INNOVATION & RESEARCH CAUCUS

IMPACTS ON REGIONAL GROWTH AND POLICY EFFECTIVENESS:

Addressing Barriers to Digital and Sustainable Adoption in West Midlands Manufacturing SMEs

IRC Report No: 044

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This document relates to IRC Project FFTwo012: Impacts on Regional Growth and Policy Effectiveness: Addressing Barriers to Digital and Sustainable Adoption in West Midlands Manufacturing SMEs

Acknowledgements
This work was supported by Economic and Social Research Council (ESRC) grant ES/X010759/1 to the Innovation and Research Caucus (IRC).

The authors gratefully acknowledge the manufacturing SME leaders and regional stakeholders who contributed to this study through interviews and focus groups. Their time, openness and practical insights were essential to the development of the evidence presented in this report.

We would like to express our sincere thanks to Professor Delma Dwight, our non-academic partner, for her invaluable contribution to this project. Her deep understanding of the regional economy and strong connections with industry partners were essential in identifying participants and shaping the policy discussions that underpin this work.

Our thanks also go to Dr Priscilla Eke, our research assistant, for her dedication and hard work throughout the project. She played a key role in managing the literature review, transcription and data analysis of interviews. Her careful organisation and commitment greatly strengthened the quality of the research and its outcomes.

We are also very grateful to Nazia Iqbal and Sarah Honeybone at Innovate UK, UKRI for their support in helping us connect with stakeholders and for providing valuable guidance on how Innovate UK and the Innovation and Research Caucus (IRC) envisage the impact of this research.

We would also like to acknowledge and appreciate the efforts of the IRC Project Administration Team for their support in preparing this report.

About the Innovation and Research Caucus
The Innovation and Research Caucus supports the use of robust evidence and insights in UKRI's strategies and investments, as well as undertaking a co-produced programme of research. Our members are leading academics from across the social sciences, other disciplines and sectors, who are engaged in different aspects of innovation and research systems. We connect academic experts, UKRI, IUK and the (ESRC), by providing research insights to inform policy and practice. Professor Tim Vorley and Professor Stephen Roper are Co-Directors. The IRC is funded by UKRI via the ESRC and IUK, grant number ES/X010759/1. The support of the funders is acknowledged. The views expressed in this piece are those of the authors and do not necessarily represent those of the funders.

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Cite as: Mahmood, S., Asghar, N. and Kousha, K. 2026. *Impacts on Regional Growth and Policy Effectiveness: Addressing Barriers to Digital and Sustainable Adoption in West Midlands Manufacturing SMEs*. Oxford, UK: Innovation and Research Caucus

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Executive Summary

This report examines the uneven adoption of digitalisation and Net Zero practices among manufacturing Small and Medium-sized Enterprises (SMEs) in the West Midlands and the implications for regional productivity, competitiveness and economic growth. Manufacturing SMEs form the backbone of the region's industrial base[1], yet their engagement with digital and low-carbon transitions remains limited and uneven[2]. The study responds to the Innovation and Research Caucus's objectives by providing evidence-based insights into what constrains adoption, how adoption contributes to regional economic outcomes and how policy design and delivery could be improved.

Drawing on secondary data, semi-structured interviews with manufacturing SME leaders and focus groups with policymakers and regional stakeholders, the research demonstrates that adoption is constrained by a combination of internal and external factors. Internally, firms face financial limitations, skills deficits and time and managerial capacity constraints that restrict strategic investment. Externally, complex policy structures, fragmented support mechanisms and uncertainty around future regulatory and technological pathways make engagement difficult, particularly for smaller and micro firms.

The findings indicate that regional policy should focus less on promoting individual technologies and more on addressing the conditions that shape manufacturing SME behaviour. More effective support requires coordinated action across digitalisation, Net Zero, productivity and regional growth agendas, alongside clearer communication and more stable advisory relationships. Policies designed around the practical realities of manufacturing SMEs' capacity, rather than models derived from larger firms, are more likely to improve adoption outcomes and contribute to inclusive regional economic growth in the West Midlands.

1 https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/adhocs/15621analysisofenterprisesineastandwestmidlandsinmanufacturingbysmeband2022?utm_source=chatgpt.com and https://bcuassets.blob.core.windows.net/docs/ceigsme-drag-effect-report-1-132828472730651653.pdf

2 https://www.enterpriseresearch.ac.uk/wp-content/uploads/2023/09/FINAL-REPORT-WM.pdf

Barriers to Digital and Net Zero Adoption

- Rising energy costs are the most pervasive external barrier facing West Midlands manufacturing SMEs, with over three-quarters of firms reporting energy prices as a major obstacle, alongside wider cost pressures, which in some cases have led firms to exit the market.
- Adoption of digital and decarbonisation practices remains uneven, with improving uptake of basic digital tools but persistently low use of advanced technologies and limited integration of supply chains into carbon-reduction strategies, highlighting structural limits to adoption depth.
- Place-based structural constraints act as key external barriers, including supply-chain dependence, limited control over premises due to landlord–tenant arrangements and older industrial building stock, which restrict firms' ability to retrofit, electrify, or deploy digital infrastructure.
- Uneven access to institutional support and fragmented delivery systems creates a perceived "postcode lottery" in business support, characterised by short-term, poorly coordinated programmes and limited advisory capacity, reducing SME awareness, engagement and sustained uptake.
- Infrastructure and system-level barriers, including slow smart-meter rollout, high electricity prices relative to gas and uncertainty around future heating pathways, weaken the commercial case for electrification and digital energy management.
- Internal barriers reinforce these external constraints, with strong risk aversion, limited time and managerial capacity, ageing workforces, skills shortages and weak operational readiness limiting firms' ability to engage with adoption, even where support is available.
- Both LSBS and qualitative evidence indicate that adoption barriers are systemic rather than attitudinal, with SMEs responding rationally to high costs, uncertainty and delivery failures rather than actively resisting digitalisation or Net Zero objectives.

SME Adoption and Regional Economic Growth

- Digital and Net Zero adoption among West Midlands manufacturing SMEs contributes to regional economic growth, primarily through productivity improvements rather than immediate job creation.

- Adoption delivers economic value where it reduces costs, improves efficiency and strengthens competitiveness, enabling firms to stabilise operations, diversify into higher-value markets and secure larger contracts.
- Employment effects are modest and conditional, typically following productivity gains and occurring incrementally, often outside core production roles.
- At the regional level, productivity-led adoption supports wider economic benefits, including improved supply-chain resilience and enhanced fiscal capacity, but these effects remain uneven.
- High energy costs, energy price volatility and limited integration of supply chains into carbon-reduction strategies constrain the scale of regional growth benefits from adoption.

Policy Effectiveness and Delivery Challenges

- Focus group evidence indicates that current policies supporting digitalisation and Net Zero adoption are constrained by a fundamental tension between innovation uncertainty and public-sector accountability, with funding mechanisms favouring low-risk, incremental interventions over more transformative change.
- Manufacturing SMEs are cautious rather than resistant, with adoption slowed by the risk of irreversible investments in technologies that may later prove to be misaligned with evolving standards or policy directions.
- Place-based structural conditions in the West Midlands significantly limit policy impact, including poor energy performance of commercial buildings and widespread landlord–tenant split incentives, which weaken the effectiveness of retrofit and decarbonisation policies.
- The policy support landscape is fragmented and poorly sequenced, with a lack of coherent adoption pathways guiding SMEs from basic readiness through to more advanced digital and Net Zero interventions.
- Weak translation between national policy objectives and local delivery for manufacturing SMEs, limited manufacturing expertise within delivery bodies and tensions between national policy design and local enforcement responsibilities further constrain effectiveness.

- Trusted intermediaries are critical to effective delivery, with sector-specific organisations consistently identified as more successful than generic consultations in engaging manufacturing SMEs and translating policy into actionable steps.
- Persistent misalignment between policy objectives and SME commercial realities constrains uptake, as policies framed around long-term transformation or societal benefit fail to influence firm behaviour unless they clearly reduce costs or enhance competitiveness.

Policy Recommendations

Based on the findings, the study identifies seven priority areas for improving the effectiveness of digitalisation and Net Zero policy support for manufacturing SMEs in the West Midlands:

- Strengthen trusted and independent advisory support to reduce uncertainty around digital and Net Zero investment decisions and support informed, confident adoption.
- Develop clear and sequenced adoption pathways, linking diagnostics, funding and evaluation to reduce risk and enable progression from basic readiness to more advanced adoption.
- Improve industry-focused outreach and communication, using sector-relevant language and simplified access points that link adoption to cost control and competitiveness.
- Support long-term, place-based collaboration, enabling combined authorities to integrate skills, energy, innovation and enforcement roles in ways that reflect regional manufacturing conditions.
- Strengthen manufacturing-relevant skills pipelines, including technical, managerial and leadership capabilities, to support sustained adoption.
- Treat workforce capability and change management as central to adoption, particularly in relation to automation and AI, to ensure productivity gains are durable.
- Simplify grant access and application support, recognising energy cost pressures, infrastructure constraints and the need to reduce exposure to price volatility.

These findings are directly relevant to Innovate UK's business-facing programmes, particularly those focused on digital adoption, Net Zero innovation and SME productivity, where risk, sequencing and delivery design strongly shape outcomes.

Policy Improvement Opportunities & Recommendations

Improving support for digitalisation and net zero adoption among West Midlands manufacturing SMEs

Strengthen Trusted Advisory Support

- Provide independent, sector-specific advice to reduce uncertainty

Develop Clear Adoption Pathways

- Structure support as a sequenced process to reduce investment risk and support progression from testing to adoption

Improve Industry-Focused Outreach and Communication

- Align messaging with manufacturing needs and priorities

Support Long-Term, Place-Based Collaboration

- Enable combined authorities to coordinate integrated regional programmes with manufacturers, skills providers and supply chains

Strengthen Skills Pipelines for Manufacturing

- Improve access to digital and low-carbon skills through further education (FE), apprenticeships, work-based training and targeted management development

Treat Workforce Capability as Central to Adoption

- Embed workforce development and change management into adoption programmes

Simplify Grant Access and Application Support

- Streamline grant processes and provide hands-on support, recognising energy cost pressures

Our Approach

Section 1 sets out the research context and objectives and reviews relevant academic and policy literature on digitalisation and Net Zero adoption among manufacturing SMEs, establishing the conceptual and empirical foundations for the study. Section 2 synthesises longitudinal data and relevant regional and national policy documents to examine trends in SME adoption and the policy environment shaping them. The analysis provides contextual insight into structural constraints and opportunities affecting the West Midlands. Section 3 draws on qualitative evidence from focus groups with regional stakeholders, alongside interviews with manufacturing SME leaders, to explore perceived barriers to digital and sustainable adoption and to assess how adoption is understood to influence firm performance and regional economic outcomes. Section 4 integrates findings across quantitative and qualitative evidence to identify key themes and gaps, concluding with evidence-based recommendations aimed at improving policy effectiveness and strengthening support mechanisms to enable manufacturing SMEs to adopt digital and sustainable practices that support productivity, competitiveness and regional economic outcomes.

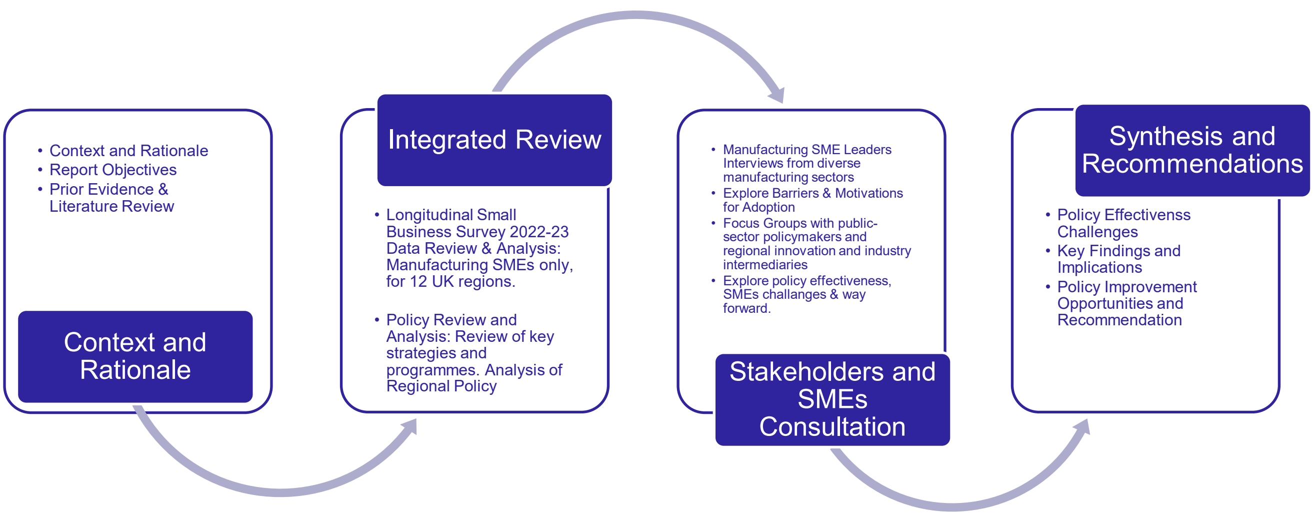

Figure 1: Approach

Section 1: Context and Rationale

1.1 Introduction

SMEs form the backbone of the UK economy, contributing 99.8% of the business population and 60% of private sector jobs (DBT, 2024a). Among 269,000 manufacturing organisations in 2023, over 90% were SMEs (ONS, 2023). Despite their economic significance, sustainability remains a low priority for many SMEs, with only one-third reporting sustainability actions as a focus (BEIS, 2021). Manufacturing, the largest emitting sector (16% of UK emissions in 2019), has a critical role in achieving Net Zero by 2050. Small manufacturers can support this goal by developing technologies and products that reduce carbon emissions and transition to a low-carbon economy. Digitalisation further enhances SME potential, with estimates indicating £145 billion in economic output, £325 billion in revenues and 2.7 million new jobs post-adoption (Sage, 2020).

Recent policies emphasise the 'Dual Transition,' integrating digitalisation and Net Zero goals (ERC, 2021). Digital technologies help SMEs adopt eco-innovations by improving energy efficiency, optimising waste management and identifying emissions hotspots, contributing to a sustainable economy (OECD, 2024). However, barriers such as limited resources, skills gaps and infrastructure challenges hinder adoption. Additionally, trade-offs like digital waste and high energy consumption of data centres can counteract environmental gains, necessitating strategic implementation and targeted policies (OECD, 2024).

UK SMEs face additional pressures from supply chain disruptions, rising energy costs and tighter credit conditions post-COVID-19 (OECD, 2024). These challenges, combined with lower productivity compared to global peers, demand investments in advanced equipment, skills and sustainable models. Addressing these aligns with the 'Triple Transition' of digitalisation, Net Zero and productivity growth (ERC, 2021).

The UK's Net Zero target for 2050 (Burnett et al., 2024) places significant responsibility on regions like the West Midlands, with its strong manufacturing base, to lead this transition. While digitalisation offers SMEs opportunities to optimise operations, reduce emissions and boost productivity, the effectiveness of these programmes in achieving combined goals of digitalisation, Net Zero and productivity remains unclear (Mole and Belt, 2023). This research addresses these gaps by providing actionable insights to help SMEs navigate these transitions, strengthen resilience and advance the West Midlands' economic growth.

Previous research and policy papers have highlighted the need to support SMEs in navigating the challenges of digitalisation, Net Zero ambitions and productivity enhancement (ERC, 2021; Kesidou and Ri, 2021). To achieve this Triple Transition, policy measures must be more comprehensive, targeted and scalable to address gaps in existing initiatives and maximise their impact on regional economic growth. This study examines how manufacturing SMEs in the West Midlands can leverage this framework to build resilience and drive economic development. The West Midlands, home to 9.07% of England's SMEs, has implemented 16.87% of Net Zero programmes, indicating a higher number of interventions per SME compared to other regions. However, the effectiveness of these programmes in advancing digitalisation, Net Zero and productivity improvement simultaneously remains unclear (Mole and Belt, 2023). Addressing these gaps is critical for creating inclusive, evidence-based strategies that empower SMEs to adopt sustainable practices, enhance productivity and contribute to regional growth.

1.1.1 Research Objectives

The study sets out three research objectives to examine adoption barriers, regional economic effects and policy effectiveness.

RO1: Investigate Barriers for SMEs in Adopting Digital and Sustainable[3] Practices

This objective identifies key barriers preventing SMEs from adopting digital and sustainable practices despite government incentives. Internal factors (e.g., resource constraints, skill shortages, financial limitations) and external factors (e.g., policy inefficiencies, lack of awareness) will be explored to provide actionable insights for targeted support mechanisms.

RO2: Analyse the Role of SME Adoption in Regional Economic Growth

This objective examines how SME adoption of digital and sustainable practices impacts regional economic growth, focusing on the West Midlands. It evaluates whether higher

[3] In this report we used decarbonisation, sustainability and net-zero interchangeably

adoption rates result in better outcomes, such as increased productivity, job creation and supply chain resilience, addressing regional disparities and enhancing SMEs' contributions.

RO3: Develop Evidence-Based Strategies to Improve Policy Effectiveness

This objective delivers evidence-based recommendations to enhance government policies and incentives. By aligning strategies with regional economic goals, it aims to help SMEs adopt transformative practices supporting sustainable growth, productivity and Net Zero targets.

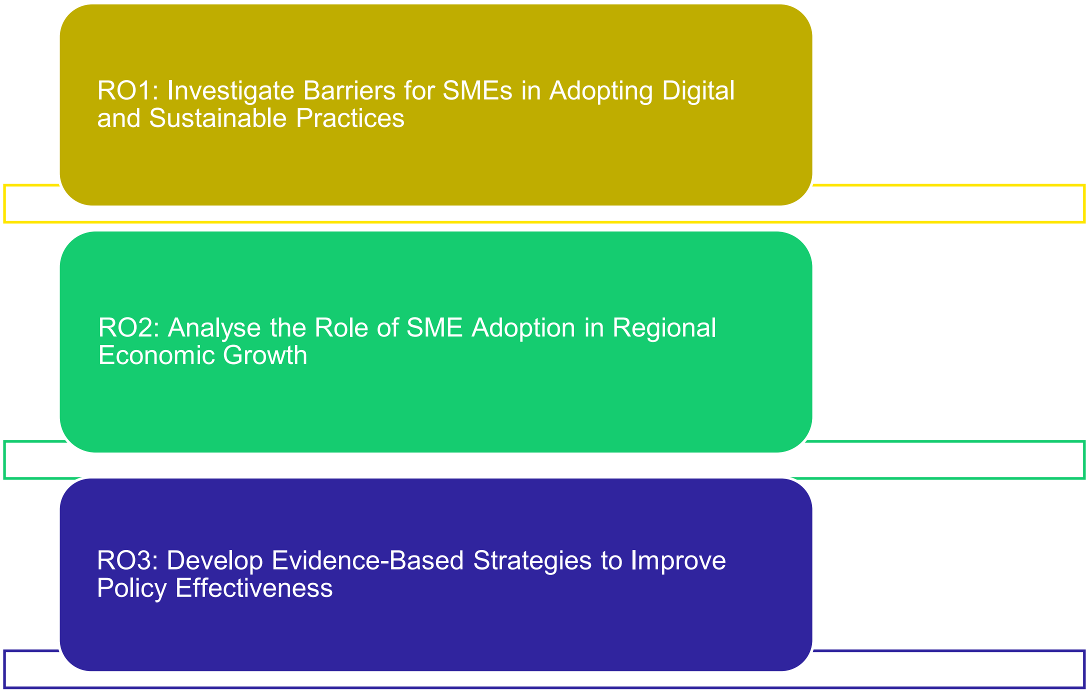

Figure 2: Research Objectives

1.2 Prior Evidence

To assess the regional realities of manufacturing SMEs' adoption of digitalisation and implementation of Net Zero practices, a critical review of literature was conducted. There's a growing push from the government to support and transform the West Midlands, enabling manufacturing SMEs to embrace Net Zero and digitalisation and the opportunities this offers for upskilling, not just their staff but also the region (Inspired and MakeUK, 2024). West Midlands as a region is in a very strategic position to support the government's levelling-up initiative and the manufacturing industry, being the highest sector, will play a significant role in regional growth and productivity (MakeUK, WMCA and RAS, 2025). However, to enable this, the industry requires significant investment and opportunities to expand the traditional manufacturing sector through digitalisation, autonomous robotics, AI and clean energy investments. In this regard, both the SMEs and the government will require adequate investments and robust support systems to expand this industry's impact and productivity (Sage and MakeUK, 2023).

1.2.1 Literature Review

Digitalisation is the process through which an SME utilises information and digital technologies to transform existing business processes (Verhoef et al., 2021). Digitalisation is seen as an enabler of dynamic capabilities for SMEs (Teece, 2007; Ojha, Patel and Parida, 2023; Hafeez, Shahzad and De Silva, 2025). It provides SMEs with the opportunity to integrate, build and reconfigure their internal and external competencies. They can sense and seek out innovative products and processes, align their organisational structures and capitalise on business opportunities enabled by digitalisation.

Digital transformations can be categorised by four dimensions according to Barragan and Becker (2024). Architecture configuration involves organisations and the digital transformation of products, processes and infrastructure. Capabilities relate to the human capacity, ensuring that the workforce has the relevant skills and knowledge required to utilise the digital tools. This aspect can involve upskilling and recruitment, which incur added costs. The third dimension encompasses ecosystem coordination, which requires customer relations, as well as informational access and network. Organisations are encouraged to transform in response to the digital upgrades used by their customers and suppliers. Therefore, to maintain their networks and connections, they are forced to upgrade. Finally, the technology scope refers to the necessary digital technologies that ensure the organisation realises its strategic growth.

Digital transformation extends beyond augmenting business production and processes, affecting organisational and management cultures, as well as supply chain processes (Horváth and Szabó, 2019). The potential for digital transformation in SMEs extends to identifying new forms of interaction with customers and suppliers, as well as innovation in value creation for customers (Kraus et al., 2022; Higón and Bonvin, 2024). Digital transformation can impact SMEs via innovation at input levels, in terms of research and development (R&D) and at the output levels in product and process innovations (Radicic and Petković, 2023).

A report by MakeUK, WMCA and RAS (2025) reveals that several key challenges have hindered the regional adoption of Robotics and Autonomous Systems (RAS) within SMEs. The research identified that the initial cost of capital investment required for robotics and automation deters SMEs. For an SME, capital and revenue are essential to survival, making external funding and support critical. Secondly, there is a shortage of skills and specialised knowledge in automation, digital systems and maintenance. As a region, there is a strong traditional manufacturing workforce, but robotics, automation and digitalisation-specific skills remain limited. Finally, there is a limited understanding of the Return on Investment (ROI) within SMEs, as there is no clear business case to support the adoption.

For the manufacturing sector to be on par with achieving Net Zero by 2050, the industry would have to halve its emissions by 2030 (Inspired and MakeUK, 2024). Recent reports (Sage & MakeUK, 2023; Inspired & MakeUK, 2024) indicate that manufacturers in the region are aware of the commercial benefits of adopting sustainability practices and are committed to reducing their carbon emissions. The sector understands that optimising its methods is necessary to achieve Net Zero and sustain profitability and competitiveness (IET, 2022). The manufacturing industry is considered a strategic contributor to the UK's transition to Net Zero, as it has significant opportunities to develop, design and produce the products and services required to decarbonise the economy (Inspired and MakeUK, 2024).

1.2.2 Existing Evidence on SME Barriers to Digitalisation and Sustainability Adoption

SMEs have been shown to struggle to fully leverage digitalisation (Amaral and Peças, 2021) and to transition to sustainability practices (Hampton et al., 2024). The barriers to adoption stem from both internal and external factors that are common across SMEs. Regional reports indicate that the majority of SMEs have not yet taken any action to enhance their knowledge and capabilities regarding Net Zero. SMEs are at an early stage of awareness of Net Zero concepts and sustainability practices, as well as of the environmental and business productivity impacts they can have (ERC, 2021). They have limited knowledge of sustainable measures they can adopt and lack clear implementation guidelines and support, which impedes the adoption of sustainable practices (WEF, 2022). Regarding the adoption of digitalisation, effective implementation requires infrastructure development, interregional cooperation and policies that account for the interests of all stakeholders and the needs of each sector (Demin, Mikhaylova and Pyankova, 2023). The key barriers to digitalisation and Net Zero adoption in the literature and West Midlands regional reports are discussed below.

