MAKE uk
The Manufacturers' Organisation

BEYOND AMBITION: ADVANCED MANUFACTURING

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"PRODUCTIVITY IS NOT EVERYTHING, BUT IN THE LONG RUN, IT'S ALMOST EVERYTHING"

This famous aphorism, coined by Nobel Prize winning economist Paul Krugman in his book *The Age of Diminished Expectations*, sets out succinctly why productivity growth, or the ability to produce more with less, is so important[1]. It is the main driver of corporate profits, employee wage growth, and hence tax revenues for public spending.

In an increasingly competitive global race for growth, the term 'Advanced Manufacturing' often conjures images of cutting-edge products with futuristic functionalities. While new products will always be important for company sales, this focus risks overlooking the true revolution taking place within the UK manufacturing sector, and the development and adoption of new manufacturing processes. True industrial advantage lies not solely in what we make, but in how we make it. By embracing advanced manufacturing as not just product oriented invention, but a focus on process-driven innovation, firms are unlocking the dramatic productivity gains, boosting environmental sustainability, and increasing their balance-sheet profitability. This report delves into some of the key technologies and strategies driving advances in UK manufacturing, exploring how they can empower firms to not only survive but thrive in the face of a rapidly evolving global market. Join us as we unveil the growing potential within advanced manufacturing, where the focus shifts from what we make to how we make it, ultimately unlocking a new era of industrial prosperity.

[1]Paul Krugman, *The Age of Diminished Expectations*, (Cambridge MA, 1990).

SEIZING THE MOMENT: LESSONS TO INFORM MANUFACTURING'S TECH-DRIVEN FUTURE

Productivity growth, that is producing more output with the same amount of input to increase company profitability, essentially comes from a combination of two factors: process innovation, and product innovation.

The UK has a productivity problem. In the 15 years before the global financial crisis of 2008 the UK economy grew by about 50%. In the 15 years following the global financial crisis it grew by only around 20%.

Between 2000 and 2007, the UK economy enjoyed a healthy period of productivity increases fuelled by high levels of investment in innovation, capital accumulation, and a skilled workforce, creating a virtuous cycle of growth and prosperity. British productivity growth was second only to America's within the G7 group of countries as output per hour grew at an annual average rate of 1.9%[2]. This translated into rising wages and higher living standards from a booming economy.

Then, disaster struck in the form of the global financial crisis. The productivity slowdown that resulted was worldwide in its impact but in Britain, it was particularly acute. Some of the factors behind the slowdown were global – affecting all countries equally - but much of the slowdown in the UK is due to a failure to invest in capital and, to a lesser extent, in skills. Other countries did not cut back their investments as fast and as far as the UK. Between 2009 and today the UK's productivity growth rate has been the second slowest in the G7. The United States, for example, produces 28% more value added per hour than in the UK. In France and Germany, firms are 13% and 14% more productive, respectively, than their UK counterparts today[3]. Whereas average annual GDP growth over the decade preceding the financial crisis in the UK was 2.7%, the new normal is closer to 1.7%[4].

The cost of almost two lost decades has been huge. Had the UK's productivity growth rate not fallen after the global financial crisis, GDP today would be £10,700 higher per person than it is. Based on current Office for National Statistics (ONS) forecasts, for the first time on record Britons will go into the next General Election worse off in real terms than they were at the time of the last General Election – just under £2,000 less for every household in the country[5]. Put simply, in the absence of productivity growth this country is getting poorer.

Raising productivity is ultimately the only route to higher growth. There would also be major benefits to the wider UK economy if businesses closed the productivity gap. Make UK analysis shows that if the manufacturing sector's direct contribution increased from 10% to 15% of current UK GDP it would add over £142bn to our economy[6]. That would mean billions of pounds more available to spend on public services and cutting taxes. Lastly, when accounting for the additional impact the manufacturing sector has on its wider supply-chain channeled into the rest of the economy via the multiplier effect, the sector's indirect contribution to output exceeds 20% of UK GDP.[7]

[2]https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/internationalcomparisonsofproductivityfinalestimates/2021
[3]https://cep.lse.ac.uk/pubs/download/special/cepsp41.pdf
[4]https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/internationalcomparisonsofproductivityfinalestimates/2020#:~:text=The%20UK's%20output%20per%20hour%20growth%20between%201997%20and%202007,the%20UK%20has%20been%20weak.
[5]https://economy2030.resolutionfoundation.org/
[6]https://www.makeuk.org/insights/reports/industrial-strategy-a-manufacturing-ambition
[7]Oxford Economics

While the causes of the UK's economic underperformance used to be referred to commonly as "the productivity puzzle", there is now widespread consensus among academics, economists and public policy experts about the answer to the question of persistently low productivity and economic growth[8].

The drivers of productivity growth fall under three key categories:

- **Investment**
- **Innovation**
- **Institutions**

INCREASING THE MANUFACTURING SECTOR'S CONTRIBUTION TO UK GDP TO 15% COULD ADD BETWEEN £140BN AND £150BN IN VALUE TO UK OUTPUT

[8]https://www.bankofengland.co.uk/-/media/boe/files/speech/2017/productivity-puzzles.pdf

1. INVESTMENT

Investment by both the private and public sectors will allow more goods and services to be produced but the UK has persistently low levels of capital investment compared to other advanced economies.

In the private sector, this low level of investment reflects economic and policy instability. This instability has been reinforced by Brexit, Covid, and supply chain disruptions due to the war in Ukraine and other environmental and geopolitical disruptions, but it also reflects a lack of long-term industrial strategy and a financial system that emphasises dividends and share buy-backs over patient long-term investment.

A lack of investment in infrastructure by both the public and private sectors has also hindered long-term growth. There are deficiencies in the UK's transport, energy, sewage, and IT systems, and an increasing need to address climate change. The state-owned Infrastructure Investment Bank, established to finance a green industrial revolution and drive growth across the country will help but the bank is too small to do it alone.

