

# Made Smarter Adoption Research Project

## Summary Report

Cambridge Industrial Innovation Policy, Institute for Manufacturing, University  
of Cambridge

February 2023

# About this report

This summary report highlights the key findings from the Made Smarter Adoption Research Project, commissioned by DBT to provide expert advice on improving the impact and measurement of the Made Smarter Adoption (MSA) programme towards the achievement of its long-term objectives.

The summary report findings are based on the authors' interpretation and analysis of the evidence reviewed, including insights and data shared by DBT, interviews with relevant stakeholders and results from a survey of beneficiary firms carried out by BMG Research. However, these findings do not necessarily represent the view of DBT; nor do they imply the expression of any opinion on their behalf.

Any mention of firm names or commercial products does not constitute an endorsement by the authors, their affiliated institutions or DBT.

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## Report commissioned by:



Department for  
Business & Trade

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This report was delivered through IfM Engage, the knowledge transfer arm of the Institute for Manufacturing (IfM), University of Cambridge.



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# Abbreviations

<b>DBT</b>	Department for Business and Trade
<b>BELFIRST</b>	Statistics on Belgian and Luxembourg Companies
<b>BSD</b>	Business Structure Database
<b>BSI</b>	British Standards Institution
<b>CATI</b>	Computer-assisted telephone interviewing
<b>CRM</b>	Customer relations management
<b>EDB</b>	Economic Development Board of Singapore
<b>ERP</b>	Enterprise resource planning
<b>GVA</b>	Gross value added
<b>IDT</b>	Industrial digital technology
<b>MSA</b>	Made Smarter Adoption
<b>SIRI</b>	Smart Industry Readiness Index
<b>SME</b>	Small and medium-sized enterprises
<b>ToC</b>	Theory of change

# Foreword from the Minister

**Nusrat Ghani MP**, Minister of State for Industry and Economic Security at the Department for Business and Trade and Minister of State for the Investment Security Unit at the Cabinet Office.



Made Smarter Adoption is the UK's successful manufacturing digital adoption programme. It ensures that manufacturing SMEs benefit from industrial digital technologies that can improve efficiency and productivity. Since its launch in November 2018, it has reached over 4,000 manufacturing SMEs. The Adoption programme is overseen by the Made Smarter Commission, which I co-chair with Brian Holliday, the Managing Director for Siemens Digital Industries. The work of the Commission reflects the shared ambition of government and industry for manufacturing growth and productivity.

I am delighted that, as part of the 2023 Autumn Statement and Advanced Manufacturing Plan, the Government has committed up to £16 million in 2025-26 to offer the scheme to all English regions. We will also be working with the devolved Governments of Scotland, Wales, and Northern Ireland to explore expanding the programme further from 2026-27. This could see the programme reach over 2,500 more manufacturing SMEs each year, across the whole of the UK. At its core, the Adoption programme is led by regional teams, tailoring support for local manufacturing SMEs as they begin their digital manufacturing journeys.

This research demonstrates the benefits delivered by the Made Smarter Adoption programme for businesses in this key sector of the UK economy. Of firms that adopted digital technologies, 97% reported benefits, including improved production and planning efficiency, and reduced costs.

The report shows the value of social research in ensuring that policymaking is evidence-based, and I welcome the Institute for Manufacturing's expert assessment on how we may best improve the evaluation of this programme. In doing so, we will continue to hear and reflect the voice of business in Government policies.

# Executive summary

- The Department for Business and Trade (DBT) commissioned this study to provide expert advice on improving the impact and measurement of the Made Smarter Adoption (MSA) programme to aid the achievement of its long-term objectives.
- Extensive desk-based research, a survey of beneficiary firms and interviews with regional business advisers have been used for this purpose.
- In total, 155 interviews were conducted via CATI (computer-assisted telephone interviewing) with Made Smarter beneficiaries between 9 September and 18 October 2022 (22 in the North East, 79 in the North West, 28 in the West Midlands and 26 in Yorkshire and the Humber).
- Analysis of the evidence base led to the construction and critical assessment of the programme's theory of change (ToC) and the analysis of how MSA can best measure productivity impacts, how it leads to productivity improvements in the short term, and how short-term improvements to productivity relate to longer-term impacts, given all of the factors that can impact productivity over time.

## How does Made Smarter Adoption (MSA) work? Awareness, access, and satisfaction

### Awareness of the programme

- The most common way for beneficiaries to find out about the programme was through a direct approach from a business adviser, followed by access through peers/colleagues.

### Access to the programme, digital readiness, and motivation

- Out of the 155 firms surveyed, 89% said it was easy to get information about the Made Smarter programme. A total of 63% believe that the programme is well suited to businesses like theirs based on their digital maturity, while 16% of all respondents do not think that digital readiness is relevant to the programme's ability to meet firms' needs, 8% think that the programme is better suited to firms with higher digital readiness, 8% believe that the programme is better suited to firms with lower digital readiness, and 5% did not provide a specific answer.
- Self-reported digital maturity among all 155 consulted firms varies between "very mature/very high digital readiness" (10%), "fairly mature/high digital readiness" (43%), "fairly immature/low digital readiness" (32%) and "not at all mature/very low digital readiness" (16%).



- The top three reasons for contacting Made Smarter included: gaining an understanding of how the business might benefit from digitalisation (85%); accessing financial support to invest in new capital equipment (81%); and accessing support to develop a digitalisation strategy (70%).

## Satisfaction with the programme

- Beneficiary satisfaction across the five investigated categories varied from 86% to 38%. However, this does not mean that firms were dissatisfied with the programme; rather, it highlights difficulties answering the question, with dissatisfaction rates varying between 6% and 10% for all five categories and “do not know/too difficult to say” ranging from 6% to 56%.
- For the small percentage of firms that expressed dissatisfaction with their experience of the programme, the majority reported that the programme generally has not helped the business or has not led to any support or improvement.
- A sample of 30 firms (out of 79 total contacts received) from the North East, North West, and Yorkshire and the Humber were asked how satisfied or dissatisfied they were with their experience of the leadership and management programme to date. A total of 80% of respondents mentioned being “fairly” or “very satisfied”, while 17% reported being “neither satisfied nor dissatisfied” and 3% answered “do not know”.
- A sample of 4 firms (out of 15 total contacts received) reported using the student placement/digital intern support service. Overall, 50% of them reported being “fairly satisfied” with their experience (2 firms), while 25% (1 firm) was “neither satisfied nor dissatisfied” and 25% (1 firm) expressed being “fairly dissatisfied” with the way the scheme went for them.
- A sample of 23 firms in the North West (out of 116 total contacts received) reported participation in the organisational workforce development programme. Of the sampled firms, 22% mentioned being “very satisfied” with their experience in the programme, while 48% reported being “fairly satisfied”, 26% “neither satisfied nor dissatisfied” and 4% “fairly dissatisfied”.
- All 155 surveyed firms received some form of adviser-based support (out of 782 total contacts received). A total of 49% of respondents mentioned being “very satisfied” with the advice-based support they had received, while 35% were “fairly satisfied”, 8% were “neither satisfied nor dissatisfied”, 6% reported being “fairly dissatisfied”, 1% were “very dissatisfied” and 1% could not answer the question.
- A sample of 46 firms (out of 147 total contacts received) went through the grant application process, with 100% succeeding in getting a grant. Overall, 63% of respondents mentioned being “very satisfied” with their experience of the advice and support received as part of the grant application process, with 35% feeling “fairly

satisfied”, 2% being “neither satisfied nor dissatisfied” and no firms expressing any dissatisfaction.

## How are firms benefiting from the Made Smarter Adoption programme?

### Technology adoption

- Around 90% of the firms that have participated in a specific service line of Made Smarter Adoption have adopted digital technologies. Automation and data management solutions are among the most popular digital applications adopted by participant firms.
- By region, the highest ratio of technology adoption is found in the North East, which is also the region where firms reported the highest digital readiness prior to joining MSA. The lowest ratio of adoption is observed in Yorkshire and the Humber, where firm support only started in January 2022, and is also the region which reported the lowest digital readiness prior to joining MSA.
- The main business area where firms are using digital technologies is production and assembly (85%), followed by materials and energy management (52%).

### Benefits of technology adoption

- Most of the firms (97%) that adopted digital technologies reported benefits. The most frequent benefits reported following adoption were: improved production planning efficiency (76%), better use of data (74%) and cost reductions (69%).

### Additionality

- The participant firms recognised the value of MSA and most of them identified that without the financial assistance provided they would have worked on a smaller scale, at a slower pace or to a lower quality in their digitalisation projects (partial additionality).

### Business growth

- As expected, considering the short time frame within which firms have participated in the programme, business growth impacts, such as increased or maintained turnover or productivity, were reported to a lesser extent than short-term benefits. Less than half of all respondents reported these impacts as a result of their participation in MSA. The most widely reported were: increased productivity (45%), maintained profits (28%) and maintained headcount (28%). The median value of profits safeguarded was £60,000, with a mean value of £163,000. On average, 1.5 employee positions were safeguarded as a result of participating in Made Smarter Adoption. Participation in MSA seemed more effective in safeguarding than increasing profits, headcount and exports, which is

understandable considering the business disruptions and economic uncertainty between 2020 and 2022.

- For those firms that reported increased turnover (23%), the median value of the increase was £40,000, while the mean value was £60,000.
- Firms awarded a grant were more likely to report business growth impacts, particularly increases in productivity.
- In terms of the type of technology, firms that adopted either printing/scanning or data-related solutions were more likely to report turnover and productivity increases.
- In terms of business area, projects involving product and process design and development were more likely than other technology adoption projects to generate productivity and export increases.

## Skills

- Significant impacts were identified in skills development, with 71% of the firms reporting either moderate or significant positive impacts.

## Carbon emissions

- A third of the firms surveyed reported positive impacts on carbon emissions. The main changes that have had positive impacts include: fewer product defects, more efficient use of logistics and lower energy use.
- Grant awardees were more likely to report positive impacts on carbon emissions.

## Diversity

- Firms with equal or greater female representation in leadership were more likely to report positive business growth impacts than those without female representation, particularly in safeguarding turnover and increasing profits.

## Revisiting the Made Smarter Adoption theory of change (ToC)

- Four main opportunity areas were identified in the programme design:
  1. **Improving the definition of programme objectives:** Steer's North West Pilot evaluation highlighted the need to improve the "SMARTness" of the programme objectives. As the programme is rolled out to other regions, it is important to define measurable objectives for each region and for the programme as a whole.

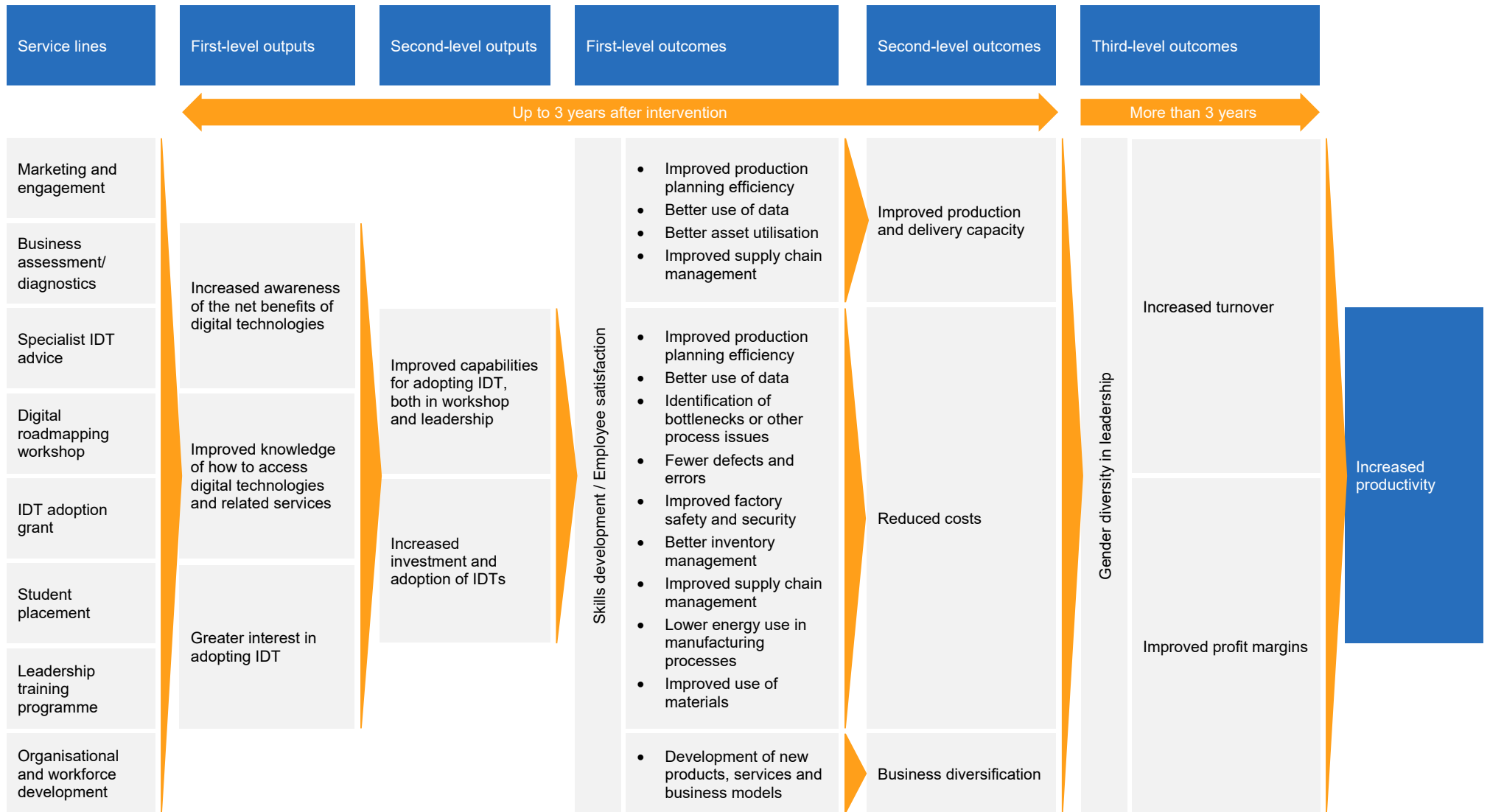
## 2. Expanding the available services lines:

- **Supply chains and sustainability:** Strengthening supply chains and reducing carbon emissions from the manufacturing sector are among the key expected impacts contained in the theory of change (ToC) of the MSA programme. However, in practice, the programme does not have clear inputs or activities targeting these impacts. This gap could be addressed by including specific work streams on these topics across different service lines, or at least as part of the specialist advice provided.
  - **Digital skills of the workforce:** The survey results and adviser interviews show that skills shortages are one of the most important barriers faced by firms adopting and benefiting from IDT technologies. The majority of interviewees see student placements as a useful and missed opportunity to address skills gaps in SMEs. MSA could consider reinstating student placements (in a format that can address the key operational challenges around resource needs and matching difficulties between firms and interns), as well as expanding the programme's support for skills development at the shop-floor level. This could include developing new service lines (e.g. online and in-person training courses) or partnering with existing programmes and services.
  - **Networking:** Firms could benefit from a specific networking service line within the Made Smarter Adoption programme. This could make it easier for them to connect and share experiences with other firms, universities and technology providers across regions, without the need for direct involvement and guidance from business advisers. In terms of networking for staff involved in the delivery of the Made Smarter Adoption programme, the consulted advisers confirmed that, although some communication exists between some regions, there are opportunities to formalise spaces for experience sharing across advisers nationally, for example, annual conferences or meetings where advisers and managers can share their experiences.
3. **Increasing grant support flexibility:** Insights from adviser interviews suggest that the size of the grant is right for the current needs of the beneficiary firms based on their digitalisation readiness level when first engaging in the programme. In exceptional cases involving larger investments in advanced technologies, larger grants or 0% interest loans may be needed, either as part of MSA or when referring firms to alternative support. Conversations with business advisers also highlighted the opportunity to support firms throughout their digitalisation journey by using grants for more than one project or providing interest-free loans for second projects.