There is a link between digitalisation and reduced emissions. At a basic level, technologies such as sensors and sub-meters help businesses monitor and manage their energy use. They can identify areas to reduce waste and improve their production efficiency (Inspired and MakeUK, 2024). Digitalisation has been identified as a key enabler for manufacturers to address sustainability challenges in their journey to Net Zero. Regionally, the adoption of digitalisation has been identified as a major driver of productivity and improvement. Manufacturers accept that new digital technologies have also impacted their business decarbonisation and their ability to achieve Net Zero (Sage and MakeUK, 2023).

Leadership culture

Another important aspect of the adoption of digitalisation, as noted in the literature, is visionary and strategic leadership that helps clarify the importance and possibilities of digitisation (Hansen, Christiansen and Lassen, 2024). Leadership's attitude towards digitalisation will determine whether an SME will embrace it. There is a lack of leadership acceptance of digital adoption, which constitutes an important initial barrier to capitalising on the opportunities associated with adopting digital tools. The people and organisational culture of an SME shape the organisation's willingness or reluctance to adopt digitalisation strategically (Made Smarter, 2025). A lack of leadership willingness to embrace digitalisation may be due to insufficient information and awareness of the benefits of adopting it, as well as the potential for both business and regional growth (OECD, 2021).

A study highlighted that the SMEs in Finland are at a disadvantage because they lack awareness, knowledge and resources to effectively keep up to date with digital technologies and adequately implement Industry 4.0 in their organisation’s production and processes (Hafeez et al., 2025). The expected adoption of Industry 4.0 is not only constrained by cost implications but also by leadership's short-term mindset and lack of expertise (ERC, 2021). The primary barrier to digitalisation is the leadership culture and insufficient human capacity to utilise the tools. When innovation, particularly Industry 4.0 innovation, is not part of leadership mindsets and standards, SMEs will rarely consider implementing digitisation in their processes. The lack of vision means that the organisation is unable to grasp the impact that digitalisation can have on its operations (Amaral & Pecas, 2021). There is a low adoption rate of Industry 4.0 technologies among European SMEs (Agostini & Nosella, 2020). Research shows Italians SMEs have limited knowledge on Industry 4.0 and digitalisation (Thomsen, Antonsen & Rosenkilde, 2024). In the West Midlands’ regional context, capitalising on the growth potential of digitalisation requires maximising the digital economy through the utilisation of mobile technologies, Internet of Things, Cloud Computing, AI and the storing and analysing of big data (Demin, Mikhaylova and Pyankova, 2023; Hafeez, Shahzad and De Silva, 2025). Sectors such as equipment and metal manufacturing highlighted that a lack of skills and leadership, funding, time and fear of failure has resulted in little to no progress and success in digitalisation. It has been observed that SMEs in these sectors lack a digitalisation plan in their strategies (MadeSmarter, 2025). For small businesses, energy costs and the availability of skilled labour are the two primary challenges to their growth (Clark, 2024).

To achieve Net Zero transitions adequately in the region, SMEs will need to make significant changes to their business models, structures and practices (ERC, 2021). There is uncertainty among SMEs about the direct correlation between sustainability, digitalisation and organisational performance. The ambiguity and lack of precise results, particularly in the short term, discourage SMEs from fully adopting sustainable and digitalisation practices (Barragan and Becker, 2024). This is coupled with the fact that, as an SME, they must contend with limited resources and the need to remain profitable.

Capacity

Capitalising on digital tools is especially challenging for manufacturing SMEs, as they already struggle to adopt digital transformation due to limited R&D facilities and limited access to innovative networks and collaboration. To fully capitalise on Industry 4.0, SMEs must be knowledgeable about emerging technologies and integrate them into their operations. These technologies include the Internet of Things, Robotics and Artificial Intelligence (AI) (Hafeez, Shahzad and De Silva, 2025). The integration of Industry 4.0 technologies will require organisations to upskill and recruit employees with the capabilities and technical know-how. The key characteristics of Industry 4.0 are, according to Horváth and Szabó (2019): 1) digitalisation, optimisation and customisation of production; 2) Automation and adaptation; 3) Human-machine interaction; 4) Value-added services and storing data; and 5) Automatic data exchange and communication. The necessary human capacity to adequately utilise Industry 4.0 technologies is termed Industry 5.0. Industry 5.0 is the human-centric approach to digitalisation. It focuses on competencies and the interplay among digitalisation, sustainability and human resources (Hansen, Christiansen and Lassen, 2024). Evidence from Kopka and Fornahl (2024) shows that upgrading digital tools, such as AI, without additional upskilling of highly qualified human capital to operate the technology, will have a direct negative impact on productivity and performance.

Moreover, there are concerns that data security hinders the adoption of digitalisation. These concerns are about cybersecurity, data ownership and the safe handling of private information (McKinsey, 2016; Cimini et al., 2017). The fear of cybersecurity risks associated with Industry 4.0 technology in “data ownership, information security and hardware security” (Ghobakhloo et al., 2022).

Cost implication

The cost implications of adopting digitalisation in manufacturing SMEs vary, ranging from recruitment and upskilling to implementing digital tools. Access to talent with the requisite digital skills and technical know-how is one of the most critical barriers to the adoption of digitalisation (STEER, 2021). There is a gap between university leavers and the competencies needed in computer science, AI tools and programming that can support SMEs in upgrading their digital tools. There are limited time and financial resources available for SMEs to invest in digital skills training, software upgrades and maintenance (OECD, 2024). For an SME, time and resources are valuable for actual work productivity that generates income for the business and safeguards its profits. SMEs are more likely to experience cash flow challenges. The lack of funds leads to their hesitancy to commit man-hours and resources to digital tools without a clear justification of the benefits (ERC, 2025). SMEs are finding digital technologies incompatible with their existing methods and technology infrastructure. Mitigating this will require a complete revamp of their operations and processes (Ghobakhloo et al., 2022).

1.2.3 Gaps Identified in Earlier Studies and Need for This Study

The literature review reveals that SMEs are more willing to adopt digitalisation than Net Zero practices because of the practicality and the ease of implementing digital tools. On the other hand, it is more challenging for SMEs to understand Net Zero practices that are relevant to their business. The understanding is that it is more feasible for SMEs to understand the practical aspects of implementing and integrating digital tools into business operations than to understand which sustainable practices can be implemented in the organisation and the benefits associated with them.

Regardless, there's a general lack of awareness of digitalisation, the use of digital tools and how they can improve productivity. There is also a lack of understanding of which sustainable practices are feasible and relevant to their unique industry. Overall, SMEs are concerned about implementation costs and the need to choose between investing in their core business to maximise profitability and investing in digitalisation and practices required to meet regional Net Zero targets. The use of digital technology helps SME manufacturers to decarbonise and become more productive (Inspired & MakeUK, 2024). The access to and adoption of sustainable technologies capable of mitigating high energy demand have been deemed appropriate (Dadzie et al., 2018). These technologies range from radiant cooling, solar energy and geothermal systems. They are designed to support existing buildings to improve their energy efficiency through retrofit. Supporting SMEs in investing in technologies capable of harnessing energy from solar, wind and geothermal sources can offer a significant advantage in reducing emissions (Olarewaju et al., 2023). This starts with building smart technologies that are scalable, upgradable, automated and future-ready. Smart connected devices that possess the capability for basic automation and an intuitive user interface (Fiorentino et al., 2020; Al-Zayani et al., 2023). This is the first stage for most SMEs in the region. There is a need to emphasise the necessity of collaboration between technology and net-zero. The unique reality of SMEs in the West Midlands is extensively missing in the literature. The focus of the region is primarily the manufacturing industry, which includes large enterprises. Manufacturing SMEs' regional-specific support and interventions are not robust enough and do not adequately account for their regional unique experiences, as regional support and interventions policies are also developed in consideration of large enterprises. It is necessary to understand the West Midlands manufacturing SMEs' perspectives and their unique challenges to adopting digitalisation and Net Zero and improving their productivity. Moreover, it is important to understand the West Midlands' manufacturing SMEs' motivation to adopt digitalisation and Net Zero practices, the internal and external challenges they face and how they have overcome them. Evidence shows that the best practices SME manufacturers are using to decarbonise their businesses involve adopting key digital tools. For instance, digital production innovation and process innovation have been reported to benefit businesses in their decarbonisation efforts. Digital product innovation can be driven by technological advances, by raising awareness of the technologies available in the industry. Manufacturers can now introduce new products and services or offer significant improvements to existing ones. Digital process innovation has led manufacturers to reconsider the production and processes of existing products, innovating them to improve efficiency. This includes their supply chain through to the production and delivery of the product (Sage & MakeUK, 2023).

The businesses that are making progress are investing in sustainable, green technologies. It requires restructuring current operations with the mindset of embedding digital transformation in the operation process. This requires developing and training the existing workforce and recruitment (MakeUK, 2024). Lessons can be learnt from best practices of larger manufacturing enterprises, including sustainable sourcing of materials and from suppliers who have demonstrated the use of low-carbon processes and smart manufacturing through retrofitting buildings and adopting smart building technologies. Most importantly, the availability of practical educational seminars that highlight options for embedding sustainability in everyday operation and processes (Loughlin, 2025).

Section 2: Integrated Review

This report combines evidence from multiple sources, including secondary data analysis, policy reviews, interviews and focus groups, to provide a comprehensive understanding of SME challenges and opportunities. Figure 3 explains the Overview of Data Sources and Analytical Framework. The analysis identifies common barriers and adoption patterns in digitalisation and Net Zero practices, highlights regional differences, particularly the position of the West Midlands and assesses the effectiveness of current policies in supporting SME digitalisation and sustainability. Based on these insights, the report proposes targeted recommendations to strengthen policy impact.

The evidence base draws on four key data points:

Secondary Data Analysis:

- Longitudinal Small Business Survey (2022–2023)
- Review of UK government policies at national, regional and local levels

Primary Data Analysis:

- Semi-structured interviews with twelve SME leaders from diverse manufacturing sub-sectors
- Three focus groups with policymakers and stakeholders, including representative organisations

2.1 Longitudinal Small Business Survey (LSBS) Analysis (2022-2023):

The study uses data from the UK's Longitudinal Small Business Survey (LSBS), the largest official survey of SMEs, commissioned by the Department for Business and Trade (BEIS, 2024). LSBS is conducted annually to capture SME challenges, behaviours and outcomes across all major sectors. This project focused on the 2022 and 2023 waves, but due to missing questions in the 2023 dataset, only the 2022 data provided consistent coverage for the topics under investigation.

Inconsistent data collection across survey waves limited longitudinal analysis. To maintain sectoral focus, the dataset was filtered to include only manufacturing SMEs (SIC code 2). This allowed examination of key factors, such as digitalisation adoption, carbon-reduction actions and environmental practices relevant to manufacturing. Data were organised by the twelve UK regions, enabling cross-regional comparisons and assessment of how practices and challenges vary geographically, with particular attention paid to the West Midlands' performance relative to other regions.

The analysis focused on manufacturing SMEs as a single category (SIC section C) without disaggregation by manufacturing subsector or firm size. This means the findings do not distinguish between different manufacturing types (e.g., metals versus food versus textiles) or between micro (1-9 employees), small (10-49) and medium-sized (50-249) enterprises. In practice, this limitation matters because barriers such as skills shortages, energy exposure and technology readiness often differ by subsector and firm size. Whilst the qualitative evidence in Sections 3.1 and 3.2 includes some observations about firm size differences (such as resource constraints affecting smaller firms and productivity gaps among mid-sized firms), these were not systematically collected and should not be interpreted as a comprehensive comparison across SME categories. Future work could address this by linking LSBS records to more detailed SIC codes where available, or by collecting targeted samples in key manufacturing subsectors.

The analysis used the 2022 survey dataset as the primary source because it offered the most comprehensive and recent evidence on digitalisation, energy use, carbon emissions, environmental pressures and technology adoption. Questions examined included software adoption, low-carbon investments, fleet electrification and energy price concerns. The 2023 dataset was less suitable due to missing variables and changes in question wording, limiting comparability. Prioritising 2022 ensured broader coverage and relevance for current policy discussions.

All analysis was conducted using SPSS. The extracted variables were categorical in nature, most often binary in format (for example, yes/no or adopted/not adopted). Therefore, data was cleaned and adjusted for missing values, valid responses were used and percentages were calculated using these valid cases as the denominator. Several variables had low valid response counts in certain regions, which limits the reliability of statistical comparisons and introduces a risk of response bias.

The analysis used a two-stage approach: (1) descriptive frequency and percentage tables by region to show manufacturing SMEs' practices and challenges; and (2) Chi-square tests to examine whether regional differences were statistically significant, applied only when assumptions were met. Where sample sizes were too small, results were reported descriptively without inferential testing.

Due to missing variables, inconsistent formats and low counts for some indicators, the analysis is cross-sectional and descriptive, not longitudinal or causal. Findings are not generalisable to all UK businesses, as the focus was on manufacturing SMEs, but they offer useful insights into regional patterns in digitalisation, environmental practices and energy/emissions challenges

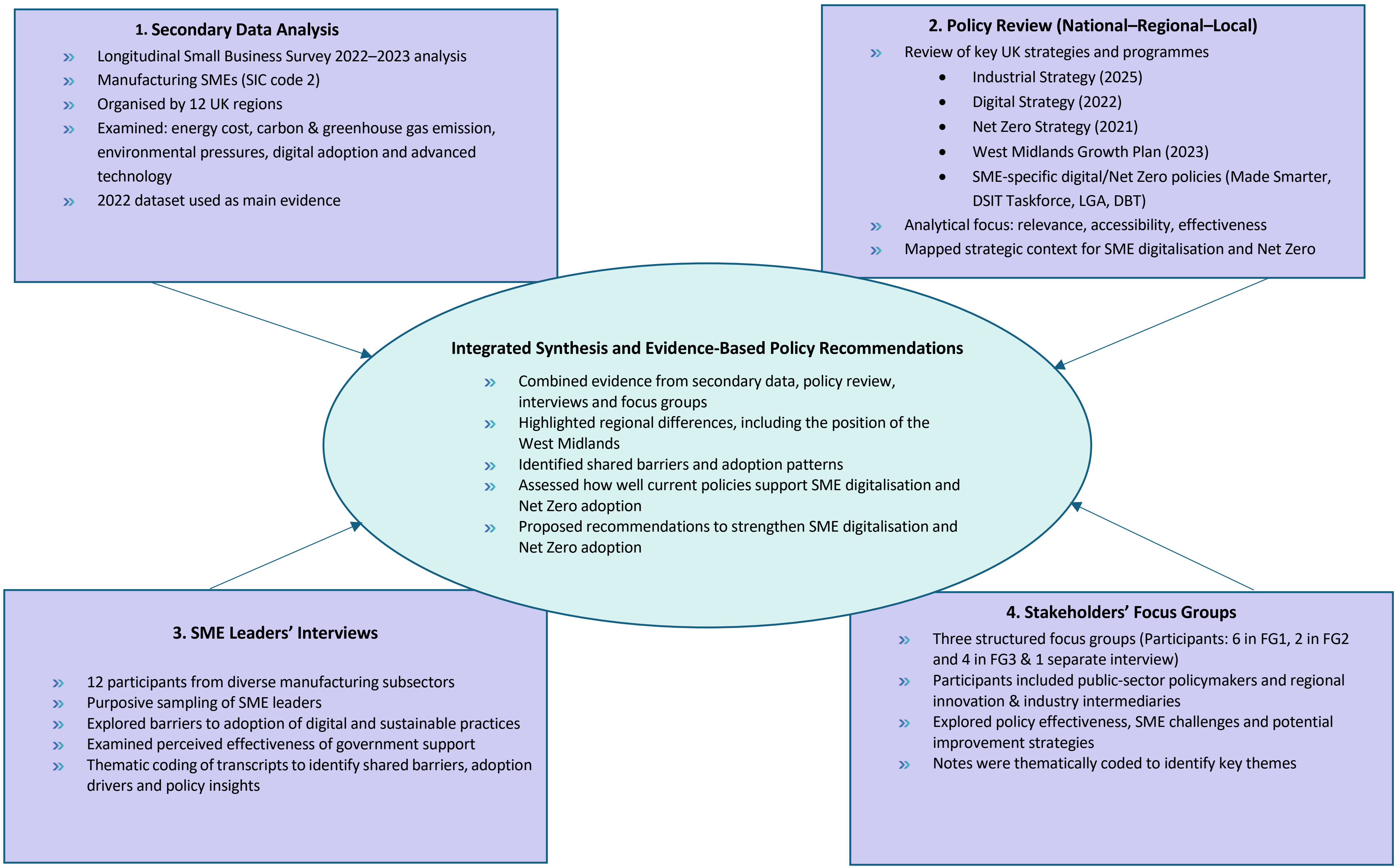

Figure 3: Overview of Data Sources and Analytical Framework

2.1.1 Contextual Evidence from Secondary Data (LSBS 2022–2023)

Energy costs are the dominant external pressure

In 2022, 76.5% of West Midlands manufacturing SMEs said rising energy costs affected their business plans. LSBS data results show that most regions believed rising energy costs were a major factor affecting business plans in 2022. While the exact percentages varied, in nearly all regions, most SMEs reported being impacted, suggesting a challenge across the UK manufacturing sector.

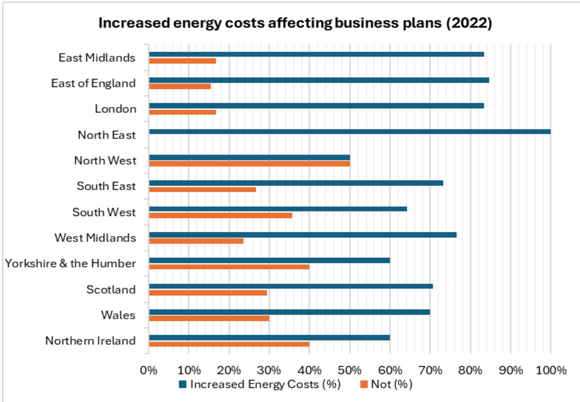

Figure 4: Percentage of manufacturing SMEs reporting increased energy costs affecting business plans, by region (2022)

Figure 4 shows the percentage of manufacturing SMEs reporting that increased energy costs (e.g. gas, electricity, LPG, oil) affected their business plans in 2022. Responses varied across regions, but high levels of concern were evident in most areas. The North-East (100%), East of England (84.6%), East Midlands (83.3%) and London (83.3%) reported the greatest impacts. In contrast, the North-West (50%) and Yorkshire & the Humber (60%) indicated lower proportions. Other regions, including Wales (70%), Scotland (70.6%) and the West Midlands (76.5%), also reported significant pressures from energy costs.

Figure 5 presents the proportion of manufacturing SMEs that identified energy prices as a major obstacle to their business in 2022 and 2023. In 2022, concerns about energy prices were already high in many regions. London (100%), Northern Ireland (88.2%) and the North-West (81.5%) reported the greatest levels, while Wales (57.1%) and the South-West (63%) were lowest. Most other regions ranged between 65–80%. By 2023, the issue had become even more widespread across most regions. Yorkshire & the Humber (83.3%), Northern Ireland (84.2%) and the North-West (80%) reported very high concern. The West Midlands (80.6%) and East Midlands (81%) also showed strong increases compared to the previous year. The South-West was the only region where concern was lower in 2023 (51.5%) compared to 63% in 2022.

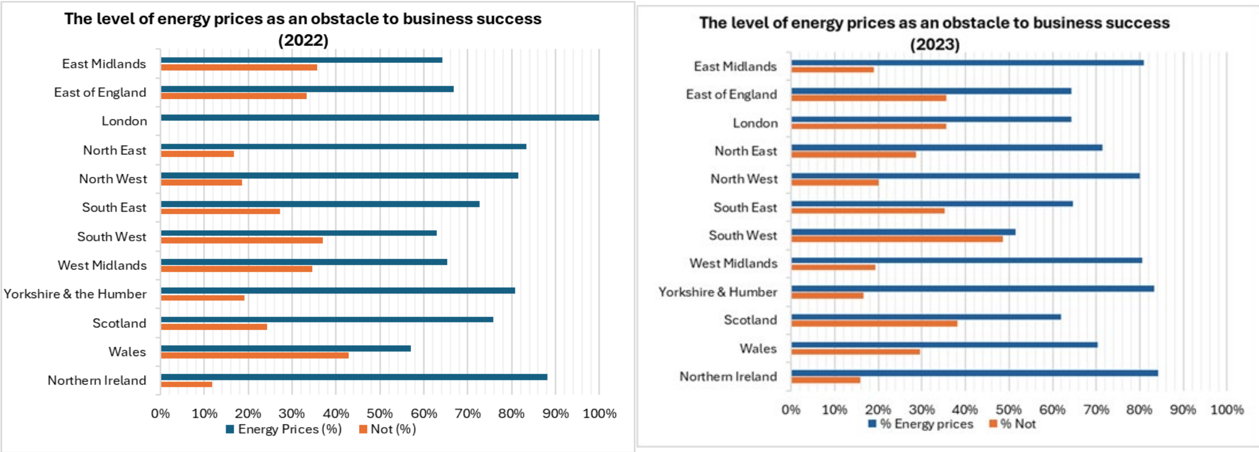

Figure 5: The proportion of manufacturing SMEs reporting energy prices as a major obstacle to business success, by UK region (2022 & 2023).

The results show that energy prices were widely regarded as a major obstacle by SMEs in both years, with 2023 reinforcing and in some regions intensifying these concerns. This mirrors the UK-wide picture and carries particular importance in the West Midlands due to the region's large manufacturing base and high concentration of energy-intensive industrial activity (WMCA, 2025b).

Infrastructure constraints limit sustainable adoption

In 2023, West Midlands SMEs reported lower smart or advanced meter adoption than several other regions, restricting their ability to monitor and reduce energy consumption.

Figure 6 compares manufacturing SME responses from the 2022 and 2023 surveys on whether their main premises had smart or advanced meters for gas or electricity. In both years, most firms reported not having such meters, though a modest increase in adoption is visible in 2023. For example, the East of England rose to 31% reporting both or electricity-only meters in 2023, up from 25% in 2022. Similarly, the South-West increased from 6.7% (both meters) in 2022 to 25.8% in 2023, with growth in electricity-only meters. By contrast, London showed little progress, with only 20% reporting electricity-only meters in 2023, which is still low compared to other regions.

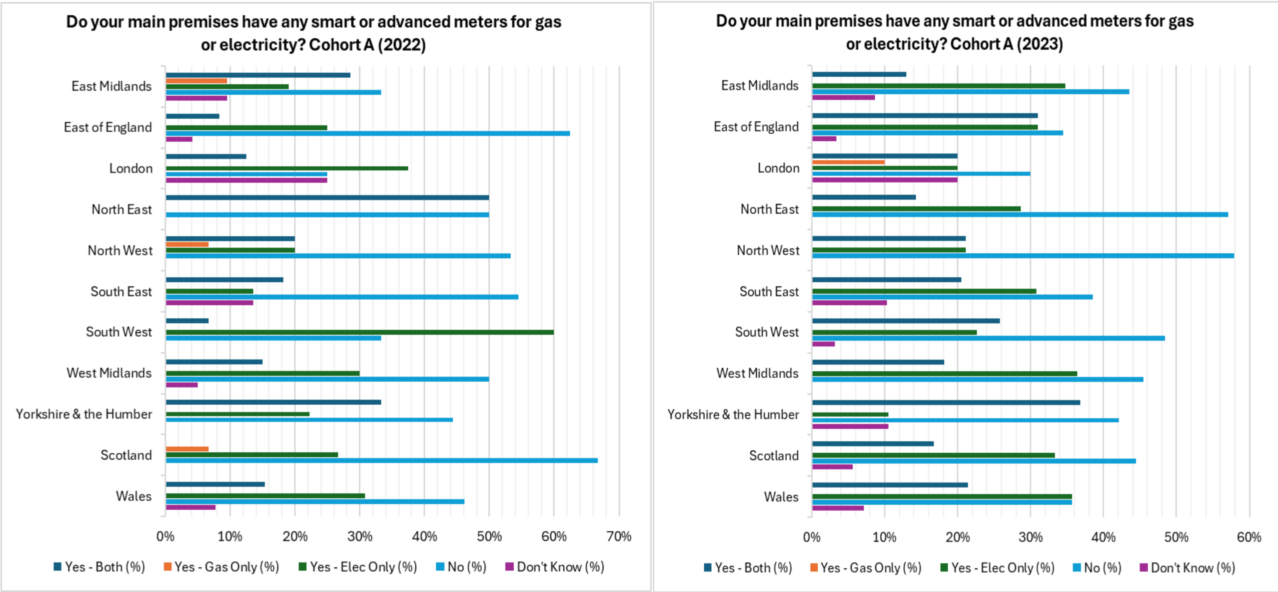

Figure 6: Proportion of manufacturing SMEs reporting the presence of smart or advanced meters for gas or electricity by region (2022 & 2023).