That's why reforms seeking to boost business investment were centre stage in last year's Autumn Statement, including the permanent full expensing of capital investment. Going forward, reform of the business rates regime to enable productivity enhancements would go a long way towards creating the right conditions for manufacturers to invest, maximizing growth and enabling UK companies to avail of the opportunities of a net zero economy. Enabling firms to invest more in their factories and machinery is of mutual benefit to the Exchequor because not only would it boost economic growth but by increasing the asset value of a manufacturing facility that can be used as collateral firms will find it easier to access private sector loans.

2. INNOVATION

Innovation policy in the UK focuses on how to generate new technologies including spending more on R&D. HM Government's target of 2.4% of GDP (about £43 billion per annum) is based on the idea that UK companies underinvest when compared to the world's biggest economies.

This country performs well on science and innovation indices such as publications, patents and personnel according to the OECD, but we languish on funding and industry-wide adoption[9].

An important inadequacy in UK innovation policy is the lack of focus on the diffusion of new technologies. A new technology only has an economic impact when it is applied in practice and widely used. Despite ranking consistently in the top-5 for innovation, the UK ranks only 38th globally for knowledge diffusion[10]. If productivity growth is about doing more with less, when it comes to innovation we are doing less with more. Technology transfer and diffusion of innovation can be difficult, costly and take time, however, implementation in the UK is believed to have been hindered by a range of factors including deficiencies in upskilling of company management, a shortage of technical knowledge, and risk aversion among companies. The government is trying to tackle this through its Help to Grow scheme, which offers subsidised management training to leaders of small businesses. Throughout the labour force, the UK has struggled for decades to equip employees with technical skills, from engineering to welding, that manufacturing employers demand. The share of the population with higher secondary qualifications — that is, people who do not take a university degree but who do stay on in education after the age of 16 through programmes like apprenticeships — is around 10% below the OECD average[11]. That's why ahead of the forthcoming general election Make UK is calling for all parties to commit to conducting a complete review of the apprenticeship levy and wider skill system.

Better training leads naturally to the spread of knowledge. When high-skilled people work with other high-skilled people, ideas diffuse. Yet although the UK has many of the world's leading research universities, it struggles to spread the knowledge they generate to companies. On average, British companies register patents at a rate half that of their competitors in America, France, or Germany[12]. To bridge the diffusion gap and support practical technology application, several initiatives exist. Catapult Centres, the network of specialised innovation hubs, offer manufacturers of all shapes and sizes access to cutting-edge facilities, expertise, and funding to help translate research into commercially viable products and services. Additionally, government initiatives like Innovate UK offer grants and loans specifically aimed at accelerating technology adoption and scaling up innovations. More could still be done by expanding and extending Made Smarter Adoption to offer wider support to the manufacturing industry. By leveraging these resources, manufacturers can overcome implementation hurdles and drive the economic impact of UK innovation.

41P OF EVERY £1 SPENT ON R&D
BY THE PRIVATE SECTOR COMES FROM A
UK MANUFACTURER[13]

[9]https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB
[10]https://www.bankofengland.co.uk/speech/2018/andy-haldane-academy-of-social-sciences-annual-lecture-2018
[11]https://www.oecd-ilibrary.org/sites/48e69087-en/index.html?itemId=/content/component/48e69087-en
[12]https://www.wipo.int/edocs/pubdocs/en/wipo-pub-941-2023-en-world-intellectual-property-indicators-2023.pdf
[13]https://www.makeuk.org/insights/publications/uk-manufacturing-the-facts-2023#/

3. INSTITUTIONS

A lack of a proper, planned, industrial strategy is the UK's Achilles heel. Every other major economy, from Germany to China, to the US, has a long-term national manufacturing plan, underlying the importance of an industrial base to the success of its wider economy. The UK is the only country to not have one.

Of course, identifying the appropriate policies is necessary, but not sufficient, to address the productivity problem. An institutional framework is needed to see that industrial strategy is implemented effectively but the UK has been blighted by systemic short-termism. Over the last 15 years, the government department responsible for managing industrial policy has been reorganised five times, there have been 12 different growth plans, and 15 different Secretaries of State responsible for business and industrial strategy (when including the various iterations of departments and remits now housed under the Business Secretary)[14].

A single government cannot fix the UK's poor productivity performance. It requires long-term planning and a persistent approach lasting over multiple governmental mandates. As manufacturers know, investment cycles take time so constant public policy churn makes it impossible to implement the structural changes that can spur sustained productivity growth. If we are to not only tackle our regional inequality but also compete on a global stage, a cross-party commitment to a long-term, sustained national manufacturing plan is required.

OF FIRMS BELIEVE THE UK GOVERNMENT NEEDS TO HAVE AN INDUSTRIAL STRATEGY TO ENSURE SUSTAINED ECONOMIC GROWTH

[14]https://www.makeuk.org/insights/reports/industrial-strategy-a-manufacturing-ambition

INNOVATE OR STAGNATE: WHY THE EXPERIENCE OF THE LAST DECADE DEMANDS NEW TECHNOLOGY ADOPTION IN MANUFACTURING

Several significant shocks have hit the British economy in recent years, sparking a shift in our macroeconomic model.

1. INTERNATIONAL CHALLENGES

The financial crisis curbed the flow of credit forcing companies to cut back on recruitment, research, and development, forcing firms to innovate for a lot less. Then there was Brexit.