4. **Ensuring a minimum level of delivery standardisation across regions:** There are opportunities to standardise the way that delivery objectives and funding are defined/allocated at regional level; to homogenise the definition of what constitutes a service line, as established by the MSA programme; to standardise the use of digital readiness assessments; and to systematise firm-level data collection for comparability.
- Various opportunities have been identified around the way the MSA programme performance is monitored and evaluated, particularly in four main areas:
    1. **Beneficiary firms' survey design:** The survey questionnaire is comprehensive and relevant; however, there are opportunities to increase its focus on understanding outputs, outcomes and impacts. Questions related to satisfaction with the programme represent approximately a third of the questionnaire; and, despite its relevance, most of this information could be collected more effectively by the regions as part of their regular monitoring of the programme.
    2. **Case studies' selection:** We recommend following a sequential design, using findings from the survey data to select case studies. For example, different pathways to impact could be identified by analysing the relationships between interventions and different impacts reported by firms. Case studies would then provide qualitative insights on the particular conditions that shape these pathways.
    3. **Diversity in firms:** Diversity in firms in this project was only captured in leadership positions; however, a more comprehensive approach would include asking the gender and ethnic background of the staff involved in MSA and whether the firm has a diversity and inclusion policy in place.
    4. **Long-term quantification of programme impact:** The difficulty inherent in collecting productivity data from firms was highlighted during this project. Insights from adviser interviews indicate that turnover and profit data tend to be easier to capture from firms. An opportunity exists to link survey data with broader firm databases, for example, collaborating with the ONS to identify participant firms in the Annual Business Survey data. Estimating broader long-term economy impacts based on firm-level data was another challenge identified in this project. Based on common practices followed in national and international impact evaluations, some ways to improve the counterfactual impact evaluation include:
      - Using other databases, such as Fame, to link evaluation data to standardised measures of turnover and other firm characteristics that may help to build a matching score;
      - Converting turnover to gross value-added data using the ONS Annual Business Survey data; and

- Considering that long-term impacts on variables such as gross value added and productivity may take at least 3 years to be realised.
5. **Short-term qualitative impact assessment through local advisers:** While long-term economy impacts based on firm-level data might not be fully visible before at least 3 years, there are opportunities to do qualitative assessments of business digital readiness and maturity by employing standard tools and methodologies.
- **A firm-level pathway towards productivity improvements:** A productivity-focused theory of change is proposed to summarise how MSA service lines may impact firm productivity in the mid- to long term (Figure 1).

**Figure 1: made smarter adoption firm-level pathway towards productivity**



Source: Cambridge Industrial Innovation Policy, 2023.

## Recommendations

Recommendations have been categorised into three main areas: (i) suggested changes to the programme's theory of change; (ii) recommendations on programme design; and (iii) recommendations on the future programme impact monitoring and measurement approach.

### (i) Suggested changes to the programme's theory of change

- Based on the analysis presented in this report, Figure 2 summarises the suggested theory of change for the Made Smarter Adoption programme, which could be adopted by the MSA team in future. The ToC aims to help improve the logic between objectives, inputs, activities, outputs, outcomes and impacts, and to help build the impact narrative of the programme.

### (ii) Recommendations on programme design

- Define measurable programme objectives.
- Formalise Made Smarter Adoption's "one-stop-shop" role.
- Expand service lines to cover sustainability, networking, supply chain management and shop-floor digital skills. Grants' flexibility.
- Allow grants to be used in multiple projects, enable funding for larger projects when needed and create specific business account management roles.
- Define a minimum level of standardisation, centralise duplicated processes and enable the diffusion of best practices.

### (iii) Recommendations on the future programme impact monitoring and measurement approach

- Shorten and re-focus beneficiary firms' survey to focus on understanding outputs, outcomes and impacts.
- Leverage programme website for collecting monitoring data.
- Leverage regional advisers to collect relevant case studies and carry out short-term qualitative impact assessments.
- Collect only tangible impact data from firms (turnover, profit and employment) and establish a multi-metric approach to long-term impact measurement.



**Figure 2: Suggested theory of change for the made smarter adoption programme**



Source: Cambridge Industrial Innovation Policy, 2022.

# 1 Introduction

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Made Smarter is the UK's national Industry 4.0 initiative. It was set up to drive “innovation, rapid adoption and stronger leadership” in industrial digitalisation to support the UK's ambition of becoming a world leader in Industry 4.0 by 2030.<sup>1</sup>

There are two main strands of work in the Made Smarter initiative. The first one is the £32 million Made Smarter Adoption (MSA) programme in the North West, North East, West Midlands, and Yorkshire and the Humber, which focuses on the adoption of industrial digital technologies (IDTs).<sup>2</sup> The second strand is the £147 million Made Smarter Innovation Challenge, which focuses on the development of IDTs.

## 1.1 Made Smarter Adoption (MSA)

The Made Smarter Adoption (MSA) programme was launched in November 2018. It was initially set up as a pilot aimed at helping up to 3,000 manufacturing SMEs based in North West England to adopt industrial digital technologies by offering specialist technology advice, management leadership training and access to matched funding.

Until October 2021, the programme had engaged with more than 1,300 SMEs in the North West.<sup>3</sup> Over 500 of these received intensive support and more than 180 undertook match-funded transformation projects. In addition, 62 SME manufacturing leaders in the North West were undertaking Made Smarter leadership and management training across five cohorts at three North West universities.<sup>4</sup>

The results from the pilot programme's independent interim evaluation show that businesses qualitatively report benefits to productivity relating to the streamlining of activities, reduced production time and waste, and reduced manual processes.<sup>5</sup> Participation in the pilot was statistically significantly correlated with turnover increase (6.5%) and employment increase (3.9%) against a counterfactual.<sup>6</sup>

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<sup>1</sup> Made Smarter website: <https://www.madesmarter.uk/>

<sup>2</sup> Made Smarter Adoption builds on the North West Pilot that ran between November 2018–March 2021 and had a budget of £20 million. The Pilot was then extended to four English regions (including the North West) for April 2021–March 2022 with a budget of £8 million. Following this a further £24 million has been allocated to continue this extension annually for the next 3 years from April 2022–March 2025.

<sup>3</sup> The North West Pilot finalised at the end of March 2021, but activity in the North West continued under the full MSA programme into 2021 and still continues to this date.

<sup>4</sup> Policy Links (2021). [Driving technology diffusion in the UK: Industry 4.0 and the Made Smarter Programme](#). With data provided by DBT.

<sup>5</sup> Steer (2021). A Process and Impact Evaluation of the “Made Smarter” North West Adoption Pilot. Report for the Greater Manchester Combined Authority.

<sup>6</sup> Ibid.

## 1.2 Made Smarter Innovation Challenge

Alongside support for adoption, the UK government is also investing £147 million through a Manufacturing Made Smarter Challenge to drive innovation in new digital solutions. The challenge has launched a number of R&D competitions, including a £30 million “Fast Start”, which supported projects including the Digital Sandwich, a blockchain-based system for food-supply-chain security. A second £20 million competition focusing on digitalising supply chains opened for applications in July and closed in October 2021.<sup>7</sup>

The challenge also launched programmes on research centres, innovation hubs and accelerators. Research centres will develop cross-cutting research across the challenge’s four priority themes (smart connected factories; connected and versatile supply chains; design, make, test; and adaptable, flexible manufacturing operations and skills).<sup>8</sup> Innovation hubs will include a national network of test beds, living labs and other facilities to support the development, demonstration and testing of new solutions for digitising manufacturing processes. Accelerators will enable innovative digital technology start-ups and scale-ups to produce new solutions or adapt their technology solutions for problems faced by UK manufacturers. A first Made Smarter Technology Accelerator led by Digital Catapult has been launched.

## 1.3 Aims and objectives

In this context the DBT has commissioned this study to provide expert advice on improving the impact and measurement of the Made Smarter Adoption (MSA) programme to aid the achievement of its long-term objectives. The objectives of the project are:

1. To suggest improvements to the current theory of change (ToC) for the programme following collection of the latest evidence on the workings of the programme between April 2021 and March 2022, and the outputs of the evaluation report of the North West Pilot of January 2019–March 2021, including the beneficiary survey results and case studies undertaken during the pilot;
2. To analyse how the MSA programme can best measure productivity impacts, how it leads to productivity improvements in the short term, and how short-term improvements to productivity relate to longer-term impacts, given all of the factors that can impact productivity over time; and
3. To make recommendations on how to maximise the longer-term impacts of the programme in this context.

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<sup>7</sup> Policy Links (2021). Op. cit.

<sup>8</sup> Policy Links (2021). Op. Cit.

## 1.4 Approach

The approach followed in this study involved desk-based research, a survey of 155 beneficiary firms, and interviews with 8 Made Smarter business advisers, divided into 6 tasks:

- **Task 1.** Project scoping.
- **Task 2.** Review of the theory of change and logic model of the Made Smarter programme.
- **Task 3.** Review of monitoring and evaluation data and approaches to facilitating a better understanding of the Made Smarter programme.
- **Task 4.** Survey of beneficiary firms.
- **Task 5.** Interviews with Made Smarter business advisers.
- **Task 6.** Preparation of final report.

## 2 Beneficiary firms' survey methodology

In July-September 2022 BMG Research carried out fieldwork for the Made Smarter Adoption Research Project. The research was undertaken in four English (Government Office) regions:

- The North West
- The North East
- The West Midlands
- Yorkshire and the Humber

### 2.1 Survey sample

- Contacts were supplied to BMG Research by the local growth companies delivering Made Smarter in each of the regions. Table 2-1 shows a summary of the contacts received.
- In total, 155 interviews were conducted via CATI (computer-assisted telephone interviewing) with Made Smarter beneficiaries between 9 September and 18 October 2022, out of 400 companies contacted (38.75% response rate, see Table 2-2).

**Table 2-1: Sample frame – summary of the contacts received**

Region	Grant	Student placement	Workforce development	Leadership and management	None of these	Total
North East	34	0	0	55	0	59
North West	60	0	116	7	374	515
Yorkshire	13	13	0	17	94	121
West Midlands	40	2	0	0	46	87

Please note: the numbers given for each type of support do not add up to the total, as some records are included in more than one type of support.

- Of all the contacts supplied, 23% were removed from the sample frame, for a number of reasons. This is summarised in Table 2-2. The main reason for removing contacts was the absence of a valid telephone number (81%), while the remainder were removed because they were duplicate contacts.
- A very high proportion of contacts (99%) had an email address. Although BMG Research did not communicate directly with beneficiaries via email, all beneficiaries

were emailed by their local growth company in advance of the approach to take part in the survey.

- No quotas were set for the survey, and BMG Research aimed to maximise the response rate over the fieldwork period. Repeated call-backs were made to contacts until a conclusive call outcome was achieved. These call-backs were made at different times and on different days of the week in order to maximise the opportunity to reach the appropriate person. Once a contact had been called 15 times, it was removed from the calling list.
- Interviews averaged around 35 minutes.
- Based on the number of available contacts (782), the number of completed interviews represented a response rate of 20%. A further 20 partially completed interviews were incorporated in the data. These were flagged in order to filter them out where necessary.

**Table 2-2: Call outcomes for Made Smarter Adoption Evaluation**

By region	North East	North West	West Midlands	Yorkshire and the Humber	Total
<b>Completes</b>	22	79	28	26	155
<b>Part-completes (up to at least Q6)</b>	1	8	5	6	20
<b>Appointments</b>	0	2	0	1	3
<b>Refusals</b>	4	31	5	12	52
<b>Gatekeeper refusals</b>	1	2	0	0	3
<b>Soft appointments</b>	3	43	4	6	56
<b>No recall of support</b>	1	28	1	3	33
<b>Interaction with programme too limited for meaningful feedback</b>	1	30	6	16	53
<b>Too early for meaningful feedback</b>	0	10	4	2	16
<b>Still in the application phase/yet to apply</b>	0	5	1	3	9
<b>Total contacted</b>	33	238	54	75	400
<b>Unobtainable/wrong number</b>	1	8	4	2	15
<b>Other (no contact yet/at multiple attempts)</b>	25	269	29	44	367
<b>Total number of contacts in circulation</b>	59	515	87	121	782
<b>Response rate on contacted sample</b>	67%	33%	52%	35%	39%

## 2.2 Regional differences

- Regions have been given freedom to implement bespoke versions of Made Smarter Adoption and refine their approaches with autonomy. As a result, the Made Smarter offer differs slightly within each region. Below is a brief summary of differences observed in each locality (Table 2-3):
  - The North West – this was the only region in which the workforce development element of the initiative was offered. The pilot scheme was run in this region.
  - The North East – a holistic package of support was delivered to accommodate funding levels that were well below those provided to the North West. All businesses signing up to the programme were offered a revenue grant of £3,500, although not all businesses took this up. Some businesses applied for a capital grant over and above the revenue grant. To take part in the programme, and to be eligible for the revenue grant and advice, all businesses had to attend the leadership and management workshops.
  - The West Midlands – the leadership and management support was not made available here.
  - Yorkshire and the Humber – the support provided to surveyed firms was limited to the duration of the regional pilot between January and mid-March 2022. Full MSA implementation currently in preparation.

**Table 2-3: regional differences in the delivery of the made smarter adoption programme**

	Specialist IDT advice	Grant-funded projects	Student placements/digital internships	Leadership and management programme	Organisational and workforce development
<b>North West</b>	Y	Y	Y	Y	Y
<b>North East</b>	Y	Y	Y	Y	N
<b>Yorkshire and the Humber</b>	Y	Y	Y	Y	N
<b>West Midlands</b>	Y	Y	Y	N	N

Y: Yes; N: No

## 3 How does Made Smarter Adoption work? Awareness, access and satisfaction

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### Key messages

- Results from a previous impact evaluation of the North West Pilot published in October 2021, and the beneficiary firms' survey questionnaire employed by that study, have been used as the basis to create an updated theory of change (ToC) for Made Smarter Adoption (MAS). The programme includes five main activities to support SMEs: marketing and engagement; registration and initial assessment; further assessment and support; roadmapping workshops; and specific industrial digital technology adoption support, including grants, student placements, participation in a leadership training programme and organisational and workforce development support.

#### **Awareness of the programme**

- The most common way for beneficiaries to find out about the programme was through a direct approach from a business adviser, followed by access through peers/colleagues.

#### **Access to the programme, digital readiness and motivation**

- Of the 155 firms surveyed, 89% said it was easy to get information about the Made Smarter programme. A total of 63% believe that the programme is well suited to businesses like theirs based on their digital maturity, while 16% of all respondents do not think that digital readiness is relevant to the programme's ability to meet firms' needs, 8% think that the programme is better suited to firms with higher digital readiness, 8% believe that the programme is better suited to firms with lower digital readiness and 5% did not provide a specific answer.
- Self-reported digital maturity among all 155 consulted firms varies between "very mature/very high digital readiness" (10%), "fairly mature/high digital readiness" (43%), "fairly immature/low digital readiness" (32%) and "not at all mature/very low digital readiness" (16%).
- The top three reasons for contacting Made Smarter included: gaining an understanding of how the business might benefit from digitalisation (85%); accessing financial support to invest in new capital equipment (81%); and accessing support to develop a digitalisation strategy (70%).



