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RESEARCH BRIEFING

The State of AI and Technology in Small and Mid-Market Manufacturing

Adoption, use cases, barriers, and the U.S. support landscape.

Prepared July 2026

Evidence from OECD, U.S. Census Bureau / SBA, JPMorgan Chase Institute, Deloitte, NIST, WEF, McKinsey, and peer-reviewed research

17.7%

of small firms have paid for an AI service (JPMorgan Chase Institute, Dec 2025)

13x

faster to 10% adoption for the 2025 small-business cohort vs. 2019

35%

average defect-rate reduction from AI vision inspection

50–71%

of non-adopters cite lack of expertise as the primary barrier, not cost

EXECUTIVE SUMMARY

Artificial intelligence is diffusing through small and mid-market manufacturing faster than any prior digital technology, yet from a low base and with sharp variation in what *adoption* actually means.

The most credible measures place measurable, paid AI adoption among U.S. small firms at roughly 17 to 20 percent, while broad self-reported surveys reach 55 to 68 percent because they count one-time experiments alongside operational deployment.

The strategic picture that emerges from the strongest sources is consistent on four points:

01

Adoption is accelerating rapidly across firms of all sizes, unusually fast by the standard of past general-purpose technologies.

02

The highest-return use cases are operational rather than generative: predictive maintenance, computer-vision quality inspection, and demand forecasting, because the sector already has measurable baselines.

03

The binding constraint is not the cost of tools but a combination of skills, awareness, siloed shop-floor data, and legacy equipment.

04

In the United States a dedicated public-support channel exists in NIST's Manufacturing Extension Partnership, though its funding is modest by international comparison.

01 Measuring Adoption: Why the Numbers Conflict

Before citing any adoption figure it is essential to understand what is being counted. Estimates diverge by a factor of three or more depending on methodology. Transaction-based data offer the firmest footing: JPMorgan Chase Institute, analyzing actual payments for AI services, placed measurable AI adoption among U.S. small businesses at 17.7 percent by the end of 2025, a transaction-based measure counting firms that have paid for an AI service, which the Institute notes aligns closely with the U.S. Census Bureau’s 17.8 percent figure for the same period.

Government survey data tell a similar operational story. The U.S. Census Bureau's Business Trends and Outlook Survey, via the SBA Office of Advocacy, found that 8.8 percent of small businesses reported using AI in producing goods or services as of August 2025, up from 6.3 percent six months earlier. Broad self-reported vendor surveys, by contrast, capture experimentation and therefore report far higher headline numbers. Neither category is wrong; they simply measure different behaviors, and any serious analysis should specify which.

WHAT EACH MEASURE COUNTS

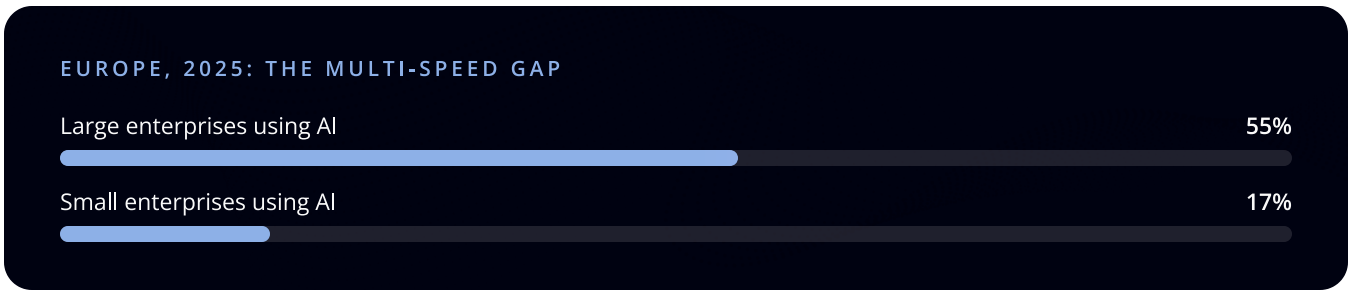
17.7%	8.8%	55–68%
Transaction data	**Government survey**	**Vendor self-report**
Firms that have paid for an AI service (JPMorgan, Dec 2025)	AI used in producing goods or services (Census BTOS, Aug 2025)	Includes one-time experiments alongside operational use

Scope note: these adoption rates cover small businesses across all industries, not manufacturers specifically. Manufacturing's heavier reliance on legacy equipment and siloed data may put its curve behind the economy-wide trend; the figures serve as context for the manufacturing-specific evidence that follows.