The uncertainty caused by Britain's exit from the EU depressed business investment by as much as 11% by the time of our departure in 2020, relative to what it would have otherwise been if the pre-existing trend had continued, and erected trade barriers with our biggest trading partner necessitating firms to explore new sources of inputs and markets for outputs[15]. COVID-19 exposed further cracks in the system. Although productivity soared when the pandemic first struck, that was because relatively unproductive services – in retail and hospitality - shut down while manufacturers – of food and drink, pharmaceuticals, and medical equipment – increased output to meet the needs of unprecedented times. The increased turn towards protectionism by major economies including the USA, India, and China, combined with the disruptions stemming from the war in Ukraine and Iranian-supported attacks on the Suez Canal shipping route have increased costs and lengthened lead times dealing with a final blow to the old just-in-time supply chains model of manufacturing as a shift in firm-level strategies has seen companies begin to hold larger inventories and embed other resilience measures in case of future disruptions. For many manufacturers this pattern of volatility poses a strategic risk to their business, and, as a result, they are adopting a range of strategies and technologies to manage relationships with suppliers at home and overseas. Encouragingly, the practice of building resilience in companies and supply chains is driving new behaviours as firms seek new ways of doing business and managing their processes.

[15]https://www.economist.com/britain/2022/06/09/britains-productivity-problem-is-long-standing-and-getting-worse

2. DOMESTIC CHANGES

There is also a productivity gap between the top and bottom-performing companies in the UK. According to the Bank of England, it's as much as 80% larger in this country than in France, Germany, or the US[15].

Capitalism always throws up winners and losers, hares and tortoises, but a long and lengthening tail of underachieving companies is another factor in why the UK economy has been performing so poorly for so long. Since the global financial crisis, what little growth there has been in this country has been dominated by population increases as more people means both more demand and more (labour) supply[16]. Unemployment has largely been at near record lows – full employment in statistical terms is anything less than 4% of the eligible population out of work (there are always some people between jobs, hence why economists don't aim for 0%) - so there is not much scope for growing labour supply from the unemployed[17]. Post-Covid, the participation rate has also dropped due to increased rates of long-term ill-health[18]. Since the coronavirus pandemic, 470,000 more people are out of the workforce on ill-health grounds, while many more continue to work at a reduced rate due to long-term health problems[19]. Early retirement also increased during the lockdowns – a trend that was particularly acute in the manufacturing sector - and an ageing population is a further headwind against higher participation rates[20]. The opportunity cost of not being able to fill vacancies as the economy opened up again after the COVID-19 pandemic lockdowns cost the manufacturing sector approximately £21 million a day in lost potential output[21]. Stricter Home Office rules since Brexit have made it harder and significantly more expensive for firms to recruit from overseas. If manufacturers want growth or a boost to their profitability they thus have to find ways to do more with less. Some of the solutions will come from investing in education and training, improving recruitment and retention and finding ways to widen participation. Technology here is already providing solutions, as robots and co-bots aid workers on factory floors while, as we will see in the next section, assistive technologies and generative software are also helping employees increase their output and their firms' innovation.

[15]https://www.bankofengland.co.uk/speech/2018/andy-haldane-academy-of-social-sciences-annual-lecture-2018
[16]https://www.bankofengland.co.uk/monetary-policy-report/2024/february-2024
[17]https://www.ons.gov.uk/economy/grossdomesticproductgdp/articles/the2008recession10yearson/2018-04-30
[18]https://ifs.org.uk/publications/long-covid-and-labour-market
[19]https://www.health.org.uk/publications/long-reads/what-we-know-about-the-uk-s-working-age-health-challenge
[20]https://committees.parliament.uk/committee/175/economic-affairs-committee/news/175197/early-retirement-and-our-ageing-population-are-causing-labour-shortages-says-lords-report#:~:text=Second%2C%20increased%20savings%20during%20the,most%20appear%20reasonably%20well%2Doff.
[21]Make UK analysis of ONS data (2021)

MANUFACTURING OUTLOOK: HOW UK MANUFACTURERS ARE GOING TO DELIVER GROWTH THIS YEAR

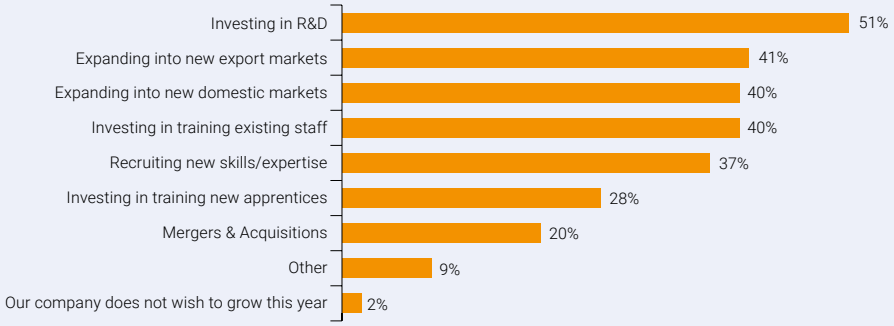
While the world faces ongoing economic challenges and geopolitical turbulence, the UK economy is poised for steady, reliable growth this year. Manufacturers too are making plans to grow. Make UK's member survey, *Manufacturing Outlook*, unveils the strategies factories are deploying to navigate the year ahead.

In what is expected to be a difficult trading environment over the next 12 months, with low demand anticipated in part owing to heightened inflation in both the UK and across other major economies, most factory bosses are optimistic about their company's long-term growth. Household budgets have been tightened and business spending is generally down. In these constrained circumstances R&D is identified as the most attractive investment option for growth amongst a field of options, such as seeking new domestic markets, workforce training, or recruiting new skills, which have typically been a higher priority for the sector in previous years. Just over half (51%) of manufacturers say that, for the year ahead, investing in research & development (R&D) will bring about growth for their company.

When we investigate why the expected low level of demand for manufactured goods in the year ahead is leading most firms to invest more, the reason R&D investment has moved up the priority list for 2024 becomes clear - developing new processes and delivering innovation within the business is seen as independent of market demand conditions in the short run, and innovation is also a way to improve demand conditions in the long run. This insight shows that the manufacturing sector intends to focus on internal improvements, so that they are best placed to maximise the opportunities once international demand conditions improve.