### **Satisfaction with the programme**

- Beneficiary satisfaction across the five investigated categories varied from 86% to 38%. However, this does not mean that firms were dissatisfied with the programme; rather, it highlights difficulties answering the question, with dissatisfaction rates varying between 6% and 10% for all five categories and “do not know/too difficult to say” ranging from 6% to 56%.
- For the small percentage of firms that expressed dissatisfaction with their experience of the programme, between 60% and 90% reported that the programme has generally not helped the business or has not led to any support or improvement.
- A sample of 30 firms (out of 79 total contacts received) from the North East, North West, and Yorkshire and the Humber were asked how satisfied or dissatisfied they were with their experience of the leadership and management programme to date. A total of 80% of respondents mentioned being “fairly” or “very satisfied”, while 17% reported being “neither satisfied nor dissatisfied” and 3% answered “do not know”.
- A sample of 4 firms (out of 15 total contacts received) reported using the student placement/digital intern support service. Overall, 50% of them reported being “fairly satisfied” with their experience (2 firms), while 25% (1 firm) was “neither satisfied nor dissatisfied” and 25% (1 firm) expressed being “fairly dissatisfied” with the way the scheme went for them.
- A sample of 23 firms in the North West (out of 116 total contacts received) reported participation in the organisational workforce development programme. Of the sampled firms, 22% mentioned being “very satisfied” with their experience in the programme, while 48% reported being “fairly satisfied”, 26% “neither satisfied nor dissatisfied” and 4% “fairly dissatisfied”.
- All 155 surveyed firms received some form of adviser-based support (out of 782 total contacts received). A total of 49% of respondents mentioned being “very satisfied” with the advice-based support they had received, while 35% were “fairly satisfied”, 8% were “neither satisfied nor dissatisfied”, 6% reported being “fairly dissatisfied”, 1% were “very dissatisfied” and 1% could not answer the question.

A sample of 46 firms (out of 147 total contacts received) went through the grant application process, with 100% succeeding in getting a grant. Overall, 63% of respondents mentioned being “very satisfied” with their experience of the advice and support received as part of the grant application process, with 35% feeling “fairly satisfied”, 2% being “neither satisfied nor dissatisfied” and no firms expressing any dissatisfaction.

### 3.1 Programme description and theory of change (ToC)

As described in the North West Pilot's independent interim evaluation by Steer, the Made Smarter Adoption (MSA) programme was originally designed to provide bespoke packages of advice, financial support and capability building, with its operating model oriented around five principal activities:<sup>9</sup>

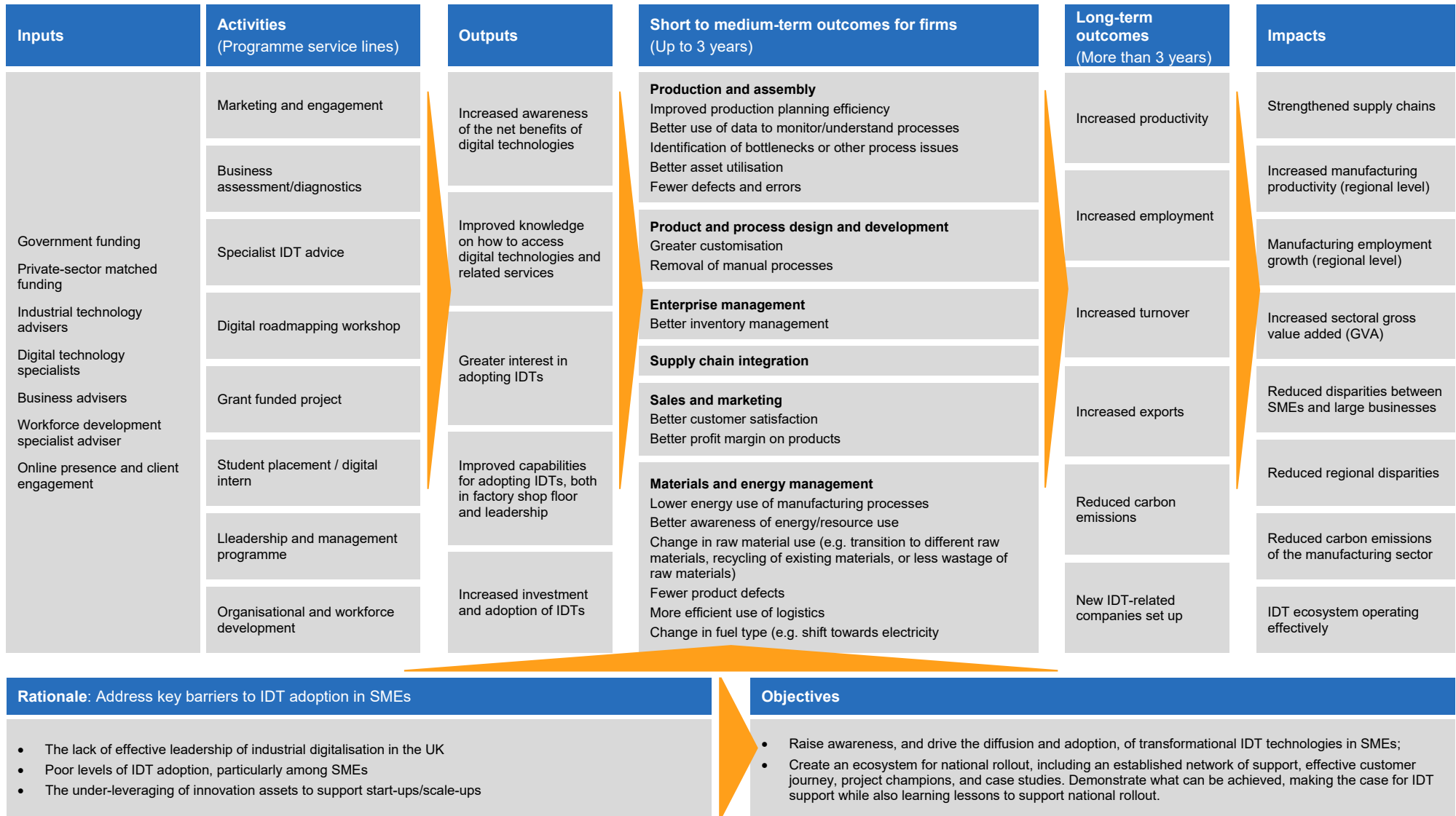
1. **“Marketing and engagement** – communications and promotional activities delivered directly to SMEs and/or via partners and stakeholders, to raise awareness and take-up of Industrial Digital Technologies (IDTs) and the pilot's services, among target SMEs;
2. **Registration and initial assessment** – a diagnostic process resulting in the triaged progression of firms through the pilot, or referral to alternative, more appropriate business support;
3. **Further assessment and support** – the provision of specialist IDT advice to understand the particular firm's IDT readiness and to establish its potential for IDT adoption;
4. **Roadmapping workshops** – resulting in the development of a specific, tailored and detailed action for the firm to progress its IDT needs; and
5. **Specific IDT adoption support** – a programme of interventions including a match-funded grant (of up to £20,000) to support IDT adoption (capital and revenue), placements involving specialist IDT students and/or participation in a leadership training programme.”

A theory of change (ToC) for Made Smarter Adoption has been developed based on the logic model created for the North West Pilot by Steer and the beneficiary firms' survey questionnaire employed in that that study, as shown in Figure 3-1. The ToC diagram highlights the logical links between inputs, activities, outputs, short- to medium-term outcomes for firms, long-term outcomes and expected impacts. A key characteristic of this ToC is the absence of specific and quantifiable targets, as this information could not be found in the programme documentation.

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<sup>9</sup> Steer (2021). Op. cit.

**Figure 3-1: initial theory of change constructed from the review of previous Made smarter adoption programme evidence**



Based on Steer impact evaluation report and evaluation questionnaire. Source: Cambridge Industrial Innovation Policy, 2022.

## 3.2 Awareness and access to the programme

The insights shown in this sub-section are based on the 155 interviews conducted via computer-assisted telephone interviewing with Made Smarter beneficiaries between 9 September and 18 October 2022.

### Awareness of the programme

The most common way for beneficiaries to find out about the programme was through a direct approach from a business adviser, followed by the “other” category and through peers/colleagues (see Table 3-1). The “other” category mostly relates to finding out about the programme through alternative organisations or professional contacts beyond the ones listed in Table 3-1. These results demonstrate the relevance of establishing links between business advisers and firms within a region, as well as the importance of raising the profile of the programme among the industrial community for peer-to-peer awareness raising.

**Table 3-1: How did you first find out about the Made Smarter Adoption programme?**

	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	<b>155</b>	<b>22</b>	<b>79</b>	<b>28</b>	<b>26</b>
Through media coverage	4%	5%	5%	4%	0%
Through a peer/colleague	15%	18%	13%	11%	23%
At a business networking event	12%	9%	19%	0%	4%
Through direct marketing materials	4%	9%	3%	4%	4%
Through a direct approach from a business adviser	26%	23%	22%	18%	54%
Through an Internet search	9%	5%	13%	11%	0%
Other (i.e. through other organisations or professional contacts)	25%	22%	19%	48%	15%
Can't recall	5%	9%	6%	4%	0%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

### Access to the programme, digital readiness and motivation

Of the 155 firms surveyed, 89% said it was easy to get information about the Made Smarter programme. A total of 63% believe that the programme is well suited to businesses like theirs based on their digital maturity, while 16% of all respondents do not think that digital readiness is relevant to the programme's ability to meet firms' needs, 8% think that the programme is better suited to firms with higher digital readiness, 8% believe that the programme is better suited to firms with lower digital readiness and 5% did not provide a specific answer.

Self-reported digital maturity among all of the 155 consulted firms (see Table 3-2) varies between “very mature/very high digital readiness” (10%), “fairly mature/high digital readiness” (43%), “fairly immature/low digital readiness” (32%) and “not at all mature/very low digital readiness” (16%). This aligns with the programme’s aim of helping firms in the lower or intermediate digital maturity scale.

**Table 3-2: Prior to joining the Made Smarter Adoption programme, how would you describe your level of digital maturity?**

Sample base: 155 firms	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Very mature/very high digital readiness</b>	10%	5%	13%	8%	8%
<b>Fairly mature/high digital readiness</b>	43%	59%	42%	39%	35%
<b>Fairly immature/Low digital readiness</b>	32%	27%	26%	39%	42%
<b>Not at all mature/very low digital readiness</b>	16%	9%	19%	14%	15%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

When asked about what prevented beneficiaries from investing in IDTs before contacting Made Smarter, the top five reasons were as follows (sample base of 155 firms):<sup>10</sup>

- Internal funding was not available (35%).
- They did not know what solutions were available (20%).
- External funding was not available (19%).
- They did not have the skills to design and implement new technology projects (16%).
- There was a lack of knowledge (12%).

However, nearly 30% of respondents answered “other”, with example reasons including:

- High cost perception;
- Digitalisation not being a priority;
- Time limitations for implementation;
- A lack of leadership and guidance;
- The COVID-19 pandemic;

<sup>10</sup> NB: The numbers given for each option do not add up to the total, as respondents were allowed to choose more than one category.

- A lack of confidence pursuing digitalisation; and
- No access/awareness of the right suppliers.

Aligned with the above, the top three reasons for contacting Made Smarter included (see Table 3-3): gaining an understanding of how the business might benefit from digitalisation (85%); accessing financial support to invest in new capital equipment (81%); and accessing support to develop a digitalisation strategy (70%).

**Table 3-3: Were any of the following among the reasons for contacting the Made Smarter Adoption programme?**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	<b>155</b>	<b>22</b>	<b>79</b>	<b>28</b>	<b>26</b>
To understand how my business might benefit from digitalisation	85%	95%	82%	82%	88%
To access support to develop a digitalisation strategy	70%	64%	73%	79%	58%
To access leadership and management development to support the business to implement a digitalisation project or programme	42%	45%	35%	36%	65%
To identify a student placement to enable the business to implement a digitalisation project or programme	23%	14%	19%	18%	46%
To access support to develop the digital skills of the workforce	52%	59%	46%	64%	54%
To access financial support to enable me to invest in new capital equipment	81%	82%	81%	89%	69%
Other	19%	9%	24%	11%	23%
Can't recall reason	1%	5%	0%	0%	0%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

### 3.3 Satisfaction with the programme

All 155 firms surveyed were asked how satisfied or dissatisfied they were with their experience of the Made Smarter Adoption programme in terms of its ability to:

- Diagnose their business’s digitalisation requirements;
- Identify sensible solutions to address their digitalisation requirements;
- Support their company with business planning/digital strategy;

- Identify solutions to address their resource efficiency requirements; and
- Work more effectively with their key supply chains.

As shown in Table 3-4, satisfaction across these five categories varied from 86% to 38%. However, this does not mean that firms were dissatisfied with the programme; rather, it highlights difficulties answering the question, with dissatisfaction rates varying between 6% and 10% for all five categories and “do not know/too difficult to say” ranging from 6% to 56%.

For the small percentage of firms that expressed dissatisfaction with their experience of the programme (third column of Table 3-4), between 60% and 90% reported that the programme generally has not helped the business or has not led to any support or improvement. This part of the survey interviews was done through open questioning, in which beneficiary firms could explain their reasoning. Other open answers received by dissatisfied firms could be classified into the following broad categories: a lack of, or poor, communication and/or feedback; the application process being long and/or complicated; and the programme’s failure to diagnose digitalisation requirements and opportunities (which could sometimes be attributed to the firms’ nature and not to specific shortcomings of the programme).

**Table 3-4: How satisfied or dissatisfied are you with your experience of the Made Smarter Adoption programme in terms of its ability to...?**

Sample base: 155 firms	Satisfied	Dissatisfied	Do not know/too difficult to say
Diagnose your business’s digitalisation requirements	86%	8%	6%
Identify sensible solutions to address your digitalisation requirements	75%	8%	16%
Support your company with business planning/digital strategy	72%	10%	18%
Identify solutions to address your resource efficiency requirements	70%	7%	23%
Work more effectively with your key supply chains	38%	6%	56%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## Leadership and management programme

A sample of 30 firms (out of 79 total contacts received, see Table 2-1) from the North East, North West, and Yorkshire and the Humber were asked how satisfied or dissatisfied they were with their experience of the leadership and management programme to date (see Table 3-5). A total of 80% of respondents mentioned being “fairly” or “very satisfied”, while 17% reported being “neither satisfied nor dissatisfied” and 3% answered “do not know”. Most respondents are located in the North East region (22 firms compared to 3 in the North West and 5 in Yorkshire and the Humber), where the number of “satisfied” firms is 72%, “neither satisfied nor

dissatisfied” accounts for 23%, and “do not know” registered 5%. The small samples from the North West and Yorkshire and the Humber were all satisfied with the programme.

In terms of satisfaction with the application process for the workshop/leadership and management programme, Table 3-6 summarises the feedback received.

**Table 3-5: How satisfied or dissatisfied are you with your experience to date of the “workshops”/“leadership and management programme”?**

By region	Total	North East	North West	Yorkshire and Humber
<b>Sample bases (out of 79 total contacts received)</b>	30	22	3	5
<b>Very satisfied</b>	27%	27%	67%	0%
<b>Fairly satisfied</b>	53%	45%	33%	100%
<b>Neither satisfied not dissatisfied</b>	17%	23%	0%	0%
<b>Fairly dissatisfied</b>	0%	0%	0%	0%
<b>Very dissatisfied</b>	0%	0%	0%	0%
<b>Don't know</b>	3%	5%	0%	0%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

**Table 3-6: The following statements all relate to the application process to join the “workshops”/“leadership and management programme”. How far do you agree or disagree with each?**

Sample base: 30 firms	Don't know/too difficult to say	Agree	Disagree
<b>The application process was straightforward</b>	3%	94%	3%
<b>The help we received to make an application to join the programme met our needs</b>	0%	97%	3%
<b>The criteria for joining the programme were clear</b>	0%	100%	0%
<b>The decision-making process was conducted in a timely fashion</b>	0%	100%	0%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

### Student placements/digital interns

A sample of 4 firms (out of 15 total contacts received, see Table 2-1) reported using the student placement/digital intern support service. Overall, 50% of them reported being “fairly satisfied” with their experience (2 firms), while 25% (1 firm) were “neither satisfied nor dissatisfied” and 25% (1 firm) expressed being “fairly dissatisfied” with the way the scheme went for them (see Table 3-7). Dissatisfaction reasons were not provided by this company,



other than stating that the programme matched them with a student located in a foreign country for the duration of the internship.