Note: Cohort A denotes the random subsample of LSBS respondents assigned the non-core module on business energy use. The smart-meter results therefore reflect only this subgroup (weighted accordingly), not the full survey sample. The 2022 and 2023 panels use different x-axis scales to optimise readability for each year's data distribution[4].

In the West Midlands, the proportion of firms reporting both gas and electricity smart meters increased from 15% in 2022 to 18.2% in 2023. The share reporting electricity-only meters also rose from 30% to 36.4%. Over the same period, the proportion reporting no smart or advanced meters declined from 50% in 2022 to 45.5% in 2023. Regional sample sizes for manufacturing SMEs in Cohort A ranged from 4 to 24 in 2022 and from 7 to 39 in 2023. Several regions had very small samples: North East (n=4 in 2022, n=7 in 2023), London (n=8 in 2022, n=10 in 2023) and Wales (n=13 in 2022, n=14 in 2023). The West Midlands had 20 respondents in 2022 and 22 in 2023. Given these small sample sizes, regional percentage differences should be interpreted cautiously as they may reflect sample composition effects rather than substantive regional variation.

[4] For more information about Cohort A please check: https://assets.publishing.service.gov.uk/media/650182ad5727800014251a4a/Small_Business_Survey_2022_-_Methodology.pdf

Environmental action is present but weaker compared with higher-performing regions

Environmental action remains weaker than in higher-performing regions, reflecting underlying barriers to adoption. In 2022, 65.5% of West Midlands firms had taken steps to reduce their environmental impact, which was below other regions such as the North-East, Scotland and Wales.

Figure 7 shows the proportion of manufacturing SMEs in 2022 that reported taking steps to reduce their environmental impact over the past 12 months. A clear majority of firms across all regions said they had acted in some way, though the level of commitment differed by region. The North-East reported the highest share of firms taking action (86.4%), followed by Scotland (77.4%) and Wales (74.3%). By contrast, the East Midlands (58.5%) and West Midlands (65.5%) recorded lower levels of engagement, pointing to weaker action compared to other parts of the UK. Negative responses were usually below one-third.

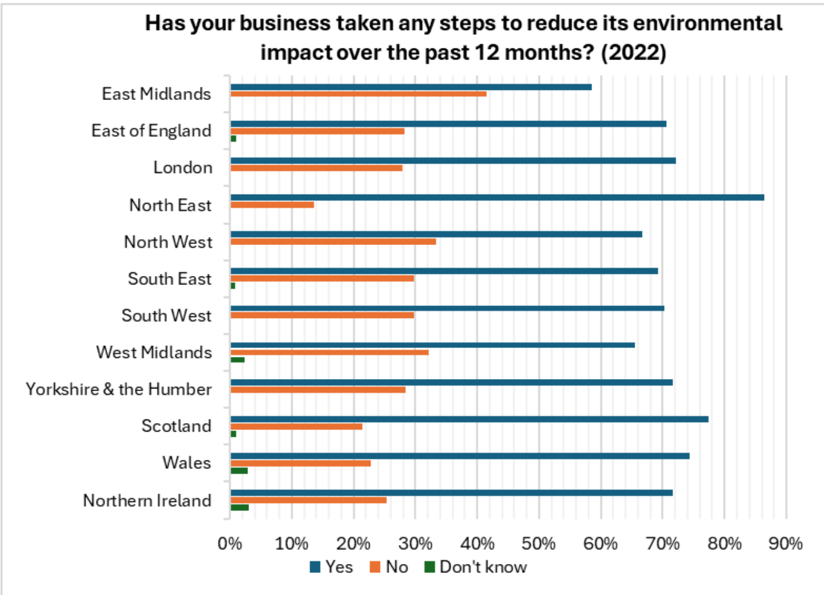

Figure 7: Proportion of manufacturing SMEs in the 12 UK regions that reported taking steps to reduce their environmental impact over the past 12 months

Carbon-reduction plans are highly exposed to rising costs

In 2022, 58.8% of West Midlands manufacturing SMEs said rising costs disrupted their carbon-reduction activity, the highest disruption across the UK. Figure 8 shows the share of manufacturing SMEs reporting that their plans to reduce carbon or greenhouse gas emissions were affected by rising costs. In 2022, results varied across regions. The East of England (53.8%) and West Midlands (58.8%) reported the highest levels of disruption, while Scotland (17.6%) and the North-East (0%) were least affected.

In 2023, the overall pattern shifted slightly. Wales (57.1%), Yorkshire & the Humber (47.1%) and the West Midlands (44.4%) reported higher levels of disruption, while the East of England (7.7%) and London (14.3%) saw much lower reported impacts. This suggests regional differences in exposure to rising costs, though response rates may partly explain variation.

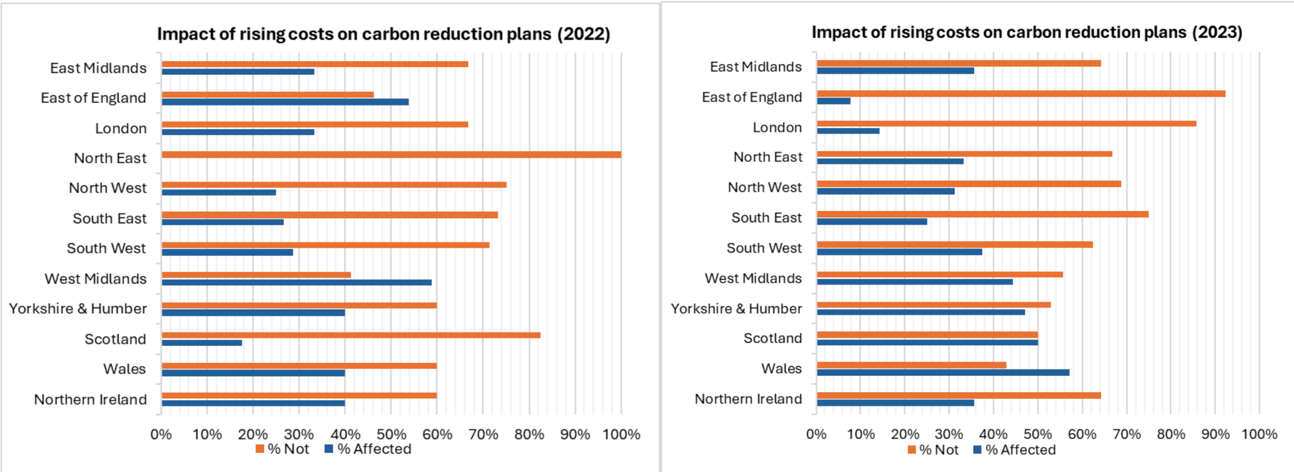

Figure 8: Proportion of manufacturing SMEs reporting that rising costs affected their carbon/greenhouse gas emission reduction plans, by UK region (2022 & 2023)

Digital adoption is improving but still behind stronger regions

Although online selling increased from 8.7% (2022) to 25% (2023) in West Midlands, it remains below Scotland (48.1%) and the North-West (39.3%) and London (36.4%). Figure 9 shows the proportion of manufacturing SMEs using online technologies to sell to customers in 2022 and 2023. In 2022, uptake was modest, with most regions reporting below one-third of firms selling online. The West Midlands (8.7%) and Scotland (15.4%) had the lowest levels, while Northern Ireland (38.5%) and the North-East (40%) were highest. By 2023, online selling had increased in several regions, particularly in Scotland (48.1%), the North-West (39.3%) and London (36.4%). Moreover, Wales (33.3%) and Northern Ireland (35.3%) also showed stronger engagement compared to 2022. For the West Midlands, online selling rose from 8.7% in 2022 to 25% in 2023, showing significant progress but still behind the UK average.

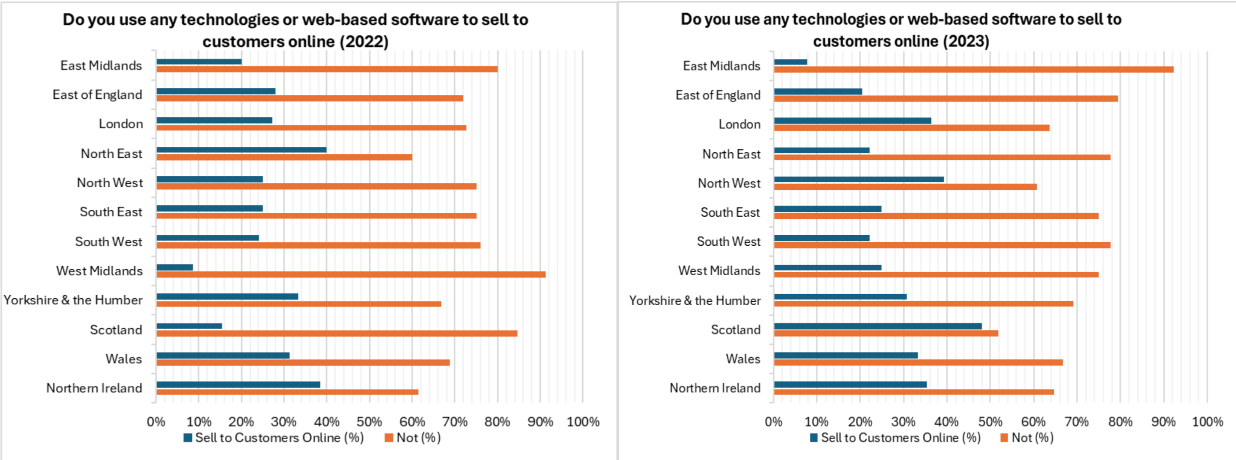

Figure 9: Proportion of manufacturing SMEs by UK region reporting sales to customers online (2022 & 2023).

Use of online tools to manage the business rose from 26.1% (2022) to 52.8% (2023), a strong improvement. Figure 10 presents the proportion of manufacturing SMEs using online technologies to manage their business in 2022 and 2023. In 2022, use of these tools differed by region, with the South-East (59.1%) and Scotland (53.8%) reporting the highest levels, while Yorkshire & the Humber (22.2%) and the West Midlands (26.1%) were lowest. Most other regions ranged between one-third and one-half of firms reporting use. By 2023, use was more widespread, with Wales (61.1%), the South-East (52.5%) and the West Midlands (52.8%) showing the highest proportions, marking notable increases compared to 2022. However, some regions, such as the North-East (22.2%), remained much lower.

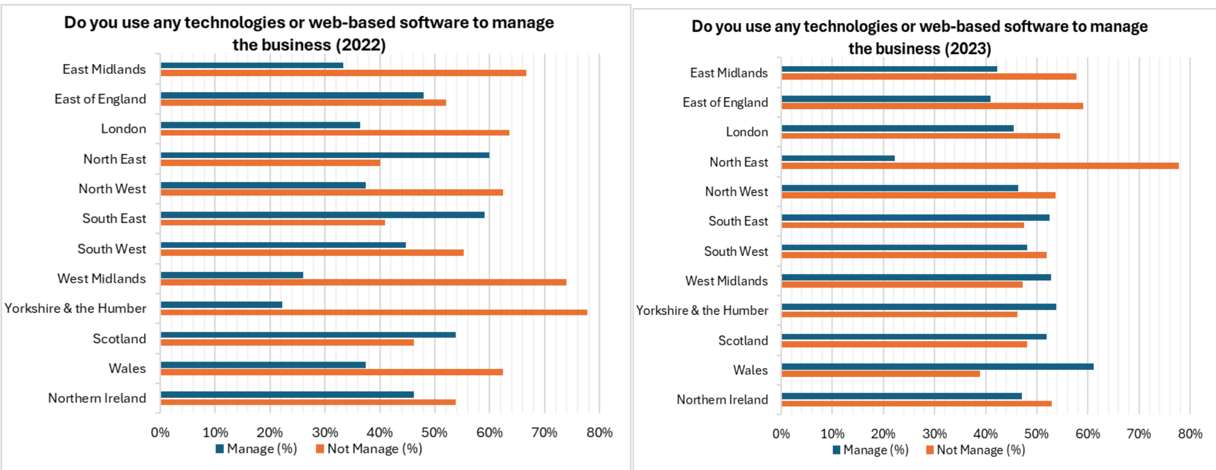

Figure 10: Proportion of manufacturing SMEs using online technologies to manage the business by region (2022 & 2023)

Advanced technology use remains very limited

Only a small minority used AI or robotics in 2022, with the West Midlands below London, the main early adopter. Figure 11 shows the percentage of manufacturing SMEs across UK regions that reported using AI, robotics, or automation in 2022. Overall, use of these production-enhancing technologies was limited. In most regions, fewer than one-quarter of firms reported adoption. London (30.2%), the West Midlands (24.1%) and East of England and Northern Ireland (both 23.9%) showed relatively higher levels of use. By contrast, Wales (17.1%) and the North-West (13.3%) were among the lowest.

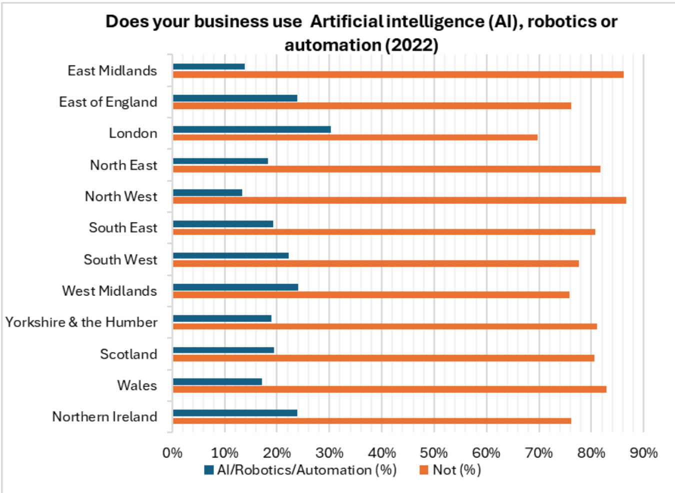

Figure 11: Use of AI, robotics and automation by manufacturing SMEs in 2022

It should also be noted that the survey question combined AI, robotics and automation into a single category. This makes it difficult to separate recent developments in AI adoption from longer-standing use of robotics and automation, which limits interpretation of the results. In particular, it prevents assessing how the rapid growth of AI and large language models (LLMs), such as ChatGPT, may have influenced more recent uptake. Results are also only available for the 2022 survey, so no comparison with 2023 can be made, even though this would have been valuable for understanding these newer developments.

Adoption of Enterprise Resource Planning, Customer Relationship Management and analytics systems remains modest, reflecting low process maturity (Appendix II). These results reinforce that foundational digital capability is uneven and that many SMEs lack the skills, time or confidence to adopt more advanced technologies. As no statistically significant associations were identified between regions and the variables examined above, the chi-square analysis is not discussed further.

Integrative interpretation

Energy and cost pressures as dominant constraints: Taken together, Figures 4–8 point to a clear energy and cost pressure’s theme for manufacturing SMEs. Rising energy costs affected business plans across most regions in 2022 (Figure 4) and energy prices were widely reported as a major obstacle in both 2022 and 2023 (Figure 5). However, enabling infrastructure remains uneven, with low uptake of smart or advanced meters across most regions (Figure 6). Environmental engagement exists but is weaker in the West Midlands than in some higher-performing regions (Figure 7) and rising costs disrupted carbon-reduction activity in both years, with the West Midlands reporting the highest disruption rate in the UK in 2022 (58.8%) (Figure 8). This pattern indicates that cost pressures are not simply a general business concern but a specific barrier to Net Zero adoption, as firms facing high operational costs are forced to delay or scale back environmental investments.

Digital adoption shows selective progress with capability gaps: Figures 9–11 together show a digital adoption and capability theme, with adoption improving but uneven across regions. In the West Midlands, online selling increased from 2022 to 2023 but remains lower than some stronger regions (Figure 9), while the use of online tools to manage the business rose strongly over the same period (Figure 10). Interpreting Figures 9 and 10 together suggests digital adoption may currently be stronger for internal management and efficiency than for market-facing online sales, indicating uneven adoption across outward- and inward-facing capabilities. Finally, advanced technology use such as AI, robotics and automation remains limited overall and is only reported for 2022, which restricts year-on-year interpretation (Figure 11). This suggests that firms are adopting basic digital tools but lack the skills and capacity to progress to advanced technologies.

2.1.2 Key Growth-Relevant Indicators from the LSBS

These indicators suggest that while adoption is occurring, its potential contribution to regional economic growth is constrained by uneven ambition and limited integration across supply chains.

Environmental innovation is steady but not exceptional

Just over half of West Midlands manufacturing SMEs reported introducing new or improved production processes, placing the region close to the UK average.

Figure 12 shows the share of manufacturing SMEs that reported introducing new or improved production processes with environmental benefits in 2022. Overall, just over half of firms across the UK had taken such steps; however, regional variation was evident. Wales reported the highest proportion (75%), followed by Scotland (59.7%) and the South-East (58.2%). By contrast, Yorkshire & the Humber (32.1%) and the East Midlands (36.8%) were notably lower, indicating weaker engagement in process innovation with environmental benefits.

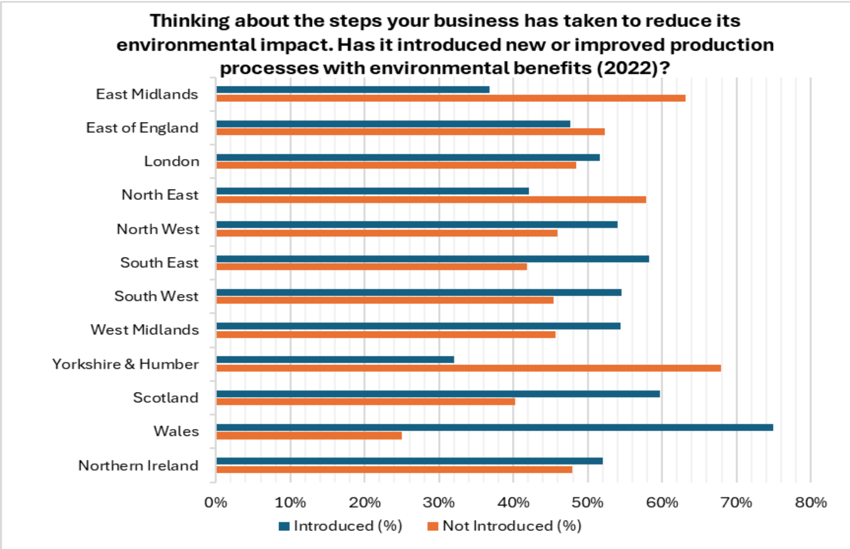

Figure 12: Proportion of manufacturing SMEs that reported introducing new or improved production processes with environmental benefits (2022)

The chi-square test confirmed significant regional variation, showing that SMEs in some regions are significantly more likely to have introduced new or improved environmentally beneficial processes. This means that regional differences were meaningful, with some areas showing much stronger adoption than others. Wales had the highest share of firms introducing new or improved production processes with environmental benefits (75%), which was significantly above the overall average. Scotland (59.7%) and the South-East (58.2%) were also above average, though not at statistically significant levels. The West Midlands stood close to the UK average, with 54.4% of firms reporting such steps, suggesting that manufacturing SMEs in the region are engaging with environmental process improvements broadly in line with the UK average. By contrast, Yorkshire & the Humber (32.1%) and the East Midlands (36.8%) were significantly below the average, with Yorkshire & the Humber particularly low.

Carbon-reduction ambitions vary

In 2023, 51.6% of the West Midlands manufacturing SMEs planned to work towards reducing emissions in the next three years, modestly improved in 2022. Figure 13 presents the proportion of manufacturing SMEs reporting plans to work towards reducing carbon or greenhouse gas emissions. In 2022, intentions were relatively strong in most regions. East Midlands (71.4%), East of England (70.8%), Scotland (69.7%), Wales (71.4%) and Northern Ireland (70.6%) reported the highest levels. By contrast, the North-East (33.3%), South-East (50%) and Yorkshire & the Humber (50%) were much lower.

In 2023, results showed mixed changes. Commitment remained high in Northern Ireland (68.4%), Wales (66.7%) and the East Midlands (66.7%). Some regions, such as Yorkshire & the Humber (56.7%) and the West Midlands (51.6%), reported moderate improvements. However, others, including the North-East (28.6%) and North-West (32%), reported lower engagement compared to 2022, which may reflect response effects or other contextual factors that warrant further investigation.

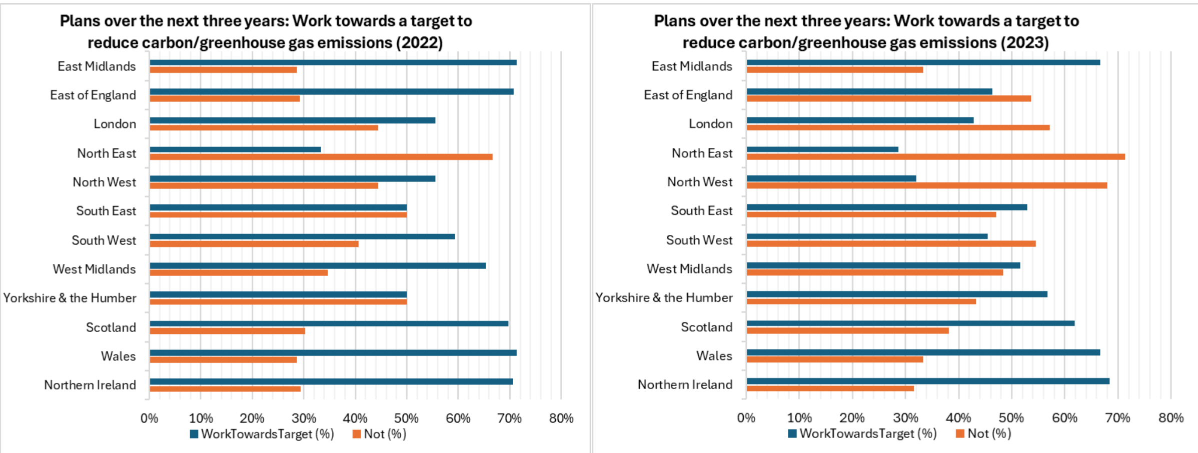

Figure 13: Proportion of manufacturing SMEs planning to work towards reducing carbon/greenhouse gas emissions, by region (2022 & 2023).

Note: This question was only asked of a random subsample of LSBS respondents (Cohort B). Results reflect only this subgroup (weighted accordingly).

Supply-chain inclusion remains limited

Only 31.3% of West Midlands firms included their supply chain in carbon targets in 2023, compared with London (66.7%) and Scotland (53.8%). Figure 14 shows the proportion of manufacturing SMEs whose greenhouse gas emission targets included their supply chains. In 2022, supply chain inclusion varied widely across regions. Scotland reported the highest proportion (65.2%), followed by London (60%) and the South-East (54.5%). In contrast, Yorkshire & the Humber (38.5%) and the North-West (33.3%) had lower levels.