Chart 1: What kinds of investments do manufacturers believe are most likely to deliver growth for their business this year?

% respondents identifying forms of expenditure most likely to lead to growth in their business



MANUFACTURERS INVESTED £33BN IN ASSETS ACROSS THE UK IN 2022[22]

Source: Make UK Survey January 2024

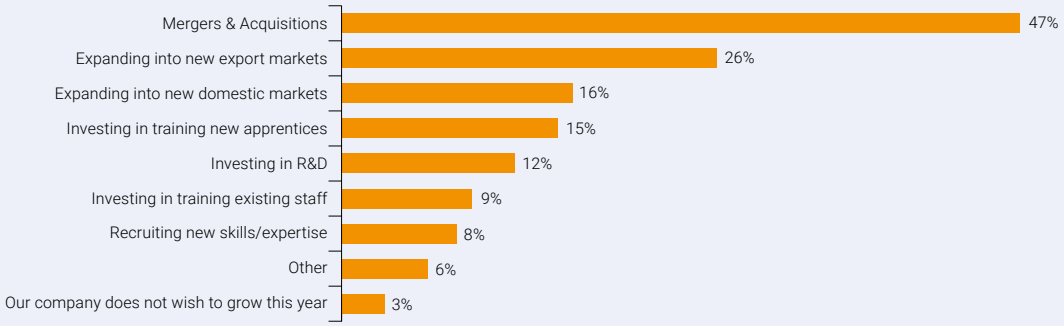
[22]https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/businessinvestmentbyindustryandasset

With uncertainty about when the UK market will improve, expanding into or finding new export markets is seen as the next most important option to improve profitability in 2024, with 41% targeting export growth. Demand may not pick up at the same time across modern economies so the intention to expand into new export markets will enable diversification and hence increase resilience, as well as affording a head-start once demand grows again in these economies.

"Developing new processes and delivering innovation within the business is seen as independent of market demand conditions in the short run and innovation is a way to improve demand conditions in the long run."

Chart 2: Which forms of investment are seen as least beneficial for business growth in the year ahead?

% respondents identifying forms of expenditure least likely to lead to growth for their business



Source: Make UK Survey January 2024

In a period of low or no growth mergers and acquisitions (M&A) are often seen as an attractive alternative for companies. Yet 47% of the manufacturing sector says that M&A activity would be counterproductive for industry growth this year. The motives for such a strong message from the sector are obvious. In the period between the COVID-19 pandemic and the extraordinary supply chain pressures that immediately proceeded due to Brexit, larger firms sought to guarantee their supply chains by increasing the amount of vertical integration in their value chain. Many endpoint, or finished goods, manufacturers looked to purchase one or more of their suppliers to guarantee the supply of that input and minimise any potential supply competition or waiting times. This activity reduced the amount of independent SME suppliers in the UK manufacturing ecosystem, concentrating production on a small number of firms, and in turn, has in some instances increased the difficulty of sourcing supply and increased vulnerabilities within the sector.

That is not to say that M&A activity is not a useful method of achieving economic growth. Indeed there are many benefits to agglomeration, including streamlining complementary processes, increasing efficiencies, reducing costs, knowledge sharing, and gaining access to new markets for exporting. However, SMEs, in particular, can find M&A to be an inaccessible route to growth due to the high costs of conducting due diligence, including the fees involved in dealing with legal firms and investment banks and accessing funding from lenders to finance transactions which can often crowd out even productive businesses from achieving their growth ambitions.

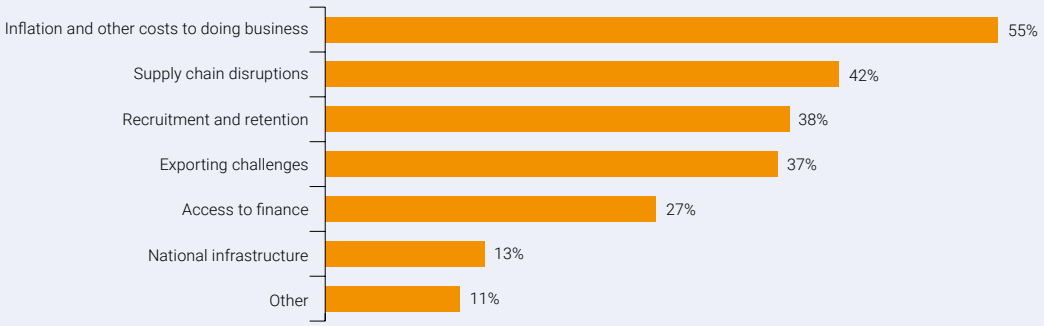
As supply chain frictions are rising once again, driven by the challenges of safe passage in the Red Sea, tensions over Taiwan, and recent earthquakes in Japan, M&A activities that make sense at the individual firm level risk creating vulnerabilities for the manufacturing ecosystem as a whole. What is rationally in one's self-interest is not always in the collective best interest. The danger of too much M&A activity is that supply chains might become overly concentrated on a small number of OEMs (Original Equipment Manufacturers) increasing vulnerabilities for a wide range of end-point producers. Competition is key, but as the disruptions of recent years have made clear, cooperation throughout the supply chain is also important for the surety of sustainability in the sector.

> "Heightened M&A activity in 2024 by large corporates driven by supply chain disruptions could lead to a thinning of supply options in the long term."

Inflation continues to weigh heavily on the minds of manufacturers this year. Inflation pushes up the prices of manufacturing inputs, squeezing profit margins and making exports less competitive. The costs of raw materials, energy, and labour are all elevated at the moment. With the Bank of England, as of the time of writing, maintaining the highest base rate since the global financial crisis, 5.25%, there is little prospect that demand conditions will improve significantly in the short term. 55% of manufacturers say that inflation and the consequently elevated costs of doing business will serve as the primary barrier to growth over the coming year.