**Table 3-7: How satisfied or dissatisfied are you with your experience of the advice and support provided through the student placement/digital intern scheme?**

By region	Total	West Midlands	Yorkshire and Humber
<b>Sample bases (out of 15 total contacts received)</b>	4	1	3
<b>Very satisfied</b>	0%	0%	0%
<b>Fairly satisfied</b>	50%	100%	33%
<b>Neither satisfied not dissatisfied</b>	25%	0%	33%
<b>Fairly dissatisfied</b>	25%	0%	33%
<b>Very dissatisfied</b>	0%	0%	0%
<b>Don't know</b>	0%	0%	0%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

In terms of the application process for the student placement/digital intern scheme, mixed feedback was received, as shown in Table 3-8.

**Table 3-8: The following statements all relate to the application process to identify a student placement/digital intern. How far do you agree or disagree with each one?**

Sample base: 4 firms (out of 15 total contacts received)	Agree	Disagree
<b>The matching process was straightforward</b>	75%	25%
<b>The support we received to find a student placement met our needs</b>	50%	50%
<b>The criteria for matching students to our needs were clear</b>	50%	50%
<b>The decision-making process was conducted in a timely fashion</b>	25%	75%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Regarding the benefits achieved through the student placements/digital interns, the participating firms reported that the placements allowed them to investigate projects for which they would otherwise not have had the time or money; they also allowed them to gain access to knowledge/skills for which they had previously been unable to recruit. However, this did not necessarily lead to tangible business impacts among the firms that reported this answer in Yorkshire and the Humber, most likely due to the short (< 2.5 month) timeframe of the placements during this region's pilot (see Table 3-9).

**Table 3-9: In which of the following ways did the Student Placements/Digital Interns benefit your company?**

	West Midlands	Yorkshire and Humber
<b>Sample bases: 4 firms (out of 15 total contacts received)</b>	1	3
<b>We were able to access knowledge/skills that we had previously been unable to recruit for</b>	100%	33%
<b>The student(s) investigated projects that we otherwise wouldn't have had time or money for</b>	100%	67%
<b>The student(s) brought a fresh perspective and new ideas</b>	0%	33%
<b>There have not been any business impacts to date, and we do not foresee any in the future</b>	0%	67%
<b>There have not been any business impacts to date, but we expect some in the future</b>	100%	0%
<b>Other (It allowed us to address some things we would not have done otherwise)</b>	0%	33%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

### Organisational and workforce development programme (North West only)

A sample of 23 firms in the North West (out of 116 total contacts received, see Table 2-1) reported participation in the organisational workforce development programme. Of the sampled firms, 22% mentioned being “very satisfied” with their experience in the programme, while 48% reported being “fairly satisfied”, 26% “neither satisfied nor dissatisfied” and 4% “fairly dissatisfied” (see Table 3-10).

**Table 3-10: How satisfied or dissatisfied are you with your experience of the organisational and workforce development support that you have received?**

Sample base: 23 firms (out of 116 total contacts received)	Total (North West only)
<b>Very satisfied</b>	22%
<b>Fairly satisfied</b>	48%
<b>Neither satisfied not dissatisfied</b>	26%
<b>Fairly dissatisfied</b>	4%
<b>Very dissatisfied</b>	0%
<b>Don't know</b>	0%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

In terms of satisfaction with the application process to participate in the programme, Table 3-11 summarises the feedback received.

**Table 3-11: The following statements all relate to support to develop your workforces’ digital skills. How far do you agree or disagree with each?**

Sample base: 23 firms (out of 116 total contacts received)	Don't know/too difficult to say	Agree	Disagree
The process for accessing the support was straightforward	9%	91%	0%
The criteria for accessing the support were clear	4%	87%	9%
The decision-making process to access the support was conducted in a timely fashion	0%	96%	4%
The support helped to upskill workers	22%	74%	4%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

### Adviser-based support

All 155 surveyed firms received some form of adviser-based support (out of 782 total contacts received, see Table 2-1). A total of 49% of respondents mentioned being “very satisfied” with the advice-based support they had received, while 35% were “fairly satisfied”, 8% were “neither satisfied nor dissatisfied”, 6% reported being “fairly dissatisfied”, 1% were “very dissatisfied” and 1% could not answer the question (see Table 3-12). In particular, no interviewees from the North East and Yorkshire and the Humber reported any dissatisfaction.

**Table 3-12: How satisfied or dissatisfied are you with the advice-based support that you have received?**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
Sample bases: 155 firms (out of 782 total contacts received)	155	22	79	28	26
Very satisfied	49%	55%	50%	43%	50%
Fairly satisfied	35%	41%	34%	36%	35%
Neither satisfied not dissatisfied	8%	4%	6%	11%	15%
Fairly dissatisfied	6%	0%	8%	10%	0%
Very dissatisfied	1%	0%	1%	0%	0%
Don't know	1%	0%	1%	0%	0%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

In terms of satisfaction with the application process to receive adviser-based support, Table 3-13 summarises the feedback received.

**Table 3-13: The following statements all relate to adviser-based support to progress your adoption of digital technology. How far do you agree or disagree with each?**

Sample base: 155 firms (out of 782 total contacts received)	Don't know/too difficult to say	Agree	Disagree
The process for accessing the support was straightforward	1%	91%	8%
The criteria for accessing the support were clear	3%	90%	6%
The decision-making process to access the support was conducted in a timely fashion	1%	90%	8%
The advice received was of high quality and supported your progress with technology adoption	9%	82%	9%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## Capital grants

A sample of 46 firms (out of 147 total contacts received, see Table 2-1) went through the grant application process, with 100% of them succeeding in getting a grant. Overall, 63% of respondents mentioned being “very satisfied” with their experience of the advice and support received as part of the grant application process, with 35% feeling “fairly satisfied”, 2% being “neither satisfied nor dissatisfied”, and no firms expressing any dissatisfaction (see Table 3-14). Further feedback on the grant application process is shown in Table 3-15.

**Table 3-14: How satisfied or dissatisfied are you with your experience of the advice and support you received as part of the grant application process?**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
Sample bases: 46 firms (out of 147 total contacts received)	46	16	17	10	3
Very satisfied	63%	56%	71%	70%	33%
Fairly satisfied	35%	38%	29%	30%	67%
Neither satisfied not dissatisfied	2%	6%	0%	0%	0%
Fairly dissatisfied	0%	0%	0%	0%	0%
Very dissatisfied	0%	0%	0%	0%	0%
Don't know	0%	0%	0%	0%	0%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

**Table 3-15: The following statements all relate to the grant application process. How far do you agree or disagree with each one?**

Sample base: 46 firms (out of 147 total contacts received)	Don't know/too difficult to say	Agree	Disagree
The process for accessing the support was straightforward	2%	91%	7%
The criteria for accessing the support were clear	0%	98%	2%
The decision-making process to access the support was conducted in a timely fashion	2%	98%	0%
The advice received was of high quality and supported your progress with technology adoption	2%	98%	0%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Of the 46 surveyed firms, 37% (17 firms) reported trying to raise alternative funding to invest in digitalisation in the 12 months prior to seeking a grant from Made Smarter. Alternative funding requests from these firms concentrated on internal company funds and applying to public-sector grants, mentioned by 88% and 29% of respondents, respectively (see Table 3-16).

External funding applications were almost evenly distributed between small (£3,000) and large amounts (£300,000), with the surveyed firms in the North East requesting smaller amounts (< £5,000) than firms in the North West, West Midlands, and Yorkshire and the Humber (> £9,600). For firms that tried to find alternative finance (17 firms), 71% reported not experiencing any difficulties trying to arrange this finance, while 24% experienced some difficulties and 5% could not reply. For those that experienced difficulties (4 firms), the reasons were equally distributed (25% each) between: being unaware of where to get finance; not meeting the fund provider’s criteria; poor business credit history or insufficient credit history (not having been in business long enough); and other unspecified reasons.

**Table 3-16: What other source(s) did you seek this funding from? (where applied for other funding)**

Sample base: 17 (out of 46 sampled firms that received grants)	Total
Public-sector grant	29%
Public-sector loan	6%
Private-sector loan (bank loan)	6%
Friends/family personal loan	12%
Company funds	88%
Other	6%

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## 4 How are firms benefiting from Made Smarter Adoption?

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### Key messages

#### Technology adoption

- Around 90% of the firms that have participated in a specific service line of Made Smarter Adoption (MSA) have adopted digital technologies. Automation and data management solutions are among the most popular digital applications adopted by participant firms.
- By region, the highest ratio of technology adoption is found in the North East, which is also the region where firms reported the highest digital readiness prior to joining MSA. The lowest ratio of adoption is observed in Yorkshire and the Humber, where firm support only started in January 2022, and is also the region which reported the lowest digital readiness prior to joining MSA.
- The main business area where firms are using digital technologies is production and assembly (85%), followed by materials and energy management (52%).

#### Benefits of technology adoption

- Most of the firms (97%) that adopted digital technologies reported benefits. The most frequent benefits obtained were: improved production planning efficiency (76%), better use of data (74%) and cost reductions (69%).

#### Additionality

- Participant firms recognised the value of MSA and most identified that without the financial assistance provided they would have worked on a smaller scale, at a slower pace or to a lower quality in their digitalisation projects (partial additionality).

#### Business growth

- As expected, considering the short time frame within which firms have participated in the programme, business growth impacts, such as increased or maintained turnover or productivity, were reported to a lesser extent than short-term benefits. Less than half of all respondents reported these impacts as a result of their participation in MSA. The most widely reported were: increased productivity, maintained profits and maintained headcount.
- For those firms that reported increased turnover (23%), the median value of the increase was £40,000, while the mean value was £60,000.

- Firms awarded a grant were more likely to report business growth impacts, particularly increases in productivity.
- In terms of the type of technology, firms that adopted either printing/scanning (including 3D) or data-related solutions were more likely to report turnover and productivity increases.
- In terms of business area, projects involving product and process design and development were more likely than other technology adoption projects to generate productivity and export increases.

### **Skills**

- Significant impacts were identified in skills development, with 71% of the firms reporting either moderate or significant positive impacts.

### **Carbon emissions**

- A third of the firms surveyed reported positive impacts on carbon emissions. The main changes that have had positive impacts include: fewer product defects, more efficient use of logistics and lower energy use.
- Grant awardees were more likely to report positive impacts on carbon emissions.

### **Diversity**

- Firms with equal or greater female representation in leadership were more likely to report positive business growth impacts than those without female representation, particularly in safeguarding turnover and increasing profits.

## **4.1 Technology adoption and related benefits**

### **Changes in behaviour and knowledge**

Firms reported changes in behaviour and knowledge as a result of their participation in the Made Smarter Adoption (MSA) programme. The most frequent change reported by participant firms is planning to make further technology investments in the future, mentioned by 92% of the firms surveyed. Over 80% of the firms have experienced positive changes in technology-related behaviour and knowledge.

Regarding region, the largest proportion of firms reporting impacts is located in the North East. More than 90% of the firms surveyed in this region reported positive effects as a result of their participation in MSA. The lower figures observed in Yorkshire and Humber may be explained by the short period of time (since January 2022) MSA has operated in this region. In terms of the type of support, firms participating in the student placement service line, grant awardees and those participating in the leadership and management service line were the most likely to

report positive changes in behaviour and knowledge. Firms that did not participate in any of these service lines, but received other type of adviser-based support (e.g. roadmapping advice) were the least likely to report a positive change in this area (Table 4-1).

The p-values of chi-square tests of independence are presented in this section of the report to assess the statistical significance of differences between sample sub-groups. The p-value is a probability value that indicates the level of statistical significance of a test. A small p-value (typically less than 0.05) suggests that the observed differences are unlikely to be due to chance and that there is likely to be a significant association between the variables.

Chi-square tests of independence were performed to examine the association between participating in service lines and showing changes in behaviour and knowledge. With the exception of the statements “We have a better understanding of how to implement digital technologies” and “We plan to make further technology investments in the future”, we found that firms that participated in service lines (grant, leadership and management, student placement or workforce development) were more likely to present positive changes in behaviour and knowledge as a result of their participation in MSA ( $p < .05$ ), than those that did not participate in any of these service lines, but received other type of adviser-based support.

**Table 4-1: Changes in behaviour and knowledge reported as a result of participating in Made Smarter (Proportion of firms that agree and strongly agree with these statements)**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Average sample bases</b>	148	21	75	26	25
<b>We have a better understanding of the costs and benefits of digital technologies</b>	82%	91%	80%	85%	80%
<b>We have a better understanding of how to implement digital technologies</b>	83%	95%	80%	89%	77%
<b>We have a greater appetite for new technology adoption</b>	83%	95%	82%	81%	80%
<b>We have a more strategic or more rigorous approach to technology investment decisions</b>	82%	95%	81%	80%	75%
<b>We are better equipped to make technology investments</b>	84%	91%	83%	83%	83%
<b>We plan to make further technology investments in the future</b>	92%	95%	93%	89%	88%
<i>Continues...</i>					



By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Average sample bases</b>	45	28	4	22	81
<b>We have a better understanding of the costs and benefits of digital technologies</b>	98%	90%	100%	91%	73%
<b>We have a better understanding of how to implement digital technologies</b>	98%	89%	75%	86%	76%
<b>We have a greater appetite for new technology adoption</b>	96%	96%	100%	86%	75%
<b>We have a more strategic or more rigorous approach to technology investment decisions</b>	98%	100%	100%	91%	71%
<b>We are better equipped to make technology investments</b>	93%	96%	100%	91%	76%
<b>We plan to make further technology investments in the future</b>	96%	93%	100%	95%	90%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## Technology adoption

Around 90% of the firms that have participated in a specific service line of MSA have implemented digital technologies as a result of this. Including those firms that did not participate in service lines (i.e. grant, leadership and management, student placement or workforce development), the ratio of technology adoption is 73%. Firms that participated in service lines were more likely to adopt digital technologies than those that only received other type of adviser-based support, such as roadmapping advice.<sup>11</sup>

By region, the highest ratio of technology adoption is found in the North East, which is also the region where firms reported the highest digital readiness prior to joining MSA. The lowest ratio of adoption is observed in Yorkshire and the Humber, where firm support only started in January 2022, and is also the region which reported the lowest digital readiness prior to joining MSA.

<sup>11</sup>  $\chi^2(1, N = 154) = 16.24, p < .01$ .

Regarding the type of support, the highest technology adoption rate was reported by firms that participated in the student placement service (although the sample size is small: 4), followed by those that participated in workforce development<sup>12</sup> and grant awardees.<sup>13</sup>

Automation and data management solutions are among the most popular digital applications adopted by participant firms (Table 4-2). Appendix A provides definitions of these technology applications. The most extended adoption of automation was observed in the North West region and by those firms that participated in the student placement service line. Other technologies and solutions cited by firms include: cyber-security, computer-aided design software, and general IT systems and devices.

**Table 4-2: Digital technologies and solutions adopted as a result of participating in Made Smarter**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	154	22	78	28	26
<b>Other</b>	22%	27%	18%	25%	27%
<b>Automation of processes</b>	18%	18%	23%	14%	8%
<b>Database/data capture</b>	11%	9%	12%	18%	4%
<b>Enterprise planning resource (EPR) system</b>	10%	14%	8%	7%	15%
<b>Printing/scanning, including 3D</b>	9%	9%	12%	7%	4%
<b>Monitoring systems</b>	5%	5%	5%	4%	8%
<b>Cloud-based systems</b>	4%	0%	5%	7%	0%
<b>Digitisation of processes</b>	3%	5%	3%	4%	4%
<b>Customer relations management (CRM) systems</b>	2%	0%	3%	4%	0%
<b>Total (% of firms that adopted DT)</b>	73%	82%	73%	71%	65%

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Sample bases</b>	46	29	4	23	84
<b>Other</b>	24%	28%	25%	26%	20%
<b>Automation of processes</b>	22%	17%	50%	30%	14%
<b>Database/data capture</b>	15%	10%	25%	22%	7%
<b>Enterprise planning resource (EPR) system</b>	9%	14%	0%	13%	10%
<i>Continues...</i>					

<sup>12</sup>  $\chi^2(1, N = 153) = 7.255, p = 0.007.$

<sup>13</sup>  $\chi^2(1, N = 153) = 14.467, p < .01.$

<b>Printing/scanning, including 3D</b>	15%	7%	0%	9%	7%
<b>Monitoring systems</b>	11%	7%	25%	4%	4%
<b>Cloud-based systems</b>	4%	0%	0%	0%	5%
<b>Digitisation of processes</b>	9%	3%	0%	4%	1%
<b>Customer relations management (CRM) systems</b>	4%	0%	0%	9%	1%
<b>Total (% of firms that adopted DT)</b>	<b>93%</b>	<b>83%</b>	<b>100%</b>	<b>96%</b>	<b>60%</b>

Note: The total % of firms that adopted DT is not equal to the sum of the specific technologies because some firms reported adopting more than one type of technology. The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

The main business area where firms are using digital technologies is production and assembly (85%), followed by materials and energy management (52%). Appendix A provides definitions of these business areas.

