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CASE STUDY COMPENDIUM

From Evidence to Action: Helping Manufacturing SMEs Go Digital and Green in the West Midlands

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Case study compendium

Four evidence-referenced cases of integrated, partial, constrained and selective adoption

1. Project background

This Action to Impact project builds directly on the earlier IRC-funded study FFTwo0012, which examined why manufacturing SMEs in the West Midlands were not fully embracing the “Triple Transition” of digitalisation, including AI adoption, net zero practices and productivity improvement. The earlier study drew on analysis of the Longitudinal Small Business Survey, interviews with manufacturing SME leaders and focus groups with regional stakeholders (Mahmood, Asghar and Kousha, 2026). This Action to Impact project has translated that evidence from interviews with manufacturing SME leaders into four evidence-referenced cases of integrated, partial, constrained and selective adoption.

2. About the cases

These anonymised cases show different pathways through digital and green adoption among manufacturing SMEs. They are based on interviews with business leaders and focus on the practical enablers, barriers, outcomes and lessons arising from each firm’s experience.

3. Case-selection rationale and criteria

Table 1: Case-selection overview

Case	Transition pathway	Reason for selection
Case 1	Integrated digital and green ¹ progress	Strong example of KTP-enabled transformation, leadership and change management
Case 2	Parallel digital and green initiatives	Partial adoption constrained by skills, finance and limited integration
Case 3	Green-led business model with constrained production digitalisation	Micro-manufacturer showing commercialisation, capacity, premises and funding barriers
Case 4	Integrated customer solutions with selective internal adoption	Advanced digital-green capability alongside manual bespoke production

¹ The interviews primarily used the terms “net zero”, “low carbon” and “carbon reduction”. Participants also discussed wider environmental practices, including waste reduction, resource efficiency, sustainable materials and environmental management. Consistent with the project title, “green transition” is used here as an umbrella term, while “net zero” is retained for evidence specifically concerning greenhouse-gas emissions and decarbonisation.

4. Case 1. Embedding expertise to accelerate digital and green transformation

Table 2: Case 1 summary

Firm type	Small steel fabrication manufacturer
Geography	Wider West Midlands region
Transition pathway	Increasing digital and green integration
Core issue	The firm demonstrated strong ambition for growth and digital transformation but lacked the internal capacity, time and specialist expertise required to transition from a paper-based production system.
Main enabler	A two-year Knowledge Transfer Partnership with an embedded university associate.
Evidence status	All operational, financial and environmental outcomes are participant-reported.

Business context and starting point

This is an established steel fabrication SME supplying to the construction and manufacturing sectors. When the current owner took over the business, its machinery, systems and working practices were described as outdated and heavily dependent on paper-based processes.

The owner's vision was to transform the company into a "*world-class manufacturing facility*" through continuous investment in people, processes, technology, buildings and accreditations. This transformation was self-funded and pursued through incremental improvements rather than major one-off interventions.

As the business grew, the limitations of its manual and paper-based systems became increasingly apparent. These processes made it more difficult to track production, maintain operational visibility and manage a growing volume of work efficiently.

Digital journey

The owner had identified paper-based production as a constraint but estimated that five to six years of internal effort produced only limited progress. A major turning point came through a Knowledge Transfer Partnership (KTP) with a university, which accelerated digitalisation through dedicated expertise and support. A full-time associate was embedded in the business for two years and was subsequently retained. Key initiatives included digitising production workflows and production visibility and developing bespoke manufacturing software tailored to the company's needs.

The transformation helped the company identify inefficiencies associated with manual and paper-based processes. The bespoke software developed through the KTP improved production visibility and supported more efficient workflow management. It also provided a stronger digital foundation for managing future growth.

Green journey

The company's green transition developed alongside its digital transformation, driven by a desire to improve efficiency, reduce costs and achieve ISO 14001 accreditation. Key initiatives included installing solar panels, monitoring energy and water usage, improving resource control and developing solar carports with battery storage planned as a future investment. The participant framed green action in commercial terms: the objective was to reduce environmental impacts without imposing an unrecoverable cost on the business.