Chart 3: The top barriers to manufacturing growth this year

% respondents identifying barriers to growth in 2024



Source: Make UK Survey January 2024

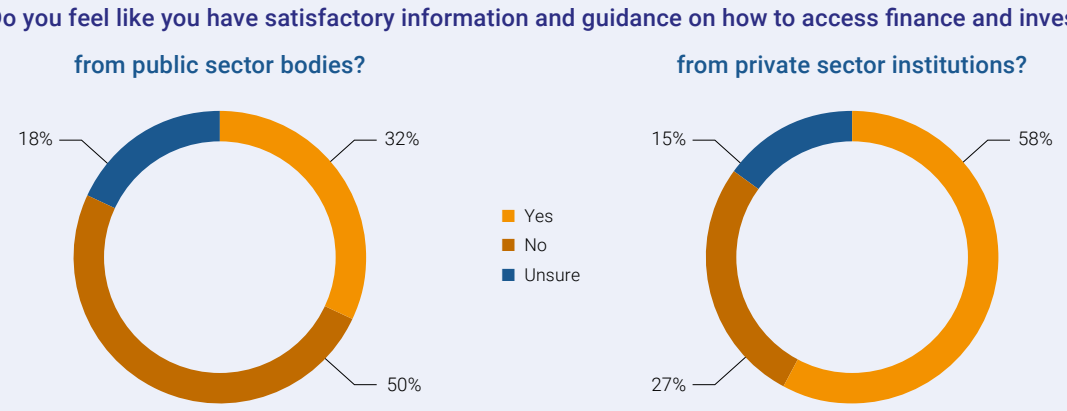
HOW FIRMS PLAN TO FINANCE THEIR FUTURE GROWTH PLANS

The message from the manufacturing sector is clear that despite the economic headwinds firms are facing this year they are eager to innovate and invest in longer-term growth. Yet only 6 in 10 manufacturers (58%) think that private sector financial institutions provide sufficient information on appropriate access to finance. Many manufacturing businesses want to invest but don't know enough about how to obtain appropriate capital from private sector providers. With private financial institutions falling short in informing manufacturers about available funding opportunities, interventions are urgently needed to ensure the manufacturing sector has the resources to fuel innovation and capitalise on future growth opportunities.

At the same time, the public sector has an important role to play. Our survey found that just 3 in 10 manufacturers (32%) think that the government or public sector bodies provide sufficient information on appropriate access to finance. That is despite a range of available outlets offering financial support to UK manufacturing businesses including the British Business Bank, Innovate UK, the Catapult network, regional growth funds, as well as devolved opportunities including Scottish Enterprise, Invest Northern Ireland, and Welsh Government schemes. Bridging the knowledge gap on financial products through targeted interventions by the government and other publicly funded bodies is needed to empower manufacturers to confidently navigate the current economic turbulence and invest in their long-term growth. Improved access to information on available financing options will be crucial in unlocking the full potential of the manufacturing sector's growth ambitions.

Chart 4: Financial providers need to do more to help manufacturers access capital

% of respondents reporting if they have sufficient information and guidance on how to access finance



Source: Make UK Survey January 2024

INVESTING IN FUTURE GROWTH: HOW NEW TECHNOLOGIES CAN SUPERCHARGE MANUFACTURING PRODUCTIVITY

The UK manufacturing sector has seen a surge of innovative technological adoption in recent years. Not all are expensive or arduous and the biggest impact on economic performance has often been seen by Small and Medium sized Enterprises (SMEs) applying new practices and processes.

The following section comprises a selection of case studies across a range of manufacturing industries, including companies of all sizes and in every UK region. These are leading examples of cost-effective ways British firms are boosting their performance and potential:

1. **Scientific Magnetics,** based in Oxfordshire, specialises in engineering next-generation magnetic and superconducting technologies. The company has recently started using a Generative AI language model to assist in solving engineering design problems in various ways. The Generative AI can understand complex mathematical calculations and formulae, identifying errors or improvements that can be made. It can also quickly access and compile vast amounts of technical information, from research papers and patents to design standards and material properties, compiling comprehensive summaries of complex topics and saving the company's engineers time and effort. By analysing vast amounts of data, the language model can provide concise overviews of technical concepts, facilitating better understanding and decision-making by the engineers. The technology has also been used to explore diverse alternatives to optimise design, help analyse potential problems and risks, and enhance creativity and innovation. Engineers have also used these models to help draft clear and concise technical reports and documentation, helping to save time and increase effective communication with colleagues. The technology does not make final design decisions or replace the need for human critical thinking but it has helped cut production and problem-solving times and improve the clarity of internal communication across the company.

2. **Contracts Engineering Ltd (CEL)** in Sittingbourne is an SME contract steel and aluminium fabricator. Five years ago the company began a strategy of scaling through automation, investing in robots and cobots including advanced algorithms in ERP and CAD. The company leadership emphasises the importance of teamwork, learning, and collective effort in embracing culture change for digitalisation by ensuring that every investment includes upskilling the workforce. Prioritising team training not only aids the effective utilisation of automation tools, but the strategy has also ensured a bottom-up as well as top-down driven technological adoption and innovation as employees at all levels within the company are encouraged to explore ways to make the company more profitable. In the years since their automation strategy was first developed, productivity and quality in their manufacturing have improved so much that employment at CEL has also grown by over 50%, and average pay has increased by over 20%, including a bi-annual profit share showing that automation is a compliment not a replacement for a well-trained workforce.

3. **Lowlife Products,** based in Macclesfield, is a manufacturer of aftermarket elevating furniture for campervans and leisure vehicles. Originally the business could retrofit up to 200 vans each year but they wished to expand their range and increase their growth. However, with limited time and resources, it has been difficult to innovate, optimise their manufacturing process and keep up with existing orders.