By region, the North East stands out for having the largest proportion of firms that applied digital technologies in materials and energy management (61%) and supply chain management (56%). In the North West, production and assembly was reported more frequently as a business area of application than in other regions. The West Midlands has the largest proportion of firms applying digital technologies in enterprise management (65%). Finally, Yorkshire and the Humber stands out for having the largest proportion of firms applying digital technologies in sales and marketing (81%); in comparison, the total average is 47%. Interviews with advisors revealed that in some of the regions, such as Yorkshire and the Humber, the expertise of the advisors helps to explain the business areas where digital technologies are being adopted.

Regarding types of support, differences were identified in the larger proportion of firms with student placements (100%) that applied digital technologies in production and assembly and product and process design and development, although they represent a small number in the sample (4). Deployment in materials and energy management was more substantial among firms that participated in leadership and management and workforce development, although the differences are small (Table 4-3).

**Table 4-3: Business area(s) of application of digital technologies**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	111	18	57	20	16
<b>Production and assembly</b>	85%	78%	86%	80%	94%
<b>Materials and energy management</b>	52%	61%	49%	50%	56%

<b>Product and process design and development</b>	47%	33%	58%	25%	50%
<b>Sales and marketing</b>	47%	17%	47%	45%	81%
<b>Supply chain management</b>	41%	56%	33%	50%	44%
<b>Enterprise management</b>	39%	50%	28%	65%	31%
<b>Other</b>	28%	33%	30%	30%	13%

<b>By type of support</b>	<b>Grant</b>	<b>Leadership and management</b>	<b>Student placement</b>	<b>Workforce development</b>	<b>Other adviser-based support</b>
<b>Sample bases</b>	43	24	4	22	49
<b>Production and assembly</b>	86%	75%	100%	86%	86%
<b>Materials and energy management</b>	49%	54%	25%	55%	51%
<b>Product and process design and development</b>	47%	46%	75%	68%	41%
<b>Sales and marketing</b>	44%	29%	75%	41%	53%
<b>Supply chain management</b>	51%	46%	25%	36%	39%
<b>Enterprise management</b>	47%	42%	25%	41%	33%
<b>Other</b>	28%	38%	50%	41%	20%

Note: The total % of firms that adopted DT is not equal to the sum of the specific business areas because some firms reported adopting technologies in more than one business area. The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## Access to technology

In terms of improved access to technology and related services, the main benefit that firms indicated from their participation in Made Smarter was their increased ability to choose the right technology supplier to meet their needs (76% of the firms). By region, Yorkshire and the Humber saw the largest percentage of firms (85%) mentioning this benefit. Regarding type of support, the four student placement participants surveyed reported these benefits, as well as 91% of grant awardees.

Firms that participated in service lines (grant, leadership and management, student placement or workforce development) were more likely ( $p < .05$ ) to report “deepened relationships with one or more providers that you had existing links with” (Table 4-4). The most frequent benefit reported from deepening relationships with technology providers was access to products that are better tailored to the company’s needs, as reported by 87% of the firms surveyed.

**Table 4-4: Improvements in access to technology**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	155	22	79	28	26
<b>Become aware of one or more new technology providers</b>	54%	59%	54%	50%	54%
<b>Purchased a product from one or more providers that you had not purchased from previously</b>	44%	45%	43%	43%	46%
<b>Deepened relationships with one or more providers that you had existing links with</b>	48%	59%	43%	54%	46%
<b>Better able to choose the right technology supplier to meet your needs</b>	76%	73%	75%	75%	85%

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Sample bases</b>	46	29	4	23	85
<b>Become aware of one or more new technology providers</b>	65%	59%	50%	65%	48%
<b>Purchased a product from one or more providers that you had not purchased from previously</b>	61%	45%	75%	48%	34%
<b>Deepened relationships with one or more providers that you had existing links with</b>	65%	55%	25%	61%	39%
<b>Better able to choose the right technology supplier to meet your needs</b>	91%	79%	100%	83%	71%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## Benefits of technology adoption

Most of the firms (97%) that adopted digital technologies reported benefits. The most frequent benefits reported were: improved production planning efficiency, reported by 76% of the firms; better use of data, reported by 74% of the firms; cost reductions, reported by 69% of the firms;

better customer satisfaction, reported by 68% of the firms; and the development of new products or processes, reported by 68% of the firms.

By region, the West Midlands observed the greatest proportion of firms that did not report benefits (10%) but also a larger proportion of firms reporting benefits across most of the different types of benefits. Meanwhile, the North West region saw the greatest proportion of firms that reported developing new products or processes (77%) and greater customisation (70%) as a result of technology adoption (Table 4-5).

Regarding the type of support, the four firms surveyed that participated in the student placement service reported benefits in four areas: improved planning efficiency, fewer defects and errors, better asset utilisation, and better inventory management. Firms that were awarded grants were more likely to report benefits such as fewer defects and errors (84%), improved production planning efficiency (77%) and greater customer satisfaction (77%).

Among firms that participated in the leadership and management service line, the most frequent benefits reported were improved production planning efficiency (79%), better use of data (79%) and fewer defects and errors (75%). Firms that participated in workforce development were more likely to report developing new products or processes as a result of the adoption of digital technologies (86%). Lastly, firms that did not participate in any service line (i.e. grant, leadership and management, student placement or workforce development), but received other type of adviser-based support, reported (more frequently than the average) benefits in areas such as greater customisation (61%) and improved factory safety or security (29%) (Table 4-5).

**Table 4-5: Benefits experienced as a result of technology adoption**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	111	18	57	20	16
<b>Improved production planning efficiency</b>	76%	78%	72%	75%	88%
<b>Better use of data to monitor/understand processes</b>	74%	83%	70%	80%	69%
<b>Reduced cost</b>	69%	78%	74%	60%	56%
<b>Better customer satisfaction</b>	68%	50%	70%	75%	75%
<b>Development of new products or processes</b>	68%	50%	77%	65%	56%
<b>Better asset utilisation</b>	67%	67%	63%	75%	69%
<b>Fewer defects and errors</b>	66%	78%	67%	70%	44%
<b>Greater customisation</b>	60%	39%	70%	60%	50%

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<i>Continues...</i>					
<b>Better inventory management</b>	57%	61%	49%	65%	69%
<b>Identification of bottlenecks or other process issues</b>	52%	44%	47%	75%	50%
<b>Improved factory safety or security</b>	26%	22%	30%	15%	31%
<b>Other</b>	19%	11%	18%	25%	25%
<b>No benefits</b>	3%	0%	0%	10%	6%

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Sample bases</b>	43	24	4	22	49
<b>Improved production planning efficiency</b>	77%	79%	100%	82%	73%
<b>Better use of data to monitor/understand processes</b>	72%	79%	50%	82%	73%
<b>Reduced cost</b>	74%	71%	75%	64%	67%
<b>Better customer satisfaction</b>	77%	58%	75%	64%	67%
<b>Development of new products or processes</b>	70%	54%	50%	86%	63%
<b>Better asset utilisation</b>	72%	67%	100%	64%	59%
<b>Fewer defects and errors</b>	84%	75%	100%	73%	53%
<b>Greater customisation</b>	67%	42%	25%	73%	61%
<b>Better inventory management</b>	58%	63%	100%	59%	53%
<b>Identification of bottlenecks or other process issues</b>	60%	42%	75%	50%	47%
<b>Improved factory safety or security</b>	23%	21%	0%	32%	29%
<b>Other</b>	21%	17%	25%	14%	18%
<b>No benefits</b>	0%	4%	0%	0%	4%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Firms showing higher readiness levels prior to joining Made Smarter Adoption are more likely to experience benefits as a result of technology adoption. The differences are particularly striking between those that showed “very high digital readiness” and those reporting “very low digital readiness”. Both categories of firms, however, represent the smallest number in the sample (9 and 14, respectively, of the 111 in the sample base) (Table 4-6).

**Table 4-6: Benefits of the adoption of digital technologies by readiness levels**

Benefits	Total	Very mature/ very high digital readiness (1)	Fairly mature/ high digital readiness (2)	Fairly immature/ Low digital readiness (3)	Not at all mature/very low digital readiness (4)	$\chi^2$ test (1) and (4) (p value)
<b>Sample bases</b>	111	9	52	36	14	111
<b>Improved production planning efficiency</b>	76%	78%	71%	75%	93%	0.295
<b>Better use of data to monitor/understand processes</b>	74%	89%	79%	61%	79%	0.524
<b>Identification of bottlenecks or other process issues</b>	52%	78%	44%	56%	57%	0.311
<b>Better asset utilisation</b>	67%	78%	60%	69%	79%	0.964
<b>Fewer defects and errors</b>	66%	78%	67%	67%	50%	0.183
<b>Improved factory safety or security</b>	26%	22%	27%	25%	29%	0.735
<b>Better inventory management</b>	57%	67%	58%	58%	43%	0.265
<b>Reduced cost</b>	69%	100%	69%	67%	57%	0.022
<b>Better customer satisfaction</b>	68%	78%	65%	72%	64%	0.493
<b>Greater customisation</b>	60%	89%	50%	69%	57%	0.106
<b>Development of new products or processes</b>	68%	89%	67%	64%	64%	0.190



Benefits	Total	Very mature/ very high digital readiness (1)	Fairly mature/ high digital readiness (2)	Fairly immature/ Low digital readiness (3)	Not at all mature/very low digital readiness (4)	$\chi^2$ test (1) and (4) (p value)
<b>Other</b>	19%	33%	15%	22%	14%	0.280
<b>Column average</b>	59%	73%	56%	59%	57%	N/A
<b>No benefits</b>	3%	0%	2%	6%	0%	N/A

Note: A small p-value (typically less than 0.05) suggests that the observed differences are statistically significant.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

The benefits reported in Table 4-6 are associated with the type of technology adopted by firms and the business area where this was implemented. In terms of the type of technology, the largest proportion of firms reporting benefits is found among those that adopted customer relations management systems, digitalised processes or data-related solutions.

As expected, considering the purpose of these digital solutions, improved production planning efficiency was more likely among firms that adopted planning systems.

Similarly, 100% of the firms that adopted data-related solutions reported better use of data to monitor/understand processes. These firms were also more likely to report better asset utilisation, better inventory management and reduced costs. Firms that adopted database and data-capture solutions were more likely to report benefits such as better use of data to monitor/understand processes<sup>14</sup> and cost reductions,<sup>15</sup> in comparison with those that adopted any other technology or solution.

Better asset utilisation was also more likely among the firms that deployed automation solutions, while fewer defects and errors were more likely to be reported by firms that adopted printing and scanning solutions and monitoring/inspection systems. The development of new products or processes was more frequently reported by firms that deployed automation of machinery, database and data-capture solutions and monitoring/inspection systems (Table 4-7).

<sup>14</sup>  $\chi^2$  (1, N = 111) = 7.099,  $p = .008$ .

<sup>15</sup>  $\chi^2$  (1, N = 111) = 8.864,  $p = .003$ .

**Table 4-7: Benefits of the adoption of digital technologies by technology or solution**

Benefits	Total	Resource, material planning systems	Printing, scanning, including 3D	Database and data capture	Automation of machinery	Cloud-based systems	Monitoring/inspection systems	Customer relations management (CRM) systems	Digitisation of processes	Other
<b>Sample bases</b>	111	15	14	17	30	6	8	3	5	35
<b>Improved production planning efficiency</b>	76%	87%	50%	82%	79%	50%	63%	67%	100%	74%
<b>Better use of data to monitor/understand processes</b>	74%	87%	57%	100%	64%	67%	63%	100%	80%	71%
<b>Identification of bottlenecks or other process issues</b>	52%	67%	57%	59%	64%	0%	38%	100%	80%	37%
<b>Better asset utilisation</b>	67%	67%	57%	76%	75%	33%	63%	67%	100%	66%
<b>Fewer defects and errors</b>	66%	47%	86%	71%	71%	67%	75%	67%	100%	60%
<b>Improved factory safety or security</b>	26%	47%	36%	18%	29%	17%	0%	33%	20%	23%
<b>Better inventory management</b>	57%	73%	64%	76%	54%	50%	50%	67%	20%	54%
<b>Reduced cost</b>	69%	67%	86%	100%	71%	50%	63%	33%	60%	57%
<b>Better customer satisfaction</b>	68%	73%	71%	71%	71%	67%	63%	67%	80%	66%
<b>Greater customisation</b>	60%	67%	71%	59%	57%	83%	63%	100%	40%	54%
<i>Continues...</i>										

Benefits	Total	Resource, material planning systems	Printing, scanning, including 3D	Database and data capture	Automation of machinery	Cloud-based systems	Monitoring/inspection systems	Customer relations management (CRM) systems	Digitisation of processes	Other
<b>Development of new products or processes</b>	68%	53%	64%	76%	82%	50%	75%	100%	80%	57%
<b>Other</b>	19%	7%	14%	29%	18%	0%	25%	33%	40%	14%
<b>Column average</b>	59%	62%	59%	68%	61%	44%	53%	69%	67%	53%
<b>No benefits</b>	3%	7%	7%	0%	0%	0%	0%	0%	0%	3%

Note: The total number of firms that adopted DT is not equal to the sum of the specific technologies because some firms reported adopting more than one type of technology.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

On average, firms that adopted digital technologies in enterprise management, supply chain management, and materials and energy management were more likely to report benefits, particularly improved production planning efficiency and better use of data. Identification of bottlenecks or other process issues, better inventory management and reduced costs were also more likely to be reported by firms that applied technologies in supply chain management. Greater customisation and better customer satisfaction were more frequently reported by firms that adopted digital technologies in sales and marketing (Table 4-8).

**Table 4-8: Benefits of the adoption of digital technologies by business area of application**

In which business area(s) did you apply this(ese) technology(ies)?								
Benefits	Total	Enterprise management	Materials and energy management	Production and assembly	Product and process design and development	Sales and marketing	Supply chain management	Other
<b>Sample bases</b>	111	43	58	97	52	52	46	20
<b>Improved production planning efficiency</b>	76%	88%	84%	80%	71%	71%	85%	70%
<b>Better use of data to monitor/understand processes</b>	74%	88%	86%	74%	69%	73%	87%	85%
<b>Identification of bottlenecks or other process issues</b>	52%	60%	60%	56%	46%	50%	63%	55%
<b>Better asset utilisation</b>	67%	72%	81%	71%	69%	69%	74%	70%
<b>Fewer defects and errors</b>	66%	65%	70%	65%	73%	56%	63%	80%
<b>Improved factory safety or security</b>	26%	35%	31%	28%	35%	29%	37%	35%
<b>Better inventory management</b>	57%	67%	67%	59%	56%	62%	74%	65%
<b>Reduced cost</b>	69%	74%	74%	71%	79%	67%	78%	60%
<b>Better customer satisfaction</b>	68%	77%	67%	70%	75%	75%	72%	80%
<b>Greater customisation</b>	60%	63%	62%	60%	73%	77%	67%	65%
<b>Development of new products or processes</b>	68%	72%	67%	68%	83%	69%	63%	85%
<b>Other</b>	19%	16%	17%	18%	17%	19%	15%	45%
<b>No benefits</b>	3%	0%	2%	2%	2%	4%	4%	5%

Note: The total number of firms that adopted DT is not equal to the sum of the specific business areas because some firms reported adopting technologies in more than one business area.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## Improvements in supply chain management

More than 60% of the firms that adopted digital technologies experienced improvements in their supply chain. The most common improvements reported were: improved flexibility to respond to uncertainties and customer expectations (61%), improved visibility (57%) and improved agility (44%).

