in real time, faster, and more accurately than humans and without fatigue. It enables near 100% inspection with limited resources, ensuring only products that meet quality standards reach customers, while optimising quality control processes and resource allocation.	**AI-driven supply chain optimisation** uses real-time forecasting, inventory optimisation, and logistics management to automate complex, repetitive tasks continuously. This improves planning accuracy, reduces stock imbalances, and streamlines distribution, creating more efficient, resilient, and responsive supply chains that better match supply with demand while lowering operational costs.	**Autonomous mobile robots (AMRs)** use intelligent navigation to move safely in dynamic environments without fixed infrastructure, unlike automated guided vehicles (AGVs). They provide flexible, 24/7 internal transport and adapt quickly to changing layouts, tasks, and volumes, making them especially valuable for scale-ups and rapidly evolving production environments.
AI-based chatbots use NLP and machine learning to handle customer inquiries in a human-like way, 24/7. They manage multiple requests simultaneously, offloading routine questions from human agents, who can focus on complex issues. This reduces waiting times and increases overall customer service capacity and efficiency.	**AI-powered OCR** converts scanned documents and images into accurate, searchable text, eliminating manual data entry. By automating data capture across diverse document types, it speeds up administrative workflows, reduces errors, and frees staff time and resources for higher-value, analytical, and customer-facing activities instead of repetitive clerical tasks.	**AI-based soft sensors for production monitoring** replace physical sensors or manual measurements in cases where direct measurement is costly, difficult, or prone to wear and tear. They predict real-time production parameters by analysing historical and live data. AI algorithms elevate their accuracy.	**GenAI for software development** leverages advanced GenAI and machine learning algorithms to automate code generation, debugging, and testing. It can also assist in creating detailed documentation and facilitate code reviews.

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46   PwC Belgium, 9 January 2025. The game-changer – roles and impact of AI.

AI as an enricher—medium-term opportunities to be unlocked with AI that can be propelled with MSME–academia as well as MSME–startup collaboration

AI-driven golden batch and setpoint optimisation learns complex relationships between historical inputs and outputs to identify the most influential parameters and propose new setpoint combinations. Operators use these suggestions to adjust production settings in real time, improving process efficiency, product consistency, yield, and quality under varying operating conditions.

AI chatbots for organisation-specific information retrieval use a retrieval augmented generation (RAG) technique to understand questions and answer from internal content. They help workers quickly find SOPs, steps, or reference values without manual search, improving knowledge transfer, speeding up problem-solving, and providing accurate, context-specific information at the right moment.

GenAI-assisted product design, largely beneficial in the conceptual phase, rapidly generates visual mock-ups from text, enabling quick exploration of diverse ideas and fast iterations. Engineers stay focused on creative decisions, while GenAI supports visualisation, speeding up early-stage design and improving the breadth of concepts considered.

Personal AI assistants support workers in time-consuming non-value adding tasks such as drafting and summarising of documents, creation of meeting minutes, and generation of to-do lists.

Collaborative robots (co-bots) work safely alongside humans, handling repetitive or hazardous tasks such as heavy lifting. With AI, they gain better real-time decision-making, adapt to changing environments, and learn from experience, freeing workers to focus on more complex, skilled, and creative aspects of manufacturing processes.

AI as a reinventor—long-term opportunities to be unlocked with AI for digitally mature MSMEs

Smart and lights-out factories can implement AI to create highly automated and interconnected manufacturing environments where machines, systems, and humans communicate and collaborate seamlessly.

AI-driven mass customisation can help manufacturers produce highly personalised products at scale, catering to individual customer preferences without sacrificing efficiency (e.g. AI design tools combined with 3D printing).

Product-as-a-service (PaaS) wherein companies use AI to shift from selling products to offering PaaS, using data to provide ongoing maintenance and support (e.g. power by the hour or compressed air as a service).

AI-enhanced digital twins wherein AI enables faster creation of virtual replicas of physical assets and enriches the created models, allowing companies to simulate operations, optimise processes, and explore new business opportunities in a virtual environment before implementing them in the real world.

Source: PwC analysis

Our research covering AI initiatives at the largest listed MSME manufacturers revealed how some have already started building value with AI (see Figure 2).

Figure 2: The scaler, the enricher, and the reinventor—examples of Indian MSMEs

|	Pre-AI challenge	AI solution	Impact
AI as a scaler	A customer of the MSME, a manufacturer of precision components for the automotive and aerospace sector, faced challenges in terms of identifying surface defects in its connecting rods, including burrs and scratches. These defects impacted the functionality, including causing reduced engine performance and also directly impacted the manufacturer's reputation.	The MSME provider formulated a solution using robotics and machine vision connected through an AI-enabled system. The AI algorithm enabled the system to analyse pictures of connecting rods to identify surface defects, which then enabled the robotic system to take a go/no-go decision to either pass the product down the manufacturing line or reject it.	This enabled identification of burrs and scratches which were as small as 150 microns, and were unidentifiable through visual inspection. The accuracy of the detection also increased to 99.5%. The systems' false positive rate reduced below 1%, which reduced manual rework and errors.
AI as an enricher	India imports around 70-80% of its medical devices, indicating a high dependence on suppliers from other geographies for high-value equipment and many categories of medical implants.* Even in cases of implant creation, surgeons faced challenges in terms of the time taken to manufacture implants based on CT/MRI scans through manual designing. This also increased the risks involved and time needed for operations/medical procedures.	An MSME focusing on 3D printing for additive manufacturing was able to utilise technologies such as AI, digital twins, and AR/VR to transform how these tools could be used in healthcare. AR helps surgeons to overlay patient-specific additive manufacturing (AM) models and identify implant positioning, while AI helps in optimising the designs generated so that the implants are lightweight and also manufacturable. AI is also being used to convert CT/MRI scans into 3D designs for implants. All of this is done within hours. The workflow is then used for manufacturing the implants, reducing the overall time needed.	This 3D AM has resulted in reduction of operation times by almost 15-40%, while also supporting faster recovery. This also reduced the workflow times for dental trauma cases from the time of incident to the time of treatment to days instead of weeks. This is incentivising increased adoption of AM for medical implants.

*Source: IBEF, Medical devices industry in India

Source: PwC analysis

AI as a reinventor

Pre-AI challenge

A BSE-listed MSME predominantly focused on manufacturing continuous emission monitoring systems and steam water analysis systems catering to oil and gas, power, and chemical plants as a one-time hardware purchase solution. For diagnostics and maintenance, it relied majorly on field visits, which were not scalable. On-site troubleshooting across remote locations was difficult, especially during monsoons, increasing travel and logistics costs. Another challenge the firm faced was the lack of any recurring revenue streams.
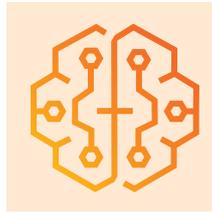
AI solution

As part of a company-wide strategy rehaul, the firm introduced the use of IoT sensors in its analyser systems. This innovation enabled real-time monitoring through cloud-based predictive analytics. It also used remote dashboards, allowing its engineers to tune systems and predict challenges or issues without having to travel for site visits. This unlocked a new revenue stream for the firm in the form of automation and digitisation, by commercialising lifecycle annual maintenance contracts (AMCs) through remote and predictive diagnostics.

Impact

This business model rehaul using AI enabled generation of INR23.9 crore in revenue through its digital segment for FY25. This helped position the MSME as an Industry 4.0 powered service provider with sustainable revenue streams.

Source: PwC analysis

Value generation by AI

PwC's 'Value in motion' research[47] reveals that AI's contribution to the overall manufacturing growth of India by 2035 would potentially be 19.2%.[48] **Based on this insight, it is estimated that AI could contribute between** **USD135.6–149.9 billion to the value creation journey of manufacturing-MSMEs, as early as 2035, assuming that they account for 50% of the nation's manufacturing value added by then (see Table 6).**

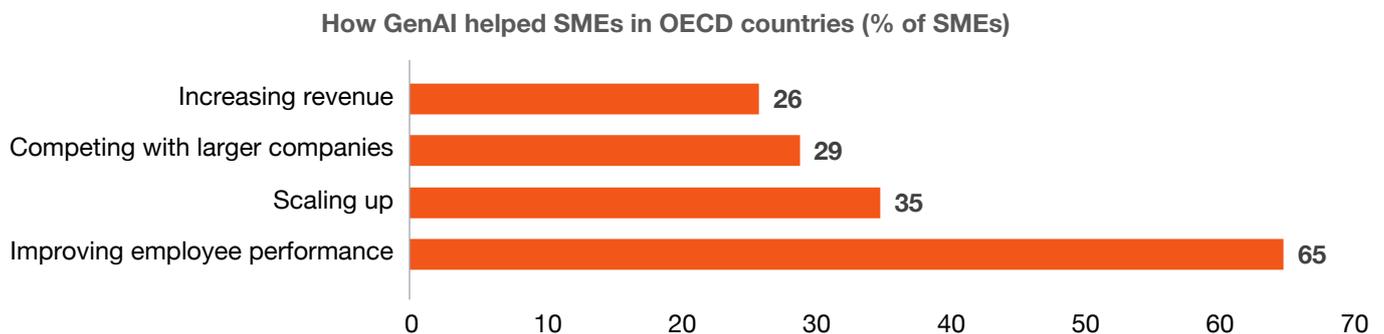**Table 6: Potential contribution of AI to MSME growth**

Scenarios	Value potential of AI by 2035 at a nominal level in USD billion
MSME contribution to manufacturing (35.4% in 2035, the same as in FY23–24)	83.2–91.9
MSME contribution to manufacturing (40% in 2035)	99.7–110.2
MSME contribution to manufacturing (45% in 2035)	117.7–130.1
MSME contribution to manufacturing (50% in 2035)	135.6–149.9

Source: PwC analysis

Such AI-driven value creation for MSME manufacturers will arise primarily from productivity and efficiency gains—largely resulting from its role as a scaler and enricher—across the manufacturing value chain. However, AI's contribution in its role as a reinventor—enabling new business models, products, and services—is expected to be significantly higher although this is difficult to quantify at present.