   Nonetheless, with the help of Made Smarter, they have been able to find the perfect solution. Beginning with match funding, Lowlife has been able to invest in LiDAR laser scanning and 3D design technology to recreate a digital model of a vehicle through a digital demonstration experience that uses virtual reality technology to allow their engineers to visualise and interact with a 3D model of their asset.

   Staff can use this software to design and test product ideas in virtual or augmented reality before manufacturing them. This has helped optimise workflows and use of space, speeding up the production process, reducing costs, and increasing accuracy. With this new technology in place, profitability increased, allowing them to implement a new growth plan which includes taking on six new staff over the next two years.

4. **Forth Engineering,** based in Flimby, specialise in manufacturing robotics for extreme environments. With the support of Made Smarter, they are improving their offer to clients by investing in a mixed hardware-software solution, which will create a virtual show room for clients to enter and interact with a 3D model of their asset. Using an augmented reality headset, as well as smart glasses, the model can be animated to demonstrate further detail with phenomenal precision.

   The use of digitalisation in this area allows Forth Engineering's customer base to grow internationally, enabling access to overseas markets anywhere in the world without needing to establish a physical in-country presence. This process has also helped to reduce the cost of and carbon footprint from international travel.

   With this new service the company aims to double turnover by £2m each year. In putting digitalisation at the forefront of its strategy, the company hopes to continue to transform and innovate for the future and is upskilling its staff to do so, which has also increased job satisfaction and employee retention.

5. **Twinfix**, a Warrington-based roof-glazing and canopy manufacturer, launched 30 years ago, has since worked on projects of national importance such as the Millenium Dome. When the pandemic struck, the company took the opportunity to re-evaluate its procedures, and found that an overreliance on manual procedures for administration was limiting its productivity.

   With the help of Made Smarter, during the pandemic, Twinfix moved to remote working. With regular Microsoft Teams check-ins and the design schedule moved onto the planner function, management had greater oversight of the day-to-day activities and could schedule workloads much better.

   Since then, Twinfix has broadened its plans for digitisation – looking to further software solutions to improve data transfer between its design systems and CNC machinery to improve efficiency, speed and accuracy. By planning for the adoption of new technology in the future, Twinfix is moving closer to their growth and success goals.

6. **Raynor Foods Ltd,** an Essex-based leading UK sandwich supplier to the NHS as well as private sector retailers. Founded 30 years ago this employee-owned company is steering a consortium of industry partners to create 'The Digital Sandwich', using a suite of cutting-edge digitalisation technologies including state of the art Internet of things (IoT) sensors, Blockchain tracing, and AI analytics, to increase traceability, security, and accountability in the food supply chain.

   With Made Smarter Innovation Funding, and in partnership with a range of manufacturers and universities, Raynor Foods use their sandwich supply chain software to provide accurate information and allow their factory to maximise efficiency and increase food safety, all while cutting out plastic packaging, ending their need for landfill waste disposal, and also reducing the company's carbon emissions.

   An important element of this innovation is that the software has greater use than simply food manufacturing. With potential to applications for any high trust, fast moving supply chain, it is likely to be of value to all manner of manufacturers, big and small.

ADVANCING MANUFACTURING: NO BUSINESS LEFT BEHIND

The UK manufacturing sector is the 8th largest in the world[23]. Yet, this country ranks only 24th globally for robotic density, with an average of 111 robots per 10,000 employees[24]. This level is well below the world average.

The implications for the long-term competitiveness of our industry are alarming. If we don't invest in productivity-enhancing technologies, then UK manufacturers, and the UK economy as a whole, risk getting left behind.

The UK manufacturing sector is an essential contributor to the country's economy generating £206bn gross value added in 2022, a fifth higher than a decade ago. It accounts for around half of all UK exports, two-thirds of spending on research & development, and despite accounting for just 10% of the overall economy in GVA terms, and 8% of total employment, it contributes 15% of total UK business investment and underpins 23% of overall economic activity when counting spillover effects into ancillary services. The sector directly employs around 2.6m highly skilled people across the UK, mostly in areas that are otherwise left behind and in need of levelling up, and manufacturers pay salaries typically 12% above the regional average[25]. In short, manufacturing matters massively to the prosperity and security of the UK.

However, the sector is now at a critical juncture. Recognising this, the UK Government has recently developed its Advanced Manufacturing Plan (AMP) to set out the actions they are taking to make the UK the best place in the world to start and grow a manufacturing business[26]. This plan defines "Advanced Manufacturers" as businesses with "production processes that integrate advanced science and technology, including digital and automation, to manufacturing".

As a result of having an advanced process, manufacturers can build advanced products – think of electric vehicles, autonomous appliances, or nanotech medicines – but even simple or conventional products can be better made by advancing the processes that make them. In that sense, all manufacturers have the potential to be advanced.

"Advanced Manufacturing" therefore doesn't just mean major multinationals or multi-billion pound start-up businesses. It means firms of all sizes and in all sectors, at every level throughout the supply chain. The key lies not in what you make, but in how you make it. Through adopting new technologies and processes, embracing innovation, and seeking support from the numerous world-class knowledge networks available - such as the relevant Catapult Centres, Local Enterprise Partnerships (LEP), UKRI, and even Make UK - any manufacturer can embark on advancing their process of production. Embracing the ethos of "advanced manufacturing" as the spirit of continuous progress and technological change, every UK manufacturer can unlock greater efficiency and resilience and ultimately increase their potential to innovate, create, and grow.

[23]https://www.makeuk.org/insights/publications/uk-manufacturing-the-facts-2023#/
[24]https://ifr.org/worldrobotics/
[25]https://www.makeuk.org/insights/reports/industrial-strategy-a-manufacturing-ambition
[26]https://www.gov.uk/government/publications/advanced-manufacturing-plan

POLICY RECOMMENDATIONS

To move beyond ambition and into reality manufacturers cannot succeed alone. We need Government to ensure a stable business environment and a long-term ambitious and modern industrial strategy.

CREATING A SUSTAINABLE WORKFORCE

There are 69,000 live vacancies in manufacturing right now. This means we are losing around £6bn. in potential output each year.

1. **Reduce employer National Insurance contributions to ease pre-profit taxation burden on SME employers.** Manufacturers welcome the actions taken by the Government through 2023 to support people back into work, particularly through expanded access to skills training and improved support for occupational health and wellbeing. However, a significant majority anticipate increasing employment costs in 2024, providing a barrier to recruitment and threatening to undermine the positive measures already taken. There is more that the Government can do to support employers to ensure that they can recruit the people they need. Following the reductions to national insurance contributions for employees and the self-employed at the Autumn Statement, the Government should make it easier for employers to recruit by reducing employer contributions too.

2. **Continue work with industry on the apprenticeship growth sector pilot.** Make UK strongly welcomes the progress that has already been made in developing proposed measures to reverse the decline in engineering and manufacturing apprenticeships over recent years. As the Treasury and Department for Education continue to take this forward, manufacturers look forward to benefitting from proposed support for capital expenditure associated with apprenticeship training delivery and improved provider capacity so that they can access the right training where it is most needed.

3. **Support employer engagement with T Levels ahead of the introduction of the Advanced British Standard.** Manufacturers support the principles which underpin the proposed new Advanced British Standard, but there remain some existing concerns about T Level delivery which need to be addressed. This is not only crucial for learners taking T Levels over the next decade but also the success of the ABS, which will depend on positive employer engagement and their ability to offer industry placements.

    a. **More work in simulated environments.** In many safety-critical engineering and manufacturing settings, it is typical for apprentices and other employees undergoing training to complete this in a simulated environment. This is not fully reflected in the approach to engineering and manufacturing T Level industry placements, where a maximum of one-third of the placement can take place in such an environment. This should be increased to ensure that employers are comfortable offering placements and learners experience the same approach to training as those entering full-time skilled employment.

b. **Ability to split the placement between more employers.** There is some concern that the current limit on dividing the industry placement between two employers does not provide enough flexibility. We propose increasing the limit to three employers.

Make UK's work has found that leadership and management skills are among the most in-demand skills for manufacturers, both now and in the future. Digitalisation, net zero and flexible working are all changing the manufacturing workplace. This creates a stronger emphasis on the need for good leaders and managers who can navigate complexity, innovate and manage people effectively.

4. **Introduce a Manufacturing Mentor Scheme:** The current Help to Grow Management scheme is a welcome start to tackling the leadership and management challenge in the UK. However, leadership and management schemes need to be far more tailored, with both sectoral and regional focuses. The Government should look at how it encourages recent or early retirees back into industry to educate and guide the next generation of leaders, managers and business owners. This could be built on existing matching platforms, but with a focus on sectoral peer to peer support.

5. **Enshrine digital skills across the education system.** Manufacturers' skills need for the next decade and beyond are largely defined by demand for digital and green skills as firms consider the rollout of new technologies to improve productivity and reduce carbon emissions. To ensure that employers have access to the skills they need in the long term, Government should focus on the delivery of digital skills through pre-16 and post-16 education and training, by introducing a digital skills account for lifelong learning and instituting a digital gatepost to enshrine digital skills across the national curriculum for schools.

CAPITALISING ON THE OPPORTUNITIES OF THE NET ZERO ECONOMY

92% of manufacturers see net zero as an important priority for their business. 68% have already made investments to help them transition to net zero and 22% plan to in the next 12 months. The same number, 68%, see net zero as a commercial opportunity for their business.

6. **Increasing the capacity and flexibility of the national grid as a matter of urgency.** Promptly resolve queue management issues for access to connections on a 'first ready, first served' (rather than on a 'first-come' basis). This is critical to enable willing and ready companies to obtain connections which will enable them to feed the energy they generate back into the grid. Adjusting the Demand Flexibility Scheme (DFS) to work for the manufacturing sector will enable many more participants to access it. Doing this early will avoid wasting a proportion of investment in power-generating assets in the first place. Without this, even if the right policies are in place, their implementation will not be possible in practice, jeopardising the overall energy security.

7. **Conduct a gap analysis of which tax incentives and funds are related to improving energy efficiency and decarbonisation to ensure a complete solution across all the different business populations (SMEs, mid-market, energy-intensive industries (for both electricity and gas))** so that no category falls through the cracks and is left behind. This should include expanding compensation and exemptions to current schemes.

8. **Roll-out the Business Energy Advisory Services (BEAS) scheme nationally:** an earlier assessment of the success of the WM-BEAS pilot scheme to enable an earlier national roll-out (if deemed successful). In addition to the energy audit, sub-metering, and plan proposed, the scheme should include help with accessing the right finance. This would increase the chances of participants actually taking their first implementation steps.

9. **The Industrial Energy Transformation Fund (IETF), should be extended, increased and reshaped into a more accessible fund for SMEs and mid-market businesses.** The Industrial Energy Transformation Fund (IETF) is designed to help businesses with high energy use to cut their energy bills and carbon emissions through investing in energy efficiency and low carbon technologies. While we welcome the recent announcement on the reduction

of the size of projects to £75K, the current IETF is still not very accessible to smaller manufacturers due to the fund matching levels required upfront. Application complexities to the fund also mean SMEs and mid-market businesses need to access costly external advice if they want to attempt to use it.

10. **Extend the 12 months of 100% business rate relief on green plant machinery and equipment, as well as the 100% business relief on building improvements introduced in April 2023.** Manufacturers are making green investments and we welcome the current 12 months reliefs. However, green investments should have a minimum of a 3-year relief to reflect business' payback period for their investments as opposed to the current 12 months. The first three-year relief could be available for a limited time early in the duration period of the scheme (between now and 2035) to spur immediate investment or bring forward investment plans.