By region, firms located in the West Midlands were more likely to report improvements in supply chain visibility (70%). In comparison, in Yorkshire and the Humber, the North East, and the North West, the most frequent improvement reported was supply chain flexibility.

Regarding the type of support, grant awardees were the most likely to report improvements in supply chain management, particularly with regards to improved flexibility and visibility (Table 4-9).

**Table 4-9: Benefits in supply chain management as a result of participating in Made Smarter**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
Sample bases	111	18	57	20	16
Improved flexibility to respond to uncertainties and customer expectations	61%	67%	58%	55%	75%
Improved visibility of parts, components or products	57%	44%	53%	70%	69%
Improved agility to quickly adjust strategy	44%	56%	44%	30%	50%
Improved integration and communication with suppliers	42%	61%	33%	50%	44%
Not applicable	16%	6%	21%	20%	6%
Too soon to say/don't know	5%	0%	5%	5%	6%

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
Sample bases	43	24	4	22	49
Improved flexibility to respond to uncertainties and customer expectations	72%	63%	50%	45%	61%
Improved visibility of parts, components or products	63%	50%	75%	36%	59%
Improved agility to quickly adjust strategy	53%	46%	50%	32%	41%
Improved integration and communication with suppliers	51%	54%	50%	32%	37%

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<i>Continues...</i>					
<b>Not applicable</b>	9%	13%	0%	32%	16%
<b>Too soon to say/don't know</b>	0%	4%	0%	9%	4%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## 4.2 Business growth

As discussed in Section 5, business growth as a result of digital technology adoption is a long-term impact that cannot be appreciated or assessed within short time frames. Accordingly, the business growth impacts were reported to a lesser extent than the short-term benefits of Made Smarter Adoption (MSA). While 97% of the firms that adopted digital technologies reported benefits, less than half of all respondents reported business growth impacts such as increased or maintained turnover, profits, employment, productivity or exports.

The top three business growth impacts reported in the survey include increased productivity, maintained profits and maintained headcount. The median value of profits safeguarded was £60,000, with a mean value of £163,000. On average, 1.5 employee positions were safeguarded as a result of participating in MSA. Participation seemed more effective in terms of safeguarding than increasing profits, headcount and exports, which is understandable considering the business disruptions and economic uncertainty between 2020 and 2022.

For firms that reported increased turnover (23%), the median value of the increase was £40,000, while the mean value was £60,000. In terms of exports, the median increase value was £175,000, with a mean value of £273,125.

By region, the greatest proportion of firms reporting impacts was located in the North East, followed by the North West. The North West region also showed the largest proportion of firms reporting increased employment (34%) and turnover (27%) (Table 4-10).

**Table 4-10: Business growth impacts of participating in Made Smarter**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	155	22	79	28	26
<b>Turnover has increased</b>	23%	18%	27%	14%	27%
<b>Turnover was maintained/safeguarded</b>	22%	32%	19%	25%	19%
<b>Profits increased</b>	23%	27%	23%	14%	27%

<i>Continues...</i>					
<b>Profits were maintained/safeguarded</b>	28%	32%	28%	29%	27%
<b>Headcount increased</b>	26%	18%	34%	18%	15%
<b>Headcount was maintained/safeguarded</b>	28%	32%	23%	46%	19%
<b>Productivity increased</b>	45%	55%	46%	32%	50%
<b>Productivity was maintained/safeguarded</b>	17%	14%	15%	25%	19%
<b>Exports have increased</b>	6%	0%	8%	4%	8%
<b>Exports have been maintained/safeguarded</b>	11%	23%	8%	18%	4%

<b>By type of support</b>	<b>Grant</b>	<b>Leadership and management</b>	<b>Student placement</b>	<b>Workforce development</b>	<b>Other adviser-based support</b>
<b>Sample bases</b>	46	29	4	23	85
<b>Turnover has increased</b>	33%	24%	0%	30%	18%
<b>Turnover was maintained/safeguarded</b>	26%	28%	25%	30%	19%
<b>Profits increased</b>	35%	31%	25%	39%	13%
<b>Profits were maintained/safeguarded</b>	33%	31%	25%	30%	27%
<b>Headcount increased</b>	26%	21%	25%	26%	28%
<b>Headcount was maintained/safeguarded</b>	41%	28%	25%	48%	18%
<b>Productivity increased</b>	70%	55%	100%	65%	31%
<b>Productivity was maintained/safeguarded</b>	15%	14%	0%	17%	20%
<b>Exports have increased</b>	7%	7%	0%	17%	2%
<b>Exports have been maintained/safeguarded</b>	17%	17%	0%	13%	6%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

In terms of the type of support, firms awarded a grant and those that participated in the workforce development service line were more likely to report impacts across the different areas analysed. The differences between grant awardees and the rest of the firms, in terms of the proportion of firms that reported productivity increases, were found to be statistically

significant.<sup>16</sup> The four firms surveyed that participated in the student placement service also reported increases in productivity (Table 4-10).

Firms that did not participate in any service line (i.e. grant, leadership and management, student placement or workforce development), but only received other type of adviser-based support were the least likely to report business growth impacts, with the exception of employment increases and productivity safeguarding. The differences in business growth impacts between firms that participated in service lines and those that did not were found to be statistically significant (Table 4-11Table ).

**Table 4-11: Business growth impacts of participating in Made Smarter, by type of support**

By type of support	Participated in at least one service line	Other type of adviser-based support	$\chi^2$ test (p value)
<b>Sample bases</b>	70	85	155
<b>Turnover has increased</b>	30%	18%	0.103
<b>Turnover was maintained/safeguarded</b>	26%	19%	0.103
<b>Profits increased</b>	34%	13%	0.005
<b>Profits were maintained/safeguarded</b>	30%	27%	0.005
<b>Headcount increased</b>	23%	28%	0.025
<b>Headcount was maintained/safeguarded</b>	40%	18%	0.025
<b>Productivity increased</b>	63%	31%	0.011
<b>Productivity was maintained/safeguarded</b>	14%	20%	0.011
<b>Exports have increased</b>	10%	2%	0.001

Note: A small p-value (typically less than 0.05) suggests that the observed differences are statistically significant.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Firms with high digital readiness prior to their participation in Made Smarter Adoption were the most likely to report business growth impacts, while those with very low readiness were the least likely to report business growth impacts as a result of their participation in the programme.

The most striking differences were seen in the proportion of firms reporting profits (27% versus 4%) and productivity increases (53% versus 20%). Firms reporting very high digital readiness previous to their participation in MSA were also the most likely to report increases in exports but differences are not statistically significant (Table 4-12).

<sup>16</sup>  $\chi^2$  (3, N = 155) = 17.496,  $p = .001$ .



Regarding the type of technology or solution, firms that adopted database and data-capture solutions were more likely to report business growth impacts. However, the largest proportion of firms that reported productivity and turnover increases was found among those that adopted printing or scanning solutions (including 3D) (Table 4-13).

Firms that adopted either printing/scanning or database and data-capture solutions were more likely than firms that adopted other types of technology to report increases in productivity.<sup>17</sup>

**Table 4-12: Business growth Impacts by digital readiness levels**

Business growth impact	Total	Very mature/very high digital readiness (1)	Fairly mature/high digital readiness (2)	Fairly immature/Low digital readiness (3)	Not at all mature/very low digital readiness (4)	$\chi^2$ test (1) and (4) (p value)
<b>Sample bases</b>	155	15	66	49	25	155
<b>Turnover has increased</b>	23%	40%	23%	26%	8%	0.148
<b>Turnover was maintained/safeguarded</b>	22%	13%	27%	16%	24%	0.148
<b>Profits increased</b>	23%	27%	30%	20%	4%	0.264
<b>Profits were maintained/safeguarded</b>	28%	20%	33%	22%	32%	0.264
<b>Headcount increased</b>	26%	27%	26%	30%	16%	0.750
<b>Headcount was maintained/safeguarded</b>	28%	20%	36%	22%	20%	0.750
<b>Productivity increased</b>	45%	53%	44%	57%	20%	0.071
<b>Productivity was maintained/safeguarded</b>	17%	7%	23%	10%	24%	0.071
<b>Exports have increased</b>	6%	20%	4%	6%	0%	0.058
<b>Exports have been maintained/safeguarded</b>	11%	7%	15%	6%	12%	0.058
<b>Column average</b>	23%	19%	24%	20%	14%	

Note: A small p-value (typically less than 0.05) suggests that the observed differences are statistically significant.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

<sup>17</sup>  $\chi^2$  (2, N = 110) = 9.90,  $p = .007$ .

**Table 4-13: Business growth impacts by technology or solution adopted**

Business growth impact	Total	Resource/ material planning systems, e.g. ERP, MRP systems	Printing/ scanning, incl. 3D	Database/ data capture	Automation of machinery, incl. CNC machinery	Other
<b>Sample base</b>	111	15	14	17	28	57
<b>Turnover has increased</b>	29%	20%	50%	41%	25%	25%
<b>Turnover was maintained/safeguarded</b>	29%	33%	21%	29%	29%	35%
<b>Profits increased</b>	29%	27%	35%	41%	29%	27%
<b>Profits were maintained/safeguarded</b>	39%	33%	35%	35%	39%	42%
<b>Headcount increased</b>	32%	33%	43%	47%	32%	25%
<b>Headcount was maintained/safeguarded</b>	34%	33%	29%	18%	32%	42%
<b>Productivity increased</b>	56%	53%	86%	76%	57%	44%
<b>Productivity was maintained/safeguarded</b>	23%	20%	0%	12%	29%	31%
<b>Exports have increased</b>	6%	7%	0%	18%	7%	6%
<b>Exports have been maintained/safeguarded</b>	15%	13%	21%	24%	18%	12%
<b>Column average</b>	29%	27%	32%	34%	30%	29%

Note: The total number of firms that adopted DT is not equal to the sum of the specific technologies because some firms reported adopting more than one type of technology.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Firms that deployed digital technologies in product and process development and sales and marketing were the most likely to report business growth impacts such as increased turnover and productivity. In comparison, firms that deployed digital technologies in materials and energy management and supply chain management were less likely to report impacts (Table 4-14). This may be explained by the fact that interventions such as energy efficiency reduce cost and therefore improve profitability, but they do not really affect productivity or turnover, hence the need for various metrics, depending upon the type of project.

We examined whether firms that adopted technology solutions in product and process design and development were more likely to report increases in turnover, profits, headcount,

productivity and exports than firms that adopted technology solutions in other business areas. We found statistically significant differences in productivity<sup>18</sup> and export<sup>19</sup> increases. This means that projects involving product and process design and development are more likely than other technology-adoption projects to generate productivity and export increases in a relatively short period of time.

**Table 4-14: Business growth impacts by business area of technology application**

Business growth impact	Total	Enterprise management	Materials and energy management	Production and assembly	Product and process design and development	Sales and marketing	Supply chain management	Other
<b>Sample base</b>	111	43	58	97	52	52	46	20
<b>Turnover increased</b>	28%	29%	27%	27%	31%	36%	27%	32%
<b>Profits increased</b>	29%	29%	29%	28%	31%	28%	24%	32%
<b>Headcount increased</b>	32%	33%	23%	32%	35%	42%	29%	36%
<b>Productivity increased</b>	56%	49%	55%	57%	59%	57%	51%	55%
<b>Exports increased</b>	6%	7%	7%	7%	13%	8%	6%	9%
<b>Column average</b>	30%	29%	28%	30%	34%	34%	27%	33%

Note: The total number of firms that adopted DT is not equal to the sum of the specific business areas because some firms reported adopting DT in more than one business area.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Only four surveyed firms (3%) indicated experiencing decreases in turnover, profits, headcount, productivity or exports as a result of their participation in MSA. The most frequent of these impacts was decreased headcount, which may be an intended impact resulting from the automation of tasks and processes. By region, the largest percentage of firms that reported this impact was found in the North West region for those that participated in the workforce development service line (9% reported reductions in headcount) (Table 4-15).

<sup>18</sup>  $\chi^2(2, N = 110) = 5.37, p = .068$ .

<sup>19</sup>  $\chi^2(3, N = 109) = 1.16, p = .011$ .

**Table 4-15: Other business impacts**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	155	22	79	28	26
<b>Headcount has decreased</b>	3%	5%	5%	0%	0%
<b>Turnover has decreased</b>	2%	0%	3%	0%	4%
<b>Profits decreased</b>	1%	0%	1%	4%	0%
<b>Exports have decreased</b>	1%	0%	3%	0%	0%

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Sample bases</b>	46	29	4	23	85
<b>Headcount has decreased</b>	4%	3%	0%	9%	2%
<b>Turnover has decreased</b>	0%	0%	0%	0%	4%
<b>Profits decreased</b>	0%	0%	0%	0%	2%
<b>Exports have decreased</b>	2%	0%	0%	4%	1%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## Expected future impacts

Although less than half of the firms that participated in the survey reported business growth impacts, most (87%) indicated that they are expecting positive impacts from their participation in MSA in the next 5 years. The most common positive impact expected is on profits (83%), followed by productivity (81%) and skills (79%). The least common impact expected is on exports (36%).

By region, the North East showed the largest percentage of firms expecting positive impacts, while Yorkshire and the Humber showed the smallest percentage (firm support in this region only started in January 2022).

In terms of the type of support, grant awardees and those firms participating in the student placement service were the most likely to expect positive impacts in the future, particularly on profits and turnover. Firms participating in the leadership and management service line, and student placement, were more likely to expect future impacts on productivity and skills development. Lastly, grant awardees and firms participating in the workforce development service line were the most likely to expect positive impacts on exports in the future. In comparison, firms that did not participate in service line (i.e. grant, leadership and management, student placement or workforce development), but only received other type of

adviser-based support were the least likely to expect positive impacts in the future (Table 4-16).

**Table 4-16: Expected positive impacts in the next 5 years**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample base</b>	155	22	79	28	26
<b>Profits</b>	83%	91%	82%	82%	77%
<b>Productivity</b>	81%	100%	77%	79%	81%
<b>Skills</b>	79%	91%	78%	71%	81%
<b>Turnover</b>	74%	73%	71%	86%	73%
<b>Employee growth</b>	66%	55%	70%	68%	62%
<b>Exports</b>	36%	36%	41%	46%	12%
<b>No impact</b>	12%	0%	14%	14%	15%
<b>Don't know</b>	1%	0%	0%	0%	4%

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Sample base</b>	46	29	4	23	85
<b>Profits</b>	98%	90%	100%	91%	74%
<b>Productivity</b>	96%	100%	100%	96%	69%
<b>Skills</b>	91%	93%	100%	91%	69%
<b>Turnover</b>	91%	76%	100%	78%	68%
<b>Employee growth</b>	76%	62%	100%	78%	61%
<b>Exports</b>	48%	31%	0%	48%	32%
<b>No impact</b>	0%	0%	0%	4%	21%
<b>Don't know</b>	0%	0%	0%	0%	1%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

### Additionality (self-reported)

Additionality is the extent to which a change occurs as the result of an intervention, which would not have occurred in its absence.<sup>20</sup> Following the methodology used by Steer to assess

<sup>20</sup> English Partnerships (2008). [Additionality Guide. A standard approach to assessing the additional impact of interventions.](#)

the additionality of the North West Pilot, two additionality factors were used when calculating the net impacts of MSA:

- Partial additionality and deadweight – what would have happened anyway, in the absence of the programme; and
- Displacement – to what extent other activities were delayed or foregone because of participation in the programme.