These findings are broadly consistent with evidence from other geographies, which demonstrates that AI skills and applications have a marked impact on small and medium enterprises (SMEs). Across OECD countries for example, a 2025 survey showed that nearly a third of all SMEs used GenAI across core recurring functions or one-off tasks, and most often a combination of the two. GenAI clearly helped SMEs achieve more, chiefly by improving employees' performance, but also by allowing them to scale up, compete with larger companies, and increase revenue.[49,50]

Figure 3: Benefits of GenAI—an OECD-SME experience

How GenAI helped SMEs in OECD countries (% of SMEs)

Increasing revenue	26
Competing with larger companies	29
Scaling up	35
Improving employee performance	65

Source: Observer Research Foundation, as adapted from 'Generative AI and the SME workforce: New survey evidence' (OECD, 2025)

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47   PwC India, 2025. Value in motion.

48   PwC India, 2026. AI Edge for Viksit Bharat.

49   OECD, 5 November 2025. Generative AI and the SME Workforce: New Survey Evidence. Paris: OECD Publishing.

50   SMEs and MSMEs are defined differently in different geographies. For instance, the OECD labels an enterprise as an SME if it employs less than 250 people. SMEs are further subdivided into micro enterprises (<10 employees), small enterprises (10–49 employees), and medium-sized enterprises (50–249 employees). By contrast, in India, MSMEs are identified on the basis of specific thresholds of investment and annual turnover. These disparities about scale and probable organisational type notwithstanding, the central point about AI's impact on SMEs and MSMEs remains valid. In fact, given the generally smaller scale of MSMEs in India, AI is likely to have a higher multiplier effect on them.

Partnering with large chip, energy, and infrastructure players to build India's AI foundation

Speaking at the World Economic Forum at Davos held in January 2026, India's Union Minister for Railways said that the investments expected to materialise in different types of AI-relevant infrastructure (data centres, semiconductor chips) by the end of 2026 would be to the tune of USD150 billion.[51] With AI estimated to contribute USD1.7 trillion to the economy by 2035,[52] the total investment in AI infrastructure required to realise this potential could conservatively be expected to be in the range of USD500 billion.

If non-tech-intensive capital goods account for 20–30% of capex on these projects—an area where MSMEs are currently active—the total opportunity that could open up for MSME manufacturers would be in the range of USD100–150 billion.

And such opportunities are material. In fact, as a part of its USD8.4 billion initiative, the India Semiconductor Mission (ISM), other than approving landmark projects such as Micron's assembly, testing, marking, and packaging (ATMP) facility and Tata Electronics' Semiconductor Fab, has also approved 24 projects for financial support and 100 companies for design infrastructure support for chip design to be implemented by domestic start-ups and MSMEs.[53]

Contribution to GVCs

Despite India's recent gains in integrating into GVCs, several ASEAN peers remain more deeply embedded, indicating significant headroom for growth. GVC participation is led by the Philippines (57.5%), followed by Thailand (51.8%), Indonesia (50%), and Vietnam (49.3%), while India stands at 41.4%.[54] The competitiveness reflects ASEAN's strong hold in regional production, anchored in high manufacturing FDI and deeper backward linkages.

The MSME sector is central to India's GVC integration, accounting for over 45% of total exports.[55] The role of Indian manufacturing MSMEs in GVCs remains significantly under-recognised, despite their substantial value share in export-oriented sectors such as auto components, engineering goods, textiles, pharmaceuticals, chemicals, electronics sub-assemblies, and precision parts. Their integration is deepest in segments where India is already a trusted sourcing base—for instance, auto components, which recorded exports of approximately USD22.9 billion in FY 2024–25 and are underpinned by a large MSME supplier ecosystem.

As multinational firms increasingly view India as an alternative manufacturing and export hub, it is expected that deeper GVC participation could generate an additional USD300–500 billion in exports over the next five years. Even if MSMEs were to account for a third of this additional export revenue accruing due to greater GVC integration of India, this would unlock a USD100 billion opportunity for the sector.

AI has a critical role to play in realising this potential. As Indian MSMEs transition from a predominantly domestic orientation to a more outward-looking growth strategy, they must not only build backward linkages but also insulate themselves against global shocks arising from geopolitical tensions, regulatory uncertainty, and trade disruptions. AI can enable this shift by enhancing agility and adaptability, while serving as a key enabler of deeper GVC integration through improved global compliance and traceability, stronger risk management capabilities, and expanded access to international markets.

51 CNBC-TV18, 21 January 2026, Investments in India's AI infra may cross $150 billion in 2026.

52 PIB, Government of India, 30 December 2025. Transforming India with AI: Over ₹10,300 crore investment & 38,000 graphics processing unit (GPUs) powering inclusive innovation.

53 Ministry of Finance, Government of India, 29 January 2026. Economic Survey 2025–26.

54 Urata, S., ed., 2021. Enhancing SME Participation in Global Value Chains: Determinants, Challenges, and Policy Recommendations. Tokyo: Asian Development Bank Institute.

55 Government of India, Ministry of MSMEs, 2025. Annual Report 2024–25. New Delhi: Ministry of Micro, Small and Medium Enterprises.

According to UN Trade and Development (UNCTAD), MSMEs face more stringent quality and compliance requirements while integrating into GVCs.[56] Several ASEAN MSMEs have benefited from early exposure to global standards and quality requirements by participating as Tier-2 and Tier-3 suppliers in GVCs. For India, deploying AI in production offers a clear opportunity to enhance its MSMEs' global competitiveness and shorten the learning curve by reducing defect rates and capital costs, while improving traceability and compliance. For instance, in the automotive sector, the use of IoT and AI has reduced maintenance time by 5%, improved quality traceability of parts, and enhanced process quality by 1%.[57] Similarly, the MSME steel and metal industry leverages AI-integrated customer procurement systems, logistics tools, and payment gateways to create an end-to-end traceable pipeline.[58]

To improve risk management, AI can enable MSMEs to make informed decisions by effectively identifying future demand and potential risks for geographies using historical sales data and external factors. It allows enterprises to optimise inventory and reduce carrying costs. Certain MSMEs in India are using AI-ML tools to manage inventory, make informed purchasing decisions, and meet buyer demand by leveraging real-time sales data.[59] Additionally, high logistics costs are a major roadblock to GVC integration for MSMEs in India, accounting for about 7.97% of total GDP.[60] AI-based applications have the potential to enhance MSMEs' logistics performance by providing route optimisation and cutting delivery timelines by 15–20%.[61]

To improve global market access further, AI-driven solutions can make cross-border e-commerce more accessible by automating end-to-end seller onboarding, supporting compliance in marketplace operations, and easing cataloguing, data management, and client servicing. Automated ad traffic validation, performance monitoring, and lead quality assessment through AI could enhance investment returns and brand reputation across the digital ecosystem.[62]

India and its ASEAN peers have differential yet complementary positions in GVCs. A significant number of Indian MSMEs are driven by upstream linkages, supplying inputs, and intermediate goods. In contrast, ASEAN MSMEs are more deeply positioned in downstream linkages, converting intermediate inputs into exportable final products within the GVCs.[63] AI adoption by MSMEs can build a strategic bridge, enabling deeper India–ASEAN GVC integration based on complementarities. AI-enabled quality compliance and traceability measures by Indian MSMEs can ensure credibility with strict buyer specifications. It can strengthen supplier discovery and trust through AI-powered platforms that match MSME capabilities with sourcing requirements. Further, AI-driven logistics can allow Indian MSMEs to meet global delivery benchmarks and integrate into ASEAN and other global production networks. The complementarities can be especially beneficial for emerging sectors such as electronics, green manufacturing, agri-food processing, and pharmaceuticals, where India possesses a strategic edge.

What, then, prevents MSMEs from fully realising these opportunities? The next section maps the key challenges they face.

56   UNCTAD, 2010. Integrating Developing Countries' SMEs into Global Value Chains. New York and Geneva: United Nations.

57   Jacob, S., March 25, 2024. With artificial intelligence at the wheel, Hyundai's TN unit shifts gear. Business Standard.

58   SMEStreet Edit Desk, 17 July 2025. Artificial intelligence enables smarter planning in metal supply chain. SMEStreet.

59   Shinde, S., 26 January 2026. SaaS major Zoho launches ERP platform to tap SME market in India', Business Standard.

60   National Council of Applied Economic Research (NCAER), September 2025. Assessment of Logistics Cost in India. New Delhi: Logistics Division, Department for Promotion of Industry and Internal Trade (DPIIT).

61   SMEStreet Edit Desk, 17 July 2025. Artificial intelligence enables smarter planning in metal supply chain. SMEStreet.

62   Khan, S. 18 September 2024. AI for MSMEs: Bridging the gap between technology and business goals is important. The Economic Times (ET Online).

63   Prakash, A., ed., 2024. GVC Mapping for ASEAN and India: Trade Prospects in the Current Economy and Goods of the Future. Jakarta: Economic Research Institute for ASEAN and East Asia (ERIA).
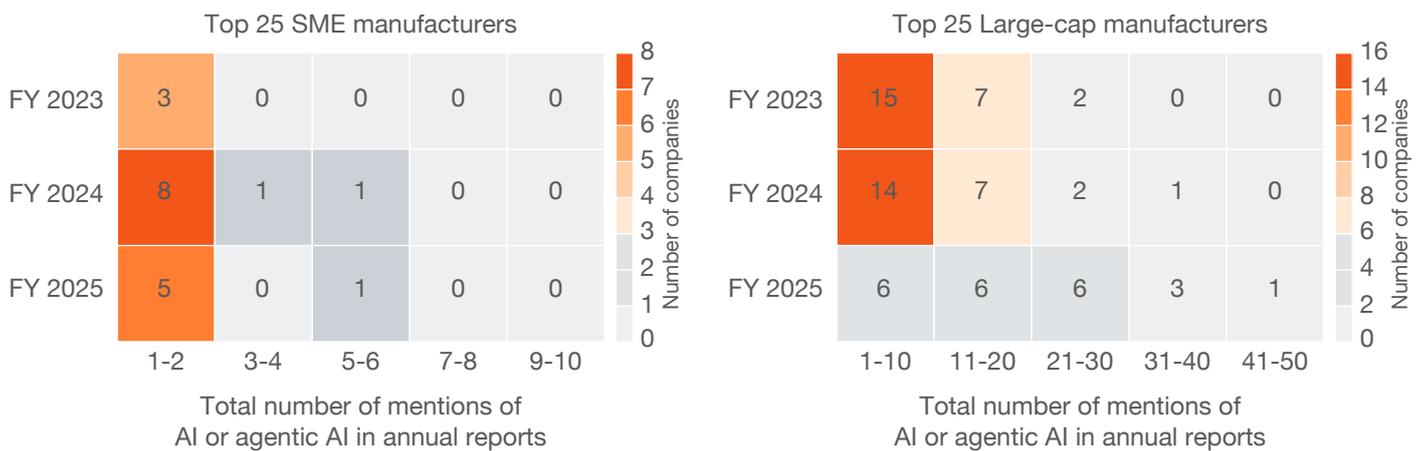
04

Navigating the challenges and risks of AI adoption

While MSME manufacturers appreciate the value AI can deliver, few articulate what this translates to in terms of on-the-ground adoption. A review of the annual reports of 25 largest large-cap listed manufacturers and those of the 25 largest listed SME manufacturers reveals how each group is engaging with AI. The findings are revealing (see Figure 4).[64]

Figure 4: AI on ground at MSMEs

Top 25 SME manufacturers

	1-2	3-4	5-6	7-8	9-10
FY 2023	3	0	0	0	0
FY 2024	8	1	1	0	0
FY 2025	5	0	1	0	0

Total number of mentions of
AI or agentic AI in annual reports

Top 25 Large-cap manufacturers

	1-10	11-20	21-30	31-40	41-50
FY 2023	15	7	2	0	0
FY 2024	14	7	2	1	0
FY 2025	6	6	6	3	1

Total number of mentions of
AI or agentic AI in annual reports

Source: PwC analysis

Over the last three fiscal years, the 25 largest large-cap manufacturers have used terms such as 'artificial intelligence', 'AI', or 'agentic AI' 963 times in their annual reports. During the same period, the 25 largest listed SME manufacturers (with publicly available documentation) have used these terms only 29 times in total in their annual reports. More importantly, the use of these terms in the context of the manufacturing MSMEs is limited to a few players, whereas it's more spread out in the case of the large-cap manufacturers.

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64   Using Python, we extracted and pre-processed the text from each report (e.g. lowercasing, removing extraneous whitespace, and normalising encoding). We defined a set of AI-related keywords: 'artificial intelligence', 'ai', and 'agent'. To reduce false positives, especially for the short term 'ai', we used word-boundary matching (e.g. regex patterns such as '\bai\b') so that only standalone instances were counted. For each company year document, we counted the occurrences of each keyword and computed a total AI-related word count, resulting in a structured dataset with one record per company per year. We then aggregated the counts at both the annual and group levels. For each year, we calculated the total and average AI-related mentions per company, and the share of companies that mentioned AI at least once.

Challenges

Conversations with a group of MSME executives and owners, combined with an analysis of discussions involving MSME leaders across digital platforms, reveal why AI continues to remain peripheral to value creation for many MSMEs.

Readiness challenges

1

"I don't know if my enterprise is ready to benefit from AI," remarked the owner of a machine component manufacturing MSME. This hesitation is understandable. Many MSMEs have had difficult experiences with earlier digital transformation efforts. In the absence of readiness assessments, several integrated 'shiny digital objects' into their operations that failed to deliver the expected returns on investment. It is therefore natural for MSMEs to approach AI with caution—particularly in the absence of benchmarks, in house skills, and neutral guidance. Many remain uncertain about the quality of their data, and whether their processes are mature and disciplined enough to successfully integrate AI into their operations.

3

"How can I make my workforce see AI not as a replacer?" is a pressing concern around workforce perceptions of AI, particularly the fear that it will act as a replacement rather than an enabler. Although this anxiety is not limited to MSMEs, it is often especially pronounced within them. As one worker put it: "Will the machine still need me once it becomes smarter?" Many MSME owners themselves remain uncertain about AI's benefits and their organisations' readiness to capture them, making it difficult to respond convincingly to such concerns or to articulate a clear change management strategy around AI adoption. As the owner of an auto electronics manufacturing MSME explained, "Changing the mindset of my machine operators and workforce will require them to clearly see the benefits of AI in their own lives. This is not easy, and it will take time."

2

"Show me the real value AI will deliver and the time frame within which I can realise it," noted another MSME leader. This sentiment reflects a broader reality: Most MSMEs cannot afford prolonged, uncertain experimentation with AI investments. They need clear answers—what exactly will AI improve, by how much, and how quickly? Past experiences with ambiguous digital promises have heightened this scepticism. As one promoter of a machine tool company succinctly put it, "AI must build traction and not be a distraction."

4

"Large companies are taking away the best talent from ITIs and engineering schools. How do you expect me to build competitive value with AI with talent pools that are not best in class?" observed a leading electronics MSME manufacturer. She further noted that this challenge is compounded by the fact that many interns and new hires aspire to work in software driven manufacturing roles, without first wanting to gain hands-on experience with actual production machinery on the shopfloor.

Ecosystem challenges

5 **"Who will bail me out if I am stuck with a sub-optimal solution due to the fault of the tech provider?"** reflects a deep-seated anxiety among MSMEs. Many have endured half implemented ERP systems, unused software, or automation initiatives that have delivered only partially, or not at all, on their promised value. For small and micro enterprises that lack legal and technical expertise as well as bargaining power, an ill-suited AI solution can result in sunk costs, data lock-in, and reputational damage with customers. As one owner put it, "If this goes wrong, I pay twice—money sunk and money that could have been invested in something that would have given me some return."

6 **"Who can guide me in making use cases scalable?"** reflects a common frustration among MSMEs. While many are able to execute a successful pilot, they often struggle to expand it from a single machine or production line to an entire plant or across multiple units. As one owner emphasised, "The consultant did a great pilot but did not have any idea about how to scale it. My money got locked." In many instances, small and micro enterprises lack the in-house digital capabilities needed to standardise processes, reuse solutions, and plan for scale.

7 **"I feel alone in this journey. Is there an ecosystem out there that can hold my hand?"** remarked one MSME owner. He added, "Everyone is trying to sell; no one is willing to stand with me." Unlike large firms, MSMEs often lack a supportive ecosystem that can guide them, validate their choices, and step in when course correction is needed—leaving them feeling unsupported in their AI adoption journey. As an automotive component manufacturer put it, "If new AI-driven solutions have to be adopted every two years because the core technology keeps changing so fast, how do you expect us to keep paying repeatedly for the same thing?"

"MSMEs in my cluster simply don't know whom to approach for AI infrastructure or GVC opportunities," shared a senior cluster leader representing micro and small enterprises during our interviews. He noted that while these enterprises are gradually becoming aware of the benefits of adopting AI, they remain largely unaware of the benefits they could reap by participating in the broader AI-infrastructure ecosystem—as suppliers and value-chain partners.

8 **"Can you please convince banks that MSME owners are businessmen, not thieves—that they won't disappear if a loan is sanctioned?"** remarked a veteran MSME cluster leader. While he acknowledged the growing number of government schemes, his central concern was that in many regions, bank staff remain highly reluctant to disburse scheme linked loans, even after the necessary approvals are in place and the "files are cleared". He cited an instance from his cluster where an MSME owner was ultimately compelled to mortgage his house to secure final disbursement under a scheme that did not require such collateral.

Risks

Notably, unless the following risks are anticipated and addressed, the challenges that MSMEs face in their AI adoption journey and in proactively participating in AI infrastructure opportunities and relevant GVCs are likely to intensify.

1

Misaligned skilling and unstructured knowledge retention: In the urgency to remain employable and relevant in a rapidly evolving job market, the MSME workforce may gravitate towards short-term that make them 'certificate rich' but capability poor. As a result, employees may become familiar with AI-related buzzwords without being able to apply the underlying skills to generate real value for manufacturing MSMEs. A related risk is the loss of tacit knowledge gained during AI pilot projects: When such learning is neither documented nor institutionalised, it dissipates as employees change roles or leave the organisation—forcing both the firm and incoming employees to restart from scratch.

2

Regulatory and statutory misalignment: The country is currently witnessing a wave of regulatory reinvention aimed at enabling businesses to accelerate value creation. However, there is a risk that these regulatory frameworks may not fully account for the scenarios that will emerge as AI becomes integrated across the manufacturing value chain.

For instance, AI adoption in manufacturing often necessitates the deployment of CCTV systems combined with computer vision technologies. It is therefore critical that both the implementation and future amendments of India's Digital Personal Data Protection (DPDP) Act, 2023, are aligned to facilitate the responsible use of AI in workplaces and on shop floors—enabling AI-driven value creation while safeguarding workforce privacy.

Similarly, AI models used for candidate screening or performance evaluation, if poorly designed or deployed, carry the risk of indirect discrimination against certain genders or communities. Such outcomes could violate the principle of equality of opportunity enshrined in India's evolving labour statutes, giving rise to conflict situations between management and the workforce.

3

Aggressive trade pacts: India is actively pursuing trade diversification through the negotiation of multiple free trade and preferential trade agreements with a range of countries. In this context, MSMEs that co-develop AI models or share production data with overseas partners may be exposed to risks arising from unclear ownership and governance frameworks. They may also face direct or indirect pressure to share proprietary knowledge or machine data with partner firms or regulatory bodies involved in the execution of these trade agreements.

4

Iniquitous societies and regional disparities: Better connected, larger, and urban MSMEs— often clustered in metros and Tier-2 cities—are more likely to attract AI-related investments and skilled talent. In contrast, smaller, informal, or geographically remote MSMEs may struggle to even initiate their AI adoption journey. As a result, profitable, AI-enabled firms stand a better chance to move up the value chain, while the rest remain locked into low-margin activities for extended periods.

How, then, can MSMEs fully capture AI-driven opportunities while overcoming adoption barriers and managing the risks that emerge along the way? The next chapter explores this question.

05

Unlocking the AI Edge for MSMEs

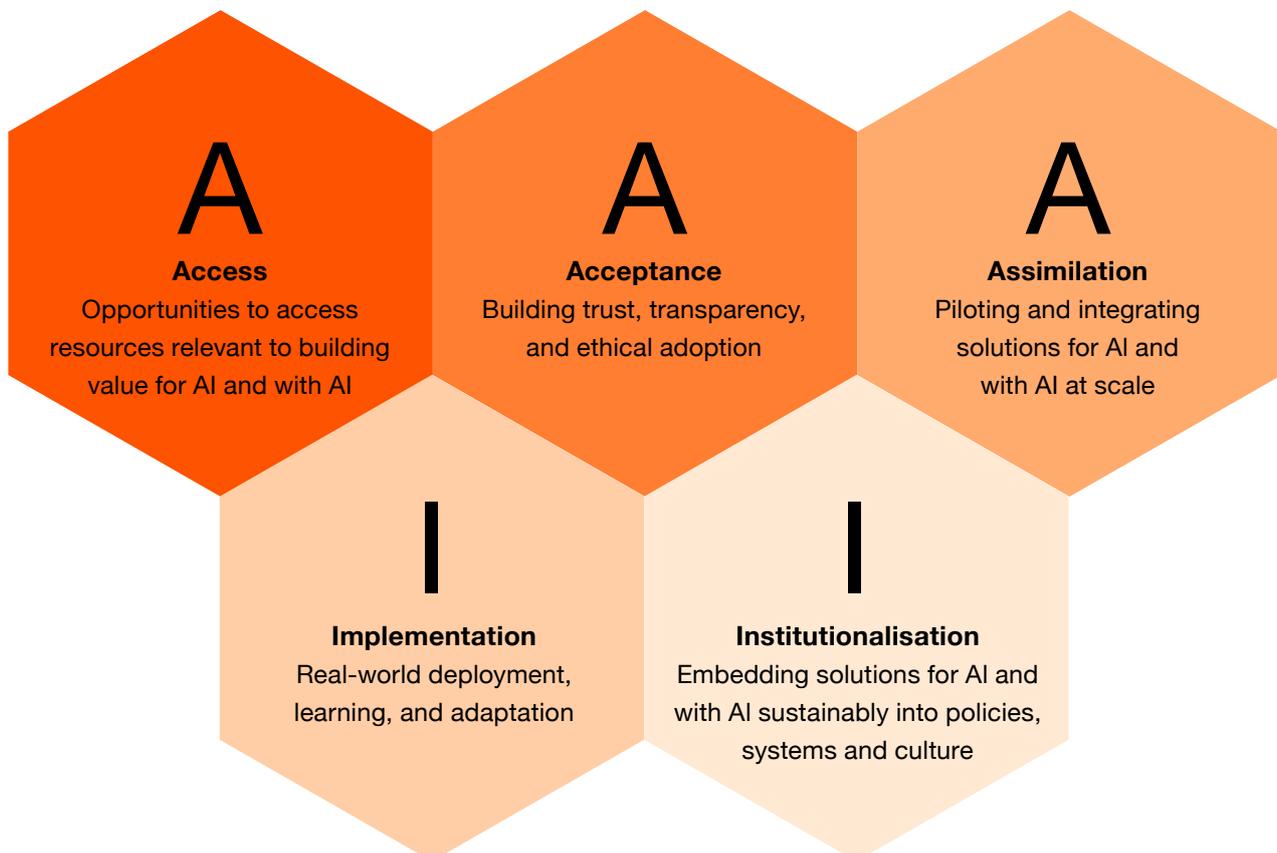'AI Edge for Viksit Bharat',[65] a PwC India publication, underscores the need for adopting a systemic approach to solution development to avoid the pitfalls of pointillistic solutions that lack scalability. To this end, the report recommends 3A2I as a structured framework for building scalable and sustainable solutions.

The 3A2I framework

The 3A2I framework's systemic approach (see Figure 5) comprises two dimensions:

- **Foundation:** Access, acceptance, and assimilation, which represent 3A, create the base for systems to learn continuously and responsibly, earn societal trust, and absorb insights and experiences across sectors.

- **Pathways to success:** Implementation and institutionalisation (2I) enable practical, scalable deployment and long-term integration of AI-driven/AI-relevant initiatives into enduring systems.

Figure 5: The 3A2I framework

A
Access
Opportunities to access resources relevant to building value for AI and with AI

A
Acceptance
Building trust, transparency, and ethical adoption

A
Assimilation
Piloting and integrating solutions for AI and with AI at scale

I
Implementation
Real-world deployment, learning, and adaptation

I
Institutionalisation
Embedding solutions for AI and with AI sustainably into policies, systems and culture

Source: PwC analysis

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65   PwC India, 2026. AI Edge for Viksit Bharat.

Access refers to providing all MSMEs and stakeholders with the essential resources needed to harness AI effectively.

Acceptance is about cultivating trust and encouraging positive engagement with AI-enabling or AI-enabled innovations within MSMEs as well as stakeholders.

Assimilation focuses on integrating knowledge, expertise, and collaborative partnerships to develop and pilot AI-enabling or AI-enabled applications that are relevant and effective. Efficient assimilation allows stakeholders to adapt proven pilots at scale, accelerating innovation diffusion, and ensuring that solutions are both contextually appropriate and scalable, thereby maximising impact.

Implementation emphasises practical deployment of solutions with minimal friction. It requires reducing regulatory hurdles, streamlining approval processes, and enabling agile methodologies that promote continuous testing, learning, and iteration. Effective implementation also involves monitoring performance, managing risks, and adapting systems rapidly in response to real-world feedback.

Institutionalisation is about embedding AI-enabled or AI-enabling initiatives sustainably within MSME-organisational structures, policies, and cultures. This includes establishing governance frameworks, ethical standards, and accountability mechanisms that ensure AI applications remain reliable, responsible, and aligned with long-term goals. Institutionalisation guarantees continuity beyond initial pilots or projects, fostering ongoing innovation, capacity building, and resilience within systems and communities.

Creating synergies across the MSME ecosystem

Strengthening these building blocks demands active collaboration among three key stakeholder groups— the government, civil society, and business—with each contributing in ways that align with its unique strengths and capabilities. The government serves primarily as an enabler, ensuring access and fostering acceptance. Civil society, comprising NGOs, multilaterals, research institutions, academia, and think tanks, acts as a facilitator supporting the government. Business/private sector—in this case, large businesses—drive efforts in implementation and institutionalisation.

These elements cumulatively form the building blocks of a comprehensive, systemic model designed to build diverse learning environments and experiences. However, these blocks do not follow a rigid linear sequence. Rather, these stakeholders engage dynamically across all five building blocks, continuously providing feedback and adapting as needed.

The following section shares recommendations based on a 3A2I approach that can help MSMEs realise value with AI by overcoming readiness challenges while addressing many of the firm-specific risks discussed in the earlier chapter.

Across the 3A2I action agenda, one implementation principle is explicit: India's AI strategy for MSMEs should prioritise frugal, bottom-up diffusion through small, task-specific models, shared plug-and-play infrastructure at the cluster level, and digital public goods that reduce the per-firm cost of experimentation. To address job-loss anxieties voiced by MSME owners, each intervention will follow an 'augmentation-first' rule, starting with use cases that raise output quality and reduce operating frictions (scrap, rework, energy waste, downtime, compliance time) while redesigning shopfloor roles so human judgment remains in the loop. This sequencing protects MSMEs' employment-generation capacity by strengthening competitiveness and enabling scale. It also creates new task demand in data capture, machine supervision, process improvement, and customer-facing responsiveness, especially when paired with skilling and cluster-based support.

Addressing readiness challenges

## Building data-driven readiness

Many small and medium-sized enterprises operate with a mix of legacy machines or equipment positioned alongside newer, digitally enabled machines. Building a coherent data stack that can be readily consumed by AI systems in such hybrid environments is inherently challenging. Reliance on manual interventions to bridge these gaps often introduces errors, and when such unclean or inconsistent data is fed into AI systems, it can lead to flawed or misleading actionable insights.

Table 7: Proposed solution towards building data-driven AI readiness by applying the 3A2I framework

3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
MSMEs must use relevant government schemes (as well as financial support in relevant cases) to gain **access** to verified and reliable vendors/ startups/university departments which can help them in building data lakes that can be effectively used towards the application of AI tools.	Governments—either at the state or the national levels—must regularly publish and update lists of relevant and reliable startups, vendors or universities that can support MSMEs in this initiative in regional languages. The scorecard on reliability must be developed through collaboration with MSMEs where such collaborations have worked/not worked.	Civil society organisations such as industry associations can act as good matchmakers in this journey.	
MSMEs must bring about the cultural change needed to make the workforce understand and **accept** the importance of data collection and the use of AI on the same. MSMEs must **assimilate** the culture of AI-relevant collation through small pilots and experiments with the startups/ vendors/universities they are collaborating with.	Building on the existing cluster-based model of MSME production, the government, in collaboration with chambers of commerce and skilling institutions, must set up 'plug-and-play' centres within the clusters, enabling enterprises to integrate data and AI tools into their manufacturing processes without incurring the full cost. The clusters can provide pooled building blocks, such as access to compute capacity and local data storage systems, at subsidised rates. Cluster-based AI adoption can offer similar AI solutions to stakeholders across the value chain, thereby reducing adoption costs, leveraging economies of scale and improving efficiency. For instance, a shared demand forecasting tool can benefit players such as producers, assemblers, packers, and distributors in managing their operations across the value chain.		Given that large businesses themselves have been through such situations in their journey of digital transformation, they can share some of the best practices with their MSME suppliers in the sphere of change management required to build data-culture and to help them with processes required to carry out pilots successfully.

3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
Learning from the success stories across functions, MSMEs must **implement** practices and toolkits to collate AI-relevant data on a scale.		Learning from the experiences of large businesses, civil society organisations, especially those involved in skilling and human resources, can look at collaborating with MSMEs towards building the toolkits and practice handbooks that help in the standardisation of AI-relevant data collation.	
Gradually the data-culture must be **instutionalised** within the MSME so that they can do this entire exercise independently.	Award MSMEs building value with AI-relevant data.		Large businesses can start providing preferential supplier status to MSMEs which institutionalise AI-relevant data collation and find ways to help them unlock new value with the same.
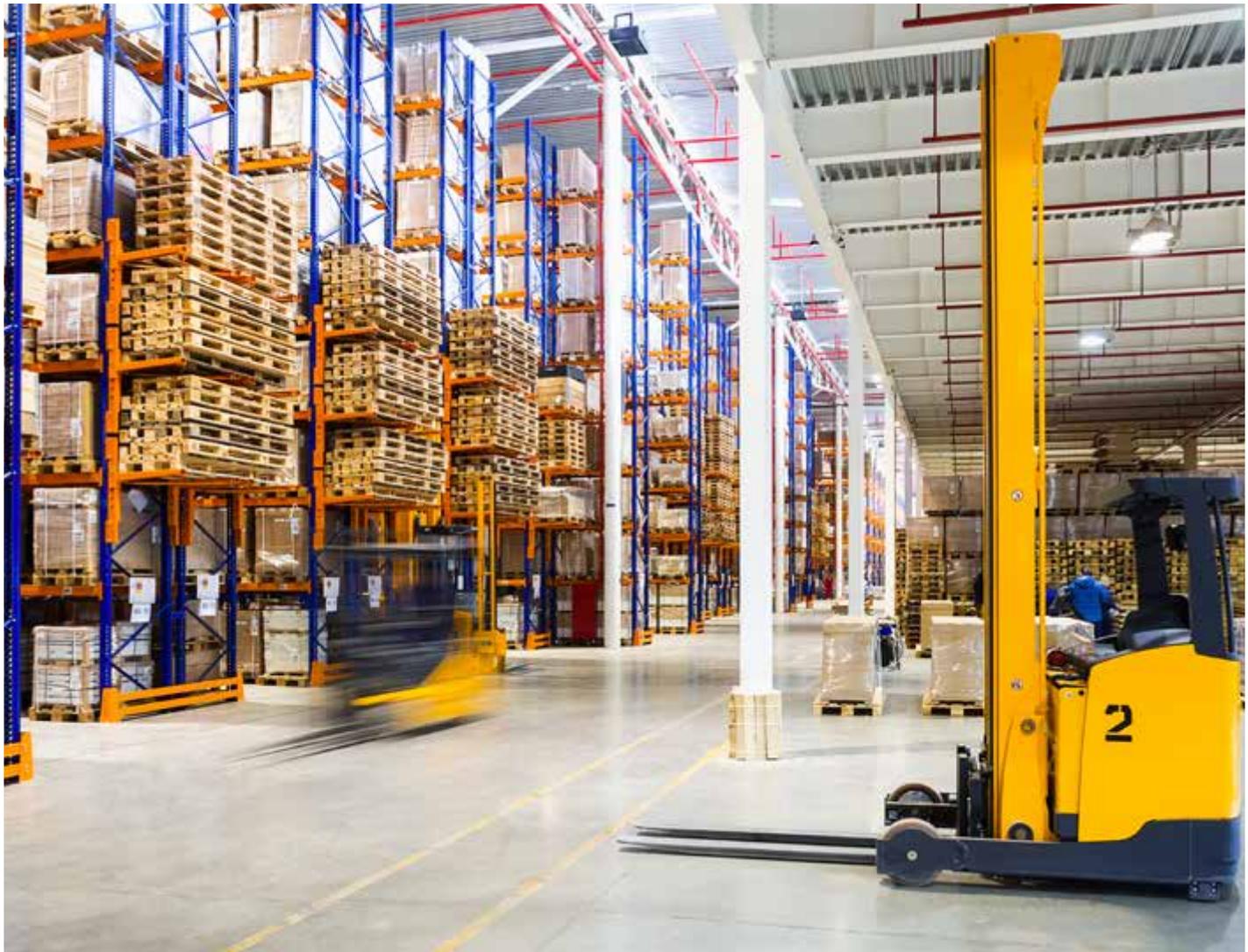
Use case prioritisation and application of AI to build time-bound measurable value across diverse MSMEs

MSMEs that take a leap of faith in adopting AI tools succeed in identifying potential use cases for applying machine intelligence within their operations. However, uncertainty about where AI will create most value often leads them to spread their efforts too thin. As a result, investments are diluted across multiple initiatives, yielding limited—or, in some cases, no—meaningful returns.

Prioritisation of use cases is therefore key. More importantly, this prioritisation cannot be based on a one-size-fits-all approach across MSMEs having different levels of maturity.

Based on discussions with MSMEs and domain experts, we observe that manufacturers with limited prior understanding of AI can begin to experience its value by adopting relatively accessible use cases—such as using GenAI to respond to RFPs or draft project proposals. Several MSMEs have already embarked on this path. As a senior cluster leader shared with us, "Quite a few accounting and finance staff in micro and small enterprises within our cluster have started using GenAI to prepare proposals. Some micro firms, which are required to submit highly detailed, process-by-process quotations to medium-sized press tool manufacturers, have even downloaded GenAI-based spreadsheet templates and are actively using them."

MSMEs with emerging levels of digital maturity (manufacturing units using spreadsheets to capture data, some level of ERP and CRM systems to capture data at least in consumer-facing functions) can prioritise the adoption of AI in sales and marketing. For example, micro enterprises can adopt AI tools that automatically design social media posts and product catalogues from simple text or product photos. They can experiment with auto-translation tools to convert product descriptions and marketing content into multiple Indian and export-market languages.

Table 8: Applying the 3A2I framework to MSMEs with emerging levels of digital maturity towards adopting AI in their marketing and sales function

3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
To begin with, micro enterprises must **access** free or low-cost open AI tools relevant to their sales and marketing use cases.	Central as well as state governments must work with local chambers of commerce and marketing associations to build primers for helping micro enterprises identify the right AI platform or tool for the marketing of their products.		
They must build capabilities internally to build greater **acceptance and assimilation** of these platforms across different product lines. Towards elevating the interest of the workforce in such pilots/experiments, they must create roles such as 'AI marketer' within the organisation to distinguish it from normal marketing roles.		SME chambers in different regions can organise online workshops for micro enterprises with those who have successfully grown revenue with AI-driven sales and marketing to help micro enterprises understand the capabilities that need to be built internally or rented as services.	

3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
While **implementing** this initiative, set a roadmap with simple measurable goals to begin with, such as posting of 3—4 AI-generated ads per week and responding to all chatbot leads within 24 hours for the AI marketer or the AI marketing team. Review AI outputs periodically and based on the analysis adjust prompts, correct errors and save successful templates for reuse. Allocate a small, fixed monthly marketing budget (could be as small as INR1,000 and 2,000) to test AI-optimised advertisements and track ROI.	Work with skilling agencies to create certified micro-courses (e.g. AI for sales for micro enterprises) with practical assignments that will help micro enterprise recruit the right professionals during the implementation phase.	Coordinate with micro enterprises towards launching cluster-level branding initiatives (e.g. 'One District One Product') that use shared AI marketing content for multiple micro producers.	Help micro enterprises which supply materials to businesses by offering API or plug-and-play integrations with commonly used platforms (WhatsApp Business, UPI apps, marketplaces) to help them understand how such tools work to help scale.
During the **institutionalisation** phase, embed AI into SOPs (e.g. every new product launch must have an AI-generated catalogue, social media campaign, and WhatsApp broadcast). Train backups, start integrating the data from AI campaigns into strategic decisions, and start building the 'best and next' practices knowledge repository.	Establish long-term standards and guidelines for data privacy, ethical marketing, and platform fairness to protect micro enterprises. Ensure that the public infrastructure supporting micro enterprises at scale is protected against cyberattacks.		Start treating micro enterprises successfully scaling such initiatives as strategic network partners. Keep helping them with relevant knowledge that can help them secure a better ROI from their AI investments on sales and marketing.

For digitally mature MSMEs (ones that are equipped to use sensors and the internet of things [IOT] devices to capture data and have at least partially automated workflows and use analytics to process captured data), we look at how they can start deploying AI to drive better quality control and reduce defect rate.

Although the MSME sector contributes around 36% of India's manufacturing output, only a small fraction is quality certified. "Fewer than 5% of registered small and micro enterprises are ISO-certified," said a senior official of a local MSME chamber. An owner of a metal precasting MSME said that quality-related losses (scrap, rework, returns, warranty) can amount to 5–25% of total production cost in typical MSME units in the foundry industry.

Consider a common visual-inspection use case. In a glass-bottle manufacturing plant, bottles typically move along a conveyor belt to an inspection station where quality-control operators manually accept or reject them based on visible defects such as scratches, blemishes, shade-gradation variations, bubbles, and minor spots. Some of these defects are detectable only by highly trained inspectors, and given the sustained concentration required, the probability of human error is statistically significant. Such errors can lead to customer dissatisfaction, prompting an additional round of sampling-based inspection before final dispatch. This process is not only labour-intensive but also inherently inefficient and wasteful.

AI's role: An in-line camera system capable of capturing 360-degree images of bottles on the production line and mapping visual data to predefined defect categories can automate accept-or-reject decisions with greater consistency. As inspection volumes increase, the system continuously learns from accumulated data, improving accuracy over time and enhancing both quality control and operational efficiency. However, successful implementation depends on the availability of large, well-labelled datasets across defect categories, which are essential for training AI models and reducing bias in automated assessments.

As the next step, the ability to monitor and plot control charts using the seven principles of control chart interpretation and mapping them back to the process parameters that resulted in these defects can further help in enhancing the process control through a feedback loop.

Over a period, the system can analyse process parameter deviations from the norm intelligently and, instead of noticing control chart parameters on finished products, the system starts monitoring the control chart for process parameter deviations and corrects them at the source or provides alerts to supervisors for correction.[66]

Table 9: Applying the 3A2I framework to make digitally mature MSMEs adopt AI for quality control

3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
The journey begins with identification of the quality pain points and the use cases such as eliminating surface defects, getting rid of wrong labelling. Once the use case is identified, the MSMEs **access** simple computer-vision apps on smartphones for basic visual inspection and define rule-based plus AI-assisted checklists.	Set up AI-enabled quality labs/common facility centres (CFCs) in clusters with shared vision inspection setups, sensors, and demonstration lines. MSME chambers and local skilling associations can create multilingual brochures explaining relevant concepts such as computer vision and its uses, as well as hold sessions with businesses to encourage them to use the centres.		For interested MSME suppliers, provide trial access or light versions of their AI quality tools.

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66   PwC India, 2023. Using AI to fast-track manufacturing operations.

3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
To make the workforce accept such solutions, explain how AI inspections help them catch defects earlier and avoid rework, penalties, and customer complaints, thereby reducing their stress and increasing productivity helping production lines deliver consistent in-time value without compromises. To enable peer-to-peer learning for better **assimilation**, organise dialogue-sessions with workers to capture worker testimonials where AI made their work easier.	Start active deliberations with the businesses towards issuing simple guidelines on 'AI + human' quality systems with a focus on safety.	Handhold MSMEs in discussions with the workforce during the acceptance and assimilation phase with a case study approach and by connecting them to other MSMEs who have carried out similar initiatives.	Help MSMEs build 'how to use' guides that can be easily understood by their workforce.
While **implementing** this initiative, set a roadmap with simple measurable goals and start integrating AI into production planning and not introduce it only as a part of implementation. In collaboration with the workforce that works on such initiatives create KPIs that are measurable and showcase the impact of AI tools/ platforms in comparison to existing ones. Integrating lessons learnt during the earlier phases, start prudently investing in hardware with an eye on ROI.	Provide performance-linked incentives for micro units that show measurable quality improvement (e.g. lower defects, higher exports).	Support cross-learning within clusters: factory visits where one micro unit shares with another how AI is used. Help micro enterprises document and present improvements to financial institutions and government bodies, to secure desired financial support/incentives to scale use of AI.	Help micro enterprises, supplying to you, by offering API or plug-and-play integrations with commonly used platforms wherever possible.

3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
During the **institutionalisation** phase, include AI checks in formal SOPs and work instructions as well as make AI reports part of daily/weekly review meetings. Start training multiple operators as well as supervisors to use and maintain AI tools. Give them the freedom to interact with vendors supplying solutions, if any. Start planning for software and other upgrades and begin allocating funds towards the same in a systematic manner.	Establish long-term standards and guidelines for data privacy and ethical use of AI in production systems. Ensure that the public infrastructure supporting micro enterprises at scale is protected against cyberattacks.	Conduct periodic studies on the impact of AI quality tools on income, inclusion, and working conditions.	Start establishing partnership programmes that enable MSME suppliers to engage with AI adoption across other use cases within the manufacturing domain.

Attracting and retaining an AI-ready workforce—ensuring presence of human in the loop

Given that MSMEs in India are usually labour-intensive, AI solutions must address challenges without eroding the country's demographic dividend. This would translate into prioritising human-centric automation, which increases worker productivity without replacing human capital. Across the pipeline, AI adoption must increasingly be designed with a human-in-the-loop approach, specifically for functions that require judgment, decision-making and accountability. Responsible AI practices, aligned with international risk-management principles such as the OECD AI Principles, must be followed to reduce ethical, operational, and legal risks such as a lack of transparency and biased decision-making. Compliance with industry regulations should be safeguarded to ensure adherence to data protection laws, training on unbiased, traceable data sets and defining accountability for AI-based outcomes.

At an operational level, while digital talent is more accessible in the market for companies in comparison to a few years ago, AI talent isn't. Even large companies struggle to find affordable AI talent. The question that arises is, how can MSMEs build and retain an AI talent pool in such circumstances?

Table 10: Applying the 3A2I framework to build a sustained AI-ready workforce

3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
Accessing AI talent in the age of talent shortage can begin with looking for talent from the inside. MSMEs must identify digitally-ready or near-digitally ready workforce within their organisations who are prepared to volunteer for roles relevant to their use cases. Also, some of the small enterprises who are experimenting with AI (that spoke to us) have explored the possibility of employing young graduate children of their workforce to build trust with the families of their employees. Indeed, a more sustainable solution lies in cultivating a robust talent pipeline from the ground up, with a specific focus on India's Tier-2 and Tier-3 cities. Instead of competing for a small pool of elite talent, a more effective strategy would be to build a geographically distributed talent base.	While there are apprenticeship schemes in the portfolio of governmental initiatives that can be accessed by interested students as well as MSMEs, it's important for the government in collaboration with chambers of commerce, skilling schools, colleges, and other educational institutions to go all out and advertise these on different forms of media to step up their attractiveness quotient. While initiatives like micro-credential AI courses is a good start that universities like IGNOU have taken, there is a need for deeper integration.[67] It would be useful to consider a hub-and-spoke model where select ITIs in each state are developed into AI excellence centres that can train instructors from other ITIs. Furthermore, the curriculum should move beyond theoretical knowledge to focus on practical, industry-relevant applications of AI in specific trades like welding, fitting, and electrical maintenance. This will ensure that the skills imparted are directly applicable on the shopfloor. To build a truly foundational talent pipeline, this should be supplemented by broadening school curricula to introduce AI concepts early. Integrating AI fundamentals and applications from the school level, including crucial elements around its responsible and ethical use, would prepare the next generation and proactively address societal concerns. States like Kerala[68] and Telangana[69] have been successful in setting up skilling centres in smaller towns to train youth in emerging technologies. This not only creates a local talent pool for MSMEs but also helps in curbing migration to metropolitan areas. The IndiaAI Mission could offer subsidised training, mentorship from industry experts, and placement support for youth in local MSMEs.		To help MSME suppliers attract and retain talent, large companies can allow them to build joint training and experience opportunities.

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67   Yadav, H, 2025. IGNOU launches 2 micro-credential courses to strengthen digital literacy. The Tribune.

68   Additional Skill Acquisition Programme Kerala (ASAP Kerala), 2024. Initiatives.

69   The Hindu, Skill development in emerging technologies, TGCHE and NASSCOM ink MoU

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3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
The other traditional ways are to build links with nearby ITIs, polytechnics and other colleges, or through offering short internships, weekend projects, or final-year projects on real problems (e.g. digitising production data, AI-driven automation of basic dashboards).	Moreover, to build a female workforce skilled at AI, existing initiatives, such as 'SANKALP: Hub for Women Empowerment', can integrate an AI for women-led enterprise track to provide industry-module-based AI skilling, facilitate business onboarding for AI tools, and provide dedicated support systems for apprenticeship and mentorships for women.		
To make youth **accept** AI-job opportunities at MSMEs, it's important for MSMEs to project their workplaces as laboratories of learning and exploration. Their owners must be going out and making themselves visible on platforms that the youth and students generally view and want to be associated with. A few senior MSME officials mentioned how they lost AI talent during the interview process. To avoid this, it's important to build a series of short tasks for them to keep them engaged through the process of interaction which reflects the willingness of MSME leadership to listen and learn.			Share best practices for conducting interviews with AI talent with MSMEs and help them internalise the same through active handholding.
Lastly, it's important to help young talent understand the freedom they would get to experiment and innovate, although with limited budgets, on the identified use cases and chart out a career path.			

3A2I elements	Support that can be extended by		
	Government	**Civil society**	**Large businesses**
Implementing the promises made to the interns and AI candidates once they join the workplace is vital. The sense of empowerment that was ensured during the interview must be felt by the new joiner by giving them opportunities to perform trials and small process changes. Start with limited budgets to experiment with AI-solutions that embed a sense of ownership within them. Ensure that they don't see their age becoming a barrier towards participating in solution-driven discussions happening at the level of middle management and above.	Chambers of commerce, MSME local bodies, skilling schools, and relevant government bodies at district and taluka levels must find ways of celebrating small AI innovations being championed by the AI talent at these MSMEs. This will help create the stickiness for the talent to remain within the sector.		Large companies must consciously not poach such talent being trained at MSMEs. Doing so would disincentivise MSMEs that are saddled with a frugal capital base from investing in AI talent.
As the AI talent (pool) grows in terms of experience, MSMEs must find ways of **institutionalising** their presence by creating separate functions or helping them build their teams. Allow for collaborations to happen with startups and institutes of repute leveraging various government schemes.			Large businesses must share their experience of building structured growth trajectories and career paths for such AI teams with MSMEs and handhold them wherever necessary.

Promoting AI-empowered MSME Champions

MSME clusters can embed AI-linked incentives within the existing MSME Champions Scheme through three core components. First, MSME Sustainable (ZED) certification can subsidise ZED certifications for MSMEs that deploy AI solutions to strengthen compliance and traceability. Second, the MSME Competitive (Lean) Scheme can recognise MSMEs that use AI to optimise energy consumption and reduce waste. Third, MSME Innovative can support MSMEs in protecting home-grown AI solutions through targeted intellectual property rights (IPR) assistance.

Addressing ecosystem challenges

To address ecosystem challenges, this report recommends establishing a **robust and inclusive validation and resolution mechanism** that both supports and validates MSMEs' approaches and solutions along their AI-adoption journey, simultaneously enabling them to explore opportunities in AI infrastructure and integration into relevant GVCs.

This mechanism—the **AI navigator**—is structured across seven layers:

1 AI solutions discovery and matching layer

Purpose: Help MSMEs identify practical, context-appropriate AI use cases and solution providers.

Description: This will be an open marketplace wherein MSMEs, on defining a business problem and sharing their constraints, will be able to access an array of solutions that they can choose from.

2 Sandbox-based piloting layer

Purpose: Enable low-risk experimentation and smooth deployment.

Description: Here, MSMEs will be provided with fiscal support (e.g. small prototype grants for early-stage experiments) and an operating environment to test solutions with real or synthetic data under relaxed regulatory conditions. They would be provided with technology vouchers by the government to secure access to shared infrastructure (cloud credits, test datasets, synthetic data generators). Larger private sector players would offer insights into change management. As a part of this layer, MSMEs will get preferential access to banks and donors or financiers willing to fund their journey.

3 Technical verification and validation layer

Purpose: Verify that solutions are technically sound, safe, fair, and commercially viable for MSMEs.

Description: The MSME, incurring minimal charges, must be able to tap into services of public R&D labs, universities, and accredited centres to test the performance of the solution, its reliability, and robustness on scale representative datasets. If the solution meets the required criteria, the MSME must then be able to secure services of an independent auditor at affordable charges to validate data privacy, security, and compliance of the solution with local regulations, as well as check for algorithmic bias and harmful behaviour in AI systems. The validating agency must then issue a 'fit-for-MSME' certification for solution. This would benefit the MSME as well as the solution provider, as the latter can then advertise such a certification on its webpage. Finally with the help of GenAI-based models, the MSME must be able to calculate the ROI of this solution, its total cost of ownership, and payback period.

4 Scaling guidance layer

Purpose: Scale the solution and build offerings based on it to generate quicker ROI.

Description: Here, MSMEs will receive structured mentoring and capacity-building support, enabling them to create scalable value from solutions they have already built, tested, and validated—guided by experts registered in the marketplace.

6 Feedback and continuous improvement layer

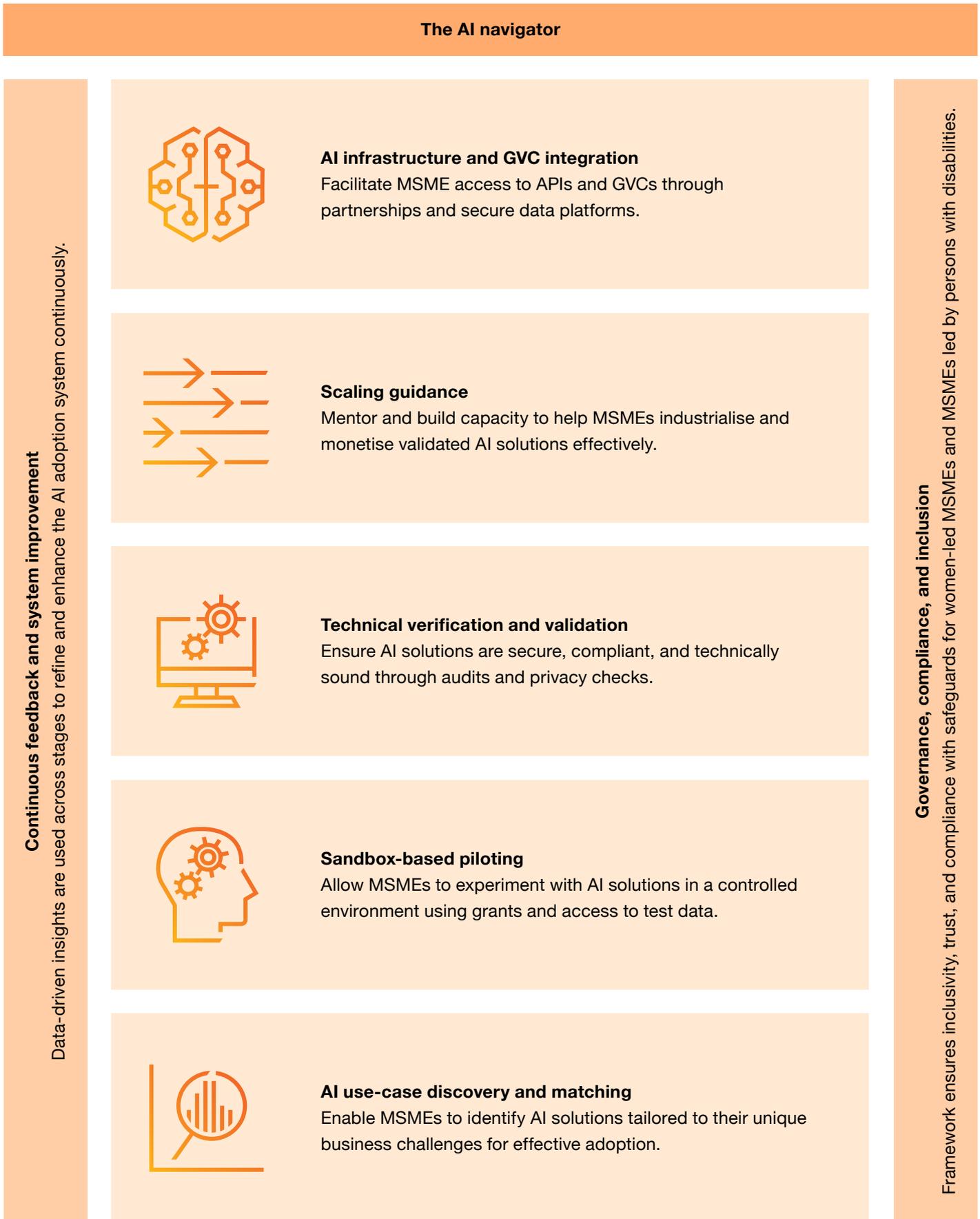**Purpose:** Ensure the marketplace improves over time and remains relevant.

Description: An AI model will be collating the data at the back end, capturing the interactions, transactions, disputes, and feedback of all parties. The insights developed based on this data will be used by the marketplace team to improve the performance of all the six layers. This feedback layer must also serve as a platform for MSMEs to highlight evolving risks and best practices in their journey to embracing opportunities emanating from AI.

5 AI infrastructure and GVC integration layer

Purpose: Help MSMEs leverage AI infrastructure as well as participate in its creation and plug into GVCs.

Description: In this layer, MSMEs will get secure, paid access to APIs, shared cloud infrastructure, tested AI models, and data platforms. They would also get access to various opportunities they can pursue with institutions involved in building data centres, chips as well as energy infrastructure. They will be mentored on GVC opportunities and on how to tap into them through accountable and active participation of trade bodies and chambers of commerce.

7 Governance and compliance layer

Purpose: Ensure the credibility and continuity of the marketplace with appropriate rules and regulations, driving greater inclusion and diversity.

Description: The marketplace operator will establish SOPs for interaction between the MSME and the solution providers advertising on the platform. MSMEs and service providers will be provided with standardised contract formats to choose from. In case of a dispute with regard to quality of the solution, its misrepresentation, wrong mentoring, or lack of abidance towards payment schedules by the MSME, the service provider as well as the MSME will be provided with access to arbitration services. The contracts would clearly specify that the ruling of the arbitrator would be legally binding on both parties and can be challenged in the court of law, only if necessary. More importantly, the governance and compliance layer must focus on enabling women-led MSMEs and MSMEs led by people with disabilities to better integrate into GVCs by leveraging the power of AI to provide support in more accessible ways.

Figure 6: Addressing ecosystem challenges

The AI navigator

Continuous feedback and system improvement
Data-driven insights are used across stages to refine and enhance the AI adoption system continuously.

AI infrastructure and GVC integration
Facilitate MSME access to APIs and GVCs through partnerships and secure data platforms.

Scaling guidance
Mentor and build capacity to help MSMEs industrialise and monetise validated AI solutions effectively.

Technical verification and validation
Ensure AI solutions are secure, compliant, and technically sound through audits and privacy checks.

Sandbox-based piloting
Allow MSMEs to experiment with AI solutions in a controlled environment using grants and access to test data.

AI use-case discovery and matching
Enable MSMEs to identify AI solutions tailored to their unique business challenges for effective adoption.

Governance, compliance, and inclusion
Framework ensures inclusivity, trust, and compliance with safeguards for women-led MSMEs and MSMEs led by persons with disabilities.

Source: PwC analysis

Strengthening MSMEs' market access

India's Foreign Trade Policy 2023 outlines the use of Dak Niryat Kendras (DNKs) and e-commerce export hubs (ECEH) to strengthen MSMEs' market access.[70] The DNKs operate as a hub-and-spoke model, with foreign post offices as the centre. Similarly, ECEH can be established through a public-private partnership that provides dedicated infrastructure and capacity-building for MSMEs. The DNKs offer a range of export-enabling services for the hinterland, including electronic customs clearance, packaging, free pick-ups, and e-filing of the postal bill of export. An added digital layer of pooled AI infrastructure within the DNKs and ECEHs can position them as AI-enabled export centres. These centres can provide onboarding support, guidance on compliance and traceability documentation, operational upgrading, and customer support.

Building a gender-balanced services ecosystem to support AI integration

Building a gender-balanced MSME manufacturing services ecosystem in India requires intentionally positioning women-led enterprises as critical enablers of the sector's digital and AI transformation. Around 20% of MSMEs are owned or led by women, yet over 95% of women-led firms are tiny and informal, often excluded from markets, finance, and advanced tools.[71] Women entrepreneurs can anchor specialised data, analytics, and AI-service MSMEs that support hardcore manufacturing units with solutions in areas such as predictive maintenance, quality analytics, supply-chain optimisation, ESG tracking, and workforce planning. Industry associations, incubators, and cluster development programmes can play a catalytic role by integrating women-owned data/AI service providers into existing manufacturing clusters and vendor ecosystems. Government and large anchor corporates can further drive demand through preferential procurement from women-led technology MSMEs and by funding pilots that prove value and scalability. Over time, this interconnected network—where women entrepreneurs supply high-value intelligence to manufacturing MSMEs—will not only enhance productivity and competitiveness but also seed more women in decision-making roles within the manufacturing value chain. The result will be a more responsive, responsible, and inclusive industrial fabric that embeds gender balance into the very architecture of India's manufacturing growth story.

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70   Government of India, Directorate General of Foreign Trade (DGFT), 2023. Chapter 9, Promoting Cross Border Trade in Digital Economy, Foreign Trade Policy.

71   Sharma, J., 2 January 2026, Women's digital empowerment: An economic imperative for India's Growth. The Times of India.

The way forward

The government has articulated a clear ambition for MSME Champions to serve as key growth engines of Viksit Bharat. MSMEs, in turn, are equally committed to championing this vision. With intent aligned, the moment now calls for decisive action—by MSMEs and the wider ecosystem of stakeholders—to implement the recommendations outlined in this report and address the challenges and risks that could otherwise derail progress towards this shared objective.

It is equally important to recognise that this transformation will be a marathon, not a sprint—one that will continuously test the trust, coordination, and collaborative spirit of MSMEs and their partners. A one-size-fits-all approach will fall short, yet excessive customisation risks fragmentation and decision paralysis. The path forward lies in striking the right balance between standardisation and flexibility.

Few technologies possess the transformative potential of AI. India has been presented with such an opportunity—and the imperative now is to act with purpose and urgency to realise its full value.
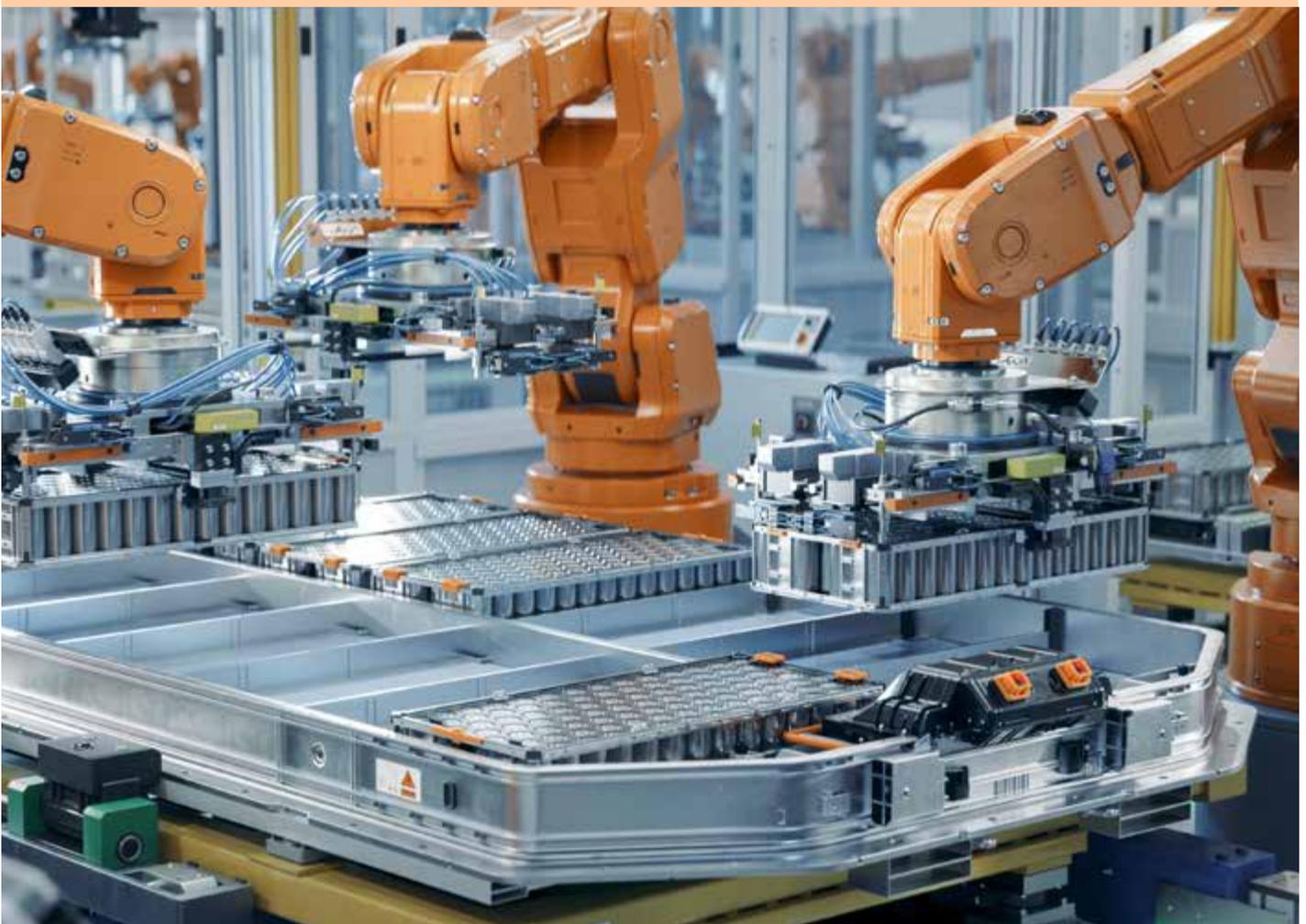
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