UNLOCKING INNOVATION, DIGITALISATION AND AUTOMATION

8 in 10 manufacturers have already or are currently digitalizing some aspect of their factories

11. **Enhanced deductions for specific classes of R&D activities, such as R&D resulting in direct reductions in carbon emissions, digitalisation and automation that result in increased productivity.** Allowing companies to claim relief on 130% of capital investment in the year of investment of specific areas of expenditure may accelerate the speed to meet net-zero targets and increase productivity.

12. **Review the changes to the R&D tax credit made in 2023 to ensure it hasn't negatively impacted innovation.** The Government announced at the Autumn Statement that the research and development expenditure credit (RDEC) scheme will be merging with the enhanced support for R&D intensive SMEs scheme. This will result in a single R&D Expenditure Scheme modelled on the existing RDEC scheme which brought another wave of uncertainty about how these changes will affect manufacturers. Government should clarify what the newly integrated scheme entails.

    The merger might further reduce the benefit rate for SMEs, who will already be feeling the impact of the deductions that took effect on 1 April 2023. If, as is expected, the headline rate of relief under the new merged scheme remains at 20%, then the resulting net tax benefit for claimants will be 15%, further erosion of the net tax benefit loss-making SMEs, which will have seen the net benefit fall from 24.7% before April 2023 to 15% after April 2024, an overall reduction of 39.3%. Similarly, if the headline relief rate of 20% is maintained under the new merged scheme, the impact for loss-making SMEs not qualifying as R&D intensive will be a net tax benefit of 16.2% (as loss-making companies will pay a 19% corporation tax rate on relief received against R&D expenditure).

    Manufacturers need certainty when planning investments, and sudden changes in Government policy create uncertainty, impacting companies' willingness to commit to any investment. We have previously raised concerns about the impact of the changes to the R&D tax relief on SMEs. Government should commit to reviewing the changes to understand what effect, if any, positive or negative, the changes have had. If the review concludes that the changes have had a negative impact, Government should consider reverting to the previous model of relief. We understand the creation of the single merged scheme was to simplify the old tax relief scheme. However, by the look of things, we are still left with two schemes: one scheme for R&D-intensive SMEs and a second for the rest.

    Furthermore, the range of changes and additional requirements introduced over the last two years has made it increasingly difficult for SMEs to manage their R&D tax relief claim process to maintain compliance with the ever-evolving legislation, not to mention the problems in building medium-term investment plans to account for the multiple changes in net tax benefits over the same period. Concerns remain around high levels of non-compliance in claims. Our members reported that more than half of all R&D claims submitted

in the first six weeks of the new Additional Information requirements were invalidated due to non-compliance.

13. **Take forward the commitment to roll out Made Smarter Adoption and evolve the programme to replicate a modern-day Manufacturing Advisory Service.** Currently, the experts and advisors tasked with executing the adoption program to enhance productivity in manufacturing SMEs are predominantly concentrated on digital adoption. Our findings indicate that SMEs require a more comprehensive advisory service, offering impartial guidance on decarbonisation, lean manufacturing, skills development, and challenges related to supply chains. The provision of these expanded advisory services has the potential to guide small to medium-sized manufacturing firms in the right direction, fostering their growth and enabling them to scale up their businesses, thereby positively impacting the economy.

14. **Expand the R&D tax relief to include capital equipment relating to industrial decarbonisation.** The cost of upgrading capital equipment is the most significant barrier to manufacturers decarbonising their processes. Government should build on the most recent qualifying extensions of the R&D tax relief to include capital equipment for green processing and industrial decarbonisation. It should then broaden this to include capital equipment more widely.

15. **Introduce employer incentives for digital and green apprenticeships.** The Government has previously used employer incentive payments for apprenticeships to significant effect, most notably during the pandemic. To address concerns about skills shortages and support more effective employer investment in apprenticeships, employers should benefit from incentive payments for apprenticeship standards related to digital and green skills and jobs. These should be identified primarily by the Government's Unit for Future Skills and may also draw upon the work done by the Institute for Apprenticeships and Technical Education to map green apprenticeships.

16. **Incentivise automation:** 60% of surveyed members agreed that the main benefit of automation is the rise of productivity, followed by 50% improvements in efficiency and overall quality. Automation reduces the need for lower skilled level jobs and creates opportunities for new job creation for higher better paid jobs, and better quality jobs which have a positive impact on the economy. Roles that are needed to accelerate automation should include data analysts, robotics engineers etc. Please see point 18.

REDUCING THE COSTS AND BARRIERS TO DOING BUSINESS AND TRADE

87% of manufacturers say they are at a disadvantage compared to our international competitors because of a lack of a UK industrial strategy

17. **Expand full expensing capital allowances to allow for the leasing of capital and upcycling of 2nd hand plant & machinery.** Making full expensing permanent was the right thing to do and will help most manufacturers. However, the tool still remains somewhat exclusionary by not allowing for leased and 2nd hand plant & machinery. Our studies show that nearly 15% of manufacturers access capital goods through leasing and these businesses are exclusively SMEs. Including second hand machinery will make innovative nearly new technologies affordable to smaller firms, increasing their ability to digitalise and automate. At the same time, it would create a market for second had machinery which can be used to offset costs of first hand purchases and therefore will act as an incentive for bigger firms to digitalise and automate more. In that way upcycling can create a circular economy for innovative technologies.

18. **Extend the business rates standard multiplier freeze from 1 year to 3 years to give businesses more time to adjust to their new evaluated rates.** Following the Valuation Office Agency's revaluations of property values in April 2023, the Industry Sector saw the biggest change in their rateables values (up by 27%) compared to the whole economy average (7%) meaning the businesses in that sector (which includes manufacturers) are disproportionately impacted by increasing rates. Extending the multiplier freeze would give businesses time to adjust their total costs.

MAKE uk
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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