For partial additionality and deadweight, the survey participants who received the grant were asked to report what they would have done in the absence of the programme. Additionality values were assigned as follows:

- 40% to answers indicating that a project would have gone ahead on a smaller scale, at a slower pace and/or to a lower quality (partial additionality);
- 100% to the response “Not gone ahead with the project at all” (full additionality); and
- 0% to the response “Gone ahead with your digitalisation project at the same scale, pace and quality” (deadweight).

The participant firms recognised the value of Made Smarter Adoption and most identified that without the financial assistance provided their digitalisation projects would have been done on a smaller scale, at a slower pace or to a lower quality (partial additionality). Aggregating additionality scores, we obtained a score of 54% for MSA.

For displacement, we applied the same approach used to assess the North West Pilot, asking grant awardees the extent to which they had to forego or delay other activities as a result of participation in the pilot. On average, 90% of the firms mentioned that they did not have to delay or forego activities relating to the purchase of capital equipment, the maintenance of capital equipment, the hiring of new staff, R&D investment, or other, as a result of the time and resources invested in MSA participation. Thus, a displacement value of 10% was assumed.

The displacement value was then subtracted from the deadweight value using the approach applied in the North West Pilot evaluation:  $\text{deadweight} - (\text{deadweight} * \text{displacement})$ , giving an overall additionality value of 48.6%, which is larger than the additionality score found in Steer’s report (43.1%). This value reflects the partial additionality of the programme, that is, digitalisation projects would have gone ahead on a smaller scale, at a slower pace and/or to a lower quality.

**Table 4-17: Without the financial assistance provided by Made Smarter, would you have gone ahead with your digitalisation projects/programmes?**

By region	Total	Additionality score	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	46	46	16	17	10	3
<b>On a smaller scale, at a slower pace or to a lower quality</b>	70%	40% (Partial)	69%	76%	60%	67%
<b>At the same scale, pace and quality</b>	4%	0%	6%	0%	10%	0%
<b>Or not gone ahead with the project at all</b>	26%	100% (Full)	25%	24%	30%	33%
<b>Additionality aggregated score</b>	N/A	54%	53%	54%	54%	60%

By type of support	Total	Additionality score	Grant	Leadership and management	Student placement	Workforce development
<b>Sample bases</b>	46	46	46	16	3	10
<b>On a smaller scale, at a slower pace or to a lower quality</b>	70%	40% (Partial)	70%	69%	67%	80%
<b>At the same scale, pace and quality</b>	4%	0%	4%	0%	0%	0%
<b>Or not gone ahead with the project at all</b>	26%	100% (Full)	26%	31%	33%	20%
<b>Deadweight aggregated score</b>	N/A	54%	54%	59%	60%	52%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

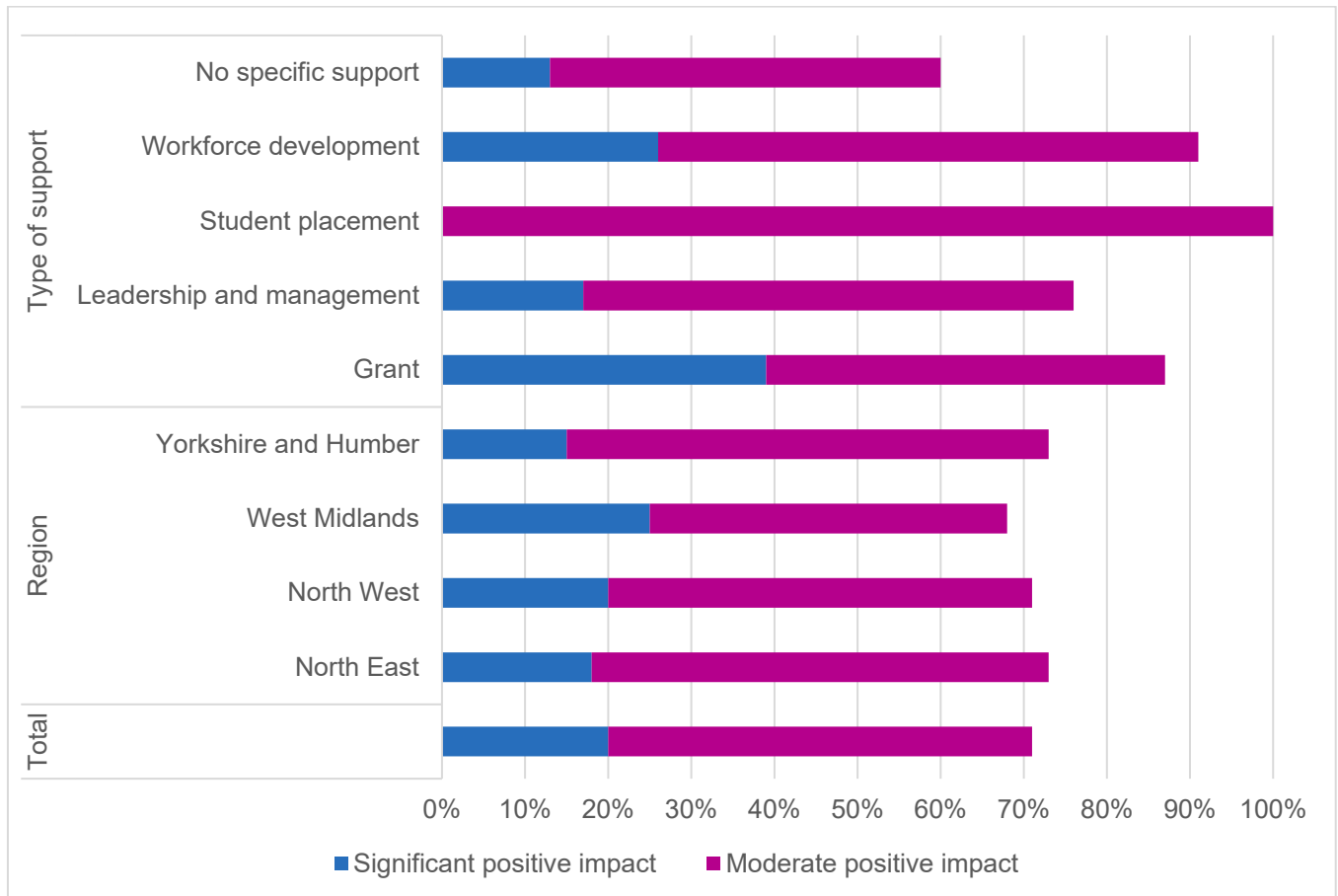
Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

### 4.3 Skills

Significant impacts were identified in skills development among the firms surveyed, with 71% reporting either moderate or significant positive impacts. No substantial differences were observed across regions in this area. Regarding the type of support, grant awardees were the largest group of firms (39%) with significant positive impacts, while the largest proportion of firms that reported moderate positive impacts on skills (100%) was found among those participating in the student placement service, although the sample size is small (4) (Figure 4-1).

The mean number of employees upskilled was 6.7, with a median value of 4. By region, the largest number of upskilled employees was found in the West Midlands, with an average of 10. In terms of the type of support, grant awardees and firms participating in workforce development reported the largest numbers, with an average of 8.

**Figure 4-1: Impacts on skills development**



Number of observations = 155.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Among the firms that reported positive impacts on staff skills levels, the main type of skills developed were: technology use (78%), production skills (72%) and processing and analysing data (65%). By region, firms located in the North East and North West stand out for having the largest percentage reporting the development of innovation skills, while the West Midlands reported the lowest percentage in this area.

Regarding the type of support, firms that participated in grants and the student placement service were more likely to develop technology skills. Those participating in the leadership and management service line were more likely to develop data analysis and innovation skills, while those that participated in workforce development were more likely to develop innovation and managerial skills (Table 4-18). Chi-square tests of independence indicate that grant awardees were more likely to develop technology skills than the rest of the firms,<sup>21</sup> while firms

<sup>21</sup>  $\chi^2(2, N = 155) = 10.076, p = .006$ .



participating in workforce development were more likely to develop innovation and managerial skills.<sup>22</sup>

**Table 4-18: Type of skills developed**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	110	16	56	19	19
<b>Technology use, monitoring and control</b>	81%	63%	79%	95%	89%
<b>Production skills: such as lean manufacturing, operations management, quality management and supply chain management</b>	65%	81%	52%	79%	79%
<b>Processing and analysing data</b>	21%	31%	23%	11%	16%
<b>Innovation skills: such as adaptability, creativity, critical thinking, and engineering and design</b>	43%	44%	43%	32%	53%
<b>Managerial skills: such as decision-making, leadership, technology trend monitoring, project management and strategic thinking</b>	72%	63%	77%	79%	58%
<b>Other</b>	58%	63%	66%	32%	58%
<b>Computer programming and coding abilities</b>	13%	13%	9%	21%	16%
<b>Don't know</b>	1%	6%	0%	0%	0%

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Sample bases</b>	40	22	4	21	51
<b>Technology use, monitoring and control</b>	88%	68%	100%	81%	82%
<b>Production skills: such as lean manufacturing, operations management, quality management and supply chain management</b>	68%	77%	50%	62%	63%
<i>Continues...</i>					

<sup>22</sup>  $\chi^2(2, N = 155) = 12.182, p = .002$ ;  $\chi^2(2, N = 155) = 8.115, p = .017$ .

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Processing and analysing data</b>	20%	27%	0%	10%	24%
<b>Innovation skills: such as adaptability, creativity, critical thinking and engineering and design</b>	43%	59%	75%	57%	35%
<b>Managerial skills: such as decision-making, leadership, technology trend monitoring, project management and strategic thinking</b>	85%	64%	100%	86%	63%
<b>Other</b>	68%	68%	75%	81%	45%
<b>Computer programming and coding abilities</b>	10%	23%	25%	10%	8%
<b>Don't know</b>	3%	5%	0%	0%	0%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

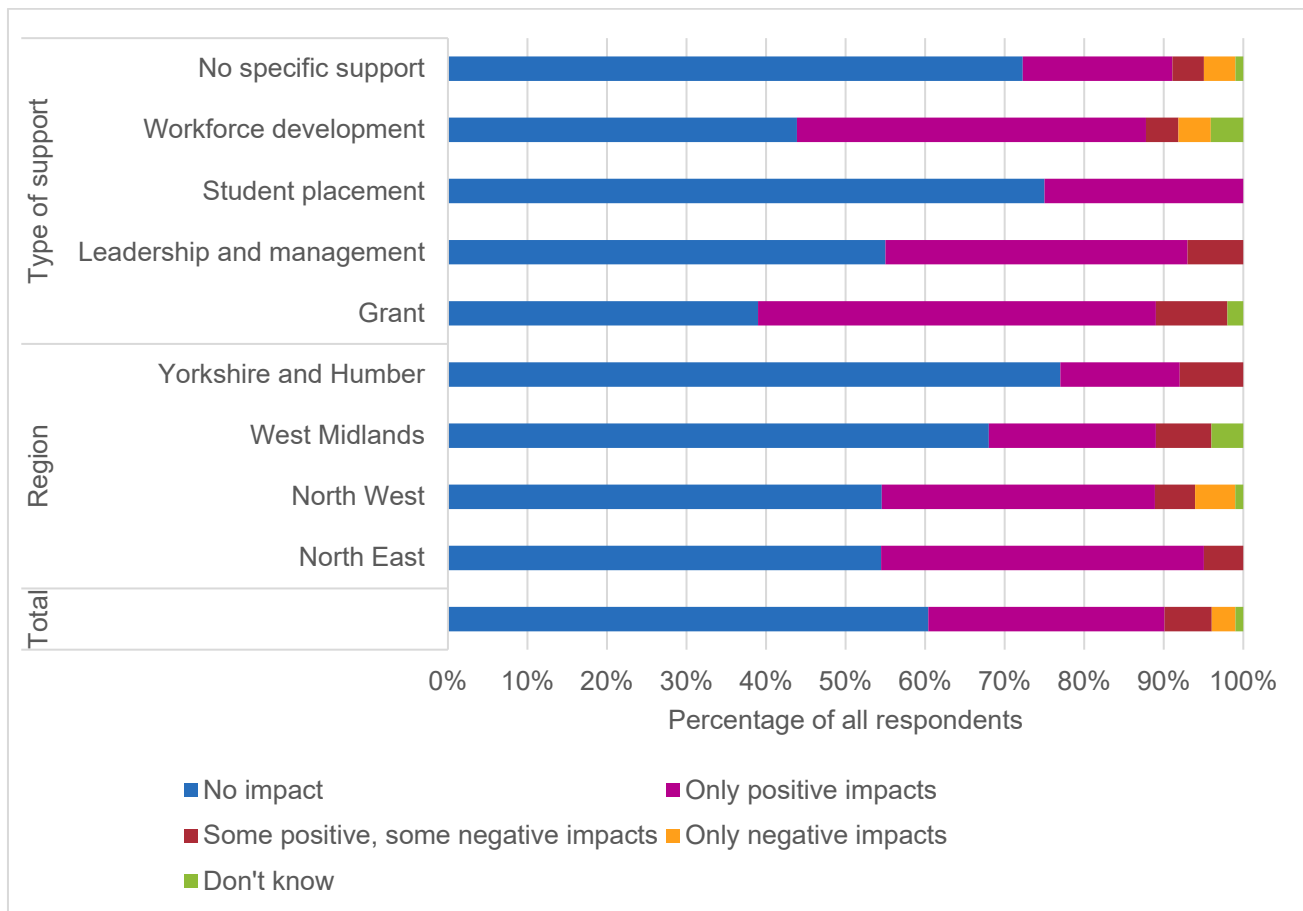
## 4.4 Carbon emissions

Six out of every ten companies surveyed reported that their participation in MSA had no impact on their carbon emissions. A third of them reported only positive impacts, while 6% reported positive and negative impacts, and 3% reported only negative impacts. By region, the largest percentage of firms experiencing positive impacts was observed in the North East and North West. By type of support, grant awardees were more likely to report positive impacts (Figure 4-2).<sup>23</sup>

The main changes that have had positive impacts include: fewer product defects, reported by seven out of every ten of the companies with positive impacts; more efficient use of logistics, reported by six out of every ten of them; and lower energy use, reported by around six out of every ten companies reporting positive impacts.

<sup>23</sup>  $\chi^2(4, N = 155) = 17.120, p = .002$ .

**Figure 4-2: Impacts on carbon emissions**



Number of observations = 155.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## 4.5 Diversity

### Gender diversity

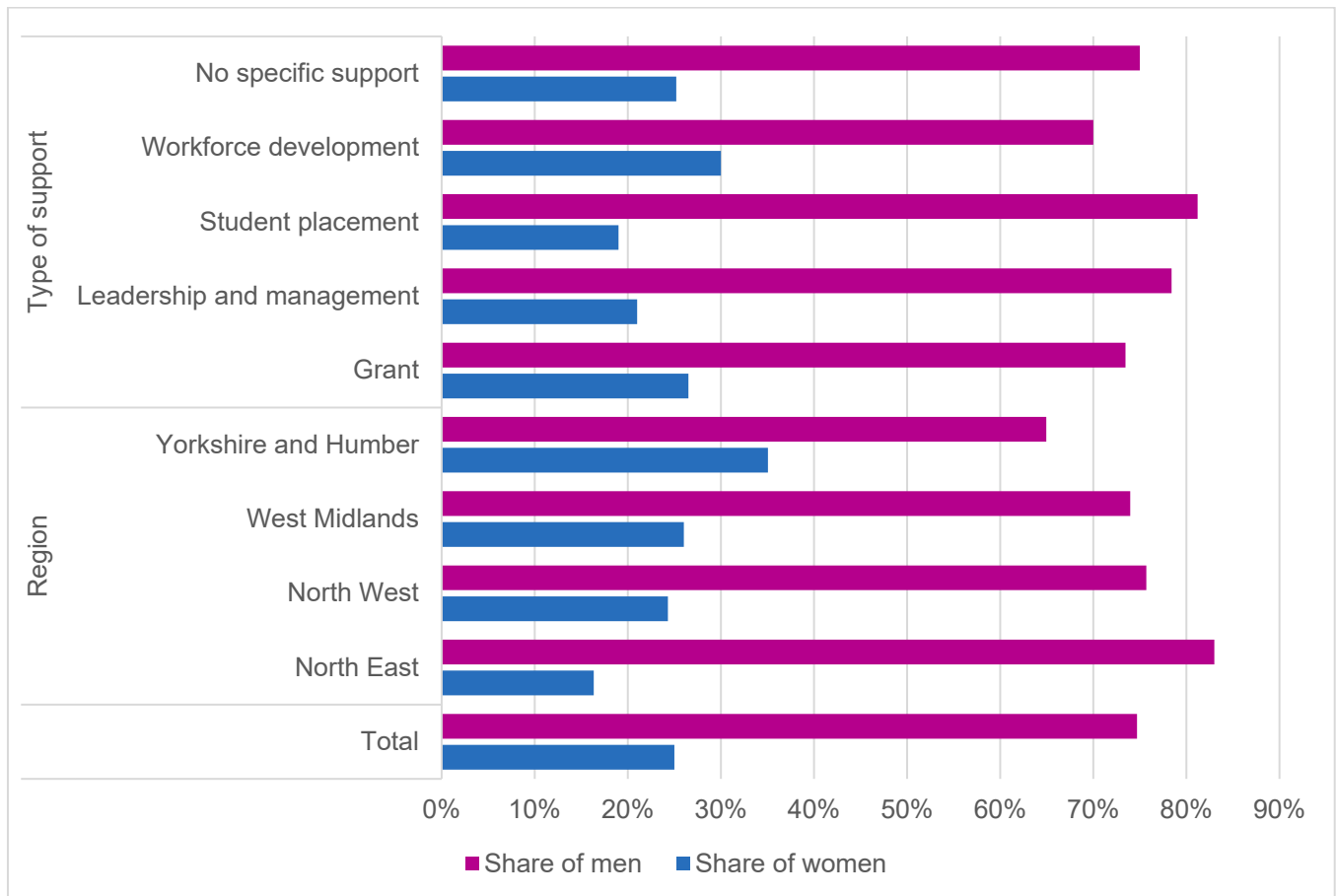
The results from this section should be read considering that the sampled businesses in this survey do not represent the region’s businesses as a whole. These should be seen as indicative of diversity in leadership as they do not represent the overall workforce of firms surveyed. The Department for Business and Trade (DBT) aims for continuous improvement of the data collected on diversity.

Leadership among the firms surveyed was found to be male-dominated. In almost 40% of the firms surveyed, there are no women in leadership positions, and in 30% of them there is less than equal (50%) representation. In comparison, only in 31% of the firms is there equal or greater female representation. The latter figure is slightly lower than the share of women-led

and equally led businesses among all manufacturing SMEs in the UK. According to the Small Business Survey, in 2021 these represented 33% of businesses in the United Kingdom.<sup>24</sup>

By region, greater participation of women in the leadership was observed in the firms surveyed in Yorkshire and the Humber (35%). In terms of the type of support, firms that participated in workforce development or which were grant awardees showed higher female representation (~30%), while those that participated in the student placement (19%) or the leadership and management service line (21%) had lower female representation (Figure 4-3).

**Figure 4-3: Representation in leadership by gender (owners, partners and directors)**



Note: Number of observations = 146.

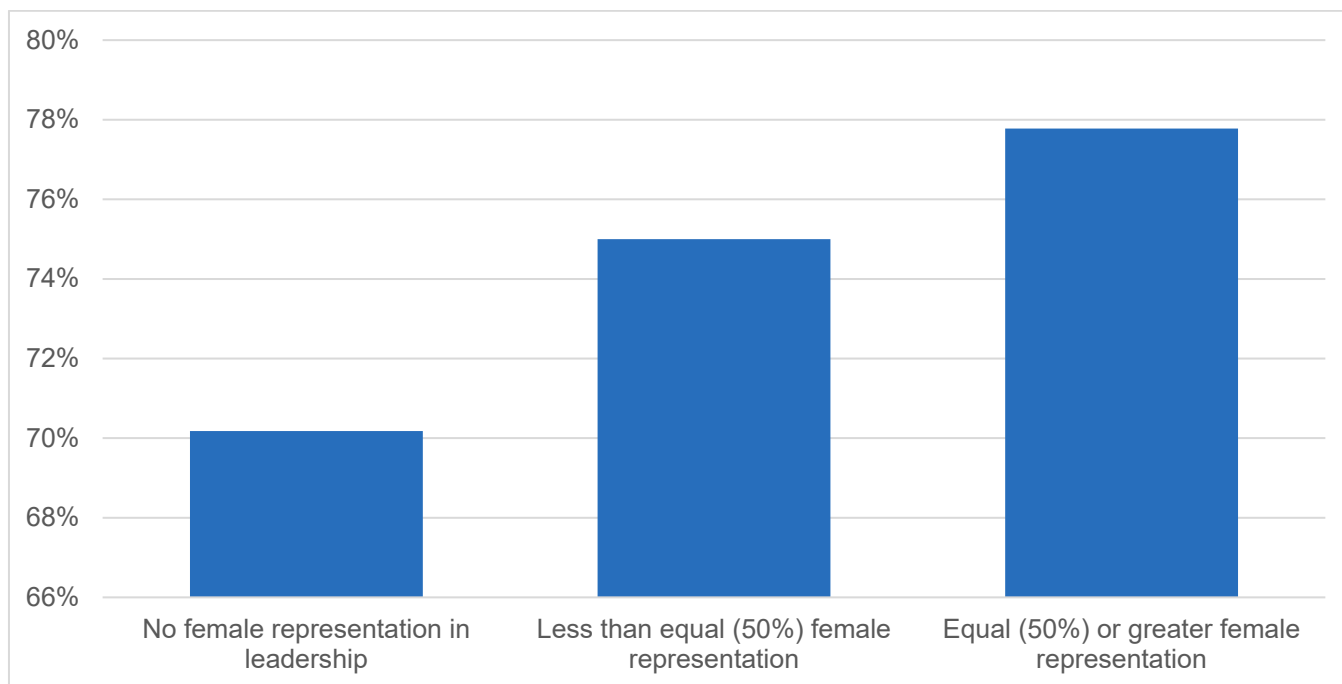
Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Firms where there is female representation in the leadership tended to show higher rates of technology adoption and to report benefits and positive impacts more frequently than those where there are no women among the leadership (Figure 4-4). However, these differences were not statistically significant.<sup>25</sup>

<sup>24</sup> Department for Business, Energy & Industrial Strategy (2022). Small Business Survey 2021.

<sup>25</sup>  $\chi^2(2, N = 146) = 0.789, p = .674$ .

**Figure 4-4: Technology adoption ratios by gender representation in leadership**



Note: Number of observations = 146.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Firms with equal (50%) or greater female representation in the leadership were more likely to report benefits from technology adoption than those with no female representation. The largest differences were found in the proportion of firms that reported better customer satisfaction, better use of data to monitor and understand processes, better asset utilisation, and fewer defects and errors. However, the differences were not statistically significant (Table 4-19).

**Table 4-19: Benefits from technology adoption by gender representation in leadership**

Benefits	Total	No female representation in leadership	Less than equal (50%) female representation	Equal (50%) or greater female representation	$\chi^2$ test (p value)
<b>Sample base</b>	111	40	32	35	111
<b>Improved production planning efficiency</b>	76%	78%	66%	83%	0.245
<b>Better use of data to monitor/understand processes</b>	74%	70%	72%	80%	0.590
<b>Identification of bottlenecks or other process issues</b>	52%	58%	41%	54%	0.333
<b>Better asset utilisation</b>	67%	63%	66%	71%	0.713
<i>Continues...</i>					

Benefits	Total	No female representation in leadership	Less than equal (50%) female representation	Equal (50%) or greater female representation	$\chi^2$ test (p value)
<b>Fewer defects and errors</b>	66%	63%	66%	71%	0.713
<b>Improved factory safety or security</b>	26%	28%	28%	23%	0.861
<b>Better inventory management</b>	57%	55%	59%	57%	0.933
<b>Reduced cost</b>	69%	70%	63%	74%	0.574
<b>Better customer satisfaction</b>	68%	68%	56%	80%	0.113
<b>Greater customisation</b>	60%	63%	63%	54%	0.719
<b>Development of new products or processes</b>	68%	70%	56%	74%	0.261
<b>Other</b>	19%	18%	13%	23%	0.540
<b>Average</b>	59%	58%	54%	62%	N/A
<b>No benefits</b>	3%	3%	3%	3%	0.987

Note: A small p-value (typically less than 0.05) suggests that the observed differences are statistically significant.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Firms with equal or greater female representation in the leadership were more likely to report positive business growth impacts than those without female representation. The largest differences were observed in the proportion of firms that reported safeguarding employment (23 percentage points larger) and turnover (22 percentage points larger) and those that reported increases in profits (19 percentage points). In comparison, firms with only men among the leadership more frequently reported increases in employment, turnover and exports.

Differences in changes in turnover and profits were found to be statistically significant (Table 4-20). These findings are in line with the literature on how female representation in the boardroom is associated with financial performance, in the UK<sup>26</sup> and beyond.<sup>27</sup> Studies on gender diversity among the leadership have also identified positive impacts on innovation activity, talent attraction and retention, and consumer satisfaction.<sup>28, 29</sup>

<sup>26</sup> Brahma, S, Nwafor, C, Boateng, A. (2021). Board gender diversity and firm performance: The UK evidence. *Int. J. Fin. Econ.*, 26: 5704– 5719. <https://doi.org/10.1002/ijfe.2089>

<sup>27</sup> International Labour Organization (2019). *The business case for change*. Geneva: OIT.

<sup>28</sup> Khushk, A., Zengtian, Z. and Hui, Y. (2022). Role of female leadership in corporate innovation: a systematic literature review, *Gender in Management*. <https://doi.org/10.1108/GM-01-2022-0028>

<sup>29</sup> International Labour Organization (2019). *The business case for change*. Geneva: OIT.

**Table 4-20: Business growth impacts from participation in Made Smarter by gender representation in leadership**

Business growth impacts	Total	No female representation in leadership	Less than equal (50%) female representation	Equal (50%) or greater female representation	$\chi^2$ test (p value)
<b>Sample base</b>	147	58	44	45	111
<b>Turnover has increased</b>	23%	29%	14%	24%	0.007
<b>Turnover was maintained/safeguarded</b>	21%	14%	16%	36%	0.007
<b>Profits increased</b>	23%	19%	14%	38%	0.011
<b>Profits were maintained/safeguarded</b>	29%	26%	30%	33%	0.011
<b>Headcount increased</b>	27%	36%	23%	18%	0.242
<b>Headcount was maintained/safeguarded</b>	28%	19%	25%	42%	0.242
<b>Productivity increased</b>	46%	47%	34%	56%	0.358
<b>Productivity was maintained/safeguarded</b>	18%	17%	18%	18%	0.358
<b>Exports have increased</b>	5%	9%	2%	4%	0.463
<b>Exports have been maintained/safeguarded</b>	11%	5%	18%	11%	0.463
<b>Column average</b>	23%	22%	19%	28%	N/A

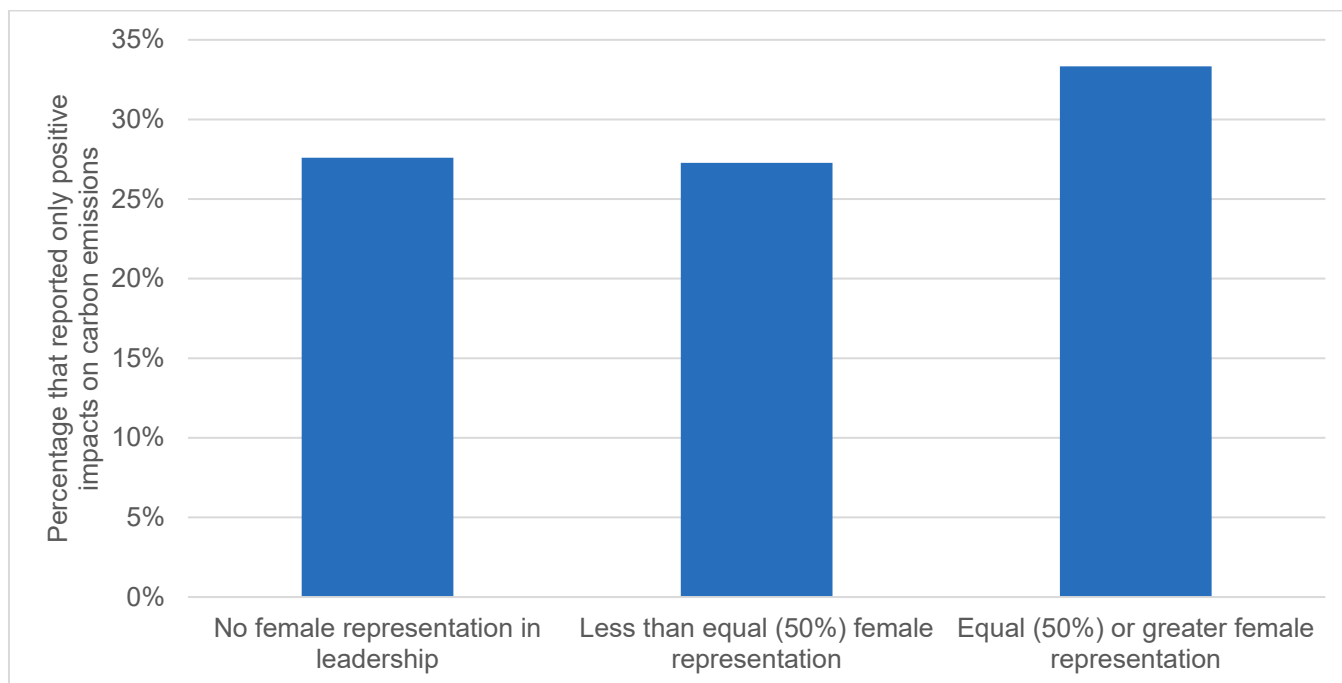
Note: A small p-value (typically less than 0.05) suggests that the observed differences are statistically significant.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Firms with equal or greater female representation in the leadership were also more likely to report only positive impacts on carbon emissions. These positive impacts are mainly explained by fewer product defects (83%), better awareness of energy and resource use (72%) and changes in raw material use (67%). However, the differences were not statistically significant.<sup>30</sup>

<sup>30</sup>  $\chi^2(8, N = 147) = 9.8265, p = .277$ .

**Figure 4-5: Share of firms reporting only positive impacts on carbon emissions by gender representation in leadership**



Note: Number of observations = 147.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## Ethnic diversity

Little ethnic diversity was observed in the leadership among the firms surveyed, although it was greater than the UK average. While non-White ethnic groups represent close to 20% of the entire UK population,<sup>31</sup> they are only represented in leadership positions in 14% of the firms surveyed, and representation of women from non-White backgrounds is only found in 2% of these firms. These figures, however, are higher than the UK average. According to the Small Business Survey, in 2021 businesses with owners or directors from ethnic minorities represented less than 5% of all manufacturing SMEs.<sup>32</sup>

By region, a larger representation of ethnic minority groups in the leadership was found among the firms surveyed in Yorkshire and the Humber and the West Midlands, particularly for Asian or Asian British groups. In terms of type of support, greater representation of ethnic minority groups was seen among firms that received grants, those that did not participate in service lines and firms that participated in the workforce development service line (Table 4-21).

Similar to the findings on gender diversity, firms with a less ethnically diverse leadership are more likely to participate in leadership and management programmes. This is explained by the

<sup>31</sup> Office for National Statistics (2022). Ethnic group, England and Wales: Census 2021.

<sup>32</sup> