MAKE uk
The Manufacturers' Organisation

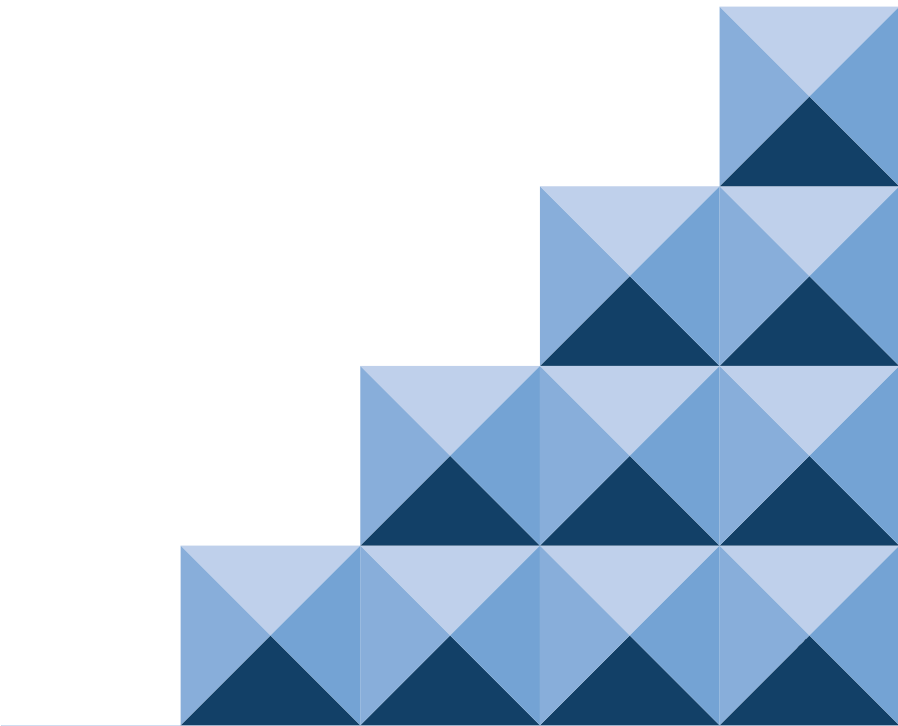
In partnership with:

Sage

MAKING IT SMARTER:

GLOBAL LESSONS FOR ACCELERATING AUTOMATION AND DIGITAL ADOPTION IN UK MANUFACTURING

Contents



Introduction

Since the early 2000s, when the growth of the internet, improvements in computing power, and the rise of robotics began transforming production processes, UK manufacturing has faced the challenge of adapting to rapid technological change. Yet, while this country is home to world-class research, cutting-edge tech firms, and leading digital tools, the manufacturing sector has been slow to adopt advanced technology compared with its international competitors, leaving UK firms at a massive disadvantage and our economy falling behind.

The UK's slow uptake of automation is demonstrated by our low score on the Robot Density Index, a key global measure of automation and productivity. Since Brexit, industrial robot installations in the UK have been is less than a tenth of that in South Korea[1], highlighting this country's sluggish progress in adopting technologies critical to delivering growth in the manufacturing sector.

The direct result is that the UK has witnessed a dramatic slip in the international rankings. A decade ago (2015), the UK was 2nd, behind only Switzerland, in the Global Innovation Index (GII) – the World Intellectual Property Organization's (WIPO) annual ranking of countries based on their capacity for, and success in, innovation[2]. However, in the face of intensifying global competition since then, the UK is declining having slipped three places to 5th, signalling the need to address structural weaknesses and sharpen policy delivery if we are to reverse our fall down this important global league table.

While countries such as Germany, South Korea, and Singapore have moved up the UNIDO Competitive Industrial Performance (CIP) Index - which measures a country's ability to produce and export manufactured goods, since 2023, the UK's manufacturing performance - which has not achieved higher than 10th since 1999 - has fallen further behind to 19th, exposing deep-rooted structural challenges in scaling production and boosting exports. While the UK retains significant manufacturing capacity, our industrial performance continues to lag behind our global peers[3].

The UK has just 112 INDUSTRIAL ROBOTS per 10,000 manufacturing workers, 1/2 the EU average and well behind other leading industrial economies*.

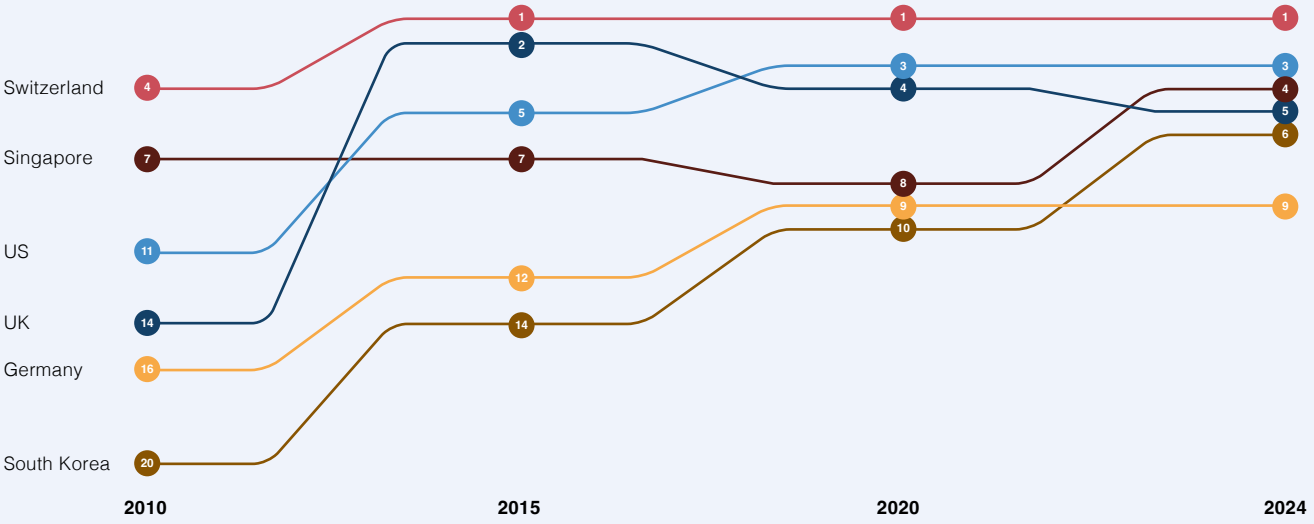
From the early stages of automation to today's frontier technologies, digital adoption has become a key driver of industrial competitiveness[4] but, while the UK produces world-class research, high-growth tech firms, and globally respected innovation centres, we do not embed digital capabilities across our manufacturing base. Despite having the sixth largest economy in the world, the UK is failing to translate that economic strength into a digitally advanced and future facing manufacturing sector. Our small and medium-sized enterprises (SMEs) – who comprise the vast majority of the sector – lag behind our G7 counterparts in digital adoption[5].

The result is that there has been a significant decline in the UK's share of global manufacturing value-added, from 3.1% in 2000 to 1.9% in 2022, while our share of global manufacturing exports has more than halved, dropping from 3.7% to 1.5%. More concerning is the UK's loss of competitiveness in high-value-added industries including pharmaceuticals and the other transport equipment category, which covers aerospace, shipbuilding, and railway equipment[6].

*Robotic Density Index: https://ifr.org/ifr-press-releases/news/global-robotics-race-korea-singapore-and-germany-in-the-lead
[1] World Robotics Report 2023: https://ifr.org/ifr-press-releases/news/world-robotics-2023-report-asia-ahead-of-europe-and-the-americas
[2] WIPO, Global Innovation Index 2024, Global Innovation Index 2024 - GII 2024 at a glance
[3] Cambridge Industrial Innovation Policy: https://www.ciip.group.cam.ac.uk/wp-content/uploads/2025/03/UK-Innovation-Report-2025.pdf
[4] GOV UK, The wider economic impacts of emerging technologies in the UK, 2025: https://www.gov.uk/government/publications/the-wider-economic-impacts-of-emerging-technologies-in-the-uk
[5] Technology Adoption Review 2025, https://www.gov.uk/government/publications/technology-adoption-review
[6] Cambridge's Institute for Manufacturing, 2025 UK Innovation Report: https://www.ciip.group.cam.ac.uk/innovation/uk-innovation-report-2025/

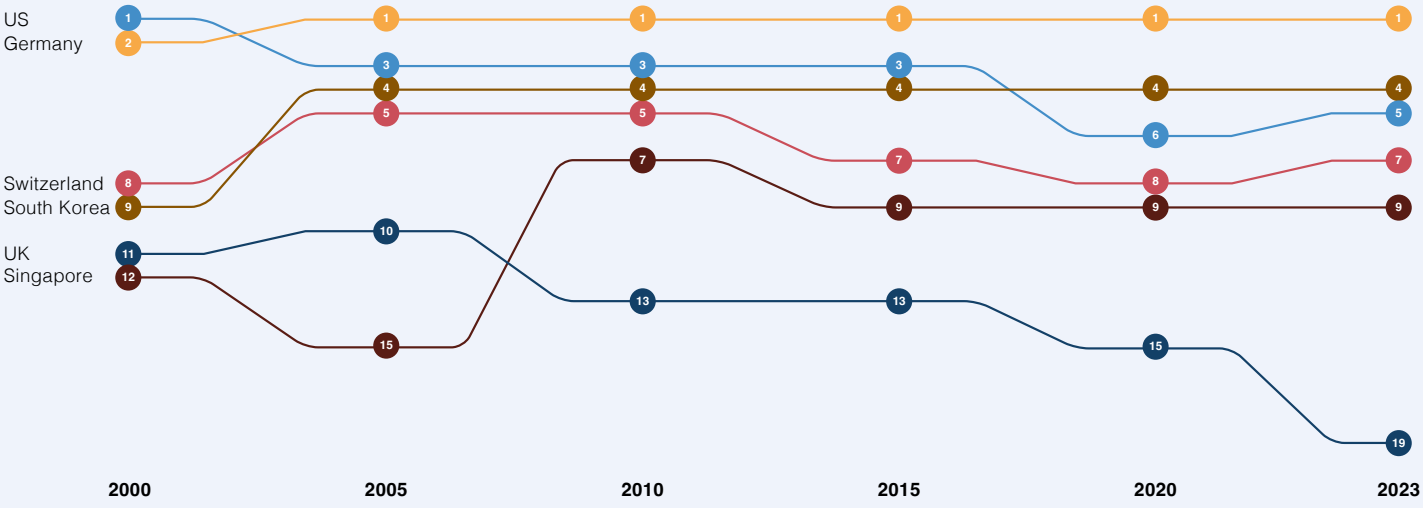
Despite substantial investment in R&D through world class academic research institutions and a high volume of patents and research publications, the diffusion of new technologies into SMEs and regional supply chains in the manufacturing sector remains poor. This gap between digitalisation and commercialisation not only limits productivity gains but also stifles long-term competitiveness and economic growth.

Chart 1 – WIPO Global Innovation Index 2010-2020



Sources: WIPO, Global Innovation Index 2024

Chart 2 – UNIDO Competitive Industrial Performance Index 2000-2023



Source: UNIDO (2024). Competitive Industrial Performance Index database

For UK businesses, the potential benefits from digital technologies – such as artificial intelligence (AI), digital twins and robotics - are vast. Businesses that integrate more digital technologies are more productive, with a higher total revenue per worker[7]. Robotics adoption also helps boost product and process innovation, improving productivity and therefore profitability in the medium-long term[8]. AI-led optimisation can also reduce companies' carbon emissions[9].

Furthermore, the use of digital tools and flexible manufacturing processes plays a critical role in enhancing operational agility and resilience[10]. Historical precedent indicates that technological innovations have significantly contributed to GDP growth, with emerging technologies, such as AI, also expected to drive substantial productivity gains in the coming decade, leading to higher wages and improved living standards in the long-run[11].

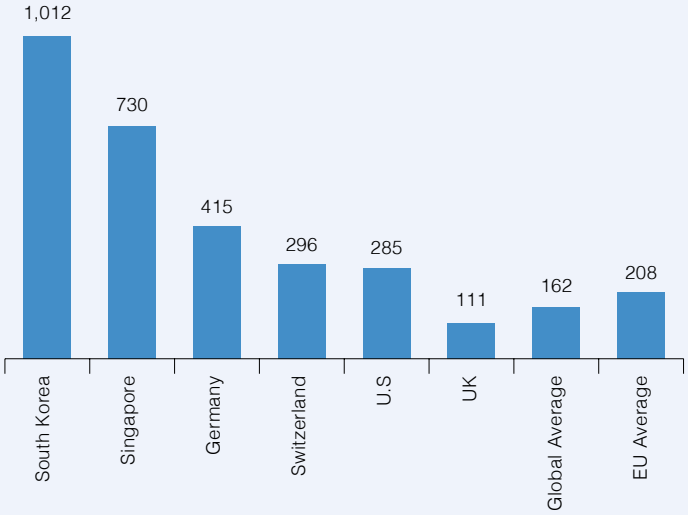
With the new Labour government having set its ambition for the UK to be fastest growing economy in the G7, the challenge of technology adoption, particularly amongst UK SMEs, has become even more pressing[12]. The UK's new Industrial Strategy will have a critical role to play in enhancing the UK's innovation-driven industrial capacity.

More pertinently, were UK manufacturers to close the gap with global technology leaders by increasing the uptake of emerging technologies including robotics and AI in UK factories, Make UK estimates that matching best-in-class manufacturing digitalisation could add around £150 billion to UK GDP by 2035, amounting to a 5% increase in the size of our economy compared to today[13].

To ensure the UK becomes the best place in the world to start, grow and invest in advanced manufacturing, it is essential to examine how leading international competitors are accelerating their digital transformation. This report examines the current state of innovation and digitalisation in UK manufacturing, and explores where the UK stands internationally, before proposing policy solutions to help increase technological adoption among the smaller manufacturers, who are crucial drivers of innovation and productivity, and therefore economic growth.

Chart 3 – Robot Density Comparison

per 10k manufacturing workers



Sources: International Federation of Robotics – *World Robotics* 2024 press release (2023 data); UK manufacturing employment (ONS). UK and Switzerland figures are considered best estimates.

Closing the digitalisation gap
in UK manufacturing
could boost GDP by
£150BN BY 2035

[7] Department for Science, Innovation, and Technology (2025) The wider economic impacts of emerging technologies in the UK: https://www.gov.uk/government/publications/the-wider-economic-impacts-of-emerging-technologies-in-the-uk/the-wider-economic-impacts-of-emerging-technologies-in-the-uk-html
[8] The Productivity Institute: https://www.productivity.ac.uk/news/the-effect-of-robot-adoption-on-profit-margins-and-productivity/
[9] Green and intelligent: the role of AI in the climate transition: https://www.nature.com/articles/s44168-025-00252-3
[10] World Economic Forum Value Chain White Paper: https://www.weforum.org/publications/from-shock-to-strategy-building-value-chains-for-the-next-30-years/
[11] UK AI Opportunities Action Plan: https://www.gov.uk/government/publications/ai-opportunities-action-plan/ai-opportunities-action-plan#changes-lives
[12] Advanced Manufacturing Sector Plan (2025) https://www.gov.uk/government/publications/advanced-manufacturing-sector-plan
[13] According to the UK Government's analysis of the economic impacts of emerging technologies, widespread adoption of emerging technologies — such as robotics, AI, and automation — across all sectors of the economy would deliver an 8.39% increase in UK real GDP by 2035, equivalent to £223.4 billion in current prices. Much of this growth is likely to come from increased adoption in production-based industries like manufacturing where digital technologies deliver strong multiplier effects by improving productivity, reducing costs, and enhancing competitiveness throughout supply chains: Government Office for Science & Department for Science, Innovation & Technology, *The wider economic impacts of emerging technologies in the UK*, https://www.gov.uk/government/publications/the-wider-economic-impacts-of-emerging-technologies-in-the-uk/the-wider-economic-impacts-of-emerging-technologies-in-the-uk-html?utm_. Given that manufacturing accounts for 47% of total UK R&D expenditure, it is reasonable to attribute a similar share of the projected economic gains to this sector: Make UK, *UK Manufacturing: The Facts 2024*, https://www.makeuk.org/insights/publications/uk-manufacturing-the- facts-2024. On that basis, Make UK calculates that matching best-in-class digital adoption could add around £149 billion to UK GDP by 2035, equivalent to a 5-6% uplift in UK GDP compared to 2025.

Section 1:

Learning from the Evolution of Digital Adoption in UK Manufacturing

UNITED KINGDOM

Population
69.6M

GDP (Nominal)
$3.38T

GDP per Capita
$49,224

Manufacturing as a proportion of GDP
9.1%

Manufacturing Output
~$265B

Global Mfg. Share
~1.6%

Expenditure % of GDP on R&D
2.9%

M = Million B = Billion T = Trillion

Government support for industrial digitalisation can be considered to have evolved through three waves of policy:

2000-2015

Consultancy Advice

The Manufacturing Advisory Service (MAS), launched in 2002, provided SMEs with tailored, locally delivered advice on technology and productivity. Despite strong uptake from businesses, MAS and its parent Regional Development Agencies were dismantled by 2016, leaving behind a fragmented and uneven support landscape.

POST-2016

Tax Incentives

In the years that followed, initiatives like R&D tax credits and Sector Deals aimed to reignite digital transformation across UK industry. These efforts aimed to encourage strategic co-investment in skills, innovation, and infrastructure. Tailored to the needs of key sectors such as aerospace, automotive and life sciences, Sector Deals showed early promise but were regrettably cut short owing shifts in government. R&D tax credits were longer lasting and remain a valuable tool for manufacturers, but recent reforms have made the system more complex and less accessible — particularly for SMEs, who face rising barriers to entry.

2018-PRESENT

Strategic Programmes

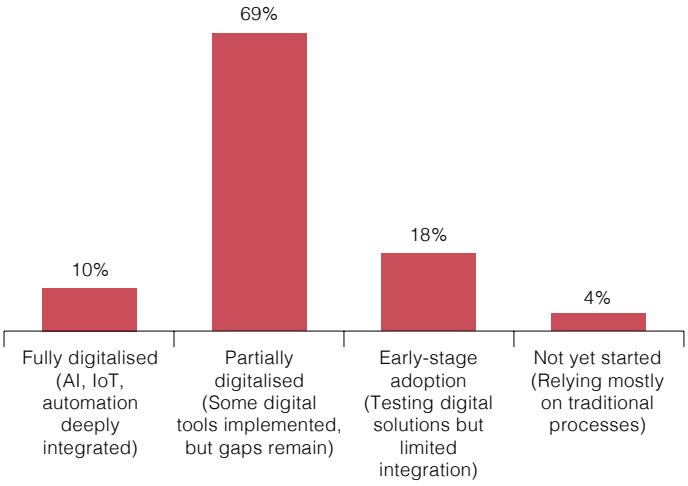
The Made Smarter Review reignited ambition around industrial digitalisation, leading to the creation of two key programmes: Made Smarter Adoption, which offers regional support to help SMEs implement mature, ready-to-use technologies; and Made Smarter Innovation, which funds R&D for developing and testing new, solution-driven manufacturing technologies. While the pilot phase delivered strong results — boosting productivity, cutting energy use, and helping firms build digital capabilities — the broader rollout has been slow and uneven, held back by limited national coordination and regional inconsistencies. Similar challenges were evident in the short-lived Help to Grow: Digital scheme. More broadly, the UK's current innovation ecosystem includes important assets such as Catapult Centres and Knowledge Transfer Partnerships (KTPs), which link research and industry to de-risk innovation and support scaling. However, these remain underutilised by many SMEs due to short-term funding cycles which limit outreach and create accessibility barriers.