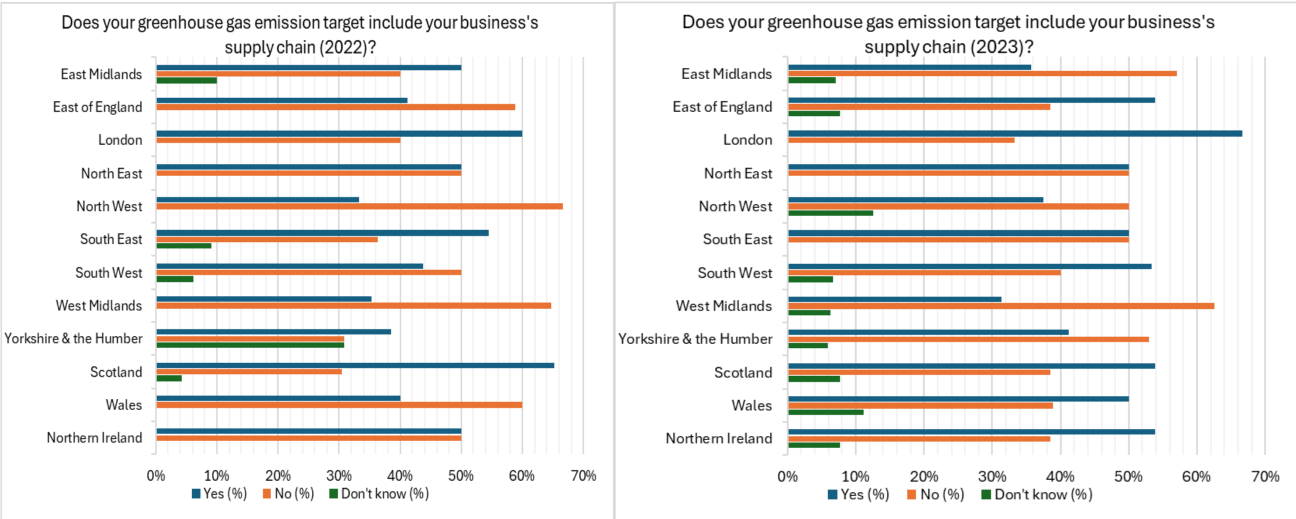

Figure 14: Share of manufacturing SMEs whose greenhouse gas emission targets included their supply chain (2022 & 2023).

Note: This question was only asked of a random subsample of LSBS respondents (Cohort B). Results reflect only this subgroup (weighted accordingly).

In 2023, results showed a more balanced picture. London (66.7%) and Scotland (53.8%) remained among the strongest regions, while the East of England (53.8%), South-West (53.3%) and Northern Ireland (53.8%) also showed relatively high levels of inclusion. Other regions, including the West Midlands (31.3%) and the North-West (37.5%), continued to report lower adoption. Results suggest gradual progress in embedding supply chain considerations, though large regional differences remain.

Overall, these results suggest that while adoption supports productivity and competitiveness, its contribution to regional growth remains uneven and weaker than in some higher-performing UK regions.

2.1.3 Survey Signals of Policy–Delivery Gaps

Low smart-meter technology adoption to manage energy

Despite strong policy emphasis, only a small share of manufacturing SMEs reported using smart meter technologies to manage their energy use. In 2022, uptake was very limited, with most regions below 20%. By 2023, usage remained modest but showed some improvement, with London (60%) and Wales (50%) notably higher. The West Midlands reported lower uptake in 2023 (33.3%) compared to 2022 (44.4%), although this may reflect survey coverage rather than a clear downward trend. Several areas, including Yorkshire & the Humber and Scotland, remained very low at around 11%.

However, response numbers were small and rates varied between regions, so it was not possible to test for statistical differences using chi-square. Overall, most manufacturing SMEs had not yet adopted smart meter–based technologies based on the available survey data.

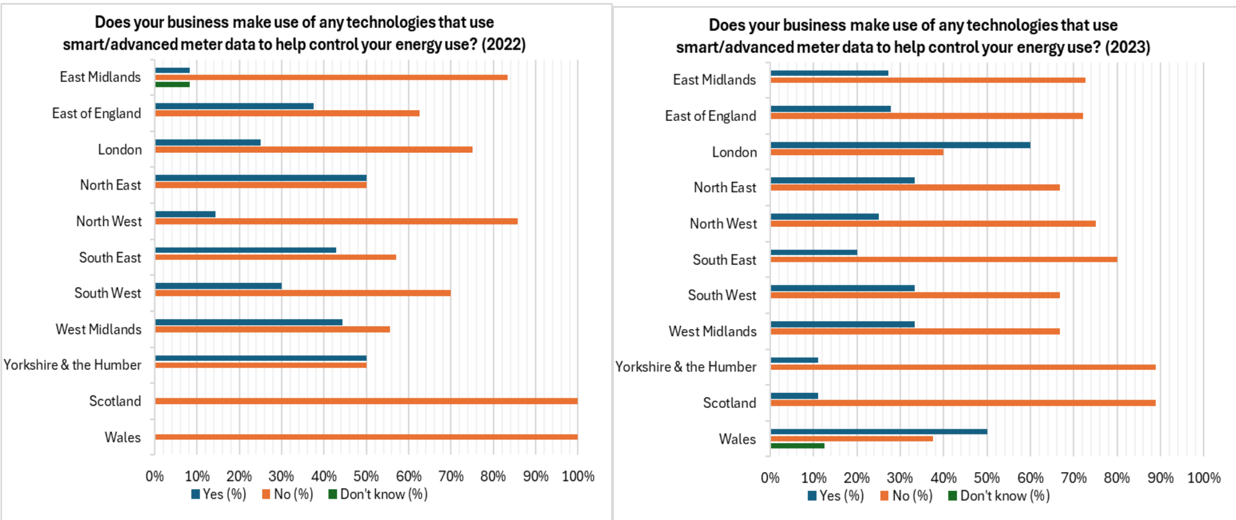

Figure 15: Proportion of manufacturing SMEs reporting use of technologies based on smart/advanced meter data to control energy use by UK region (2022 & 2023).

Note: This question was only asked of a random subsample of LSBS respondents (Cohort A) assigned the non-core module on business energy use. Results reflect only this subgroup (weighted accordingly).

Limited uptake of advanced digital systems

Despite years of national promotion, this pattern suggests a disconnect between policy ambition and operational reality. The LSBS shows that digital adoption is rising in the West Midlands, but the region still lags behind some stronger areas of the UK. Most West Midlands SMEs now use basic digital tools such as accounting software, similar to the rest of the UK. By contrast, the adoption of more advanced systems, including ERP, AI, automation and business analytics (Appendix II and Figure 11), remains limited and uneven. Similar patterns are observed nationally, where these technologies are used by only a minority of SMEs, while CRM adoption is more widespread but varies across regions.

Taken together, these survey indicators point to gaps between policy ambition and delivery, providing context for the qualitative findings that explore how issues of policy structure and coordination shape adoption.

2.2 Policy Review

This report has reviewed the UK government policies at National, Regional and local levels (e.g., Digital Strategy, Net Zero Strategy, Innovate UK programmes) for accessibility, relevance and effectiveness, identifying gaps and assessing how well they addressed SME needs. The analysis is drawn exclusively from a review of current policy documents to map the strategic context in which manufacturing SMEs operate. Documents were selected purposively based on their relevance to SME digitalisation, Net Zero adoption and regional economic policy, forming a focused narrative review rather than a systematic one.

2.2.1 National Strategic Frameworks

At the highest level, UK government policy establishes a clear and consistent vision for a modern, productive and sustainable economy. The core national strategies, the UK Industrial Strategy, the UK Digital Strategy and the Net Zero Strategy, collectively establish the strategic importance of advanced manufacturing, clean energy and the widespread adoption of digital technology.

- The UK Industrial Strategy aims to bolster productivity and investment by backing high-potential sectors, explicitly targeting Advanced Manufacturing and positioning the UK as a ‘Clean Energy manufacturing superpower’.
- The UK Digital Strategy seeks to build a world-leading digital economy by investing in skills, infrastructure and financing for technology growth, acknowledging digital adoption as a key lever for productivity.
- The Net Zero Strategy sets out the decarbonisation pathways for industry, transport and buildings, establishing the national commitment to achieve Net Zero by 2050.

These frameworks demonstrate strong thematic alignment, framing digitalisation and sustainability, not as separate goals, but as intertwined components of a singular economic vision.

A number of other national and regional policies were also announced to address the existing and upcoming operational and growth challenges SMEs are facing. Table 1 summarises the national and regional policies reviewed for this report. Appendix 1 (Policy Comparison Table) reviews the policies following the nine themes i.e., Policy level, vision/aim/objectives of the policy, Relevance to Manufacturing SMEs (digitalisation, sustainability, productivity), Key Mechanisms / Instruments (funding, training, regulation, partnerships), Regional Focus (especially West Midlands), Identified Barriers or Gaps, Links to Other Policies, Implications for Your Study (supporting or conflicting evidence) and Gap in policy (related to our study only),

Table 1: Policy documents reviewed

Policy document	Policy Level	Focus
UK Industrial Strategy (DBT, 2025a)	National Strategy	Combined (Digital, Net Zero & Productivity)
Digital and Technologies Sector Plan (DBT and DSIT 2025)	National	Digital
UK Digital Strategy (DCMS, 2022)	National Strategy	Digital
Net Zero Strategy (BEIS & DESNZ, 2021)	National Strategy	Net Zero
West Midlands Growth Plan (WMCA, 2025c)	Regional Plan	Combined (Digital, Net Zero & Productivity)
WM Net Zero Technical Report (WMCA, 2022)	Regional Plan	Net Zero
Made Smarter SME Roadmap (Made Smarter, 2025)	SME-specific	Digital / Industry 4.0
SME Digital Adoption Taskforce (DBT, 2025b)	UK-focused Taskforce Report - SME-specific	Digital
LGA Digital Strategy (Local Government Association, n.d.)	Local/Regional Strategy	Digital (Local Government focus)
Backing your Business, Plan for SME (DBT, 2025c)	National Plan-SME-specific	Combined (Digital, Net Zero & Productivity)

2.2.2 SME-Specific Support Mechanisms

The United Kingdom's SME support framework reflects a coherent policy commitment to improving productivity, reducing regional disparities and enabling the transition to a low-carbon economy. Rather than functioning as a set of discrete initiatives, major programmes such as Made Smarter, Help to Grow: Management and the Business Growth Service (BGS) operate across interlinked domains of capability development, digital readiness and system coordination. Collectively, they seek to address the heterogeneous barriers faced by manufacturing SMEs, ranging from leadership and skills gaps to information failures and fragmented access to support, while contributing to the broader objectives of competitiveness, regional balance and decarbonisation.

Made Smarter programme emerges in response to several deep-rooted drivers that hinder productivity and technological upgrading within UK manufacturing SMEs. It plays a central role in addressing the digital adoption gap by helping manufacturing SMEs access advanced technologies, technical expertise and digital road mapping. Its focus on overcoming information asymmetries and capacity limitations makes it particularly relevant for small and medium manufacturers operating in digitally intensive or high-energy-use subsectors. The programme provides training designed to strengthen managerial capacity for digital transition, further supporting the adoption process. These drivers collectively produce significant consequences, including increased adoption of digital technologies through supported diagnostics, leadership development and grant-funded implementation; improved digital maturity and productivity, evidenced by pilot programmes generating hundreds of technology adoption projects and measurable gains in efficiency, job creation and upskilling; and greater readiness for low-carbon transition as digital tools reduce energy use and streamline production processes (Made Smarter, 2025). Regionally, Made Smarter contributes to economic rebalancing by concentrating support in manufacturing-intensive areas such as the North West, North East and Midlands. However, the programme's delivery implications are significant. National expansion is required to ensure consistency across regions, a process now underway through phased roll-out across England, Scotland, Wales and Northern Ireland (Made Smarter, 2025). Delivery also needs stronger segmentation of SMEs by digital readiness, firm size and energy intensity, as the Made Smarter Innovation evaluation highlights that adoption varies by subsector and business size (SQW, 2025). Furthermore, uptake challenges linked to limited internal skills and low awareness call for deeper outreach and capacity-building efforts, while coordination with regional support ecosystems remains essential for equitable delivery.

Help to Grow: Management addresses persistent leadership and capability constraints that continue to influence SME performance. By providing structured training in strategic management, digital adoption and growth planning, the programme enhances managerial human capital, an area in which micro and small firms often face acute constraints. Early evaluations indicate strengthened managerial confidence, improved digital uptake and better medium-term planning (DBT, 2024a). This suggests that the programme has the potential to generate incremental productivity gains across sectors and regions and to support firms in making more informed long-term investment and transformation decisions.

The Business Growth Service (BGS) focuses on the long-standing fragmentation of the UK's business support landscape. By offering a unified digital entry point to finance, export support, innovation services and skills provision, BGS aims to address information and coordination failures that hinder SMEs' ability to navigate available support. This is particularly significant for firms in regions with historically weaker support infrastructures or lower awareness of national schemes. Through improved accessibility and coherence, BGS strengthens the broader support ecosystem and enhances SMEs' capacity to adopt technologies, pursue innovation and expand their operations.

Taken together, these programmes can be understood through a clear theory of change. Each intervention targets a specific barrier like, skills and leadership deficits through Help to Grow: Management; digital readiness through Made Smarter; and coordination and information failures through BGS, while acknowledging persistent regional disparities that cut across the system. The expected outcomes include improvements in managerial capability, increased adoption of digital and low-carbon technologies, strengthened competitiveness among small and medium manufacturers and a gradual narrowing of regional productivity gaps. To realise these objectives, delivery will require consistent evaluation frameworks across programmes, enhanced sub national delivery capacity, stronger integration of programme objectives to avoid duplication and more explicit tailoring of support to different types of manufacturing SMEs, including variation between micro, small and medium firms as well as those in high-energy-intensive subsectors.

Overall, the UK's SME support programmes collectively form a broadly coherent response to long-standing structural barriers. However, their effectiveness could be strengthened by deeper integration, more consistent evidence collection and clearer differentiation of support for diverse SME segments. A structured, theory of change perspective enables policymakers to connect interventions more explicitly to national priorities and reinforce the alignment between programme design and the UK's ambitions for productivity growth, regional development and the transition to net zero.

2.2.3 Regional and Local Implementation

Policy Ambition and Governance Framework

The translation of national strategy into place-based action is primarily driven by regional governance structures. Nationally, the UK aims to achieve Net Zero by 2050, setting broad ambitions for decarbonisation, digitalisation and productivity growth. Regionally, the West Midlands has adopted a more ambitious trajectory, targeting a 33% emissions reduction by 2026 and achieving Net Zero by 2041. These goals are embedded in the West Midlands Growth Plan, which outlines £4.3bn of planned investment to 2026 and £15.3bn over the following two decades to support decarbonisation and economic resilience (WMCA, 2022; Invest West Midlands, 2022).

Governance reforms further strengthen policy alignment. The West Midlands Trailblazer Devolution Deal positions the WMCA to integrate skills, business support and Net Zero programmes under a single strategic framework. Annual Delivery Plans and the State of the Region reports reinforce accountability by setting out the region's policy ambitions and monitoring progress (WMCA, 2023; 2024).

Intended SME Journey and Delivery Mechanisms

At the delivery level, regional hubs and coordinated triage models aim to create a clearer SME journey, reducing duplication and improving warm referrals across skills, innovation and decarbonisation support offers. However, varying resources and organisational capacity among local authorities continue to produce fragmented experiences for SMEs, particularly in underserved boroughs.

National initiatives also shape the expected SME journey. The UK Industrial Strategy positions digitalisation, robotics, cloud systems, industrial internet technologies and digital twins as a core mechanism for improving productivity in manufacturing SMEs (DBT, 2025a). Programmes such as Made Smarter provide structured interventions, including leadership training, digital road mapping and adoption support, with the intention of offering SMEs a coherent pathway from diagnostic to implementation.

Evidence on Reach, Outputs and Outcomes

Evidence on reach indicates substantial engagement. In the West Midlands, the £1.9m digital adoption programme under Made Smarter has supported hundreds of manufacturing and engineering firms. National level evaluation reports find improvements in productivity and competitiveness among adopters, though outcomes remain uneven and point to the need for stronger post adoption support and more consistent metrics (Made Smarter, 2025A).

In the Net Zero space, local delivery outputs include programmes supporting transport electrification, building retrofits and industrial energy efficiency. However, national policy documents including the Net Zero Strategy (2021) and the WM Net Zero Technical Report (2022) highlight persistent structural barriers such as limited grid capacity, lack of long term SME-focused decarbonisation pathways and inconsistent policy signals, all of which constrain measurable outcomes for SMEs.

Innovation Programmes and Pilot Outcomes

The WMCA reports that the Innovation Accelerator and Made Smarter extensions have generated outputs of 5,000 jobs upskilled and £70m leveraged to support high growth clusters (WMCA, 2025a). These figures demonstrate reach and early impacts but do not yet provide evidence of longer-term outcomes such as productivity improvements, firm level digital maturity, or sustained decarbonisation performance. Clearer and more transparent monitoring frameworks are required to differentiate short term pilot achievements from system level impact.

Local Growth Ecosystem and Policy Alignment Challenges

Governance of local business support shifted in 2024 with the transfer of Local Enterprise Partnership (LEP) functions to local and combined authorities. While this may streamline the ecosystem, the transition brings risks of uneven delivery capacity and strategic misalignment between local and national systems. Ensuring consistent standards, interoperable data systems and alignment with national bodies such as Innovate UK, the British Business Bank and UK Export Finance is essential to secure equitable SME access and achieve intended outcomes (ICAEW, 2024).

2.2.4 Evaluating Regional Policy: Accessibility, Relevance and Effectiveness

Accessibility

Recent progress includes efforts to streamline business support through single-entry platforms such as the Business Growth Service and the rebranded business.gov.uk, alongside digital enhancements like GOV.UK One Login and the UKEF online insurance portal. Financial accessibility has also improved, with British Business Bank guarantees extending beyond London and the South-East (DBT, 2024a & 25b; British Business Bank, 2025). However, significant challenges remain. Public sector websites continue to face accessibility issues and SME engagement with advisory support is low, with only 26% seeking external advice in 2023. Additionally, administrative complexity in grant and loan applications, coupled with fragmented local delivery, persists as a barrier to efficient support (UK Government, 2024 a & b).

Low uptake indicates that the challenge spans both access and engagement barriers, requiring policy levers that address each dimension in a coordinated and integrated way. On the access side, improvements require simplifying and consolidating the current support landscape. Measures such as one-stop digital portals, single sign-on systems, clearer and more consistent eligibility criteria and reduced administrative requirements can significantly lower the procedural burden on SMEs. Streamlined forms, standardised processes and stronger coordination between national, regional and local delivery bodies would further enhance navigability and reduce friction at the point of access. Comparable approaches have proven effective elsewhere: for instance, single-gateway support models used by small-business ecosystems in countries such as Singapore and Denmark demonstrate that integrated platforms and simplified eligibility pathways can increase SME uptake and shorten application times.

However, access improvements alone are insufficient without addressing persistent engagement constraints. SMEs often lack the time, confidence or perceived value to proactively seek support, meaning delivery models must shift toward more active outreach. Targeted communications, the use of SME account managers, sector-specific engagement strategies and behavioural insights can help increase participation. Consolidated branding can strengthen visibility and reduce confusion, while “push” mechanisms, such as automated notifications, eligibility prompts and integration with existing business systems like tax or self-assessment platforms, lower the effort required to engage. Demonstrating tangible value through clear evidence of impact, success stories and peer recommendations can further build trust and motivate SMEs to take up available support. Evidence from established support programmes, such as proactive adviser models used in regional growth hubs in parts of the UK, or nudging techniques used by government innovation agencies in several OECD countries, shows that outreach-driven approaches and automated prompts substantially improve participation. Similarly, showcasing clear value through impact case studies, peer-to-peer endorsements and return-on-investment evidence helps build trust, reinforcing the likelihood that SMEs will take up available support.

Relevance

There is strong alignment between finance, export support, leadership skills and digital adoption as key drivers of productivity in manufacturing regions such as the West Midlands (DBT, 2024b; British Business Bank, 2025). However, progress towards Net Zero remains partial. SMEs continue to face significant barriers, including time and capacity constraints, unclear regulatory timelines and gaps in access to finance. Research from the finance industry recommends targeted interventions such as sector-specific guidance and the establishment of local taskforces to accelerate adoption and address these challenges (UK Finance, 2024).

Effectiveness

Leadership Development: The Help to Grow: Management programme has delivered positive outcomes, with strong reported improvements and high satisfaction among participants. However, time pressures remain a leading cause of dropout, indicating the need for more flexible cohort structures and tailored pathways for micro businesses to ensure wider accessibility and completion.

Digitalisation and Innovation: The Made Smarter initiative continues to show promise in supporting SME digital adoption, but national evaluations highlight the need for improved impact measurement and scalable post-adoption support. Innovate UK funding is strongly correlated with firm growth; however, accessibility challenges persist due to broad funding calls, limiting uptake among smaller firms (Cowling, et, al., 2024; Myriad Associates, 2025).

Finance and Export Support: The Growth Guarantee Scheme (GGS) has delivered substantial regional lending, strengthening SME access to finance. Similarly, UK Export Finance (UKEF) achieved record levels of support and SME engagement, particularly when integrated with local advisory services, demonstrating the effectiveness of combined financial and advisory channels (British Business Bank, 2025; UK Export Finance, 2025).

Net Zero Policy Certainty: Uncertainty surrounding Net Zero policy, driven by legal rulings requiring revisions, continues to undermine SMEs' ability to plan capital investments and timelines. Greater clarity and stability in regulatory frameworks are essential to enable businesses to make informed decisions and invest confidently in sustainability measures (House of Commons Library, 2024).

2.3 Conclusion

Since 2021, UK policy has shifted from fragmented, programme-led initiatives (e.g., Net Zero Strategy, Digital Strategy, Innovate UK funding streams) towards greater consolidation and accessibility. Key developments include the creation of the Business Growth Service and business.gov.uk, stronger financial backstops through the Growth Guarantee Scheme and targeted capability programmes such as Help to Grow: Management and Made Smarter Adoption. Public service accessibility has improved via One Login and enhanced monitoring, while export and finance channels have expanded through UKEF SME products and British Business Bank guarantees.

Despite these advances, SMEs continue to face fragmented delivery, administrative friction and uneven local capacity. Evidence of impact is mixed: leadership programmes show positive behavioural change; adoption programmes demonstrate productivity potential but limited reach; Net Zero policy clarity remains contested; and Innovate UK’s broad instruments support firm-level growth but suffer from low success rates and scheme pauses, creating uncertainty.

Section 3: Stakeholders and Manufacturing SMEs' Consultation

Stakeholders' and manufacturing SMEs' consultation was carried out through semi-structured interviews and focus groups.

Semi-Structured Interviews: Twelve SME leaders from diverse manufacturing sub-sectors were interviewed to examine barriers to adopting digital and sustainable practices and to assess the perceived effectiveness of government support to adoption. Participants were recruited through purposive sampling and interview transcripts were analysed using thematic coding to identify shared patterns in barriers, adoption behaviours and views on policy effectiveness.

Table 2: Interview participants by role and subsector

Name	Role	Subsector
Participant 1	CEO	Mechanical engineering
Participant 2	Financial Manager	Construction
Participant 3	Technical Manager	Boiler engineering
Participant 4	Managing Director	Extruder manufacturer
Participant 5	Commercial Director	Manufacturing supplier
Participant 6	Managing Director	Metal finisher/polishing
Participant 7	Managing Director	Steel manufacturer
Participant 8	Site General Manager	Food processing
Participant 9	Product Development Engineer	Steel manufacturer
Participant 10	General Manager	Industrial automation supplier
Participant 11	Managing Director & Co-Founder	Bio-degradable plastic alternative manufacturer
Participant 12	Chairman and CEO	Plumbing and building material and construction

Focus Groups: Three focus groups and one additional interview were conducted with public-sector policymakers and regional innovation and industry intermediaries to examine policy effectiveness, SME challenges and potential strategies for improvement. Participants were drawn from organisations including the West Midlands Combined Authority, local councils, university-based research and knowledge-exchange centres and regional support bodies.

Each focus group was guided by a semi-structured discussion schedule designed to ensure consistency while allowing participants to elaborate on issues most relevant to their experience. The guide comprised four thematic sections: barriers to SME adoption of digital and sustainable practices; the effectiveness of existing policy and support schemes; the contribution of digitalisation and Net Zero adoption to regional growth; and the role of collaboration among regional authorities, councils, industry bodies and large firms in supporting the 'triple transition'. Each section included a core question and targeted probes to distinguish short- and long-term challenges, assess policy design and delivery and identify sectoral and regional priorities. The sessions concluded with an open reflection, during which key points were summarised to participants and a final prioritisation question was posed to elicit a clear recommendation for immediate policy action.

Table 3: Focus group participants by role and type of organisation

No.	Focus Group	Position	Type of Organisation
1	1	Senior Research Associate	Regional research / knowledge-exchange forum
2	1	Delivery Manager Cluster Leadership	Public sector regional governance body
3	1	Economic Development Manager	Local government department/unit within a borough council
4	1	Director of SME Engagement	University department / academic-industry collaboration group focused on SMEs
5	1	Technology Manager	Membership/trade-association / cluster organisation (non-profit limited company) supporting firms in the Midlands.
6	1	Technology Manager	Membership/trade-association / cluster organisation (non-profit limited company) supporting firms in the Midlands.
7	2	Business Development Manager	Local government authority (city council) a public sector body.
8	2	CEO	Private/industry membership & network organisation.
9	3	Energy Research Analyst and Partnership Co Ordinator	Public sector regional governance body
10	3	Senior council officer in economic development	Local government programme or unit focussed on business growth (within the council).
11	3	Senior Delivery Manager - Plan for Growth	Public sector regional governance body (a combined authority of local councils)
12	3	Policy Manager	Public sector regional governance body (a combined authority of local councils)
13	INT	Adoption Director	Public–Private Partnership / Innovation Delivery Company

During the focus group discussion, detailed notes were taken. The data from the focus group and one interview were analysed using NVivo qualitative analysis software. An initial coding framework was developed deductively from the research questions and discussion guide and refined inductively as themes emerged from the data. Transcripts and notes were coded thematically to identify recurring patterns and key issues, enabling the analysis to foreground salient themes relevant to the research objectives.

The following section presents evidence from the primary data, including stakeholder focus groups and interviews with manufacturing SME leaders. It is divided into two parts: first, barriers and drivers shaping manufacturing SMEs' adoption of digitalisation and Net Zero practices; and second, the role of SME adoption of digital and sustainable practices in regional economic growth in the West Midlands.

3.1 Barriers and Motivations in Manufacturing SMEs' Adoption of Digitalisation and Net Zero Practices

This section addresses RO1 through focus groups with regional stakeholders and interviews with manufacturing SME leaders.

3.1.1 Motivations for Adoption of Digitalisation and Net Zero

Interviews:

SME manufacturing leaders described a range of motivations for adopting digitalisation and Net Zero practices, shaped by both internal and external influences. Participants emphasised that a central motivation was the desire to improve operational efficiency and productivity. They explained that more efficient systems enable higher levels of output, making productivity gains a key driver of digital adoption within their businesses.

Participants are aware of the Net Zero target for 2050 and the regional target for 2041 and have reviewed their operations to identify suitable, efficient practices to adopt. They are aware that saving on energy will impact their bottom line in the long run. From reducing energy use to switching to electric vehicles (EVs) or installing solar panels, participants shared the Net Zero practices they have implemented in their businesses. They understand the implications of energy saving for lowering their carbon emissions and reducing their energy costs in the long run.

External influences that motivated participants to implement digitalisation and adopt Net Zero practices came from government initiatives, their suppliers and their clients. Some participants revealed that the government's policies around digitalisation and Net Zero are clear and they are willing to implement them if they are feasible for them. To align with their suppliers' market trends, participants reported they also had to implement similar digital tools to ensure continuous partnership and seamless operations. The influence of clients motivated some of our participants in both digitalisation and Net Zero adoption. Regarding Net Zero, they revealed that key clients were interested in reducing carbon emissions; therefore, they had to consider how to adopt energy-efficient practices and evidence their carbon emissions reduction in their production and delivery of their services. Secondly, participants stated that to acquire new clients, they need to implement tools similar to those used by potential clients in the industry. These motivations expressed by SME manufacturing leaders were broadly consistent with views shared by regional stakeholders in the focus groups.

Focus groups:

Focus group stakeholders emphasised that adoption motivations were often driven by external commercial pressures rather than environmental commitments. Energy cost reduction was described as a primary driver, alongside increasing supply-chain requirements from Original Equipment Manufacturers (OEM)[5] and international buyers. In particular, stakeholders noted that SMEs supplying EU markets are under growing pressure to measure and reduce emissions in anticipation of carbon border adjustment mechanisms (CBAM)[6], framing Net Zero engagement as necessary for maintaining export access and supply-chain participation rather than as a voluntary sustainability choice.

Focus group stakeholders further reflected that initial interest in sustainability among businesses was driven largely by rising energy costs linked to the war in Ukraine, which encouraged a focus on energy efficiency. However, they noted that this momentum weakened as energy prices fell. Stakeholders also highlighted that sustainability efforts were often

[5] Large manufacturing firms that produce final products So, when SMEs talk about OEM pressure, they mean: OEMs are asking their suppliers to reduce carbon emissions, digitise production or report sustainability data. If SMEs don't comply, they risk losing contracts or being excluded from the supply chain.

[6] CBAM is a new EU carbon pricing system that applies to imports of carbon-intensive goods (steel, cement, aluminium, fertilisers, electricity, hydrogen, etc.). From 2026, exporters to the EU will need to report and pay for the carbon embedded in their products unless the UK introduces an equivalent domestic carbon pricing scheme. For manufacturing SMEs that export to the EU, this becomes highly relevant.

motivated by personal values, ethical considerations and the role of sustainability in employee engagement and recruitment. At the same time, they suggested that progress slowed after early adopters, as anticipated legislative support did not materialise quickly enough to sustain wider uptake. In contrast, stakeholders observed that digitalisation was easier for firms to justify than sustainability, as digital technologies were perceived to be more accessible and associated with clearer short-term benefits.

Figure 16 contrasts the motivations for digitalisation and Net Zero adoption identified through SME interviews and stakeholder focus groups. It shows that SME decisions are primarily driven by internal operational considerations, particularly productivity and cost efficiency, while stakeholder perspectives emphasise external commercial pressures, such as supply-chain requirements and market access. The figure also highlights differences in how energy costs and policy signals are interpreted, with SMEs focusing on long-term savings and stakeholders responding more strongly to short-term price volatility and buyer requirements. Overall, the figure illustrates that adoption is shaped less by voluntary environmental commitment and more by commercial and market-based incentives.

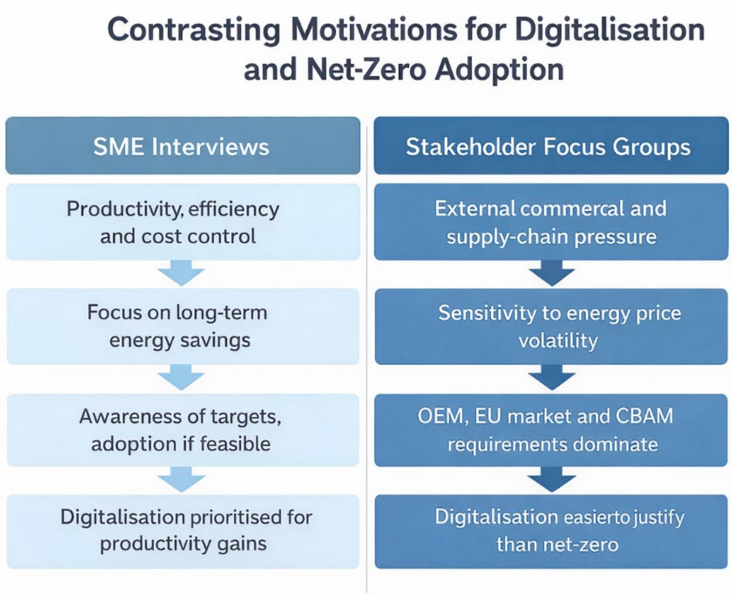

Figure 16: Contrasting motivations for digitalisation and Net Zero adoption among manufacturing SMEs.

3.1.2 External Barriers to Digitalisation and Net Zero Adoption

Focus groups and SME interviews identified external barriers to digital and Net Zero adoption operating at two levels: structural and place-based constraints that shape feasibility and policy design and delivery factors that influence whether SMEs engage with available support.

A. Structural and place-based constraints

a) Firm Level Structural Constraints: Focus group participants highlighted that the industrial structure of the West Midlands manufacturing base shapes how SMEs engage with digitalisation and Net Zero adoption. Many firms, particularly in the Black Country, operate as small, owner-managed suppliers within supply chains rather than as OEMs, limiting their strategic control over procurement, technology choice and sustainability requirements. This structure constrains firms' ability to drive adoption independently, even where motivation exists. This supplier position creates a direct adoption bottleneck: firms cannot independently choose to invest in digital technologies or sustainability measures because these decisions are controlled by their larger customers or OEMs, meaning that adoption depends on external requirements rather than internal business strategy.

Stakeholders also emphasised the role of the region's physical and property infrastructure. Older industrial buildings and legacy factory stock increase the cost and complexity of retrofitting for both digital infrastructure and energy efficiency. This infrastructure legacy translates into higher upfront investment requirements and longer payback periods, making adoption financially unfeasible for many manufacturing SMEs operating on tight margins. These challenges are intensified by property ownership arrangements: many SMEs operate from rented premises and lack the authority to install measures, such as solar panels or insulation. In one case discussed, an SME that installed solar panels on a rented site subsequently faced a rent increase, discouraging further investment. This example illustrates how landlord–tenant relationships can actively disincentivise adoption, even when firms are willing to invest. More broadly, this property constraint creates a feasibility barrier: SMEs in rented premises cannot undertake building-level energy efficiency measures or install renewable generation, eliminating entire categories of Net Zero options regardless of available funding or business motivation. Stakeholders further indicated that many manufacturing SMEs in the West Midlands have limited control over key business decisions. Supplier and procurement choices are often made by headquarters located elsewhere, based on cost or technical criteria rather than local considerations. As a result, materials and services are sourced from outside the region, leading to leakage of expenditure from the local economy. Although products may ultimately be exported, this activity often occurs through facilities outside the West Midlands, limiting the extent to which local production generates regional economic value and constraining SMEs' ability to influence digital and Net Zero decisions.

b) Infrastructure constraints: slow smart meter rollout and energy system barriers: Stakeholders identified energy infrastructure as a constraint on digital-enabled Net Zero adoption. The slow rollout of smart and advanced meters was described as limiting firms' ability to monitor and manage energy consumption effectively. Without real-time energy data, SMEs cannot identify efficiency opportunities, quantify savings from digital investments or participate in demand-flexibility programmes, limiting both the business case for adoption and access to related support schemes.

In addition, participants emphasised that relative energy prices constitute a further infrastructural constraint. Persistently high electricity prices compared to gas reduce incentives for firms to electrify heat-intensive processes and space heating (heating of buildings and workspaces), even where lower-emission technologies are available. Weak and inconsistently applied energy-performance regulations, including exemptions for continued gas use, further reduce the commercial case for adoption, reinforcing system-level barriers to decarbonisation. Together, these energy system constraints create fundamental payback uncertainty: firms face higher costs to electrify processes whilst lacking the infrastructure to measure potential savings, meaning that even where government funding is available for low-carbon heat technologies, the commercial viability remains unclear.

c) Labour cost pressures and firm exit: Focus group participants also highlighted rising labour costs as an external barrier affecting manufacturing SMEs. One stakeholder reported that four member firms shut down operations in January following increases in National Insurance contributions. These closures were described as decisions taken by owner-managers approaching retirement age, who concluded that rising labour costs had rendered their businesses unprofitable. Participants emphasised that such exits result in the permanent loss of jobs, productive capacity and manufacturing assets and suggested that similar closures may become more common as cost pressures intensify. These dynamics further reduce the number of firms able to engage with digitalisation and Net Zero adoption, meaning that support programmes reach fewer businesses even as investment increases and regional manufacturing capacity shrinks before transition can take place.

d) Geography-shaped constraints: Focus group participants emphasised that the West Midlands' inland geography limits access to nationally prioritised Net Zero opportunities, such as offshore wind, shaping the regional energy mix and reducing the relevance of some government strategies. The region's clean power strategy for 2030 highlights these issues, emphasising the need for businesses to adapt their models by collaborating with neighbouring firms to share resources, such as heat and to switch to less carbon-intensive alternatives. However, many local businesses, especially small owner-managed ones in the Black Country, struggle with the time and resources required for such innovations and may not see immediate financial benefits from collaborative or transformative approaches, limiting uptake in practice, leaving firms with limited viable adoption routes even where policy support exists.

B. Policy Design, Delivery and Support-System Constraints

a) Institutional barriers - uneven access to support: Stakeholders consistently described access to digital and Net Zero support as uneven across the West Midlands, characterising it as a "postcode lottery" shaped by firms' location within or outside combined authority boundaries. SMEs were reported to struggle to identify relevant programmes, understand eligibility criteria and navigate fragmented delivery systems. This complexity means that firms invest significant time in searching for appropriate support rather than implementing changes and many disengage before accessing assistance, even when suitable programmes exist.

Stakeholders highlighted that many schemes are targeted at specific types of businesses, such as those in particular supply chains, high-growth firms or startups and are therefore not open to everyone. Eligibility thresholds, such as minimum energy-use requirements for audits and grants, were also described as limiting access, especially for smaller firms. This means that smaller firms are excluded from programmes, whilst support concentrates on high-growth firms and specific supply chains, creating a mismatch between programme design and the broader manufacturing SME population.

In addition, stakeholders noted that some government-endorsed programmes do not cover all needs or have sufficient capacity, meaning that many firms that could benefit from digitalisation or decarbonisation are unable to access support or are unaware of it. This view was echoed by SME manufacturing leaders, who reported limited awareness of government initiatives and difficulties accessing relevant information in the West Midlands. SME interviewees also described the local ecosystem for awareness-raising and information-sharing on sustainability as fragmented, noting that available support is not always clearly communicated or easily usable for SMEs.

b) Regional support capacity: Stakeholders described the region as relatively well organised in terms of business support compared with other parts of the UK. They referred to a region-wide business support service, Business Growth West Midlands, which operates across the Combined Authority area and is delivered locally to a regional specification, alongside a range of local and regional programmes. Participants noted that few programmes are explicitly labelled as digitalisation or sustainability, reflecting what businesses are perceived to ask for, although advisors can provide support where businesses raise sustainability issues. In contrast, stakeholders described significant limitations in providing equivalent support for digitalisation, noting that it is not feasible to have experts who can advise all businesses given the wide range of digital products and industry contexts. This expertise gap means that firms seeking digitalisation support cannot access specialist guidance matched to their specific manufacturing context, limiting their ability to identify appropriate technologies.

Engagement and take-up were also described as weak, with SMEs unlikely to engage without sustained outreach. Both stakeholders and SME interviewees emphasised that firms struggle to engage directly with technology suppliers and therefore require trusted, independent intermediaries - ‘knowledgeable individuals or teams’ - who can guide them in understanding digital and sustainability options and support informed decision-making. Limited access to such guidance was identified as a key constraint on uptake. Without trusted intermediaries, SMEs either disengage from adoption decisions entirely or make uninformed technology/sustainability choices that fail to deliver expected benefits, reinforcing risk aversion and reluctance to invest further.

c) Misaligned programme messaging: Stakeholders reported that early digital and Net Zero programmes were framed too narrowly around carbon reduction, rather than around issues SMEs priorities, such as cost savings, efficiency and profitability. As a result, many firms disengaged from programmes when the commercial value of participation was unclear, with participants noting that businesses 'voted with their feet' when they could not see clear commercial benefits. This messaging misalignment created an engagement barrier: programmes designed to support adoption failed to attract participants because environmental objectives were not clearly linked to business performance.

Participants noted improved engagement when sustainability was reframed around productivity improvements, reduced energy use and waste reduction. However, SME interviewees also highlighted that limited sharing of local examples of successful adoption constrains peer learning and replication across the region. Without visible regional examples, SMEs cannot assess whether adoption is feasible in their own context, reinforcing caution and delaying investment decisions.

d) Regional Net Zero ambiguity: Stakeholders highlighted significant ambiguity around how regional Net Zero targets relate to national objectives, for example, how city-region targets such as Net Zero by 2041 align with the national 2050 target and what actions are expected from individual businesses. This uncertainty was described as making it unclear whether firms need to take immediate action or can delay engagement. Conflicting guidance from different levels of government was described as creating uncertainty around timing, costs and responsibilities, leading some manufacturing firms to delay engagement. In addition, the term "net zero" itself was described as inherently confusing when applied at the business level, as firms can continue to use energy and generate emissions while still being compatible with national net-zero targets. Participants suggested that this conceptual ambiguity becomes more pronounced as national targets are translated to smaller economic units, making it difficult for individual businesses to understand their role and contribution.

This uncertainty was echoed in SME interviews, where manufacturing leaders expressed a lack of clarity about what sustainable practices mean for their business and what actions they can take. They further highlighted that perceptions of net-zero are mixed, with some viewing it as beneficial in the long term while others see it primarily as an added cost.

e) Funding and support system issues: Focus group participants and SME interviewees identified funding and support systems as a major external constraint on digital and Net Zero adoption, shaped by a set of interrelated mechanisms. Application processes were widely described as administratively burdensome, time-intensive and poorly aligned with manufacturing realities, particularly where productivity improvements do not translate into job creation. Competitive funding was seen as risky, requiring substantial effort without assurance of success, which discouraged engagement among firms with limited time and overheads. SMEs also reported difficulties with writing-intensive applications and policy or technical jargon, while requirements to use government-approved contractors were described as significantly increasing costs and reducing the effective value of grants.

Although stakeholders acknowledged the need for due diligence to protect public funds, concerns were raised about proportionality, particularly where small grants were subject to oversight requirements, similar to much larger awards. These application barriers create a self-selection effect: the firms most able to navigate complex processes are often those with existing administrative capacity, whilst smaller manufacturers who might benefit most from support are systematically discouraged from applying.

Beyond application processes, participants highlighted weak commercial alignment and limited affordability as key barriers. SMEs emphasised the high upfront costs of assessments and implementation, alongside uncertainty over whether investments would deliver meaningful savings in a context of persistently high energy prices. This payback uncertainty means that even when grants cover partial costs, firms cannot justify the remaining investment or operational risk, creating an affordability barrier that funding alone cannot resolve. While grants were seen as useful in the short term, over-reliance on grant funding was described as weakening long-term business sustainability, as adoption is ultimately driven by market demand, sales and profitability.

Stakeholders further identified fragmentation, short funding cycles and lack of programme continuity as limiting sustained impact. Following the end of European Regional Development Fund (ERDF) funding, support was described as increasingly divided into smaller, short-term projects delivered by multiple organisations, constraining learning, scale and follow-on support. Across both focus groups and interviews, these factors shaped perceptions of public funding as slow, complex and risky, leading many firms to disengage or delay participation despite the availability of support. Together, these features of funding design shape how SMEs assess risk, affordability and feasibility, often discouraging engagement even where support exists.

C. Binding Constraints and Structural-Policy Interactions

The evidence reveals that several constraints are particularly binding for West Midlands manufacturing SMEs. Supplier position within supply chains (Section 3.1.2A) removes strategic control over technology decisions, whilst property tenure arrangements prevent building-level investments regardless of available funding. These structural barriers interact directly with policy constraints: fragmented information systems and unclear eligibility criteria (Section 3.1.2B) mean that firms cannot identify support that might address the limited decision-making authority they face, whilst funding programmes offering building-level grants remain inaccessible to the many SMEs operating from rented premises. Energy system constraints, particularly the slow smart meter rollout and electricity-gas price differentials, create fundamental payback uncertainty that persists even where grants reduce upfront costs. This uncertainty is compounded by administratively burdensome application processes that discourage engagement, creating a self-selection effect where the smallest firms, already constrained by limited resources, are systematically excluded from support. Programme fragmentation and short funding cycles further limit effectiveness: structural barriers such as ageing infrastructure or supply chain dependencies require sustained, coordinated intervention, yet support is increasingly divided into short-term projects that cannot address these deep-seated challenges. Together, these binding constraints create a situation where motivated SMEs face adoption barriers that policy support, as currently designed and delivered, cannot adequately resolve.

3.1.3 Internal Barriers to Digitalisation and Net Zero Adoption

While SMEs expressed clear motivations to improve efficiency and reduce costs, stakeholders and interviewees highlighted a set of internal barriers that often prevent these motivations from translating into adoption.

a) Behavioural and risk-perception barriers: Focus group participants and SME interviewees highlighted behavioural barriers to digital and Net Zero adoption, rooted in strong self-reliance and risk aversion. SMEs were described as reluctant to engage with external support or technology initiatives unless the benefits were immediate and clearly articulated. Many firms prioritised existing practices and relied on their own judgement, which supports business survival but also increases hesitation towards unfamiliar technologies or services.

Across the data, SMEs were consistently described as highly risk-averse when considering digital and Net Zero investments, placing greater weight on potential losses than on uncertain or longer-term gains. This risk aversion was shaped by uncertainty over returns and reinforced by previous investments that failed to deliver expected benefits. As a result, firms tended to delay or avoid decisions involving high upfront costs or steep learning curves.

b) Workforce, skills, leadership and operational readiness constraints: Focus group participants and SME interviewees highlighted internal capacity constraints related to workforce composition, skills availability, leadership capability and operational readiness.

Stakeholders noted that many manufacturing SMEs in the West Midlands, particularly in the Black Country, have owner-managers and workforces that are predominantly aged 50 and over. This age profile was associated with lower familiarity with digital technologies and greater scepticism towards change. While younger workers were perceived as more digitally confident and open to new technologies, participants emphasised that weak apprenticeship pipelines, limited graduate entry and high recruitment costs constrain firms' ability to address skills gaps through workforce renewal. Leadership succession was also identified as a significant constraint, with concerns that the next generation may lack the experience or capacity to drive transformation.

Skills shortages were consistently identified as a key internal barrier to digital and Net Zero adoption. Stakeholders reported that many manufacturing SMEs struggle to find and retain staff with the technical expertise required to assess, implement and manage new technologies, particularly in a competitive labour market. Small firms were described as lacking in-house digital and sustainability expertise, limiting their ability to engage confidently with technology adoption or process change, even where potential productivity benefits were recognised.

Participants also described a deeper industrial cultural dimension shaping resistance to Net Zero adoption. In heavy manufacturing contexts, particularly in the Black Country, stakeholders referred to a strong industrial identity rooted in traditional processes involving heat, combustion and visible production. This identity was described as making it difficult for some firms to conceive of electrification or alternative fuels as legitimate industrial practices, constraining adoption beyond purely technical or economic considerations.

Participants also emphasised limited time, low margins and immature core processes as key barriers to operational readiness. For many fabrication and metalworking firms producing small batches or customised outputs, digitalisation was not perceived as immediately relevant, particularly where underlying workflow organisation and waste reduction had not yet been addressed. Similarly, Net Zero measures requiring changes to business models, such as shared heat systems or new supplier relationships, were described as time-intensive, risky and difficult to prioritise, given constrained resources. Together, these factors restrict firms' capacity to engage with digital and Net Zero adoption, even where potential benefits are recognised.

c) Competing internal pressures and weak commercial drivers: Focus group participants emphasised that manufacturing SMEs operate under multiple, simultaneous pressures, including rising input costs, skills shortages, productivity demands, competitive pressures and uncertain demand, which shape how firms prioritise investment decisions. These challenges were described as dominating managerial attention and resources, leaving limited capacity for longer-term transformation activities. In this context, digitalisation and decarbonisation were often treated as secondary priorities relative to immediate business survival.

Stakeholders noted that SMEs respond primarily to firm-level commercial incentives and are unlikely to engage where benefits are uncertain or long-term. Sustainability measures were frequently described as lacking a clear and immediate business case, while digitalisation was seen as easier to justify due to more visible productivity and efficiency gains. In the absence of strong regulatory requirements or demonstrable financial payback, many firms reported to continue operating as they are, reinforcing delayed or partial adoption.

d) Understanding and terminology barriers: Stakeholders identified limited understanding and problematic terminology as further internal barriers to engagement. Digitalisation was generally described as more familiar to SMEs than sustainability, with clearer drivers and more tangible benefits. By contrast, sustainability-related concepts were often poorly understood and therefore less likely to be prioritised, particularly among smaller firms and in areas such as the Black Country, where awareness was described as limited rather than actively resistant and often focused on visible measures such as solar panels.

Participants also reported that SMEs frequently feel overwhelmed when engaging with technology providers, who were described as using technical language and jargon that firms struggle to interpret. This was said to generate mistrust and reluctance to engage, particularly where SMEs lacked the time or knowledge to assess competing digital options. In addition, many firms were described as lacking foundational systems, such as ERP, or sufficient process maturity to benefit from advanced digital tools. As a result, programmes positioned at more advanced stages of adoption were sometimes perceived as inaccessible, limiting effective engagement and uptake.

3.1.4 Connections Between Internal and External Barriers

Several internal barriers identified above are directly shaped by and interact with, the external policy and support constraints described in Section 3.1.2. Limited understanding of sustainability concepts and digital options (Section 3.1.3d) is compounded by fragmented information systems and misaligned messaging (Section 3.1.2B(a) and (c)), meaning that even where advisory support exists, firms cannot access or interpret it effectively. Risk aversion shaped by uncertainty over returns (Section 3.1.3a) is reinforced by weak commercial alignment and payback uncertainty in funding programmes (Section 3.1.2B(e)), as firms cannot assess whether investments will deliver benefits in the context of high energy prices and unclear programme outcomes. Skills shortages and lack of in-house expertise (Section 3.1.3b) interact with limited access to trusted intermediaries and specialist manufacturing knowledge within support programmes (Section 3.1.2B(b)), leaving firms unable to assess technology options or engage confidently with suppliers. Finally, limited time and competing business pressures (Section 3.1.3c) are exacerbated by administratively burdensome application processes and short funding cycles (Section 3.1.2B(e)), which demand resources that resource-constrained firms cannot spare. Together, these interactions demonstrate that internal and external barriers are mutually reinforcing, rather than independent constraints.

Figure 16 illustrates the mutually reinforcing nature of barriers to digital and Net Zero adoption build up among West Midlands manufacturing SMEs, as discussed above. Place-based structural conditions, such as energy costs, infrastructure and industrial legacy, shape the external systems firms operate within. These external system barriers include uneven access to support, fragmented funding, limited advisory capacity and unclear or poorly aligned Net Zero messaging. Together, these factors influence internal firm barriers, such as risk aversion, skills and workforce constraints, limited leadership and operational capacity, weak commercial incentives and difficulties understanding sustainability-related concepts. Adoption outcomes reflect the combined effect of these layers, rather than a lack of willingness among SMEs to adopt.

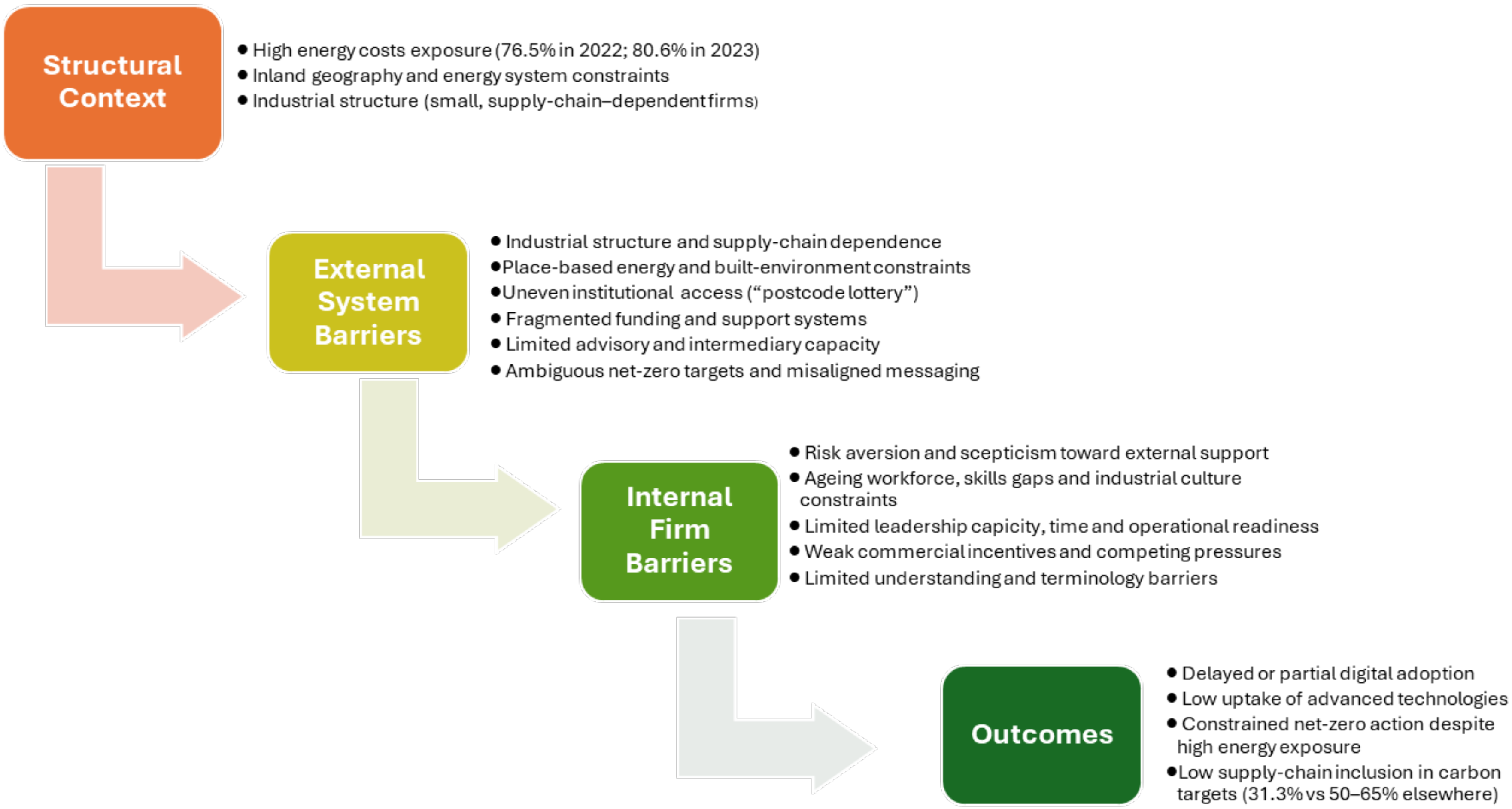

Figure 17: Integrated Evidence Framework of Barriers to Digital and Net Zero Adoption among West Midlands Manufacturing SME

3.2 SME Adoption and Regional Economic Growth

This section addresses the second research objective (RO2) through focus groups with regional stakeholders. It examines how SME adoption of digital and sustainable practices is perceived to influence regional economic growth in the West Midlands, with particular attention paid to productivity, employment outcomes and supply chain resilience.

3.2.1 Commercial Rationales for Digital and Net Zero Adoption

Focus group participants frame both digitalisation and net-zero adoption as relevant to SMEs primarily when they support productivity and competitiveness. Adoption was discussed as a means of improving business performance rather than as an end in itself.

The data highlight persistent productivity gaps, particularly among mid-sized firms, which participants identify as a constraint on regional economic performance. Digitalisation is presented as a mechanism to address these gaps through more efficient processes and improved use of resources, with sustainability and productivity discussed as closely related rather than separate agendas. Participants describe productivity improvement as the primary route through which firms are able to stabilise operations, expand activity and pursue growth, rather than growth being driven directly by employment expansion.

However, productivity gains were not assumed to translate automatically into employment growth. The data suggest that positive employment outcomes occur primarily when digital technologies complement rather than replace labour and where firms invest in workforce upskilling. Participants emphasise that this sequencing (productivity first, employment second) is central to maintaining competitiveness in the current economic context.

Net Zero initiatives, by contrast, were perceived as facing greater political and cost-related constraints. While digitalisation was discussed through immediate and observable business examples, Net Zero adoption was framed as more uncertain and sensitive to external policy and funding conditions.

3.2.2 Firm-level Economic Mechanisms: Cost reduction, Productivity and Value Creation

Focus group participants described the economic contribution of digital and Net Zero adoption primarily through firm-level mechanisms of cost reduction and value creation. Adoption was discussed in terms of reducing energy, processing and labour costs, alongside enabling innovation and new ways of operating. These mechanisms were explicitly linked to improved competitiveness and increased output, with adoption viewed as economically meaningful only when it delivered tangible operational benefits.Participants linked productivity gains to firms' ability to innovate, diversify and take on larger contracts, such as expanding from automotive into aerospace. Productivity improvement was viewed as the primary route to firm growth, with employment treated as a secondary and flexible outcome that follows where required. Supporting firms to manage overheads, invest in machinery and adopt innovation was seen as strengthening long-term sustainability and competitiveness rather than delivering immediate job creation. Employment growth was more likely to occur in sales or business functions as output expanded with workforce expansion and skills development following where required.

At the same time, stakeholders expressed uncertainty regarding causality. They questioned whether digital and net-zero adoption leads to higher productivity or whether already productive and competitively oriented firms are simply more likely to adopt. This raised concerns about the extent to which encouraging adoption among laggard firms would necessarily generate meaningful productivity improvements, rather than compliance-driven uptake.

3.2.3 Regional Fiscal and Ecosystem Spillovers

Beyond firm-level effects, participants explicitly referenced wider regional economic implications. Increased firm productivity was described as contributing to a virtuous cycle of higher cash generation, increased tax receipts and greater public-sector capacity to intervene. This logic was presented as a rationale for public-sector involvement, framing adoption-led productivity growth as a long-term fiscal benefit rather than a short-term cost.

Participants also highlight ecosystem-level spillovers, particularly through supply-chain localisation associated with Net Zero practices. Participants suggested that shorter supply chains may reduce carbon emissions and generate additional regional efficiencies, including lower traffic volumes and fewer accidents. These effects were described as collective productivity gains that accrue across the regional economy, extending beyond individual firm performance.

3.2.4 Energy Price Volatility, Carbon Costs and Regional Manufacturing Competitiveness

This section shifts from firm-level mechanisms to external cost and policy conditions that shape their viability. Focus group participants highlighted energy price levels and volatility as a central factor constraining SME decisions around electrification and Net Zero adoption. High electricity costs were described as discouraging firms from electrifying, irrespective of potential efficiency gains. Price volatility further complicated decision-making, as anticipated savings from efficiency improvements could be offset by subsequent increases in energy prices, making financial impacts difficult to articulate at the firm level.

Emerging carbon-related costs were also seen as altering this calculus for energy-intensive manufacturers. The introduction of a carbon border adjustment mechanism (CBAM) was described as potentially elevating carbon considerations alongside, or above, energy prices, increasing their relevance for manufacturing competitiveness.

Participants emphasised that where manufacturing takes place matters for the region, even when demand for Net Zero technologies is global. High energy costs and strong competition from overseas producers, particularly from China, were seen as increasing the risk that manufacturing activities supporting Net Zero technologies could move outside the West Midlands. This would weaken local supply chains and reduce the regional economic benefits of the transition. In this context, carbon-related measures, such as the CBAM, were viewed as tools to help protect existing manufacturing strengths, including metal casting and to support supply-chain security rather than to create entirely new industries.

These dynamics are particularly significant for the West Midlands, given the region's high concentration of manufacturing SMEs, persistent productivity gaps and exposure to energy-intensive production, which make productivity-led growth and supply-chain resilience more critical to regional economic performance than in less industrialised regions.

3.2.5 Implications of Causal Uncertainty

The causality uncertainty identified above has important implications for policy design and implementation. If manufacturing SMEs that are already productive and competitively oriented are more inclined to adopt digital and Net Zero technologies, then supporting adoption among lower-performing SMEs requires more than simply providing access to technology or funding. For these firms, adoption support must be paired with complementary capability-building initiatives that address the underlying constraints preventing them from benefiting from new technologies. As detailed in the recommendations (Section 4.3), this includes independent advisory support to guide implementation, clear sequenced adoption pathways that link diagnostics to investment, skills development programmes and workforce capability-building integrated into adoption programmes, rather than focusing solely on technology funding.

The focus group evidence reinforces this need for sequenced, capability-oriented support. Participants emphasised that productivity improvements occur when digital technologies complement rather than replace labour and when firms invest in workforce upskilling alongside technology adoption. This suggests that effective support for lower-performing SMEs must combine technology access with hands-on implementation guidance, training provision and support for organisational readiness. Without this complementary approach, there is a risk that adoption initiatives reach only those firms already positioned to benefit, whilst lagging firms either do not engage or adopt technologies that fail to deliver expected productivity gains, reinforcing rather than addressing regional performance gaps.

Table 4 brings together qualitative evidence from focus groups and quantitative indicators from the LSBS to summarise key mechanisms, constraints and regional implications of SME adoption of digital and Net Zero practices in relation to regional economic growth. Taken together, the evidence indicates that SME adoption of digital and Net Zero practices in the West Midlands supports regional economic growth, primarily through productivity-led mechanisms rather than immediate employment expansion. The table highlights how cost reduction, operational efficiency and competitiveness underpin firm-level growth, while regional spillovers and supply-chain resilience remain uneven and sensitive to external conditions, such as energy prices and carbon costs. This synthesis underscores that the growth contribution of adoption is real but constrained, reflecting uneven ambition and limited integration across regional supply chains. These patterns reinforce the implementation implications discussed above, demonstrating the need for capability-building support alongside technology access.

Table 4: SMEs' Digital and Net Zero Adoption and Regional Economic Growth in the West Midlands

Dimension	Evidence from Focus Groups	Evidence from LSBS	Implication for Regional Growth
Productivity	Adoption improves efficiency, cost control and competitiveness; productivity viewed as a prerequisite for growth	54.4% of West Midlands manufacturing SMEs reported introducing new or improved production processes with environmental benefits (Figure 12)	Productivity-led growth pathway
Employment	Job creation incremental and conditional; follows productivity gains and workforce upskilling	Not captured in LSBS	Employment effects secondary and uneven
Innovation and diversification	Adoption enables diversification and capacity to take on larger contracts	Process innovation reported by over half of firms but below leading regions such as Wales (75%) and Scotland (59.7%) (Figure 12)	Growth potential exists but not fully realised
Supply-chain resilience	Retention and localisation critical for regional spillovers and resilience	Only 31.3% of West Midlands firms included supply chains in carbon targets in 2023 compared with London (66.7%) and Scotland (53.8%) (Figure 14)	Spillover and resilience benefits constrained
Competitiveness constraints	Energy prices and carbon costs shape adoption viability and location decisions	51.6% of West Midlands manufacturing SMEs planned to reduce emissions in 2023, close to the UK average but below higher-performing regions (Figure 13)	Structural conditions limit growth impact
Regional fiscal spillovers	Productivity gains linked to higher cash generation increased tax receipts and greater public-sector capacity to intervene	Not captured in LSBS	Provides a rationale for public-sector support as a long-term fiscal investment

Note: LSBS data capture adoption prevalence and ambition, but do not measure firm-level performance or fiscal outcomes.

Section 4: Synthesis and Recommendations

This section synthesises findings from the primary and secondary evidence to identify policy-relevant challenges, implications and recommendations. It draws on stakeholder focus groups, SME interviews and LSBS data to assess policy effectiveness and delivery in supporting digitalisation and Net Zero adoption among manufacturing SMEs in the West Midlands.

4.1 Policy Effectiveness Challenges

This subsection draws primarily on stakeholder focus group evidence. The policy effectiveness challenges discussed below emerged from focus groups with regional stakeholders including representatives from public sector governance bodies, local government authorities, academic institutions, industry membership organisations and public-private partnerships (see Table 3 for full details). It identifies a set of interrelated challenges that limit the effectiveness of existing policies, including tensions between uncertainty and accountability, fragmented policy design, weak translation between national objectives and local delivery and misalignment with SME commercial realities.

While the focus group evidence provides valuable insights into policy effectiveness challenges from the perspective of regional delivery stakeholders, it is important to acknowledge that certain viewpoints are not directly represented. The analysis does not include perspectives from large corporations implementing digital and Net Zero strategies at scale, national government policymakers responsible for programme design, or specialist sustainability-focused non-profit organizations. These perspectives could provide additional insights into policy design rationales, corporate-SME supply chain dynamics and alternative delivery models. The integration of literature below helps to complement the stakeholder evidence and address these broader perspectives.

Figure 18: Policy Effectiveness Challenges for Manufacturing SME digitalisation & Net Zero, based on stakeholder focus group evidence.

Figure 18 summarises the interrelated challenges identified in the focus groups that affect the effectiveness of policies supporting digitalisation and Net Zero adoption among manufacturing SMEs.

4.1.1 Limits of Policy Intervention Under Uncertainty

Participants highlighted uncertainty and risk exposure as central constraints on policy effectiveness. Manufacturing SMEs were described as cautious rather than resistant, particularly where adoption requires irreversible investment in technologies that may later prove inefficient or misaligned with evolving standards. This risk aversion at the firm level was seen to mirror constraints within public funding systems.

Stakeholders emphasised a fundamental tension between the uncertain nature of innovation and the design of public-sector funding mechanisms, which prioritise accountability and risk minimisation. While innovation requires experimentation and tolerance of failure, policy instruments were described as facing challenges in supporting genuinely transformative activity under uncertainty. As a result, funding frameworks tend to favour incremental or low-risk interventions over more experimental approaches.

Participants noted that compulsory regulatory measures, such as mandatory energy standards for commercial buildings, could accelerate adoption but would likely face strong resistance from SMEs concerned about compliance costs and business viability. This highlights an inherent trade-off between regulatory effectiveness and political and commercial acceptability.

4.1.2 Structural Constraints on Policy Impact

Policy effectiveness was further constrained by place-based structural conditions in the West Midlands. Participants emphasised the poor energy performance of much of the region's commercial building stock, where retrofit often requires substantial capital investment or full redevelopment. For many SMEs, the scale and cost of such interventions were described as beyond practical reach, limiting the feasibility of policy-driven upgrades.

Incentive misalignments in landlord–tenant relationships were identified as a persistent structural barrier. Where SMEs operate from rented premises, tenants are often expected to fund energy-efficiency improvements while landlords capture long-term asset value gains. This split incentive was described as significantly weakening the impact of policies aimed at accelerating digital and Net Zero adoption in a region with high levels of rented commercial property.

4.1.3 Fragmented Support Pathways and Missing Sequencing

Participants described the policy support landscape for digitalisation and Net Zero adoption as fragmented rather than integrated. While multiple initiatives exist, stakeholders noted the limited availability of a coherent "adoption pathway" to support SMEs through staged progression from basic readiness to more advanced interventions. As a result, firms struggle to identify priorities, build capability and adopt technologies in an appropriate sequence.

This gap was particularly evident in energy and retrofit policy. Participants highlighted cases where technologies such as solar panels or heat pumps were installed without prior efficiency improvements, resulting in oversized or suboptimal systems. Stakeholders emphasised the value of impartial audits covering both digital readiness and energy use, which were seen as critical for identifying appropriate technologies and sequencing adoption. However, such audit-led pathways were described as inconsistently embedded within regional programmes, leaving SMEs without clear progression routes from assessment to implementation. Even where appropriate pathways were identified, delivery was constrained by workforce capacity. Participants highlighted shortages of trained retrofit workers in the region, limiting the practical implementation of retrofit-focused policy despite growing policy attention.

Research emphasises that effective implementation requires policies that account for the interests of all stakeholders and the needs of each sector, rather than fragmented, sector-blind approaches (Demin, Mikhaylova and Pyankova, 2023). Research on SME support systems suggests that such fragmented policy approaches can constrain the development of coherent adoption pathways and limit long-term competitiveness (OECD, 2024). Evidence also indicates that digitalisation and sustainability are often treated as separate policy domains rather than integrated objectives, limiting opportunities for synergistic adoption (IET, 2022).

4.1.4 Policy Translation, Delivery and Local Capacity

Focus group participants emphasised that policy effectiveness depends on the ability to translate national objectives into forms that are meaningful and workable for manufacturing SMEs. Local and regional bodies were described as playing a critical connector role between national policy and firm-level implementation. However, participants noted constrained manufacturing expertise within combined authorities, limits their ability to interpret policy in sector-specific ways.

Tensions were also identified between national policy design and local enforcement. While the central government sets regulatory requirements, local authorities are responsible for implementation and enforcement, despite having little influence over policy design, leading to frustration when businesses direct concerns at local bodies. This was illustrated through planning and energy performance certificate requirements, where local bodies face business dissatisfaction, despite having no role in setting policy parameters.

Participants argued that greater regional autonomy and devolution could improve policy translation and effectiveness. Fragmented funding streams for skills, innovation and digital adoption were described as limiting integration, with greater regional control presented as a way to align policy instruments more closely with the industrial structure of the West Midlands manufacturing base.

Participants also highlighted challenges in engagement and delivery. Conventional consultations were described as often reaching the same firms, while trusted intermediaries, particularly sector-specific organisations such as the Manufacturing Technology Centre, were seen as more effective in engaging senior manufacturing leaders. This suggests that policy effectiveness depends not only on design but also on who leads engagement and how relationships with industry are brokered.

4.1.5 Policy–SME Commercial Realities Misalignment

Finally, stakeholders consistently emphasised a misalignment between policy objectives and SME commercial decision-making. While policy frameworks often frame adoption in terms of long-term transformation or societal benefit, SMEs were described as operating primarily on profitability, cash flow and short-term returns. Adoption was therefore unlikely unless policies clearly reduced costs or enhanced competitiveness.

Participants noted that existing incentives are often insufficient to shift adoption into core business decisions, particularly where compliance increases costs or administrative burden. This misalignment was described as structural rather than ideological, reflecting differences between public-sector accountability requirements and SME commercial priorities. Policy effectiveness was therefore seen as dependent on designing incentives that align accountability, delivery requirements and firm-level commercial benefit rather than treating these as competing objectives. Recent evidence highlights similar challenges, noting that manufacturing SMEs often struggle to understand the language used by policymakers and institutions, whilst eligibility criteria may exclude high-growth potential businesses through arbitrary categorization (MakeUK and Civitas, 2025). This misalignment is compounded by uncertainty about the direct correlation between sustainability adoption and organisational performance, with ambiguity over short-term results discouraging full engagement (Barragan and Becker, 2024).

4.2 Key Findings and Implications

This section synthesises evidence across the LSBS, SME interviews and focus groups to distil the key policy-relevant findings and their implications for regional and national intervention. It highlights how adoption patterns, structural constraints and delivery gaps shape the effectiveness of current digitalisation and Net Zero policies in the West Midlands.

4.2.1 Rising energy costs are the strongest and most consistent barrier for West Midlands manufacturing SMEs

LSBS evidence shows that the West Midlands has some of the highest rates of firms reporting energy costs as a major obstacle (76.5% in 2022; 80.6% in 2023), while stakeholders and SME interviewees explained that these pressures reduce cash flow, increase uncertainty and limit firms' willingness to invest in digital tools, energy efficiency and carbon-reduction measures. Stakeholders also noted that rising labour-related costs have, in some cases, led manufacturing SMEs to cease operations, further constraining adoption capacity.

Implication: Without targeted relief or region-specific support, high operating costs will continue to restrict digital and Net Zero adoption and stall productivity improvements.

4.2.2. Regional Infrastructure Weaknesses Restrict Both Digital and Low-carbon Adoption

The West Midlands shows lower smart-meter adoption compared with several other regions, reducing firms' ability to monitor and control energy use. Policy-focused stakeholder discussions indicated that this constraint is reinforced by the region's inland geography, which limits access to offshore wind–led decarbonisation pathways and places greater reliance on demand management and system flexibility. Stakeholders further highlighted a lack of clarity over future heating options for non-domestic buildings (particularly the role of electrification versus hydrogen) and weak, inconsistently applied energy performance requirements. Together, these factors reduce the confidence of SMEs in investing in digital energy systems or low-carbon heat, even when technologies are available.

Implication: Without clearer, place-specific infrastructure pathways and stronger enabling conditions for digital energy management, manufacturing SMEs in the West Midlands are likely to delay investment in both digitalisation and Net Zero technologies.