02 Adoption Trends and the Closing Gap

The direction of travel is unambiguous even where levels are contested: adoption is accelerating rapidly across firms of all sizes, and unusually fast by the standard of past general-purpose technologies. JPMorgan's researchers found that the 2025 cohort of small businesses reached a ten-percent adoption rate roughly thirteen times faster than the equivalent 2019 cohort.

The OECD, whose 2025 discussion paper for the G7 is the most authoritative cross-country source, nonetheless frames low SME adoption as the central policy problem: uptake remains well below that of larger firms and below other digital technologies. The gap is stark in Europe, where 55 percent of large enterprises used AI in 2025 against only 17 percent of small enterprises, a pattern the OECD terms *multi-speed* diffusion. One finding recurs across economies: generative AI is the most widely used form of AI among SMEs, valued chiefly for efficiency and innovation gains, because natural-language interfaces lower the cost and skill barriers to entry.



03 High-Value Use Cases in Manufacturing

Manufacturing enjoys a structural advantage that most sectors lack: operations already generate measurable baselines, such as overall equipment effectiveness, defect rates, cycle times, and downtime cost, so return on investment is comparatively easy to demonstrate. The highest-return, lowest-risk applications cluster in a few areas.

Predictive maintenance

−20–40% downtime

The most frequently cited win. Documented production deployments report unplanned downtime cut by 20 to 40 percent and maintenance costs reduced by 25 to 40 percent. The supporting economics have shifted decisively in favor of smaller shops: industrial IoT sensor prices fell to roughly ten to eighty cents per unit by 2025, making the underlying data layer affordable. Deployment nonetheless remains early. Fewer than a third of maintenance and operations teams have implemented AI solutions, though about 65 percent plan to within a year.

Computer-vision quality inspection

−35% defects

AI vision systems deployed among Ontario manufacturers produced an average 35 percent reduction in defect rates, catching flaws that human inspection consistently misses. The recurring practical advice is to begin at a single point of known cost, the worst defect-escape station or the bottleneck machine, where the baseline is clear and errors are recoverable.

Demand forecasting and supply-chain optimization

−5–20% logistics cost

McKinsey estimates that AI applied to supply-chain operations can reduce logistics costs by 5 to 20 percent, and smaller firms are increasingly accessing these gains through affordable software-as-a-service rather than the custom systems large companies build.

A CAUTION ON THE GENERATIVE-AI NARRATIVE

The operational value in manufacturing sits largely with analytical rather than generative AI. World Economic Forum analysis of leading Lighthouse factories found that roughly **77 percent of top use cases are driven by analytical AI** tied to sensors, schedules, and routings, not by the generative tools that attract the most attention.

04 Barriers to Adoption

The most-cited barrier across every serious survey is not cost but capability and awareness. Between 50 and 71 percent of non-adopting businesses cite a lack of expertise as their primary obstacle, ahead of cost, regulation, and data privacy. The pattern is sharpest among the smallest firms, where perceived inapplicability falls quickly as firm size rises, pointing to an education gap rather than genuine incompatibility.

For manufacturers specifically, three structural issues compound the skills gap:

~70%

Data quality and system silos

The sleeper barrier. Nearly 70 percent of manufacturers name data quality, contextualization, and validation as the single biggest obstacle to AI, as programmable controllers speak legacy protocols and MES and SCADA systems remain siloed.

~65%

Legacy equipment

Roughly 65 percent of manufacturers still rely on older systems that are incompatible with modern AI, making integration costly and complex.

68%

The labor and skills squeeze

Around 68 percent of manufacturers report difficulty finding qualified employees, up from 56 percent in 2023, the steepest skills gap of any small-business segment, even though the sector's existing process data otherwise suits it well to AI.

05 The U.S. Institutional Support Landscape

A distinguishing feature of the U.S. context is a dedicated public channel for helping smaller manufacturers adopt technology. NIST's Manufacturing Extension Partnership, created in 1988, works to make manufacturing technologies, processes, and services more accessible to small and medium-sized manufacturers through centers in every state and Puerto Rico. NIST publishes concrete AI case studies from this network, for example the Georgia MEP helping a chemical manufacturer replace manual, paper-based batch processes that had become an operational bottleneck.

Two developments define the current policy direction. A new federal effort explicitly targets emerging technology: a May 2026 MEP pilot program names artificial intelligence, automation, and additive manufacturing as focus areas, with the aim of accelerating advanced-technology adoption especially among smaller manufacturers. At the same time, analysts note that U.S. support is modest by international standards. As a share of GDP, Japan invests roughly thirty times as much in its equivalent SME-manufacturing support program, and Germany over twenty times as much.