The participant reported that these investments generated savings, with solar panels supplying around 40% of the company's electricity needs. Green initiatives were pursued not only for environmental reasons but because they delivered clear operational and financial benefits, supporting both business growth ambitions and progress towards its environmental goals.

How digital and green activity connect

The company's digital and green initiatives initially developed separately but later became connected through the planned production of solar carports. This connection emerged from the owner's wider ambition to build a more efficient and competitive manufacturing facility, where digitalisation supported growth and green investment needed to deliver commercial value. The carports were intended to be manufactured using the company's digitalised production system, creating a link between digital capability and a new green product opportunity. However, the solar-carport activity was still under development at the time of the interview.

Skills and organisational change

The main challenge was organisational change, particularly helping employees accept new ways of working. Resistance from employees required strong leadership, effective change management and sustained engagement to secure buy-in across the business. Key barriers included limited internal digital expertise, lack of time and specialist skills and the need for staff to adapt to new ways of working.

The KTP helped address these capability gaps by providing specialist knowledge, project management support and access to university expertise. Embedding the new culture took approximately two years, highlighting the long-term commitment required for successful organisational transformation.

Reported outcomes and remaining limitations

- Improved workflow visibility and production control
- Reduced reliance on inefficient manual and paper-based processes.
- Smoother and more efficient production processes
- Productivity gains from digitalisation
- Annual saving from green programme
- Retention of the KTP associate and development of a second KTP.
- Participant-reported energy and cost savings from solar and resource controls.
- Potential commercialisation of the bespoke software and solar-carport products.
- Continued need for system development and investment in digital technologies, AI and marketing.
- Digital transformation remained ongoing and was not fully complete

Policy and practice lessons

The case highlights several key lessons for policymakers, universities and SME leaders. Policymakers could improve awareness of support programmes such as KTPs, focus on communicating business benefits like productivity and cost savings, provide longer-term support and promote peer-to-peer learning. Universities can support SME innovation by building sustained partnerships, increasing awareness of knowledge exchange opportunities and embedding students and associates within businesses to address skills gaps. For SME leaders, the findings emphasise the importance of strong leadership, viewing digitalisation and sustainability as long-term investments, maintaining commitment throughout the transformation process and leveraging external collaborations to accelerate innovation and growth.

5. Case 2. Progressing digital and green initiatives without integrating them

Table 3: Case 2 summary

Firm type	Small manufacturer of industrial extrusion machinery
Geography	Wider West Midlands region
Transition pathway	Parallel digital and green initiatives
Core issue	The firm has introduced useful digital systems and energy-efficiency measures but lacks internal implementation capacity to connect and extend them.
Main enablers	Made Smarter advice, partial grant support, customer requirements and senior leadership.
Evidence status	All operational, financial and environmental outcomes are participant-reported.

Business context and starting point

The SME operates in a highly competitive global market supplying bespoke extrusion machinery internationally and exporting most of its output. It faces strong competition from lower-cost producers and expanded rapidly before contracting during weaker global market conditions. The SME was seeking to improve productivity and competitiveness through better systems, process improvements and new technology.

The managing director inherited spreadsheet-based processes, fragmented information and systems that do not integrate effectively. Years of incremental development have resulted in disconnected systems and no dedicated transformation resource. Workforce challenges, including an ageing workforce and shortages in engineering and software skills, added to these challenges. Economic uncertainty, tariffs and rising labour costs further constrain investment. Overall, the firm needed better-integrated systems and stronger internal capability to support future growth.

Digital journey

The firm is advancing its digital journey through participation in the Made Smarter programme, receiving advisory support and partial funding for digitalisation. It uses Salesforce Customer Relationship Management (CRM) extensively and has introduced a procurement and stock control system integrated with Sage accounting software, following Made Smarter guidance. This implementation aimed to improve stock visibility, reduce missing components and better connect stores with the shop floor, with the participant reporting a significant reduction in time required to book incoming goods. Barcode scanning and digital stock control have further improved efficiency. The business is also reviewing legacy systems to eliminate duplication and reduce costs. While awareness of AI, automation and Industry 4.0 is growing, adoption remains at an early stage. Future plans focus on integrating disconnected systems, increasing automation and investing in digital skills and capability.

However, implementation remained fragile because capability was concentrated in a small number of individuals. The employee leading the procurement-system implementation was leaving, while the managing director reported difficulty recruiting software and engineering skills.

Green journey

The firm's green journey has focused on practical energy-efficiency improvements, including upgraded boilers, lighting systems and heat-circulation fans identified through a building assessment. It has also introduced electric and hybrid vehicles into its fleet. Participation in a low-carbon support programme has supported these initiatives. The business completes EcoVadis assessments annually to meet customer requirements for evidence of environmental and responsible business practices. Solar energy has been considered but is constrained by leased premises and EV charging infrastructure has not yet been implemented. Green activity has been shaped by customer requirements, cost savings and practical operational improvements, alongside product innovation such as biodegradable polymers and energy-efficient machinery, rather than a formal net-zero strategy.

Relationship between the transitions

Digital and green initiatives have largely been pursued separately, with no formal projects integrating the two. This separation appears to reflect limited implementation capacity rather than a deliberate decision to keep the two agendas apart. At the time of the interview, the firm was focused on sales, avoiding further job losses and responding to volatile global conditions. Responsibility for new systems was also concentrated in a small number of senior managers, limiting the capacity to develop a more integrated approach. This is an important finding, showing that SMEs can make progress in both areas without a coordinated digital-green strategy. There are potential indirect links, as improved digital systems may support greater efficiency, resource monitoring and waste reduction. However, these connections had not yet been developed into an integrated approach within the firm.

Financial and policy pressures

The SME faces significant financial pressure following rapid growth and subsequent contraction, leading to redundancies and reduced investment capacity. Rising employment costs, including National Insurance increases, have further constrained hiring.

Externally, global volatility, tariffs and export dependency create uncertainty and limit long-term planning. Policy support is seen as increasingly difficult to access, with R&D tax credit changes and higher compliance burdens reducing their usefulness for SMEs.

Concerns are also raised about increased financial transparency requirements, which may disadvantage SMEs in competitive markets. Overall, these pressures are shifting focus from long-term transformation toward short-term operational survival.

Reported outcomes and remaining limitations

- Improved procurement and inventory efficiency
- Improved CRM use and reporting.
- Faster barcode-enabled booking of incoming goods has reduced the manual admin work.
- Better visibility of performance and customers via Salesforce
- Building energy-efficiency improvements and partial fleet electrification.
- No integrated digital-green project. Fragmented and poorly integrated systems
- Limited internal capacity for transformation delivery
- Dependence on a small number of implementation champions.
- Solar investment is constrained by tenancy.
- Difficulty recruiting and retaining digital/software skills
- Financial constraints limiting innovation investment
- AI adoption remains at an early stage
- R&D support and funding processes are viewed as complex and resource-intensive

Policy and practice lesson

This case shows that SME transformation depends on people, skills and sustained implementation rather than technology alone. It requires longer-term, practical policy support, simpler funding processes and better access to digital talent, with a focus on implementation ownership, skills retention and systems integration. Universities can support through placements and applied collaboration, while SME leaders should build internal capability, improve efficiency and use external partnerships where needed. For green investment, tenant-led initiatives may be constrained where landlords control infrastructure. Overall, success depends on coordinated, long-term support rather than short-term interventions.

6. Case 3. A green-led micro-manufacturer constrained in production digitalisation

Table 4: Case 3 summary

Firm type	Micro-manufacturer of bio-based alternatives to fossil-fuel plastic
Geography	WMCA area
Transition pathway	Green-led business model with constrained production digitalisation
Core issue	Environmental purpose is central to the business, but limited staff, older equipment, finance and premises control restrict production digitalisation and further green investment.
Main enablers	Sustainability-led business model, certified electricity and recognition of potential digital benefits.
Evidence status	Claims about emissions and material performance are participant-reported; no full life-cycle assessment had been completed.

Business context and starting point

The case firm is a small manufacturing startup developing bio-based alternatives to conventional plastic products, with sustainability embedded in its core business model. The business currently operates with a very small workforce and operates a manufacturing facility while focusing on achieving full commercialisation before expanding further. Growth and recruitment have been constrained by rising employment costs and wider economic pressures. Unlike many firms that have adopted sustainability as part of a broader transformation agenda, the firm was founded around environmentally sustainable products and processes, making sustainability a central element of its value proposition.

Digital journey

Digital adoption in the firm remains at an early stage. Digital systems are used for CRM, accounting and business administration to support sales, financial management and operations, but manufacturing processes remain largely non-digital. The participant distinguishes between digital administration and production, noting that second-hand equipment and high retrofitting costs constrain automation, monitoring and data integration. While the benefits of digitalisation are recognised, implementation in production is limited by resource, cost and infrastructure constraints.

Green journey

The firm's business model is sustainability-led from the outset, with the participant describing sustainability as being "at the heart" of the company. Sustainability is embedded in both its product strategy and operational

practices. The firm purchases electricity accompanied by a zero-carbon certificate and undertakes environmental practices such as waste separation and food-waste composting. Its core mission is sustainability-driven, reflected in the development of a bio-based material designed to replace fossil-fuel plastics and support home compostability. While solar energy is seen as a desirable next step, its adoption is currently constrained by the firm's status as a tenant rather than a property owner, limiting control over infrastructure investments. The firm also highlighted the limited availability of composting facilities in the UK, including industrial and home composting options.

The company reported that emissions from its own operations and purchased electricity were “basically at zero”. However, because a full assessment of the material's environmental impact from production to end of life had not been completed, its wider environmental benefits had not yet been fully assessed.

Relationship between the transitions

The firm does not currently integrate digitalisation and net zero through a dedicated initiative. However, the participant identified potential future links between the firm's sustainability orientation and future production digitalisation. Digital tools could support improved energy efficiency, waste reduction, production optimisation, environmental monitoring and learning about the material. These remain anticipated benefits because digital adoption in manufacturing is still at an early stage.

Skills, time and funding constraints

The firm faces significant skills, time and funding constraints affecting both production digitalisation and further green investment. The workforce has limited exposure to digitalisation, while the small team prioritises sales and product development, leaving little capacity for change projects. Digitalisation and automation are seen as costly and public funding is viewed as limited and administratively burdensome for a micro firm. External pressures such as rising labour costs, tariffs and economic uncertainty further reinforce short-term survival priorities. As a tenant SME, the firm also faces structural barriers to building-related green investments, including solar energy.

Reported outcomes and remaining limitations

- Digital administration through CRM and accounting systems.
- Green product purpose and certified electricity purchasing.
- Participant reported low emissions from the firm's own operations and purchased electricity.
- Sustainability embedded in the core product offering.
- Recognition of digitalisation's potential to improve efficiency and reduce waste.
- Very limited digitalisation of manufacturing operations
- No integrated digital-green project.
- Inability to invest in building-level green infrastructure due to tenancy constraints.
- No full Life-Cycle Assessment because of cost.
- Limited staff time, funding and implementation capacity.
- Potential future benefits from monitoring, data and process optimisation.
- Lack of automation and data integration.

Policy and practice lesson

The case highlights the need for more targeted support for micro-manufacturers, especially tenant SMEs facing structural barriers to green investment. The case also suggests that green-led manufacturing start-ups may require support that goes beyond standard SME advice, including help with commercialisation, production scale-up, affordable life-cycle assessment, verification of environmental claims and small-scale production digitalisation. This reflects the participant's account of trying to sell and improve the material while facing limited time, finance, production space, energy costs and manufacturing-specific digital capability. Policymakers could reduce administrative burdens and provide practical funding for digital and net-zero transformation. Solar schemes may require landlord engagement, while digital support could focus on small, high-impact use cases.

Policy design should also reflect SME constraints such as limited time, funding access, ageing equipment and premises ownership. Colleges and universities could strengthen manufacturing-focused digital and sustainability training and support workforce upskilling. SME leaders can view sustainability in environmental, social and financial terms and see digitalisation as a gradual enabler of efficiency and waste reduction.

7. Case 4. Delivering integrated digital and green solutions while retaining manual production

Table 5: Case 4 summary

Firm type	Small engineering manufacturer of industrial control systems and bespoke machinery
Geography	Wider West Midlands region
Transition pathway	Integrated customer solutions with selective internal adoption
Core issue	The firm has advanced digital engineering capability, but its own low-volume bespoke assembly remains appropriately manual.
Main enablers	Engineering expertise, apprenticeships, environmental management, external assessments and consultancy.
Evidence status	Customer outcomes and internal carbon reductions are participant-reported.

Business context and starting point

The firm is a long-established SME engineering, specialising in bespoke industrial control systems and special-purpose machinery. Its products contain robotics, programmable logic controllers (PLCs), supervisory control and data acquisition (SCADA) systems and advanced software. Operating across sectors such as automotive, energy, utilities, food and beverage and recycling, it delivers end-to-end services including design, manufacturing, software development, installation and support. Despite supplying advanced digital solutions to customers, its own low-volume, highly customised production processes remain largely manual.

Digital journey

Digital adoption is primarily concentrated in administrative, engineering and customer-facing functions rather than core manufacturing processes. The firm utilises enterprise systems (e.g., CRM, enterprise resource planning (ERP) and computer-aided design (CAD) systems), field-service tools and low-code platforms to support design, project management and service delivery, while also developing advanced digital solutions including machine learning applications, robotics and industrial control systems, for external clients. However, internal production remains largely manual, relying on paper-based schematics, hand assembly and conventional wiring methods. This creates a notable contrast between the firm's externally delivered digital sophistication and its internally traditional manufacturing practices. Initial steps are being taken to integrate AI tools to enhance operational efficiency and maintain competitiveness.

Green journey

The firm demonstrates a structured approach to environmental sustainability, evidenced by ISO 14001 certification, a formal carbon-reduction plan and participant reported year-on-year carbon reductions since 2018. Key initiatives include replacing petrol and diesel vehicles with electric and hybrid models, installing electric vehicle charging points and plans to explore renewable energy options such as solar panels. In addition,

its environmental risk assessment extends beyond its direct footprint, recognising that failures in control systems used across sectors such as power, water, waste and industrial emissions could have significant environmental impacts.

How digital and green activity connect

Digitalisation and sustainability are seen as closely linked, primarily through their role in reducing waste, improving efficiency and lowering energy use. While no formal internal digital-green programme exists, the firm develops client-facing solutions that integrate digital technologies with environmental benefits, such as machine learning to reduce waste, sensor systems to optimise resource use and digital tools to monitor energy consumption. Overall, these projects show how digital technologies can support productivity, resource efficiency and lower energy use.

Why internal production remains manual

Internal production remains largely manual due to the firm's focus on highly customised, low-volume output, where automation offers limited efficiency gains. With relatively low volumes of bespoke products produced annually, traditional methods are considered effective in ensuring quality. Cultural preferences for established practices further reinforce this approach, resulting in digitalisation being concentrated in engineering, design and management rather than manufacturing operations.

Skills and external support

Skills shortages are identified as a significant challenge, particularly as increasing technological complexity leaves the firm uncertain about adopting digital solutions. The company addresses this through internal talent development, including a long-standing apprenticeship programme and supplements this with external support from initiatives such as KTPs and industry partnerships. It also received useful consultancy through the Business Energy Efficiency Programme (BEEP) and Made Smarter, though the participant described support as difficult to find and insufficiently flexible. The participant also noted that the firm sits across overlapping regional and local support areas, with different pockets of funding available in each. Cybersecurity regulation was identified as a growing barrier because secure data connectivity is increasingly essential to digital manufacturing. Drawing on this firm's experience, the case suggests that consultancy support can be valuable, but limited administrative capacity may reduce SMEs' ability to identify and use available support schemes.

Reported outcomes and remaining limitations

- Advanced digital and energy-saving solutions delivered to customers.
- Strong use of digital systems across administrative, engineering and service functions
- Internal environmental management and fleet decarbonisation. Ongoing reductions in carbon emissions.
- Participant-reported year-on-year carbon reductions since 2018
- Delivery of customer solutions that improve efficiency, reduce waste and enhance productivity
- Manual assembly retained where it supports bespoke quality and flexibility.
- Apprenticeship-based skills pipeline.
- Difficulty accessing support, with different pockets of funding available across overlapping regional and local areas.
- Increasing cybersecurity and emissions-reporting requirements across supply chains.
- Predominantly manual manufacturing processes
- Cultural resistance to changing established practices
- Persistent industry-wide skills shortages
- Funding access challenges, including fragmentation and inflexibility
- Growing administrative burden associated with collecting and reporting emissions data

Policy and practice lesson

Adoption should be judged against the firm's production model rather than by the amount of visible automation on the shop floor. Support could help firms identify the right solution, not prescribe a fashionable technology. For innovative SMEs, simpler support structures and predictable R&D incentives may matter as much as equipment grants.

Policymakers could simplify and better promote support schemes while improving funding accessibility and flexibility for SMEs, alongside strengthening innovation incentives such as R&D tax support. Practical consultancy and continued investment in skills development remain critical, while SME leaders could adopt digitalisation and sustainability where they fit the firm's production model and support competitiveness and changing customer requirements.

8. Cross-case synthesis

The four cases demonstrate that digital and green transition is not a single linear process. Case 1 shows increasing integration supported by embedded expertise and leadership. Case 2 shows parallel progress without integration. Case 3 shows a green-led business model with constrained production digitalisation. Case 4 shows advanced digital-green capability in customer solutions while retaining manual internal assembly for sound commercial reasons.

Table 6: Cross-case synthesis

Case	Pathway	Digital evidence	Green evidence	Integration
1	Increasing digital-green integration supported by a KTP	Digitised production workflows; bespoke software; improved job tracking; reduced reliance on paper	Solar panels, planned battery storage, monitored resource use, ISO 14001, participant-reported cost savings	Digitalised production supports the planned manufacture of solar carports
2	Parallel but unintegrated transitions	CRM (Salesforce), procurement system integration, barcode systems, improved inventory efficiency	Energy-efficiency upgrades (lighting, boilers), partial fleet electrification, EcoVadis compliance	No formal integration; only indirect links through efficiency and reporting
3	Green-led business model with constrained production digitalisation	CRM/accounting used for administration; limited manufacturing digitalisation due to cost, equipment and capacity constraints	Core business model sustainability (bio-based materials), renewable electricity, low operational emissions (reported)	No current integration; digital tools seen as potential future enablers of efficiency, monitoring and waste reduction
4	Integrated externally, selective internally	ERP and CAD systems internally; AI, robotics and machine learning mainly in customer solutions; internal production largely manual	ISO 14001, carbon reduction plan, fleet electrification, emissions monitoring, future solar plans	Strong integration in customer solutions (waste, energy reduction); limited internal integration due to bespoke production model

9. Methodological and anonymisation note

The cases are based on interviews with manufacturing SME leaders and have been anonymised for publication. Company names, precise locations and other identifying or commercially sensitive details have been removed or generalised.

Case details have been shortened, paraphrased or presented at a higher level to reduce identification risk while retaining their substantive meaning.

Operational, financial, productivity, energy and environmental outcomes are participant-reported and have not been independently verified.

The four cases are illustrative examples drawn from SME interview evidence collected through the wider FFTwo0012 study (Mahmood, Asghar and Kousha, 2026). They show some specific place-based constraints, including tenancy and building-level green investment barriers in Cases 2 and 3, limited local composting infrastructure in Case 3, and overlapping local and regional funding areas in Case 4. The broader place-based priority is developed further in the accompanying Policy and Practice Framework using the wider FFTwo0012 evidence base, including regional stakeholder focus groups.

REFERENCE

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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