4.2.3. Environmental Engagement Exists but is Weaker Than in Stronger UK Regions

Only 65.5% of West Midlands firms reported taking steps to reduce environmental impact, compared with far higher levels in the North East (86.4%), Scotland (77.4%) and Wales (74.3%). Rising costs disrupted carbon-reduction activity for 58.8% of firms—the highest disruption rate in the UK. This pattern is consistent with interview and focus group evidence, where manufacturing SMEs and stakeholders described Net Zero engagement as highly sensitive to energy costs and policy uncertainty, with adoption slowing when financial pressures increase or support lacks continuity.

Implication: The region's 2041 Net Zero target is at risk unless support addresses cost pressures and provides clearer, more stable pathways for SME decarbonisation.

4.2.4. Digital Adoption is Improving but Lags Key Comparator Regions

Online selling rose from 8.7% (2022) to 25% (2023), but remains behind Scotland (48.1%), the North West (39.3%) and London (36.4%). Adoption of digital management tools improved (26.1% to 52.8%), but advanced technologies such as AI, automation and robotics remain rare. Interview and focus group evidence reinforces this pattern, with SMEs and stakeholders describing digital adoption as largely incremental and focused on immediate operational benefits, while more advanced technologies are avoided due to skills constraints, risk aversion and uncertain returns.

Implication: Productivity gains linked to digitalisation will remain limited unless firms receive sustained guidance and capability-building support.

4.2.5. Internal Capacity Constraints and Policy–delivery Gaps Jointly Limit Adoption

SMEs reported limited time, weak digital readiness, workforce resistance, low process maturity and unclear business cases for technology adoption. These internal constraints were consistently reinforced by external pressures, particularly policy uncertainty and a fragmented support landscape.

Across interviews, focus groups and policy review, recurring policy–delivery gaps were identified, including inconsistent programme design, unclear or misaligned messaging, bureaucratic grant processes, short-term interventions and low awareness of available schemes. Together, these factors help explain the limited uptake of advanced digital systems and energy-management tools despite strong national and regional promotion. These constraints are further shaped by place-based structural conditions, including supply-chain dependence, limited control over premises and legacy industrial buildings, which restrict firms' ability to respond to policy incentives.

Implication: Interventions must address internal firm capacity and external delivery failures simultaneously. Isolated skills or grant programmes are unlikely to shift adoption patterns *unless delivery systems, incentives and communication are better aligned with SME commercial realities.*

4.2.6. Adoption Supports Regional Competitiveness, but Unevenly and Without Consistent Job-creation Effects

Environmental innovation levels are close to UK averages, but not exceptional. Only 31.3% of West Midlands SMEs include supply chains in carbon targets, well below London (66.7%) and Scotland (53.8%). Stakeholders reported productivity gains and commercial benefits from adoption, but employment effects were mixed, as firms typically prioritised productivity improvements before expanding their workforce.

Implication: Digital and Net Zero adoption contribute to competitiveness, but uneven uptake limits aggregate regional productivity outcomes.

4.2.7. The Evidence Points to Specific Regional Support Features that Would Improve Adoption

Stakeholders and interviews identified concrete needs for the West Midlands:

- Trusted intermediaries to translate policy into practical steps
- guided, hands-on adoption support rather than one-off grants
- Long-term advisory relationships
- Coordinated regional delivery rather than fragmented schemes
- Local skills pipelines aligned with manufacturing needs
- Co-produced programmes reflecting business logic
- Widen Knowledge Transfer Programmes (KTPs) collaboration opportunity with universities

Implication: These elements match the structure of the West Midlands' manufacturing economy and should guide future regional and Innovate UK interventions.

The recommendations in Section 4.3 are designed to address these specific needs.

4.3 Policy Improvement Opportunities and Recommendations

These recommendations are developed in direct response to the empirical evidence from manufacturing SMEs and regional stakeholders. They focus on improving the effectiveness of policy design and delivery by addressing regional and sector-specific constraints to digital and Net Zero adoption.

4.3.1 Strengthen Independent and Trusted Advisory Support

Manufacturing SMEs in the West Midlands would benefit from access to independent, non-commercial advisory support to reduce uncertainty around digitalisation and Net Zero investments. Technically informed audits, peer mentoring and longer-term advisory relationships can help firms make informed decisions and reduce the fear of investing in inappropriate technologies. While this aligns with existing initiatives such as Made Smarter, the evidence indicates that delivery should move beyond short interventions towards longer-term, technically grounded advisory relationships.

Local authorities and combined authorities can play a key convening and brokerage role by connecting manufacturing SMEs with trusted technical expertise and longer-term advisory support, complementing existing consultancy-based provision where appropriate.

4.3.2 Develop Clear and Sequenced Adoption Pathways

Support for digitalisation and Net Zero adoption among manufacturing SMEs should be structured as a staged process rather than a single intervention. Existing innovation and R&D funding mechanisms provide a foundation, but clearer sequencing is needed to reduce investment risk for manufacturing SMEs. Linking grants to prior diagnostics, such as energy audits or digital readiness assessments, can reduce investment risk and improve outcomes. Combining guidance with financial support helps manufacturing firms progress incrementally while aligning adoption decisions with operational needs and productivity goals.

Support pathways should be linked to clear productivity measurement and evaluation, with consistent metrics used to assess the impact of digitalisation and Net Zero investments at firm level. A more structured national or regional framework for productivity evaluation would strengthen accountability and help SMEs understand the tangible outcomes of adoption.

Support pathways should reflect differences in manufacturing processes and activities. Less energy-intensive processes can often be addressed through standard measures, while energy- and process-intensive activities, such as brick firing and cement production, face structural constraints because emissions are inherent to the production process. Differences in productivity, particularly among mid-sized firms, further shape adoption capacity and regional resilience. This points to the need for process-sensitive support pathways, rather than uniform models applied across manufacturing.

4.3.3 Improve Industry-Focused Outreach and Communication

Low awareness of available support remains a major barrier to adoption. Outreach should be redesigned to align with manufacturing SMEs' needs, using sector-specific language and practical examples that link digitalisation and Net Zero to cost control and competitiveness. This requires clearer, more consistent regional messaging and simplified access points.

4.3.4 Support Long-Term, Place-Based Collaboration

Digitalisation and Net Zero adoption require long-term collaboration between public bodies, manufacturers and education and innovation institutions. While current policy frameworks promote partnership working, delivery remains fragmented at the regional level.

Place-based approaches led by combined authorities can help integrate skills, energy and innovation support into coherent regional strategies. Involving manufacturing SMEs in programme design can ensure alignment with production constraints and commercial priorities. This includes greater devolution of discretion and resources to combined and local authorities responsible for implementation and enforcement, alongside clearer guidance of national standards to reduce tension between SMEs and local delivery bodies and improve trust in policy delivery. Greater emphasis should also be placed on supply-chain–level support, enabling manufacturing SMEs to align digital and Net Zero adoption with customers and suppliers rather than acting in isolation.

Access to Knowledge Transfer Programmes and university expertise should be simplified through lighter-touch collaboration models, enabling a wider range of manufacturing SMEs to benefit from technical and analytical support.

While this recommendation is grounded in West Midlands evidence, the secondary data analysis (Section 2.1) demonstrates that similar challenges of fragmented support, energy infrastructure constraints and uneven adoption are evident across UK manufacturing regions. For example, low smart meter adoption affects most regions (ranging from 11% in Yorkshire & Humber to 60% in London in 2023), whilst supply chain inclusion in carbon targets remains limited across the UK (averaging 31-54% across most regions). This suggests that place-based approaches may be relevant to other manufacturing regions facing comparable barriers.

4.3.5 Strengthen Skills Pipelines Relevant to Manufacturing

Skills shortages remain a major constraint on adoption for manufacturing SMEs in the West Midlands. Policy initiatives should place greater emphasis on further education colleges, apprenticeships and work-based training that can improve access to practical digital and low-carbon skills. Flexible training routes are particularly important for smaller manufacturers with limited capacity to release staff for formal education. Management and leadership development should be more explicitly targeted at manufacturing SMEs to support strategic adoption decisions.

4.3.6 Treat Workforce Capability as Central to Sustained Adoption

While skills pipelines address supply, workforce capability within firms determines whether adoption is sustained. Smaller firms were described as lacking in-house digital and sustainability expertise, limiting their ability to engage confidently with technology adoption (Section 3.1.3b). Fear of disruption, skills gaps and concerns about job displacement slow uptake, particularly in relation to AI and automation. Policy interventions should therefore integrate workforce development, change management and upskilling into adoption programmes, ensuring that productivity gains are durable rather than short-lived.

4.3.7 Simplify Grant Access and Application Support

Grant application processes for digitalisation and Net Zero support should be simplified, with hands-on application support provided to manufacturing SMEs to reduce administrative burden and improve uptake. Grant design and application processes should explicitly recognise persistent energy cost pressures and infrastructure constraints in the West Midlands, as these conditions shape manufacturing SMEs’ capacity to co-invest and influence the pace of digital and Net Zero adoption. Consideration should also be given to mechanisms that reduce exposure to energy price volatility, as price uncertainty undermines the business case for electrification and energy-efficiency investment.

Implementation Pathway: Sequencing Policy Actions

Addressing the barriers identified in this study requires coordinated action across multiple stakeholders over different timeframes. Table 5 summarises the recommended implementation sequence, followed by evidence-based justification for this approach.

Table 5: Implementation Pathway for Policy Recommendations

Phase	Priority Actions	Key Stakeholders
Immediate (0-1 year)	• Simplify grant application processes (Rec 7) • Improve industry-focused outreach and communication (Rec 3) • Strengthen trusted intermediaries as clear entry points	National government, Combined authorities, Growth Hubs, sector bodies
Medium-term (1-3 years)	• Develop clear, sequenced adoption pathways (Rec 2) • Strengthen independent advisory support (Rec 1) • Support place-based collaboration (Rec 4) • Integrate workforce capability into programmes (Rec 6)	Combined authorities, Made Smarter, Manufacturing Technology Centre, universities, delivery organizations
Longer-term (3-5 years)	• Strengthen skills pipelines (Rec 5) • Simplify Knowledge Transfer Programme access • Establish regional monitoring and evaluation frameworks	National government, further education colleges, universities, combined authorities

Addressing the barriers identified in this study requires coordinated action across multiple stakeholders over different timeframes. Based on the evidence, recommendations can be sequenced to build on each other and create sustained momentum for adoption.

Immediate priorities: Stakeholders emphasised that access barriers and low awareness currently prevent SME engagement with existing support. Immediate actions should focus on simplifying grant application processes (Recommendation 7) and improving outreach and communication to raise awareness of available support (Recommendation 3). Strengthening trusted intermediaries as clear entry points was identified as essential for navigating the fragmented support landscape. These foundational steps address the confusion and administrative burden that participants described as major deterrents to engagement.

Medium-term actions: With improved access and awareness in place, participants noted that focus should shift to building structured support systems. This includes developing clear, sequenced adoption pathways that link diagnostics to implementation support (Recommendation 2) and expanding independent advisory capacity to provide the longer-term, hands-on guidance that SMEs reported as missing (Recommendation 1). During this period, place-based collaboration frameworks should be established to coordinate skills, energy and innovation support into coherent regional strategies (Recommendation 4). Stakeholders emphasised that workforce capability programmes should be integrated into adoption initiatives to ensure that technological investments are matched with organisational readiness (Recommendation 6).

Longer-term foundations: Sustained adoption depends on addressing the structural capability gaps identified throughout the study. This requires strengthening skills pipelines through further education, apprenticeships and targeted leadership development for manufacturing SMEs (Recommendation 5). Participants noted that longer-term collaborative relationships between SMEs, universities and innovation institutions are needed, supported through simplified Knowledge Transfer Programme access and supply-chain-level support mechanisms. Regional monitoring and evaluation frameworks should be established to track outcomes and enable continuous improvement of support delivery.

Coordination across stakeholders: The evidence indicates that effective implementation requires clear coordination between national policy design, regional and local delivery bodies (including combined authorities) and trusted intermediaries such as Made Smarter and the Manufacturing Technology Centre. Stakeholders emphasised that without such coordination, support remains fragmented and fails to reach the manufacturing SMEs most in need of assistance. This sequenced approach recognises that immediate access improvements must precede capability-building investments and that longer-term structural change depends on effective coordination between national and regional mechanisms.

4.4 Conclusion

These recommendations are consistent with current national and regional initiatives, including Made Smarter, Help to Grow: Management, the Business Growth Service and the West Midlands Growth Plan. However, the evidence in this report indicates that the effectiveness of these frameworks depends less on policy intent than on delivery conditions, including uncertainty, sequencing, workforce capability and place-based coordination. By combining stakeholder and SME evidence, the study highlights where policy translation, consultation and delivery currently break down and where trusted, sector-specific intermediaries are most effective in bridging the gap between policy objectives and firm-level decision-making. Without addressing these conditions, existing digitalisation and Net Zero initiatives are likely to deliver uneven and limited productivity gains, constraining their contribution to sustained regional economic growth for manufacturing SMEs in the West Midlands.

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Thank you

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Appendices

Appendix I: Policy Comparison Table

Analytical Dimension	UK Industrial Strategy (DBT, 2025a)	WM Growth Plan (WMCA, 2025)	SME Adoption Taskforce Report (DBT, 2025b)	LGA Digital Strategy (Local Government Association, n.d.)	UK Digital Strategy (DCMS, 2022)	Net Zero Strategy (BEIS & DESNZ, 2021)	WM Net Zero Technical Report (WMCA, 2022)	Made Smarter Roadmap (Made Smarter, 2025)	Digital and Technologies Sector Plan (DBT and DSIT 2025)	Backing your Business, Plan for SME (DBT, 2025c)
Policy Level	National	Regional	SME-specific	Local/Regional level	National	National	Regional	SME-specific	National	National SME-specific
Main Aims and Objectives	**Aim:** Deliver strong, secure and sustainable economic growth across the UK through targeted support for eight high-growth sectors. **Objectives**: Increase business investment and productivity. Support regional development and resilience. Drive innovation, digitalisation and net-zero transition. Create a long-term partnership between government and business. Reform regulation, planning and infrastructure to enable growth.	**Vision:** To increase living standards across all parts of the West Midlands by: Creating good quality jobs; boosting productivity; reducing poverty and deprivation; and advancing towards net-zero by 2041. **Strategic Pillars:** Empowering people Enabling productive businesses Making places more prosperous and resilient Strengthening partnerships and storytelling	**Vision**: Make UK SMEs the most digitally capable and AI-confident in the G7 by 2035. **Objectives:** Drive productivity and competitiveness through digital and AI adoption. Address barriers such as cost, complexity, lack of expertise and fragmented support. Create a coordinated, scalable transformation effort across government and industry.	**Main Aims and Objectives** Strengthen the UK's position as a global science and technology superpower. Grow the UK's digital economy, with a projected increase of £41.5 billion in GVA and 678,000 new jobs by 2025. Promote inclusive digital growth through local government leadership, innovation and investment. Enhance public service delivery using data and digital tools. Ensure digital inclusion and improve digital skills across the population.	**Main Aims and Objectives** Establish the UK as a global Science and Tech Superpower by 2030. Drive economic growth through digital innovation, aiming to add £41.5 billion in GVA and create 678,000 jobs by 2025. Strengthen digital foundations: infrastructure, data, regulation and security. Promote digital skills and talent development across all levels. Support innovation and IP generation, especially in emerging technologies (AI, quantum, semiconductors). Ensure inclusive digital prosperity across all UK regions. Align digital	**Main Aims and Objectives** Achieve net-zero GHG emissions by 2050. Deliver a Green Industrial Revolution through innovation, investment and job creation. Meet interim targets, including the Sixth Carbon Budget (78% emissions, reduction by 2035 from 1990 levels). Embed net-zero across all sectors: power, industry, transport, buildings and natural resources.	**Main Aims and Objectives** Achieve net-zero carbon emissions across the West Midlands Combined Authority (WMCA) area by 2041. Deliver a 33% reduction in emissions by 2026 (against 2016 baseline) under the "Accelerated" scenario. Align with the Paris Agreement and the UN Sustainable Development Goals. Drive a just transition that supports inclusive growth, reduces inequalities and creates green jobs. Mobilise £4.3 billion gross investment by 2026 to support the transition.	**Main Aims and Objectives** To support UK SME manufacturers in adopting digital technologies through a structured, people-first approach. To demystify digital transformation by breaking it into three stages: Digitisation, Digitalisation and Digital Transformation. To provide practical support, funding and leadership development to help SMEs become more productive, sustainable and competitive. To build a national movement for digital adoption, with regional rollouts across the North West, North East,	**Main Aims and Objectives** Position the UK as one of the top three global destinations to create, invest in and scale fast-growing technology businesses by 2035. Secure the UK's first trillion-dollar tech company. Drive economic growth, productivity and job creation through digital and frontier technologies. Embed digital and technology innovation across the economy to support national security, net-zero and public service transformation.	**Main Aims and Objectives** To unlock the full potential of SMEs by combining universal improvements with targeted interventions. Focuses on finance, business environment, skills and opening up opportunities (e.g., procurement, exporting).

					transformation with net-zero and sustainability goals. Enhance the UK's global digital leadership and influence international digital governance.			Yorkshire and Humber and the Midlands.			
Relevance to Manufacturing SMEs (digitalisation, sustainability, productivity)	**Digitalisation:** Expansion of the Made Smarter programme to support SMEs in adopting digital technologies. Creation of Robotics Adoption Hubs and AI Growth Zones. **Sustainability:** Clean Energy Superpower Mission includes support for electrification, CCUS, hydrogen and heat pumps. Circular Economy Strategy (due Autumn 2025) to promote resource efficiency. **Productivity:** £4.3 billion committed to Advanced Manufacturing, including £2.8 billion for R&D. British Industrial Competitiveness Scheme to reduce electricity costs for energy-intensive manufacturers.	**Digitalisation**: AI Adoption Blueprint and distributed AI infrastructure model. Business Growth West Midlands offers support for digital transformation. Innovation Accelerator and Further Education Innovation Fund support SME tech adoption **Sustainability**: Black Country Industrial Cluster and Tyseley Energy Park promote clean tech and decarbonisation, Retrofit Skills Hubs and green construction initiatives. **Productivity**: Leadership and management training for SMEs. High Growth Programme and Supply Chain Transition Programme. Access to finance via Co-Invest Fund and Midlands Mindforge.	**Digitalisation**: Emphasis on CRM, ERP, ecommerce and AI tools. Sector-specific AI applications (e.g., inventory management in retail) are encouraged. Support for CTO-as-a-service and plug-ins to the Business Growth Service (BGS). **Sustainability:** Indirect relevance via digital tools that improve operational efficiency and reduce waste. **Productivity:** Estimated 1% productivity uplift across SMEs could add £94bn annually to GDP. Evidence from Be the Business and Lloyds Bank shows digital adoption correlates with revenue growth.	**Digitalisation:** Emphasises the adoption of digital technologies by SMEs, with potential productivity gains of up to 25%. **Sustainability:** Supports decarbonisation through digital and data initiatives, including smart devices and technologies that reduce carbon footprints. **Productivity**: Highlights the role of digital tools in improving SME productivity and competitiveness, especially through platforms like Digital Boost, which offer pro bono digital mentoring.	**Digitalisation:** The "Made Smarter" programme supports SME manufacturers with digital adoption (AI, IoT, digital twins). Help to Grow: Digital offers SMEs up to £5,000 in discounts for digital tools (CRM, accounting, e-commerce). **Sustainability:** The strategy aligns digital innovation with net-zero ambitions. Programmes like the Net Zero Innovation Portfolio and Industrial Energy Transformation Fund support low-carbon tech and energy efficiency in manufacturing. **Productivity:** SMEs using two or more digital tools can see up to 25% productivity gains. "Help to Grow: Management" aims to support 30,000 SMEs with leadership and	**Digitalisation:** Emphasis on smart systems, energy digitalisation and smart meters to enable flexible energy use. Support for digital innovation in energy and industrial systems. **Sustainability:** Strong alignment with resource and energy efficiency, circular economy and low-carbon technologies. Encouragement for SMEs to adopt low-carbon heating, renewable energy and green transport. **Productivity:** Investment in skills, innovation and infrastructure to boost productivity. Support for SME decarbonisation through funding	**Digitalisation:** Emphasis on smart systems, digital connectivity and smart meters/thermostats. Support for 5G-enabled innovation through the Green Innovation Challenge with WM5G and 5PRING Accelerator. **Sustainability:** Industrial decarbonisation through energy efficiency, fuel switching, hydrogen and carbon capture and storage (CCS). Promotion of circular economy practices via a dedicated taskforce. **Productivity:** Retrofit and energy efficiency programmes aim to reduce operational costs, retain energy spend locally and boost competitiveness. Manufacturing SMEs are central to the low-emission vehicle supply chain, including battery gigafactories and EV infrastructure.	**Digitalisation:** Central to the programme, with a focus on integrating technologies like robotics, IIoT, AI, cloud computing and digital twins. Emphasis on creating smart factories and digital threads across operations. **Sustainability:** Digital transformation is positioned as a key enabler of net-zero goals. Case studies (e.g., Just Bee Honey, Beagle Orthopaedic) show how automation and data analytics reduce waste and energy use. **Productivity:** Automation and data-driven decision-making improve efficiency, reduce downtime and enhance quality. SMEs report improved competitiveness, faster innovation cycles and	**Digitalisation:** Emphasis on AI, advanced connectivity and semiconductors as enablers of smart manufacturing. Support for adoption of digital tools through initiatives like the Hartree Centre and AI Adoption Hubs. **Sustainability:** Engineering biology and quantum technologies are highlighted for their potential to support net-zero goals. Digitalisation is framed as a key tool for decarbonising energy systems and improving resource efficiency. **Productivity:** Technology adoption is expected to contribute up to 8.4% to UK GDP by 2035. ACT alone is projected to deliver £14.6 billion in productivity	**Digitalisation: Aims to boost** tech adoption via digital adoption pilots and expanding the Made Smarter programme. Productivity: Directly aims to tackle barriers to SME growth and productivity, such as late payments and access to finance. **Sustainability:** Mentions the need to support SMEs in the transition to net-zero**.**

	Upskilling and reskilling programmes tailored to manufacturing.				digital transformation training.	and technical assistance.		reduced time to market.	benefits by 2035. SMEs are targeted through IP-backed lending, export finance and public procurement reforms.	
Key Mechanisms / Instruments (funding, training, regulation, partnerships)	**Funding**: National Wealth Fund (£27.8 billion). British Business Bank (£25.6 billion capacity). UK Export Finance (£13 billion lending capacity). Local Innovation Partnerships Fund (£500 million). **Training:** Skills England coordination. Technical Excellence Colleges. AI Skills Hub and TechFirst programme. **Regulation**: Regulatory Innovation Office to streamline innovation pathways. Planning reforms to fast-track infrastructure. Electricity market reforms and CBAM introduction. **Partnerships:** Strategic partnerships with Japan, Saudi Arabia and others. Sector councils and Industrial	**Funding:** £30m Skills Innovation Challenge Fund. £160m West Midlands Investment Zone. £500m Local Innovation Partnership Fund. £100k Big Issue Invest pilot for social impact entrepreneurship. **Training:** AI Skills Action Plan Post-16 College Compact Sector-led Skills Action Plans (e.g., Green Skills, Construction) **Regulation:** Advocacy for devolved powers over employment and skills systems. Spatial Development Strategy for land use planning. **Partnerships:** WMCA with universities, NHS, local authorities and private sector International Strategy with UK Government Innovation Board and cluster organisations (e.g., SuperTech, Create Central).	**Funding:** Call for cross-departmental review of financial incentives (e.g., R&D tax credits, grants). Recommendation for joint public-private financing models. **Training**: Short, practical AI training sessions. Digital skills support via trusted partners (e.g., accountants, trade bodies). **Regulation**: Proposals for e-invoicing standards, Digital ID and simplified SME regulatory frameworks. **Partnerships**: Public-private initiative led by No.10. Engagement with local chambers, tech firms and service providers.	**Funding**: £2.6 billion via the UK Shared Prosperity Fund for local digital development. £13.9 million in grants to councils for cyber resilience. Private capital investment of £27.4 billion in 2021, with continued support for tech start-ups via Tech Nation. **Training**: Focus on digital skills education in schools and universities. Lifelong learning initiatives to address the digital skills gap (costing the UK £63 billion annually). Digital Boost platform for SME mentoring. **Regulation**: Plan for Digital Regulation: A pro-innovation, light-touch regulatory framework. Reform of GDPR and introduction of the UK Digital Identity and Attributes Trust Framework. Online Safety Bill and Algorithmic Transparency Standard for	**Funding**: £2.6bn UK Shared Prosperity Fund. £1.6bn for British Business Bank regional funds. £147m for Made Smarter Innovation; £24m for Made Smarter Adoption. R&D tax reliefs (SEIS, EIS, RDEC). £1bn Net Zero Innovation Portfolio. **Training**: Digital Skills Partnerships, Skills Bootcamps, T Levels, AI PhDs and scholarships. Digital Skills Council and Institutes of Technology. **Regulation**: Light-touch, pro-innovation regulatory regime. Reform of GDPR and data protection laws. Online Safety Bill, AI White Paper and Algorithmic Transparency Standard. **Partnerships**: Collaborations with academia, industry (e.g., Tech Nation, UKRI, Innovate UK). International partnerships (e.g.,	**Funding**: £26bn government capital investment; £1.5bn for innovation; sector-specific funds (e.g., £450m Boiler Upgrade Scheme, £1bn CCS Infrastructure Fund). **Training**: Green Jobs Taskforce; Skills Bootcamps; support for retraining in green sectors. **Regulation**: UK Emissions Trading Scheme (ETS); phase-out dates for fossil fuel vehicles and boilers; energy efficiency standards. **Partnerships**: Industrial clusters, local authorities, devolved administrations and private sector collaborations.	**Funding**: £4.3bn gross investment to 2026; specific allocations include: £3.5bn for domestic retrofit £400m for commercial retrofit £270m for industrial renewables **Training** & **Skills**: Collaboration with colleges, universities and employers to develop green skills. Focus on reskilling 140,000 jobs and creating 92,000 net new jobs by 2041. **Regulation**: Local implementation of Zero Carbon Homes Routemap. Support for Minimum Energy Efficiency Standards (MEES) and Future Homes Standard. **Partnerships**: Energy Capital, LEPs, local authorities, TfWM, BEIS, Cadent, WPD and industry. Establishment of a Net Zero Delivery Board and Net Zero Business Pledge.	**Funding**: Grants up to £20,000 for technology adoption (e.g., automation, robotics, IIoT, additive manufacturing). **Training** & **Leadership**: Leading Digital Transformation (LDT) programme (3 months, strategic focus). Leading Change for Digital Champions (LCDC) (2-day operational leadership). Digital Champions Network for peer learning. **Digital Transformation Workshops**: Bespoke diagnostics and roadmaps for SMEs. **Partnerships**: Collaborations with universities (MMU, Bath, Nottingham, Loughborough), research centres (AMRC, MTC) and organisations like Make UK and Innovate UK.	**Funding**: £22.6bn annual public R&D investment by 2029/30. £4bn Industrial Strategy Growth Capital via British Business Bank. £500m Local Innovation Partnerships Fund. £1bn for AI compute infrastructure; £196m for engineering biology R&D; £670m for quantum computing. **Training** & **Skills**: TechFirst programme: 1 million young people, 4,500 bursaries, 7.5 million workers upskilled in AI by 2030. Short courses funded via Growth and Skills Levy. Semiconductor skills package (£35m), AI scholarships and doctoral training centres. **Regulation**: Regulatory Innovation Office (RIO) and Regulatory Horizons Council.	**Support Service:** New Business Growth Service (BGS). **Regulation:** A new Fair Payment Code and legislation to tackle late payments. **Finance:** Expanding UK Export Finance capacity

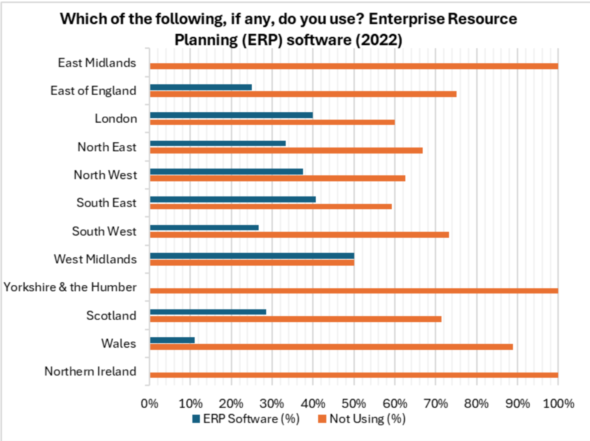
	Strategy Advisory Council (ISAC). Collaboration with devolved governments and local authorities.			ethical AI and data use. **Partnerships**: Support for Local Skills Partnerships. Engagement in global digital partnerships (e.g., GPAI, OECD AI Principles, ITU Council).	UK-US Tech Partnership, UK-Japan Digital Group).				Regulatory sandboxes (e.g., AI Airlock, Engineering Biology Sandbox). Pro-innovation reforms to reduce regulatory burden by 25%. **Partnerships**: Collaboration with devolved governments, Mayoral Strategic Authorities and industry councils. International partnerships (e.g., AUKUS, UK-Singapore, UK-India, UK-US). Engagement with academia, trade unions and business (e.g., TechUK, FSB).	
Regional Focus (especially West Midlands)	**West Midlands:** Identified as a key cluster for Advanced Manufacturing, Clean Energy and PBS. Strategic Partnerships with the National Wealth Fund. Local Innovation Partnerships Fund allocation. Investment Zones and Freeports support. Transport upgrades including HS2 and local connectivity. Skills investment through Technical	**Geographic Scope:** Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall, Wolverhampton **Corridors & Zones:** UK Central Gateway Black Country Corridor, Birmingham Knowledge Quarter, Wolverhampton Green Innovation Corridor and Coventry-Warwick Gigapark. **Local Strategies:** Place-Based Strategies tailored to borough-level needs.	**Regional Focus (especially West Midlands)** **Indirect**: While not region-specific, the report encourages local delivery via chambers of commerce and regional champions. Alignment with initiatives like Made Smarter and regional AI hubs. Tailored programmes to address unique regional challenges.	**Regional Focus (especially West Midlands)** While the brief does not explicitly mention the West Midlands, it references: The Levelling Up White Paper, which includes regional digital infrastructure goals. The UK Shared Prosperity Fund, which allocates localised funding for digital connectivity and skills. The Digital Ecosystem Report, identifying regional digital and tech growth hubs (potentially	**Regional Focus (especially West Midlands)** West Midlands 5G: Recognised as the UK's top region for 5G coverage due to early adoption and streamlined deployment. Made Smarter Adoption: Expanded to the West Midlands in 2021. Innovation Accelerators: West Midlands selected as one of three pilot regions for £100m investment. Local Digital Skills Partnerships: active in eight regions, including the West	Regional Focus (especially the West Midlands) **West Midlands:** Identified for automotive electrification, zero-emission buses and public sector decarbonisation (e.g., Windsor Academy Trust received £2m). Levelling Up: Strategy integrates net-zero with regional economic development, targeting industrial heartlands and areas like the West Midlands for investment	**Regional Focus (especially West Midlands)** Entire plan is region-specific, covering Birmingham, Wolverhampton, Dudley, Sandwell, Walsall, Coventry and Solihull. Highlights local authority actions, e.g.: Coventry: All-electric bus city by 2025. Wolverhampton: 6.9MW solar array at New Cross Hospital. Solihull: Wildlife Ways and town centre heat network. Emphasis on place-based delivery, local	**Regional Focus (especially West Midlands)** While the document covers national ambitions, it highlights regional rollouts, including the Midlands. The Manufacturing Technology Centre (MTC) in Liverpool and AMRC North West are key hubs supporting Midlands SMEs. Case studies from Midlands-based SMEs (e.g., AV Metals, Massey & Harris) demonstrate local impact.	**Regional Focus (especially West Midlands)** West Midlands identified as one of 10 priority regions for: Local Innovation Partnerships Fund (£30m earmarked). Cluster Champions programme via British Business Bank. Recognised as a digital tech hub and 5G testbed. Collaboration with University of Birmingham on UK-GRAFT (graphene research). AI Growth Zones	**Regional Focus (especially West Midlands)** The case study of Unique IQ highlights a Midlands-based software provider supported by the Midlands Engine Investment Fund.

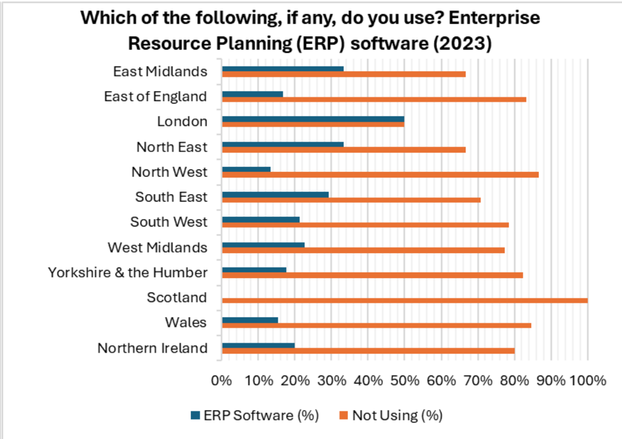
	Excellence Colleges and Jobcentre integration.			including the West Midlands).	Midlands. UK Shared Prosperity Fund: Localised funding for digital skills, innovation and entrepreneurship.	and job creation.	area energy planning and natural capital (e.g., increasing tree cover from 1.5% to 13%).		and other frontier tech initiatives to be regionally distributed.	
Identified Barriers or Gaps	High industrial electricity costs and grid connection delays. Regulatory complexity and slow planning approvals. Skills shortages, especially in engineering and digital. Limited access to growth finance for SMEs. Fragmented support landscape for tech adoption and innovation. Poor diffusion of innovation across the economy.	**Economic:** GDP per capita 22% below national average. High unemployment and economic inactivity **Skills:** Shortage of Level 3 STEM qualifications Youth unemployment and racial disparities in employment **Infrastructure:** Energy grid constraints until 2036 Housing affordability and low density **Business Support:** Fragmented SME support ecosystem Limited access to finance and scale-up support.	**Barriers:** High switching costs and lack of data portability. SMEs overestimating digital readiness. Fragmented support ecosystem. Limited access to finance and trusted advice. **Gaps:** Lack of behavioural insights and comparative data (e.g., DESI). Absence of a central accountability structure within government. Need for clearer SME-focused AI policies and standards.	**Digital skills gap**: 11.8 million UK adults lack essential digital skills for work. Cybersecurity vulnerabilities in local councils. Digital exclusion: Emphasis on ensuring inclusive access to digital opportunities. Need for ethical data use and regulation to prevent misuse (e.g., misinformation, AI ethics).	**Digital skills gap:** Estimated £63bn annual cost to the UK economy. Digital exclusion: 11.8 million adults lack essential digital skills. Access to finance: SMEs face challenges in scaling due to limited access to patient capital. **Regional disparities:** Digital exclusion and infrastructure gaps persist outside London and the South East. **Complexity in tech adoption:** 44% of SMEs find digital solutions confusing.	High upfront costs for low-carbon technologies (e.g., heat pumps). Skills shortages in green sectors. Infrastructure readiness (e.g., grid capacity, hydrogen networks). Uncertainty around hydrogen's role in heating (decision pending in 2026). Carbon leakage risks for industry. Consumer engagement and behavioural change challenges.	**Access to finance and funding structures.** Regional powers and infrastructure limitations. Skills gap in green jobs and low-carbon sectors. Behaviour change resistance due to cost and lifestyle impacts. Grid capacity and planning system constraints. Lack of clarity in national policy and regulatory frameworks.	**Lack of digital strategy in many SMEs** (2 in 3 do not include digital transformation in business plans). Common SME challenges: limited time, funding, skills and fear of failure. Fragmented support landscape with overlapping initiatives and lack of coordination (as noted by Make UK). Cultural and people-related barriers to adoption (addressed by People-Led Digitalisation Centre and InterAct).	**Access to finance**, especially for scaling and deep tech SMEs. **Skills shortages in STEM** and digital roles (130,000 STEM and 13,500 digital vacancies in 2022). Infrastructure bottlenecks (e.g., grid access for data centres). **Regulatory complexity** and lack of flexibility. Fragmented support landscape and underutilisation of public procurement.	**Late payments,** which cost the economy £11bn per year. **Burdensome regulation** **Access to finance**. Difficulty for SMEs in accessing finance, especially for new businesses**.** Fragmented and hard-to-navigate **business support landscape.**
Links to Other Policies	**Links to Other Policies** **Invest 2035:** Consultation informing the strategy. AI Opportunities Action Plan: Integrated into digital and tech sector plans. Clean Energy Superpower Mission: Embedded in energy and manufacturing strategy. Get Britain Working White Paper: Labour	**Links to Other Policies** Modern Industrial Strategy (2025): Alignment with 8 national priority sectors. Named initiatives in creative industries, advanced manufacturing and professional services. **Inclusive**	**Links to Other Policies** **Directly Linked:** Small Business Plan Industrial Strategy Business Growth Service (BGS). AI Opportunities Action Plan Technology Adoption Review. **Referenced Models:** Singapore's Go Digital New Zealand's Digital Boost	**Links to Other Policies** Levelling Up White Paper (Mission Four – digital infrastructure). National Data Strategy. Plan for Digital Regulation. Online Safety Bill. Digital, Data and Technology (DDaT) Playbook. Global Britain in a Competitive Age (Integrated	**Links to Other Policies** Levelling Up White Paper. National Data Strategy Innovation Strategy. National AI Strategy Net Zero Strategy. Online Safety Bill Digital Regulation Plan Digital, Data and Technology Playbook Global Britain in a	**Links to Other Policies** Ten Point Plan for a Green Industrial Revolution. Energy White Paper. Transport Decarbonisation Plan. Hydrogen Strategy Heat and Buildings Strategy. North Sea Transition Deal	**Links to Other Policies** UK Government's: Ten Point Plan Clean Growth Strategy. Future Homes Standard. MEES (Minimum Energy Efficiency Standards). National Net Zero by 2050 target. Local:	**Links to Other Policies** Aligned with: UK Industrial Strategy. Net Zero Strategy. Made Smarter Innovation Challenge (Innovate UK). Clean Growth Strategy. Supported by	**Links to Other Policies** Science and Technology Framework. National Quantum Strategy. AI Opportunities Action Plan. Clean Growth Strategy and Net Zero commitments. UK Semiconductor Strategy. National Skills Strategy and	**Links to Other Policies** Explicitly states that it sits alongside the Trade and Industrial Strategies.

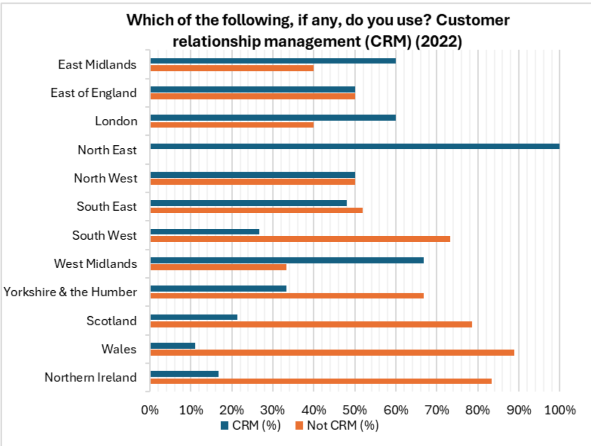
	market and employment support. Corporate Tax Roadmap: Fiscal stability and incentives. Planning and Infrastructure Bill: Accelerating infrastructure delivery.	**Growth Framework (2018)** **Net Zero Five Year Plan** **Local Transport Plan and Skills Strategy (upcoming).**	Denmark's SME support approach.	Review 2021). Online Media Literacy Strategy. OECD AI Principles, GPAI, ITU Council.	Competitive Age (Integrated Review).	Build Back Better: Plan for Growth.	WM2041 Environmental Recovery Plan Local Transport Plan (LTP). Zero Carbon Homes Charter. Circular Economy Taskforce.	Make UK, BEIS and regional LEPs.	Digital Inclusion Action Plan.	
Implications for IRC Study (supporting or conflicting evidence)	**Supporting Evidence**: Strong alignment with themes of SME digitalisation, sustainability and productivity. Recognition of manufacturing SMEs as central to economic renewal. Policy emphasis on regional clusters like the West Midlands. **Conflicting Evidence**: While ambitious, implementation timelines and funding access for SMEs may be challenging. Risk of policy fragmentation despite efforts to streamline.	**Supporting Evidence:** Strong emphasis on SME digitalisation and sustainability. Recognition of manufacturing's role in future growth. Policy instruments directly targeting SME productivity. **Conflicting Evidence:** Potential mismatch between ambition and delivery capacity (e.g., energy infrastructure delays). Limited clarity on long-term SME R&D support, especially in aerospace.	**Supporting Evidence:** Strong alignment with digitalisation and productivity goals for SMEs. Recognition of sector-specific needs and regional delivery models. Emphasis on behavioural science and data-driven policy. **Conflicting Evidence:** Limited direct reference to manufacturing SMEs. No specific mention of sustainability or green tech adoption in manufacturing.	**Supporting Evidence:** Strong alignment with themes of digitalisation, SME productivity and regional economic development. Emphasis on local government leadership aligns with our role and regional focus. Highlights the importance of digital skills and inclusion, which may support our study's emphasis on workforce development. **Conflicting Evidence**: Lack of specific focus on manufacturing SMEs—most references to SMEs are general. Limited detail on sector-specific challenges or tailored support for manufacturing.	**Supporting Evidence:** Strong alignment with themes of digitalisation, SME productivity and regional development. Emphasis on manufacturing digitalisation through Made Smarter. Recognition of digital skills as a key enabler for economic growth. Policy support for sustainable innovation aligns with green manufacturing goals. **Conflicting Evidence**: While manufacturing is mentioned, the strategy is broad and tech-sector focused, with limited deep engagement with manufacturing-specific challenges. No dedicated section on manufacturing SMEs or sector-specific digitalisation	**Supporting Evidence:** Strong alignment with themes of sustainability, digitalisation and productivity in manufacturing SMEs. Policy Support: Multiple funding and training mechanisms applicable to SMEs. **Potential Conflicts:** Uncertainty in hydrogen strategy and infrastructure readiness may limit SME adoption in the short term.	**Supporting Evidence:** Supports the case for regional leadership in ne-zero delivery. Provides evidence of alignment between industrial decarbonisation, skills development and SME engagement. Highlights the need for tailored support for SMEs in manufacturing, especially in energy efficiency and fuel switching. Reinforces the importance of place-based approaches and cross-sector collaboration.	**Supporting Evidence:** Strong supporting evidence for the role of digitalisation in improving SME productivity and sustainability. Demonstrates the importance of leadership and workforce development in successful transformation. Highlights the need for integrated, regionally delivered support models. Reinforces the value of structured roadmaps and diagnostics for SMEs.	**Supporting Evidence:** Strong alignment with our study's focus on digitalisation, productivity and sustainability in manufacturing SMEs. Reinforces the importance of regional innovation ecosystems and place-based interventions. Provides evidence of government commitment to supporting SME digital transformation through funding, skills and infrastructure. Highlights the need for better coordination and simplification of support mechanisms.	**Supporting Evidence:** This is the most current, SME-focused policy document. It provides a clear view of the government's intended support mechanisms, like the BGS, which are central to the study's analysis of the support landscape.

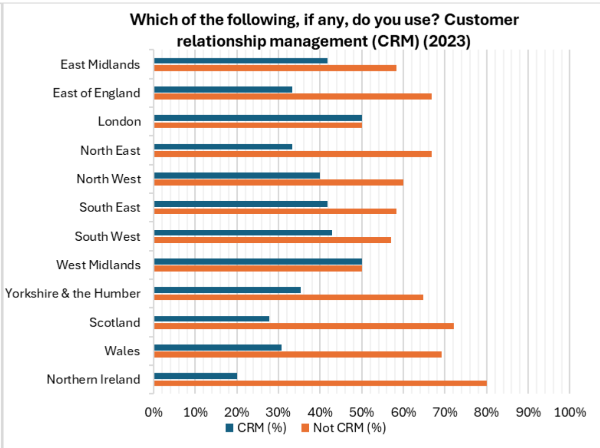
					pathways beyond Made Smarter.					
Gap in policy (related to our study only)	**Gap Identified:** Limited detail on how SMEs outside the IS-8 sectors will be supported long-term. Lack of clarity on integration of SME feedback into ongoing policy refinement. Need for more granular support mechanisms tailored to micro-manufacturers and early-stage tech adopters.	**Gap in Policy Manufacturing SMEs:** While the plan supports advanced manufacturing, there is limited direct support for traditional manufacturing SMEs transitioning to digital and sustainable practices. **R&D funding gaps** for SMEs in aerospace and defence sectors (e.g., 94% of Midlands flying parts manufacturers received no national R&D support in 10 years). **Need for more granular,** sector-specific SME support beyond flagship clusters.	**Gap in Policy Manufacturing SMEs:** Lack of tailored support for traditional manufacturing transitioning to digital and sustainable practices. No explicit mention of industrial digitalisation (e.g., robotics, IoT, smart factories). Need for clearer integration with Made Smarter and regional manufacturing clusters.	**Gap in Policy** Sector-specific strategies for manufacturing SMEs are underdeveloped. No direct mention of advanced manufacturing, Industry 4.0, or digital twin technologies. Limited focus on supply chain digitalisation, which is critical for manufacturing SMEs. Sustainability is addressed broadly, but not in the context of manufacturing operations or resource efficiency.	**Gap in Policy** Lack of granular policy detail on: Integration of digital tools in manufacturing supply chains. Support for low-carbon manufacturing processes beyond energy efficiency. Tailored digital skills training for manufacturing roles (e.g., CNC, robotics, additive manufacturing). SME-specific barriers to adopting advanced manufacturing technologies (e.g., cost, interoperability, standards).	**Gap in Policy** Limited SME-specific focus: While SMEs are mentioned, the strategy lacks tailored pathways or support mechanisms specifically designed for manufacturing SMEs, especially in non-clustered or dispersed regions. Digitalisation for SMEs: More emphasis needed on digital transformation support for SMEs in manufacturing, including access to data, digital tools and advisory services.	**Gap in Policy** While the plan references manufacturing and industrial decarbonisation, it lacks specific, targeted interventions for manufacturing SMEs. No detailed roadmap for digital transformation in manufacturing SMEs. Limited focus on SME-specific funding access, despite their prevalence (88,600 businesses, most with <10 employees). Monitoring and evaluation frameworks for SME engagement and outcomes are underdeveloped.	**Gap in Policy** While the programme is impactful, it lacks: Specific focus on long-term sustainability metrics beyond initial adoption. Integration with broader regional economic development or skills strategies. Tailored support for SMEs in niche manufacturing sectors or those outside current pilot regions. Clear pathways for scaling up from pilot projects to full transformation.	**Gap in Policy** While the strategy is comprehensive, it lacks: Specific, tailored support for manufacturing SMEs outside the frontier tech sectors. Clear mechanisms for integrating digital adoption into traditional manufacturing supply chains. Monitoring frameworks specific to SME outcomes (e.g., digital maturity, productivity gains). Localised delivery models that reflect the diversity of SME needs across regions.	**Gap in Policy** While comprehensive, it still treats digitalisation and decarbonisation as separate issues rather than offering an integrated support framework for the "twin transition" for manufacturing SMEs.

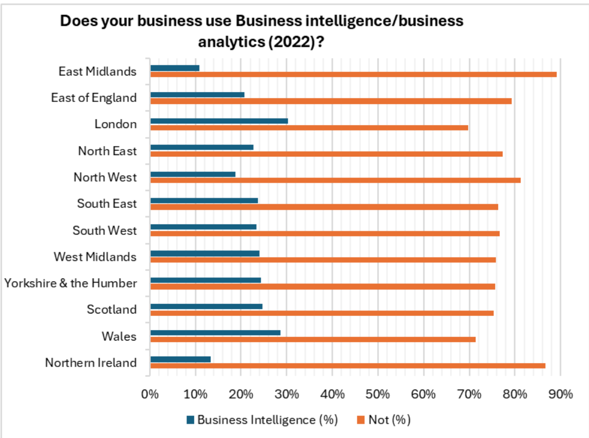
Appendix II: Use of ERP software, Customer Relationship Management (CRM) software and business intelligence/business analytics software by manufacturing SMEs across UK regions











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