30x

Japan's relative investment in its equivalent SME-manufacturing support program, as a share of GDP

20x+

Germany's relative investment versus the U.S. MEP program

06 Outlook: 2026 and Beyond

Deloitte's 2026 Manufacturing Industry Outlook is the most-cited forward view. Its central claim is that the industry is moving from experimental pilots to at-scale implementation, with success depending on balancing aggressive technology investment against an adaptive workforce strategy. Spending intentions are strong: 80 percent of manufacturers plan to allocate at least a fifth of their improvement budgets to smart-manufacturing initiatives such as automation, analytics, sensors, and cloud.

Current deployment, however, remains moderate, an honest counterweight to the enthusiasm. Deloitte's survey found 29 percent of manufacturers using AI or machine learning at facility or network scale and 24 percent having deployed generative AI at that scale, with many still early in exploring capabilities.

Two themes bear watching. The first is agentic and physical AI, meaning more autonomous robots, with roughly 22 percent of manufacturers planning to use physical AI within two years, more than double today's share. The second is the framing that appears to actually unlock adoption: *augmentation rather than replacement*. Deloitte projects that more than 81 percent of manufacturing task-hours will remain human-driven, and positioning AI as employee augmentation addresses the workforce fears that otherwise stall investment.

07 Conclusion: A Path Forward for Smaller Manufacturers

The window open to smaller manufacturers is narrow but real. Adoption is accelerating from a low base and at a pace unusual for a major technology, a window in which deliberate movers can close ground that was unrecoverable in earlier technology cycles.

The task, then, is to build the capability to use it well. Three principles follow from the evidence.

1 Keep implementation human-centric

Workforce anxiety is the most consistent predictor of stalled adoption, and augmentation-not-replacement the most consistent predictor of success. With more than four-fifths of manufacturing task-hours expected to remain human-driven, the near-term goal is to free skilled people from repetitive work and route their judgment toward higher-value problems. Adoption accelerates because the effort aligns with what the workforce already knows to be true.

2 Prioritize analytical AI tied to measurable impact

Manufacturing's structural advantage is that it already produces quantifiable baselines, and the highest-return applications, predictive maintenance, computer-vision inspection, and demand forecasting, exploit them directly. The lesson from leading factories is that analytical, not generative, AI drives the large majority of top use cases. Attack a single loss with a known cost: the first project gets a clear baseline and a calculable payback.

3 Close the expertise gap through external resourcing, chosen with discipline

Because lack of in-house expertise, not cost, is the primary barrier, the fastest route runs through outside help, whether public channels such as the Manufacturing Extension Partnership or private integrators. The right partner is oriented toward partnership and knowledge transfer, leaving the organization more capable, and prioritizes foundational work, data integration, sensing, and analytics, over generative-AI showpieces.

START WITH STRATEGY

Underlying all three principles is a prior question that technology decisions too often skip: what is the business actually trying to achieve? AI investment pays off when it is anchored to long-term strategy, real constraints, and specific opportunities, so that each deployment serves a defined goal rather than a general sense that the firm should be *doing AI*.

Smaller manufacturers that start with strategy, choose the analytical over the fashionable, and treat their people as the point of the exercise rather than its cost will convert a closing capability gap into durable advantage. Those who wait for the technology to become simpler, or who chase visible tools ahead of foundations, will find the window has quietly closed.

08 A Note on Source Quality

The quantitative backbone of this briefing rests on primary and authoritative sources: the OECD, the U.S. Census Bureau and SBA Office of Advocacy, the JPMorgan Chase Institute, Deloitte, NIST, the World Economic Forum, McKinsey, and peer-reviewed work. Several operational return-on-investment figures, including the 20 to 40 percent downtime reductions and 35 percent defect-rate improvements, are traceable through consulting and vendor material rather than independently audited studies. They are consistent across sources and directionally credible, but should be read as indicative rather than precise. Where a statistic originates with a primary body but was retrieved through a secondary compilation, the footnote names both.

A second distinction concerns scope. The headline adoption rates, the closing large-versus-small gap, and the expertise-not-cost barrier finding are cross-sector results for small businesses generally; the Section 3 use cases and ROI ranges, Deloitte's deployment and budget figures, the shop-floor data and legacy-equipment barriers, and the WEF Lighthouse analysis are manufacturing-specific. Where the two are combined, as in the premise that adoption is accelerating and the large-firm advantage eroding, the economy-wide trend is a reasonable but unproven proxy for the sector.

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