Despite these waves of policy effort and the growing availability of support mechanisms, digital adoption across UK manufacturing remains uneven and incomplete. While digitalisation is now widely seen by manufacturers as essential, this recognition has not yet translated into widespread transformation. While 70% of firms are investing in digital tools, only 10% operate fully digital factories, reflecting the scale of the implementation gap. Technologies like ERP systems, AI, robotics, and cloud platforms are gaining traction, but uptake is especially limited among SMEs. Persistent barriers — such as skills shortages, legacy systems, and fragmented access to support — continue to hold back progress.

The limitations of recent initiatives underscore the importance of not just designing good programmes, but delivering them in ways that are consistent, visible, and accessible to the businesses that need them most. Without targeted action to overcome persistent structural barriers, the UK risks missing its innovation potential and falling further behind global competitors.

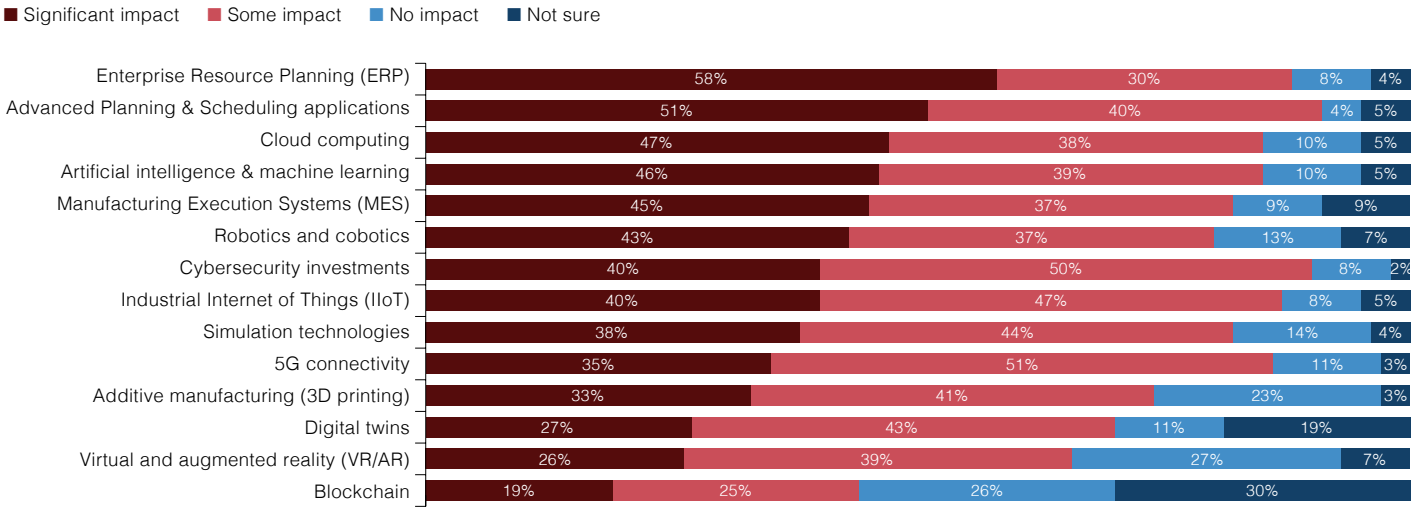
Make UK member surveys show that manufacturers predominantly prioritise technologies that improve efficiency and coordination, with 58% highlighting Enterprise Resource Planning (ERP) systems as especially impactful. Yet many SMEs continue to face challenges due to skills shortages, system integration and limited capital. Alongside ERP systems, other widely adopted technologies include Advanced Planning & Scheduling (51%), cloud computing (50%), artificial intelligence and machine learning (46%), robotics (43%), and the Internet of Things (40%).

Chart 4 – Level of digitalisation among UK manufacturers



Source: Make UK, Make Smart, 2025

Chart 5 – Technologies impacting manufacturing businesses



Source: Make UK, Make Smart, 2025

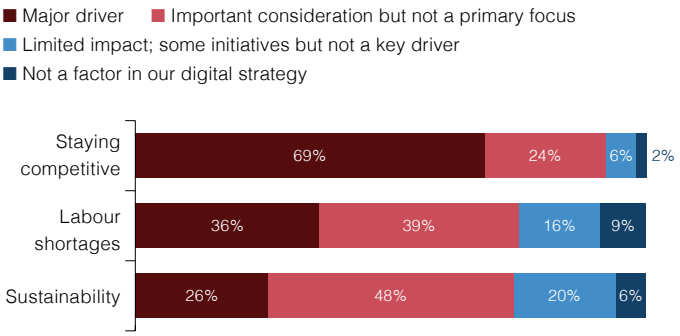
Labour shortages — cited by 36% of manufacturers — and pressure to meet sustainability goals — highlighted by 28% — are also accelerating investment in digital technologies. Automation offers a dual benefit: it can help ease workforce gaps while improving resource efficiency. By enabling firms to redeploy staff to higher-value tasks, automation (e.g., robotics), not only boosts productivity but also supports the reshoring of manufacturing[14]. Together, these capabilities can embed greater agility and resilience across the UK's industrial supply base.

Although manufacturing represents just 9% of the UK's nominal GDP, it punches well above its weight in innovation — accounting for 47% of total national R&D spending in 2024[15]. Yet the UK's overall R&D intensity still lags behind key global competitors, limiting the scale and impact of industrial digital transformation. Public investment continues to skew toward research rather than practical adoption, weakening the flow of innovation from academia into industry.

These structural challenges are compounded by skills and operational barriers on the ground. Nearly half of manufacturers (46%) identify a lack of technical skills as their biggest hurdle, closely followed by integration difficulties caused by outdated IT infrastructure (41%). Change management and leadership issues further impede adoption: workforce transitions and cultural resistance affect 36%, while 17% cite a lack of clear vision, and 13% point to insufficient management and leadership capabilities. Limited access to external advice is another constraint, with 17% of firms reporting difficulties obtaining the support needed for effective technology integration. For SMEs in particular, uncertainty around understanding and measuring the business benefits of automation (27%) often stalls progress beyond initial pilot projects[16].

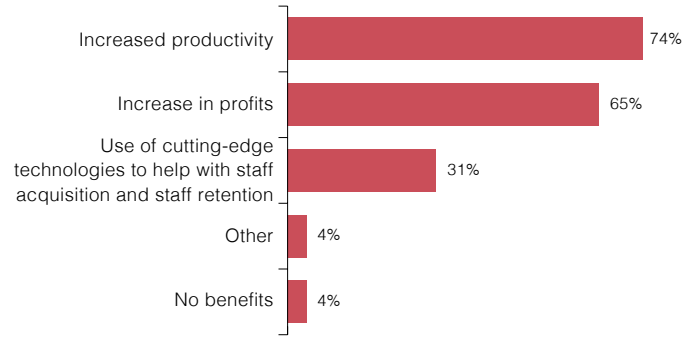
In addition, current support schemes — though helpful in initiating digital adoption — often lack the continuity and depth needed to drive full-scale transformation. As a result, many firms find the journey toward digital maturity costly, complex, and fragmented. Accelerating adoption will require policy stability and long-term direction – as is the intention of the Government's new Industrial Strategy

Chart 6 – Why manufactures invest in digitalisation



Source: Make UK, Make Smart, 2025

Chart 7 – Benefits of investing in R&D



Source: Make UK, Make Smart

- that prioritises SME-friendly funding, comprehensive skills development, stronger regional delivery, and practical, hands-on guidance. With targeted investment and coherent national leadership, the UK can begin to close the gap between pioneering innovators and the broader manufacturing base — unlocking productivity gains, driving sustainability, and strengthening global industrial competitiveness in an increasingly digital world.

[14] Lamperti, F., Lavoratori, K., & Tredicine, L (2025). From globalization to reshoring? The role of Industry 4.0 in Global value chains across Europe. https://doi.org/10.1080/10438599.2025.2487145
[15] Make UK Fact Card 2024: https://www.makeuk.org/insights/publications/uk-manufacturing-the-facts-2024
[16] Manufacturing and Automation: https://www.makeuk.org/insights/reports/2023/10/23/manufacturing-and-automation

Section 2:

Lessons from the Global Leaders in Manufacturing Digitalisation

Around the world, governments are moving decisively to position their manufacturing sectors at the forefront of the wave of industrial change, commonly referred to as the Fourth Industrial Revolution, driven by emerging technologies such as AI, robotics, the IoT, additive manufacturing and advanced data analytics.

Other countries are making the most of the new technology in a far more effective way than the UK. So where is the UK going wrong, what do we need to do to catch up, and what can we learn from best global practice?

In this section, we examine how leading manufacturing economies including Germany, Singapore, South Korea, Switzerland, and the United States are responding to this shifting global landscape. Each of these countries provides valuable benchmarks. All are recognised as a global manufacturing powerhouse. Some are among the world's largest goods producers. Others have smaller economies but are highly impactful in terms of the manufacturing sector's domestic economic contribution and/or global exports. Each example was chosen because of its distinctive approach to manufacturing digitalisation and industrial strategy which, we believe, yields lessons relevant to the UK's context:

- Germany, Europe's industrial engine, benefits from strong integration between SMEs (Mittelstand), industrial R&D institutions like the Fraunhofer Institutes, and long-term policy coordination
- Singapore demonstrates how targeted investment in digital infrastructure and automation can rapidly transform manufacturing.
- South Korea leads the world in robotics adoption and high-tech exports, showing how industrial policy can drive advanced manufacturing at scale.
- Switzerland, with high R&D intensity and global precision engineering leadership, illustrates how smaller economies - especially those outside the EU Customs Union - can lead in high-value niches.
- The United States of America, a key UK trade partner, has introduced bold reindustrialisation measures in recent years, combining strategic public investment with renewed industrial strategies.

Taken together, these international comparators illustrate a range of policy choices, institutional frameworks, and incentive strategies that have supported successful industrial transformation and economic growth. By examining their experiences in comparison to the UK, this section of the report identifies practical insights and potential pathways, both through specific lessons from individual countries and shared lessons across countries, to strengthen the UK's own approach to the digitalisation of manufacturing.

Learning from the Best: Comparative Case Studies of Industrial Tech Adoption

CASE STUDY 1: GERMANY

Population
84.5M

GDP (Nominal)
$4.53T

GDP per Capita
$54,990

Manufacturing as a proportion of GDP

Manufacturing Output
~$845B

Global Mfg. Share
~4.8%

Expenditure % of GDP on R&D
3.1%

M = Million B = Billion T = Trillion

Germany has long served as Europe's economic engine thanks to its strong integration of small and medium-sized enterprises (the Mittelstand) with world-class industrial R&D institutions, supported by a tradition of long-term policy planning and coordination.

Germany's network of Fraunhofer Institutes[17], established in 1949 to bridge the gap between academic research and industrial application, is a key strength of the country's innovation ecosystem. Today, there are 75 Fraunhofer Institutes and Innovation Hubs across the country, each closely affiliated with a local university and regional businesses, each specialising in applied research and each working particularly closely with small and medium-sized enterprises (SMEs). Operating on a co-financing model, they reduce the financial risk of innovation for businesses while fostering commercial uptake of new technologies.

The UK's Catapult Network — a set of technology and innovation centres designed to accelerate the commercialisation of research — was modelled, in part, on the Fraunhofer example. However, the UK has yet to replicate the scale, integration, and impact that Germany's system has achieved, in part due to the fragmentation of the Catapult Network, the broad spectrum of firm sizes it supports and the short-term funding cycles that can create uncertainty and impact long-term planning.

Germany's flagship SME innovation programme, *ZIM* (Central Innovation Programme for SMEs), supports R&D across all sectors and technologies. It enables SMEs to work individually or in partnership with research organisations like Fraunhofer Institutes. The UK's Innovate UK is the nearest equivalent for British companies, but it supports organisations of all sizes, with the German ZIM designed only for SMEs. The result is more targeted support for the smaller German firms that form the backbone of the economy. The UK's broad-brush "one-size-fits-all" approach dilutes impact and means Britain's SMEs continue to underperform and as a result never reach their growth potential.

[17] Fraunhofer Institutes, Germany: The Fraunhofer-Gesellschaft

This approach risks diluting impact because SMEs - though typically harder to reach - comprise the majority of the UK economy and therefore offer the most significant opportunity to shift the dial on innovation and economic growth. Given the UK's productivity challenges and SME underperformance, a more targeted strategy similar to ZIM may be needed. Targeting SMEs, however, requires tailoring support to meet the unique needs and challenges of time poor and cash constrained smaller firms, which are crucial drivers of growth and productivity. Adopting a more focused, SME-centric model like ZIM could help address these gaps and strengthen the UK's innovation ecosystem.

Germany's *Industrielle Gemeinschaftsforschung* (IGF)[18] programme sets a strong example of industrial policy in action. It funds collaborative, pre-competitive research - that is, research conducted before commercial interests come into play - focused on shared technical challenges across entire sectors, particularly benefiting SMEs that lack in-house R&D capacity. By sharing costs, risks, and results across industry, IGF helps companies of all sizes to innovate and accelerate productivity. While rare in UK manufacturing, the ReMediES consortium showed how pre-competitive collaboration can drive system-wide innovation, laying the groundwork for the £56 million Medicines Manufacturing Innovation Centre (MMIC), which now supports firms in adopting advanced production and digital technologies[19]. Meanwhile, the Engineering and Physical Sciences Research Council's Prosperity Partnerships fund early-stage, business-led research at low technology readiness levels, aligning fundamental science with long-term industrial needs. These programmes deliver strong economic value - with £1 million in funding generating £7.75 million in return - but remain dominated by large firms, which make up 82% of participants. High cash contribution requirements limit SME involvement, though 77% of firms reported an increased likelihood of investing in the UK as a result[20].

Finally, Germany's system delivers a generous R&D tax credit that offers SMEs a 35% allowance, even in loss-making years, with a cap of €3.5 million annually[21]. This provides direct financial relief and incentivises long-term innovation, including for companies that outsource R&D.

Overall, Germany's approach blends targeted tax relief, sector-specific research, and regionally accessible digital support. The UK could benefit from taking a more coordinated SME-focused route - simplifying access, building stronger local innovation partnerships, and tailoring support to help smaller firms innovate, digitise, and grow. Germany has backed digital adoption with practical, SME-focused programmes like go-digital and the Mittelstand-Digital Initiative, which provide free expert advice, workshops, and testbeds to help firms adopt technologies such as AI, IoT, and robotics all under one roof[22]. In contrast, the UK offering is complex, with a mix of distinct and separate initiatives including Digital Catapult, Made Smarter, Growth Hubs, and Innovate UK which, while all individually valuable, operate as disparate entities. Unlike Germany's coordinated, one-stop-shop approach, UK support is often segmented and consequently less targeted towards SME needs. There is a clear opportunity to build on existing strengths by developing a more integrated and regionally focused model to accelerate SME digital transformation.

TWO KEY TAKEAWAY LESSONS:

1. Build a More Integrated and National Support Infrastructure

Germany's success is built on an integrated and nationwide support infrastructure. The UK should strengthen local-industrial innovation linkages by fostering closer collaboration between Catapults, universities, research institutes, and regional SMEs, particularly in areas with sectoral or technological strengths. HM government should also aim to expand and coordinate the Catapult Network to better replicate the Fraunhofer Institutes - and the U.S Manufacturing Extension Partnership which the German model also inspired - by increasing the number of centres, deepening their regional ties with universities and businesses, and securing long-term funding cycles to ensure stability.

2. Make R&D Partnerships Work for SMEs

Germany puts SMEs at the heart of public–private R&D. The UK could learn from this success by redesigning public sector initiatives to improve SME participation, such as by easing the cash co-investment requirement or offering matched grants for smaller firms and track SME involvement and outcomes more explicitly to ensure that public funds reach a broader base of businesses.

[18] DLR Projektaeger: https://projekttraeger.dlr.de/de/foerderung/foerderangebote-und-programme/foerderprogramm-industrielle-gemeinschaftsforschung-igf
[19] IfM Insights: https://www.ifm.eng.cam.ac.uk/insights/global-supply-chains/remedies-collaboration-as-the-best-medicine/
[20] Independent Review of EPSRC Prosperity Partnerships: https://www.ukri.org/publications/evaluation-of-epsrcs-prosperity-partnerships-programme/
[21] EURa, Growth Opportunities Act: changes to the research allowance (2024), Growth Opportunities Act: changes to the research allowance
[22] Federal Ministry for Economic Affairs and Energy: Mittelstand Digital - Centers in the Network

CASE STUDY 2: SINGAPORE

Population
5.9M

GDP (Nominal)
$500B

GDP per Capita
$92,930

Manufacturing as a proportion of GDP

Manufacturing Output
~$100B (est)

Global Mfg. Share
~0.6% (est)

Expenditure % of GDP on R&D
1.92%

M = Million B = Billion T = Trillion

Despite its reputation as a service-driven economy, Singapore, much like the UK, is in fact one of the most industrialised countries in the world — ranking consistently among the top five globally for per capita manufacturing output. While manufacturing as a share of Singapore's GDP declined from 27% to 20% in the mid-1980s, the sector has since rebounded, demonstrating the precedent of a country revitalising its manufacturing sector through a deliberate policy of industrial strategy. Today, manufacturing remains a cornerstone of Singapore's economic model, contributing around 20 – 25% of its economy in a given year. Like the UK, Singapore no longer competes on high-volume, low-cost production. Instead, it has built global leadership in high-value, advanced manufacturing — particularly in semiconductors, precision engineering, pharmaceuticals, and clean energy. This sustained success is no accident: it reflects decades of deliberate, state-led industrial strategy that has placed manufacturing at the heart of the country's long-term growth and resilience.

Since the 1960s, Singapore's industrial economy has been driven by strategic planning, robust investment in infrastructure, and a pro-innovation regulatory environment. Today, with global competition intensifying and industrial production entering a new digital era, Singapore is actively reshaping its manufacturing model to lead in Industry 4.0. The government's Research, Innovation and Enterprise 2025 (RIE2025) plan sets the direction, committing S$25 billion to priority sectors like robotics, semiconductors, and biomedical sciences, while supporting enabling technologies such as AI and sustainable manufacturing.

A defining feature of Singapore's industrial strategy is its clear alignment between long-term vision and practical delivery. R&D tax incentives are among the most generous in the world — companies can claim up to 400% tax deductions on local R&D or opt for a 20% cash payout, giving start-ups and SMEs greater flexibility and cashflow certainty. These are complemented by targeted grants which cover up to 70% of costs for technology adoption, capability building, and business transformation.

Crucially, these financial incentives are backed by major public investment in infrastructure and sector development.

Innovation districts like Jurong and Punggol act as anchor sites for advanced manufacturing, with a recent $3 billion to attract inward investment and boost workforce capabilities alongside a £400 million transformation package to support SME job redesign, workforce planning and digital skills development.

What sets Singapore apart is not only its financial and infrastructure support, but its integrated ecosystem for SME innovation. Programmes such as T-Up — which seconds researchers into small businesses — along with the Collaborative Commerce Marketplace and sector-specific transformation roadmaps developed by A*STAR and Enterprise Singapore, ensure that smaller firms are not left behind. These are supported by institutions like the National University of Singapore (NUS) and the Singapore Institute of Manufacturing Technology (SIMTech), which help translate research into commercial application. This bridging of the so-called 'valley of death' — where innovation so often stalls in the UK — is a central strength of Singapore's approach.

Singapore also places strong emphasis on international collaboration. Through frameworks like the Germany – Singapore Co-Innovation Programme and participation in the EUREKA network, an international network which helps companies source funding for R&D, it actively promotes cross-border SME partnerships and applied R&D. The UK operates in a similar fashion, being part of the EUREKA network and having bilateral funding initiatives in place through Innovate UK and its counterparts in Germany, Canada, the U.S, Japan to name a few. However, UK funding tends to be tied to short, thematically focused calls — such as for semiconductors or sustainable aviation — which limits the flexibility and responsiveness of UK businesses to pursue international collaboration when opportunities arise. By contrast, Singapore's co-innovation programmes are more open-ended, allowing applications across any sector, provided they demonstrate strong innovation potential and commercial relevance.

Singapore's innovation ecosystem is also defined by a high degree of accountability. Public funding is accompanied by rigorous oversight, structured processes, and a clear emphasis on measurable outcomes. There is a strict system of learning from success to guide future policy decisions. The UK's Help to Grow: Management scheme was a positive step, but uptake has been limited and its future is uncertain. Embedding it more firmly in industrial policy, with clearer metrics and monitoring, would help. Likewise, the re-established Industrial Strategy Council — secured in part through Make UK advocacy — should be tasked with tracking and evaluating delivery. Singapore demonstrates that good management, clear goals, and strong follow-through aren't bureaucratic hurdles — they are essential to making industrial strategy work.

The strength of Singapore's model, which aims to grow manufacturing by 50% from 2020 levels by 2030, lies in its ability to align R&D incentives, SME support, workforce transformation, and sector-specific planning into a coherent industrial vision which targets smaller firms in an effective way.

TWO KEY TAKEAWAY LESSONS:

1. Institutionalise Researcher Secondments into SMEs
In Singapore — as with Germany — support programmes second researchers into SMEs for 6-12 months to accelerate knowledge transfer, and to ensure skills and knowledge are embedded after the consultants leave. The UK should learn from this by scaling up and stabilising the Innovation Launchpad Network+ and creating stronger links with, and pathways through, programmes such as Innovate UK's Knowledge Transfer Partnerships (KTP), transforming the Innovation Launchpad model into a permanent feature of the UK's innovation system that, in coordination with KTPs, provides clear pull through from academic research to commercialisation.

2. Strengthen International SME Co-Innovation Programmes
Singapore's industrial economy has been driven by strategic planning, robust investment, and a pro-innovation regulatory environment. The UK should adopt a similar approach by further promoting co-innovation partnerships between UK SMEs and counterparts in countries like Singapore, Germany, and Canada, supported by reciprocal, open, and flexible funding mechanisms that mirror Singapore's internationally oriented R&D approach.

CASE STUDY 3: SOUTH KOREA

Population
51.7M

GDP (Nominal)
$1.87T

GDP per Capita
$36,129

Manufacturing as a proportion of GDP
24%

Manufacturing Output
~$427B (est)

Global Mfg. Share
~2.7% (est)

Expenditure % of GDP on R&D
4.6%

M = Million B = Billion T = Trillion

South Korea offers a compelling example of how a coordinated national strategy can transform an SME-dominated manufacturing sector into a globally competitive, digitally advanced economy. Like the UK, over 99% of South Korea's manufacturing firms are SMEs, with the same challenges of transitioning from legacy production methods to more advanced, digitalised systems. Yet South Korea has rapidly modernised its industrial landscape through a combination of effective policy, targeted sectoral support, and significant public-private investment. Central to this transformation is the Smart Factory Initiative, launched to digitalise tens of thousands of manufacturing facilities, with tailored support for small and medium-sized enterprises.

After the Korean War, the government launched root-and-branch industrialisation drive underpinned by education, infrastructure, and innovation. Over decades, sticking to the same plan, it has helped South Korea emerge as a global leader in advanced manufacturing and technology. Today, it is doubling down delivering some of the most generous R&D tax incentives in the world (e.g. the K-CHIPS Act) — offering up to 30% for SMEs investing in semiconductor facilities and extending broader innovation tax credits through to 2029 and beyond. For the UK, where firms often cite uncertainty and complexity around R&D relief schemes, South Korea's consistent approach demonstrates the power of clear, generous, and stable incentives — particularly when targeted at critical sectors like semiconductors, clean tech, and AI[23].

A flagship example of South Korea's industrial ambition is the planned $470 billion semiconductor cluster in Yongin, led by Samsung and SK Hynix. This national effort — backed by both public and private investment — builds on Korea's dominant position in memory chip production and extends into high-value areas such as system chips for AI and automotive applications. The scale and coherence of this strategy far outstrip anything in the UK semiconductor space, which remains dispersed and under-capitalised by comparison.

Ensuring SMEs are digitising their production was also central to the successful strategy. As workforce capacity – or lack of it – was key, the South Korean Government

[23] MOEF, Korea Net: Press Releases: Korea.net : The official website of the Republic of Korea

committed to training 40,000 workers to operate fully automated production systems, ensuring that the skills pipeline kept pace with technological change. This proactive, integrated approach stands in stark contrast to the UK's track record, where workforce development has often been fragmented and underfunded. The UK's Help to Grow: Management programme has seen limited uptake, while the Apprenticeship Levy — intended to boost skills — was followed by a 42% drop in apprenticeship starts since its 2017 launch. Both highlight the need for more effective, sector-focused training tied to industrial transformation — an urgent priority as the British government reforms the Levy into the Growth and Skills Levy. This contrast suggests that without coordinated delivery, sufficient scale, and strong industry alignment, skills policy in the UK will continue to fall short of supporting the kinds of structural transformation seen in South Korea[24].

Simple access to help is also key, with the South Korean government providing SMEs with targeted vouchers for automation, ERP and MES software as well as cyber protection and upskilling staff. An ageing population and weaker domestic demand has also led the Government to commit over £400 million in R&D funding for AI, IoT and smart sensors to deal with the skills pipeline shortage quickly approaching.

The success of South Korea's approach is clear. Firms adopting smart factory technologies in Korea report a 25% increase in productivity and a 27% drop in defects. These kinds of metrics are a reminder of what the UK could achieve with a more cohesive approach — aligning industrial strategy, digital infrastructure, skills, and R&D into a single vision rather than treating them as siloed policy domains.

South Korea's success also underscores the importance of converting research into commercial application. Nowhere is this clearer than in the case of graphene. Despite being first isolated at the University of Manchester in 2004 — and receiving a £50 million UK government commitment in 2011 — the UK has struggled to commercialise the material at scale. Meanwhile, South Korea identified graphene's strategic value for its electronics and semiconductor industries early on, and both Samsung and the government heavily invested in R&D. Within a decade, Samsung held the world's largest graphene patent portfolio, and, in 2014, Samsung and Sungkyunkwan University developed a method to speed up the commercialisation of graphene[25]. Whilst the UK has demonstrated recent successes in graphene production[26], this example reflects a broader pattern in UK manufacturing: a strong research base undermined by weak domestic commercialisation pipelines and underdeveloped institutional memory — something South Korea's joined-up, learning-oriented innovation system helps to avoid.

TWO KEY TAKEAWAY LESSONS:

1. Build in Commercialisation

Commercialisation is at the core of all innovation in South Korea from the beginning. The UK should seek to learn from this by strengthening post-research innovation support, including scale-up funding, accessible manufacturing testbeds, and long-term partnerships that help firms move from prototype to production at speed. We should also build institutional memory and continuity around technology commercialisation, ensuring that UK breakthroughs (such as graphene) are not lost in translation. Finally, we must encourage deeper collaboration between universities, SMEs, and large firms, with stronger IP pathways and co-investment mechanisms.

2. Fuel Early Innovation Through Industry Collaboration

South Korea aligns research funding with industry needs. The UK should similarly back sector-wide, pre-competitive R&D models that include SMEs and large firms jointly in tackling shared industrial challenges - as Germany has done with its IGF programme and South Korea has done in semiconductors, sensors, and smart systems. The UK could also replicate Korea's K-CHIPS Act approach in priority sectors, combining tax relief, capital investment, and collaborative research funding to build sovereign manufacturing capacity in areas like green energy, AI hardware, and advanced electronics.

[24] South Korea Smart Factory Information: https://www.trade.gov/country-commercial-guides/south-korea-manufacturing-technology-smart-factory
[25] Samsung Press Release: https://news.samsung.com/global/35576/2
[26] Versarien secures £1.93 million investment: https://iuk-business-connect.org.uk/casestudy/graphene-pioneer-goes-global-ps19m-south-korean-investment/

CASE STUDY 4: SWITZERLAND

Population
8.9M

GDP (Nominal)
$897B

GDP per Capita
$104,523

Manufacturing as a proportion of GDP


Manufacturing Output
~$150B (est)

Global Mfg. Share
~1.0% (est)

Expenditure % of GDP on R&D
3.3%

M = Million B = Billion T = Trillion

With a population no larger than London's, Switzerland delivers a manufacturing output of around £150 billion — astonishingly close to the UK's £217 billion. This remarkable productivity stems from a national strategy that prioritises advanced technologies, SME competitiveness, and long-term innovation. Under the Digital Switzerland Strategy 2025, the country has created an ecosystem where digitalisation and precision manufacturing go hand in hand. The result is that Switzerland consistently tops the Global Innovation Index, while the UK has slipped in recent years — underscoring a widening gap in innovation performance that demands attention.

At the heart of Switzerland's success is a coordinated, SME-focused approach to innovation delivery. *Innosuisse*, the Swiss Innovation Agency, channels public funding toward science-based projects with real commercial potential — especially those led by smaller firms. Typically, *Innosuisse* funds up to 50% of eligible project costs for SMEs, while large firms only qualify if they partner with smaller ones, and at a lower subsidy rate. This ensures funding flows where it can have the greatest impact. The UK once mirrored this approach through its Smart Grants scheme, which funded up to 70% of costs for small enterprises. Importantly, these too required SME involvement if large firms applied[27]. However, Smart Grants have been paused for the 2025/26 financial year, creating a gap in open-access innovation support[28]. Unlike challenge-led schemes, Smart Grants supported bottom-up innovation and early-stage R&D across sectors, including projects that fall outside government priorities. Whilst InnovateUK state they are exploring new funding schemes focussed on SMEs, the gap created by the pause in Smart Grant funding risks slowing SME-led innovation and sends mixed signals about the UK's industrial strategy, especially when global competitors are expanding SME support. This highlights the need for more consistent, accessible funding to underpin long-term innovation and growth.

One key lesson from Switzerland is the critical role of institutions in enabling innovation — not just funding it. Swiss universities and technical centres are embedded in industrial delivery, offering coaching, technical advice, and internationalisation support. SMEs receive hands-on guidance navigating what is otherwise a complex system — from local development offices, trade associations, and cantonal authorities. This contrasts with the UK's more fragmented, competitive model via Innovate UK, which can be bureaucratic and tends to favour larger firms with grant-writing capacity. For the UK to unlock SME-led innovation, simplifying access, improving coordination, and providing practical support at the regional level is essential.

[27] InnovateUK Smart Grants: https://www.ukri.org/councils/innovate-uk/guidance-for-applicants/guidance-for-specific-funds/smart-innovation-funding-guidance/
[28] Smart Grants Paused: https://iuk-business-connect.org.uk/news/new-funding-and-support-packages-for-innovative-smes/

Switzerland also leverages its decentralised fiscal structure to foster innovation. While federal R&D tax relief is modest, individual cantons compete to attract business by offering targeted, refundable incentives. The canton of Lucerne, for instance, is now consulting on a 30% credit for R&D personnel costs, 20% for capital investment, and 10% for contract research. This kind of regional fiscal flexibility stands in sharp contrast to the UK's centrally administered R&D relief system, which has recently become more restrictive — especially for SMEs. Allowing UK regions to tailor tax incentives to their industrial strengths could help revive investment and rebalance the national economy.

In supporting digital adoption, Switzerland combines national initiatives like *digitalswitzerland* with hands-on, regionally delivered programmes. Initiatives such as Next Industries — run by *Innosuisse* and *Swissmem* — offer practical training and tools for SMEs transitioning to Industry 4.0. Regional organisations like Platinn and Alp ICT provide coaching, while cantonal offices offer funding advice and help broker partnerships. This multi-level support ensures that SMEs are guided from awareness through to implementation — a contrast to the UK's more piecemeal approach, where firms, particularly SMEs, often struggle to navigate the landscape or find support tailored to their digital maturity.

Internationalisation is also tightly integrated into Switzerland's innovation model. Switzerland Global Enterprise (S-GE)[29], the country's trade and investment agency, provides SMEs with expert advice on exporting, setting up overseas, and accessing global markets. This unified offer — from innovation to international expansion — helps smaller firms grow with confidence and scale globally.

Switzerland's model holds several clear lessons for the UK. Its success is not down to scale or geography, but to smart design: an institutional ecosystem that embeds research in delivery, tailors support to SME needs and empowers regions to drive innovation on their own terms. In contrast, the UK's support landscape remains overly centralised, fragmented, and often designed around the needs or capability of larger businesses. To close the gap, the UK must simplify access for smaller firms, reinstate flexible funding programmes like Smart Grants, strengthen regional capacity to deliver innovation support, and ensure university–industry collaboration is not the exception but the norm.

Above all, Switzerland shows that productivity gains and global competitiveness come not from isolated interventions, but from a sustained, coordinated commitment to industrial improvement. Switzerland's model demonstrates that scale is not a precondition for global leadership in manufacturing and innovation. What matters is clarity of purpose, strength of institutions, and integration of delivery. For the UK to close the innovation gap and raise productivity, it must shift from fragmented, short-term schemes towards a coherent, regionally empowered, and SME-first innovation system — built for delivery, not just design.

TWO KEY TAKEAWAY LESSONS:

1. Flexible SME-Focused Innovation Funding
The UK should ensure funding mechanisms explicitly prioritise smaller firms, as in Switzerland's *Innosuisse* model, where large firms only receive support if they partner with SMEs. This should include moving away from our over-reliance on challenge-led funding, which can exclude smaller companies and subsectors from vital early stage support.

2. Devolve Fiscal Tools to Support Regional Industrial Strengths
Aiming to emulate the success of Switzerland's example, the British government should enable devolved authorities and combined mayoral regions in England to experiment with targeted R&D tax credits or innovation incentives, mirroring Swiss cantonal flexibility. This could include location-based R&D support pilots, such as enhanced credits or matching capital grants, in high-potential regions to drive investment in underperforming manufacturing centres.

[29] https://www.s-ge.com/en

CASE STUDY 5: THE USA

Population
335M

GDP (Nominal)
$28.78T

GDP per Capita
$85,795

Manufacturing as a proportion of GDP
10%

Manufacturing Output
~$2.5T

Global Mfg. Share
~16.5%

Expenditure % of GDP on R&D
3.5%

M = Million B = Billion T = Trillion

Despite its strong association with free-market capitalism, the United States has long relied on active industrial policy to shape and grow its manufacturing sector. From the early days of the republic, the federal government actively intervened to support strategic industries using tools such as tariffs, public procurement, direct subsidies, and government-backed research. Strategic sectors including aerospace, computing, semiconductors, and biotechnology were all seeded and scaled through state-led investment, particularly via defence, space, and energy programmes that provided stable demand and early-stage funding. Silicon Valley itself emerged not solely from private enterprise, but from decades of federal support for R&D and innovation. In this sense, the US economy has always been underpinned by a quiet but powerful industrial strategy, one that prioritised sovereign capability, technological leadership, and global competitiveness.

In recent years, this interventionist tradition has become more explicit. Under President Biden, the landmark Inflation Reduction Act (IRA) and the CHIPS and Science Act marked a more than $50 billion commitment to domestic semiconductor production as well as sweeping incentives for clean energy, advanced manufacturing, and supply chain security. These initiatives were designed not only to accelerate innovation but also to reshore key industries and create high-quality jobs. Under President Trump, that industrial agenda continues, though with different tools and rhetoric. While his administration focuses more on tariffs and deregulation, the goal remains the same: to boost U.S. manufacturing, safeguard critical technologies, and reassert industrial leadership.

The U.S. has built a nationally coordinated system that integrates innovation funding, workforce development, SME support, and foreign direct investment into a coherent industrial strategy. A central component of this system is the Manufacturing Extension Partnership (MEP)[30], a network of 60 centres operating across all 50 states and Puerto Rico. Managed by the National Institute of Standards and Technology (NIST), the MEP delivers practical, hands-on support to small and medium-sized manufacturers,

[30] Manufacturing Extension Partnership: https://www.nist.gov/mep

helping them with digital transformation, lean production, cybersecurity, workforce training, and market positioning. In 2024 alone, MEP centres supported over 33,500 manufacturers, enabling $15 billion in new and retained sales and contributing to more than 100,000 jobs created or retained[31]. The programme's hybrid model — where some centres deliver direct support via in-house experts and others act as brokers to qualified consultants — ensures flexibility while maintaining national standards. A recent funding reallocation by the Trump administration in 2025, which diverted $12.9 million from MEP centres in ten states toward emerging technologies such as AI and quantum computing, has raised concerns about policy consistency. Nevertheless, the MEP remains a gold standard in how government can enable SME-led industrial transformation at scale.

This approach to local delivery under a national framework is reinforced by Manufacturing USA, a network of 17 public-private innovation institutes that focus on specific advanced technologies, from additive manufacturing to smart materials. These institutes exist to bridge the gap between early-stage research and commercialisation, a critical weak spot in the UK innovation landscape. Run in partnership with agencies such as the U.S. Department of Energy and Department of Defense, these institutes also embed workforce training into their missions, ensuring firms not only adopt new technologies but also develop the talent needed to sustain them. The Manufacturing USA model shows how mission-led, multi-agency coordination can advance national technological priorities while building long-term capability within industry.

The UK is the most reliant economy in the world on government financial support for business research and development. In 2021, HM government provided the highest level of government financial support for business R&D – primarily in the form of R&D tax relief – as a share of GDP among OECD countries, reaching 0.48% of GDP, more than double the OECD average[32]. Larger firms tend to benefit more from tax-based R&D incentives, as they have the internal resources to navigate complex claims, whereas SMEs, especially early-stage and advanced manufacturers, often need upfront, non-dilutive funding, skills support and help with technology. Other OECD leaders, especially the U.S., combine R&D tax relief with direct funding and coordinated industrial strategy, often through national innovation agencies or public-private partnerships. To improve outcomes, the UK may need to rebalance its approach, complementing tax incentives with more targeted, strategic direct investment in sectors and regions that drive productivity and long-term growth.

Equally significantly, the U.S. has successfully used public sector seed funding to crowd in private sector capital as well. Consistent policy over decades — regardless of administration — has given global firms the confidence to invest heavily in U.S. manufacturing. Since 2021, 40% of manufacturing facilities requiring over $1 billion in investment have come from FDI in the US[33]. These are not merely symbolic projects: they bring advanced capabilities, create spillover benefits for domestic supply chains, and boost productivity. For every job created by a foreign multinational, U.S. workers see average wage gains of $13,400. Productivity in manufacturing rose by 7.8% between 2013 and 2019 as a result of such FDI[34]. In light of the UK government's adoption of the Harrington Review into FDI, the U.S. example underscores the importance of long-term policy stability in attracting and embedding high-value international investment.

More recently, the U.S. Small Business Administration launched the 'Made in America Manufacturing Initiative' under the Trump administration, aimed at lowering barriers for small manufacturers[35]. This includes plans to cut regulation, expand access to finance, and strengthen skills pipelines. A particularly innovative feature is the new onshoring portal, which connects domestic customers with verified U.S. manufacturers — a practical tool to incentivise reshoring and strengthen local supply chains[36]. Make UK has taken steps in a similar direction, including our new steel portal, but HM Government could take this a step further by creating a national database to help UK firms source domestic suppliers and therefore support British content, skills, and growth, across key sectors. Recently launched as part of the Government's Growth Service, the new website Business.Gov.Uk would be the obvious outlet for such a portal[37].

Taken together, the U.S. based programmes demonstrate the power of a long-term, joined-up approach to industrial strategy — one that blends national vision with local delivery, integrates skills with innovation, and supports firms across the entire lifecycle of technology adoption, from early research to commercial scale. They are backed by stable funding, clear governance, and a political consensus that industrial policy is key to economic competitiveness and national resilience.

[31] MEP 2024 Statistics: https://www.nist.gov/news-events/news/2025/03/mep-economic-impacts-boost-business-and-jobs
[32] Cambridge's Institute for Manufacturing, 2025 UK Innovation Report: https://www.ciip.group.cam.ac.uk/innovation/executive-summary-2025/
[33] How foreign investment is boosting U.S manufacturing: https://hbr.org/2024/09/how-foreign-investment-is-boosting-u-s-manufacturing
[34] The Effects of Foreign Multinationals on Workers and Firms in the United States: https://academic.oup.com/qje/article-abstract/136/3/1943/6262364?redirectedFrom=fulltext&login=false; SelectUSA report on FDI: https://www.trade.gov/sites/default/files/2022-04/IndirectJobsSelectUSABrief.pdf
[35] Made in America Manufacturing Initiative: https://www.sba.gov/article/2025/03/10/sba-announces-made-america-manufacturing-initiative
[36] SBA Onshoring Portal: https://www.sba.gov/priorities/american-manufacturers
[37] Government growth service to save small business time and money - GOV.UK: https://www.gov.uk/government/news/government-growth-service-to-save-small-business-time-and-money

For the UK, several clear takeaways emerge. First, the U.S. shows how national coherence and regional flexibility can go hand-in-hand — MEP and Manufacturing USA both maintain federal oversight whilst tailoring support to local industrial strengths. Second, the integration of workforce development into innovation policy is a core strength of the U.S. model and something the UK should prioritise as it builds out its new industrial strategy. Third, the commitment to non-dilutive, early-stage funding provides a useful benchmark for reforming UK grant systems to ensure smaller firms can access capital on fairer terms.

Ultimately, if the UK wants to transform its manufacturing sector, it must move beyond piecemeal pilots and short-term competitions. The U.S. experience shows the value of long-term vision, stable institutions, and policy alignment across skills, innovation, investment, and trade. It is this kind of strategic commitment — rooted in delivery, not declarations — that the UK must now embrace. The U.S. shows that industrial strategy need not be centralised to be coherent. Decades of consistent, well-funded delivery — across workforce, innovation, investment, and trade — have made the U.S. a global manufacturing powerhouse. For the UK to revitalise its own base, it must move past fragmented pilots and build enduring, scaled infrastructure for industrial support.

TWO KEY TAKEAWAY LESSONS:

1. Integrate Trade, Innovation, and Investment Promotion

Based on U.S. best practice, the UK should align export and investment strategies with industrial priorities. This would require improving cross-departmental coordination to provide seamless support for exporters, and internationalisation initiatives. In the past, UK export and investment efforts often operated in separate silos to industrial strategy, therefore missing opportunities to fully support economic growth and SME access to international markets. A more joined-up approach, modelled on what the U.S. does, would help to unlock the full potential of UK manufacturing on the international stage.

2. Signpost the System of SME Support

The U.S. Manufacturing Extension Partnership (MEP) shows that SMEs benefit not just from funding, but from having trusted, local advisors who help them navigate a complex support landscape and connect with the right partners. The UK should introduce local brokering and navigation services, modelled on the U.S. MEP system, to help SMEs overcome complexity and connect with relevant funding, R&D, training, and technological adoption support. The UK should also streamline grant applications and cut red tape to make it easier for smaller firms — especially those unfamiliar with Innovate UK or Catapult processes — to access funding and support. Above all, government must ensure regionally balanced access so that manufacturers across the UK receive tailored, long-term support.

Section 3:

Leading by Example: Actionable Insights from World Leading Experience

While the case studies in the previous section offered country-specific recommendations — some unique or exemplary — the following section draws on common themes across all five case studies to propose a set of shared, cross-cutting recommendations.

SHARED LESSON 1.
TRACK RESULTS, LEARN FAST, DELIVER BETTER

Key Insight:

The U.S., South Korea, and Singapore show that lasting industrial strategy depends on strong institutions, clear accountability, and the ability to learn and adapt over time. Their success stems from treating industrial policy as a long-term national project, not a short-term initiative.

Policy Recommendations:

- **Make Industrial Policy Permanent and Mission-Driven**
  Embed industrial strategy into the core of economic policymaking, with clear goals for productivity, sustainability, and global competitiveness — as seen in Singapore's Manufacturing 2030 plan — to focus delivery and galvanise industry.
- **Strengthen the Industrial Strategy Council**
  The UK's new Industrial Strategy Advisory Council is a step in the right direction but without a statutory footing, it lacks independence, permanence and authority. Parliament should place it on a legal basis, giving the Council a formal mandate to monitor performance, evaluate impact, and recommend course corrections, drawing lessons from the success of the Singapore, South Korea, and the U.S. federal oversight models. Government should also ensure the Industrial Strategy Council has real powers to coordinate across departments and report publicly on progress.
- **Treat Innovation Support as Infrastructure**
  Build long-term institutional continuity by moving away from fragmented, time-limited initiatives. Strengthen regional collaboration between academia, catapults, Made Smarter hubs, and local firms to embed delivery and reduce reliance on short-term project funding.

SHARED LESSON 2.
POWER DIGITAL TRANSFORMATION THROUGH PEOPLE

Key Insight:

Germany, the U.S., South Korea, and Singapore have shown that innovation policy works best when it is tightly linked to workforce development. Embedding skills into the heart of industrial strategy ensures firms can adopt new technologies and build the capabilities to sustain change over the long term.

Policy Recommendations:

- **Link Funding to Building the Future Workforce**
  Digital transformation succeeds only when workers have the skills to implement and sustain it. Skills programmes must therefore be embedded within broader digital adoption strategies, not treated as separate or secondary. Public investment in innovation and automation should come with clear expectations around corresponding workforce training and transformation. Firms receiving support should commit to upskilling their employees, ensuring the skills needed to optimise use of current and future technologies are built in from the start.

- **Make Sector-Specific Upskilling a Core Pillar of Digital Adoption**
  Public funding should be targeted to incentivise companies to train a new digitally-skilled workforce for the future, so the UK can catch up with our global competitors. Government and industry should co-develop targeted training and reskilling programmes that directly align with the technologies reshaping key sectors – such as robotics, smart systems, and cybersecurity in advanced manufacturing. Models like Singapore's SkillsFuture and U.S. regional tech hubs show how workforce development can be a core driver of industrial competitiveness when tightly linked to innovation policy and sector-specific needs.

- **Unlock Digital and Automation Training Through the Growth and Skills Levy**
  With the Apprenticeship Levy now being reformed into the Growth and Skills Levy, government should seize the opportunity to target the Growth and Skills Levy at digital and automation skills gaps by making it more flexible, responsive, and aligned to industrial needs. The new system must include industry-designed short courses, modular training, and micro-credentials in high-demand future-facing skills such as robotics, cybersecurity, and smart manufacturing. Crucially, it should support regional skills pipelines tied to industrial clusters – echoing successful U.S. models – and make it easier for SMEs and advanced manufacturers to access training that keeps pace with technological change.

SHARED LESSON 3.
SMART SUPPORT FOR SME INNOVATION

Key Insight:

Across all five case studies, one message is clear: comprehensive industrial transformation depends on getting digital innovation support right for SMEs. Smaller firms face unique barriers – limited capacity, risk aversion, and fragmented support – that require targeted, simplified, and sustained backing.

Policy Recommendations:

- **Streamline and Scale Support Under One Roof**
  Unify programmes including Made Smarter, Catapult Centres, and Growth Hubs under a single national platform with SME-oriented branding, clear targets, and cross-cutting coordination. Take inspiration from models like South Korea and Switzerland, where SME support is not peripheral but central to innovation delivery – backed by strong regional delivery partners and national visibility.
- **Design SME-First Innovation and R&D Schemes**
  Develop dedicated funding streams for SMEs, modelled on Germany's ZIM, with tailored schemes for small manufacturers that avoid dilution across larger firms. Broaden eligibility, lower match-funding requirements, and simplify application processes to reflect the realities of SME time and resource constraints. Offer hands-on, localised support – not just funding – to help firms plan, adopt, embed and scale technologies.
- **Build Sector-Specific Roadmaps to Guide Digital Adoption**
  Co-develop transformation roadmaps with industry, academia, and government to give SMEs clear pathways through digital adoption – from awareness and training to implementation and integration. Use examples like A*STAR and Enterprise Singapore, digitalswitzerland, and South Korea's regional delivery model to ensure support is proactive, phased, and accessible even to harder-to-reach firms.

Conclusion

As the UK sets its sights on becoming the fastest-growing economy in the G7 and the best place in the world to start, grow and invest in advanced manufacturing, we must overcome deep-rooted structural challenges that have long hindered technology adoption, particularly among small and medium-sized firms.

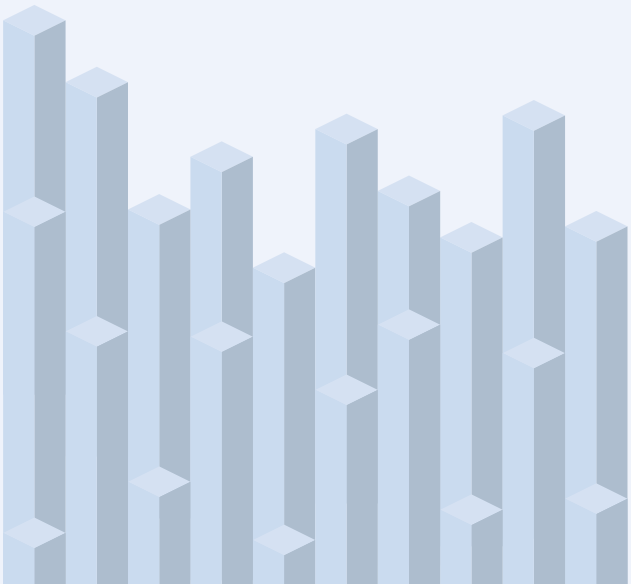
While peer economies such as Germany, the United States, Singapore, South Korea, and Switzerland have pursued integrated, long-term strategies — aligning public R&D investment, workforce development, and industrial policy — the UK has often lacked the institutional coherence and policy continuity required to match their performance.

The lesson from these global leaders is clear: transformative industrial growth does not happen by accident. It demands enduring investment, stable governance, and a delivery system that connects national ambition to regional strength. These, the most successful manufacturing ecosystems in the world, demonstrate that progress hinges on more than just funding or technology. It depends on aligning research, skills, infrastructure, and business support into a unified system that serves firms of all sizes, especially the small and medium-sized manufacturers who make up the backbone of every economy. Long-term commitment, institutional consistency, and close coordination across national and local levels are critical for turning strategic intent into practical outcomes.

The UK has firm foundations to build on. It boasts world-class research institutions, a thriving tech sector, and a renewed commitment to industrial strategy. The publication of the new Industrial Strategy and its accompanying Sector Plans marks a meaningful shift toward a more joined-up national framework consistent with other leading nations approaches. Progress now depends on moving from vision to execution. We must build the connective links between universities and businesses, skills and innovation, local delivery and national ambition that can together translate our strengths into scale. That means simplifying access to support, embedding workforce development into innovation policy, and ensuring that small firms have the tools, capacity, and incentives to adopt and apply new technologies.

This is not about chasing the latest trend or launching another round of pilot schemes. It is about building a durable system that supports continuous improvement, rewards collaboration, and empowers regions to lead industrial renewal from the ground up. If the UK is to close its productivity gap and compete in the industries of the future, it must make this transition: from fragmentation to focus, from short-termism to structural change.

Only by placing SMEs at the heart of this automation and digitalisation agenda, and backing them with a coherent, long-term ecosystem of support, can the UK unlock its full manufacturing potential and deliver a more resilient, inclusive, and technologically future-ready economy.



Sage

Viewpoint

Digital transformation is no longer optional for UK manufacturing. It's essential. We have the talent and the ambition to thrive. But a coordinated approach is required to make a real impact on the world stage. With a bold strategy, inclusive support for SMEs, and policy reforms, the UK can lead in digital manufacturing.

At Sage, we believe digital transformation is not just a technological shift—it's a strategic imperative that UK manufacturing needs to embrace to stay ahead. The Make UK Digitalisation Report 2025 paints a compelling picture: while the UK has world-class innovation capabilities, we're falling behind when it comes to turning that potential into real-world progress. And that must be urgently addressed if we are to remain globally competitive.

Barriers to tackle

The report highlights a sobering reality. Despite being the world's sixth-largest economy, the UK ranks just 24th in robotic density and has slipped in global innovation rankings. And while 70% of manufacturers are investing in digital tools, only 10% operate fully digital factories. The barriers are clear — skills shortages, legacy systems, fragmented support, and limited access to capital, particularly for SMEs.

A bright outlook

Yet, there's cause for optimism. From AI and robotics to ERP systems and cloud computing, manufacturers are increasingly turning to technology and recognising that digitalisation is essential to improve efficiency, resilience, and sustainability. At Sage, we see this every day in our work with customers who are using digital tools to streamline operations, enhance decision-making, and unlock new growth opportunities.

We need a bold approach

But a bold, coordinated approach is required to scale these successes. The report's global case studies offer valuable lessons. Germany's integration of SMEs with research institutions, South Korea's long-term policy consistency, and Singapore's approach linking R&D incentives, workforce planning, and SME support all demonstrate the power of a shared strategy and collaboration. The UK needs to move beyond pilot programmes and fragmented initiatives to deliver a national digital manufacturing strategy that's bold, coherent, and focused on SMEs.

Digitalisation has to be inclusive

At Sage, we strongly support the call for simpler access to funding, better integration between academia and industry, and a renewed focus on skills. We also believe digitalisation must be inclusive. SMEs make up 99% of UK manufacturing businesses, yet they face the biggest hurdles. We must ensure that digital transformation is a shared opportunity for everyone.

Sage is a technology partner to thousands of UK manufacturers and we're committed to playing our part. We're investing in intuitive, scalable solutions that help businesses of all sizes digitalise with confidence. We're also advocating for policy reforms that put SMEs at the heart of the UK's Industrial Strategy.

The time for transformation is now

The UK has the talent, the technology, and the ambition to lead in digital manufacturing. But we must act decisively. With industry, government, and technology providers working together, we can build a more productive, sustainable, and globally competitive manufacturing sector. Let's make it happen now.

The Manufacturers' Organisation

Make UK is backing manufacturing – helping our sector to engineer a digital, global and green future. From the First Industrial Revolution to the emergence of the Fourth, the manufacturing sector has been the UK's economic engine and the world's workshop. The 20,000 manufacturers we represent have created the new technologies of today and are designing the innovations of tomorrow. By investing in their people, they continue to compete on a global stage, providing the solutions to the world's biggest challenges. Together, manufacturing is changing, adapting and transforming to meet the future needs of the UK economy. A forward-thinking, bold and versatile sector, manufacturers are engineering their own future.

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Sage empowers manufacturers to streamline operations, reduce costs, and drive growth with intelligent, cloud-based ERP solutions. Designed for discrete and process manufacturers, Sage software enhances visibility across production, inventory, and financials - enabling better decision-making and improved quality control. With tools to automate workflows, manage multi-site operations, and optimise procurement and order processing, Sage helps businesses stay agile and competitive in a fast-evolving market. From real-time insights and configurable dashboards to integrated accounting and manufacturing systems, Sage supports end-to-end efficiency and scalability. Whether you're a growing manufacturer or a global enterprise, Sage delivers the flexibility and control needed to meet customer demands, ensure compliance, and unlock new opportunities. Trusted by industry leaders, Sage is the partner of choice for manufacturers ready to transform their operations and future-proof their business.

www.sage.com/en-gb/industry/manufacturing/

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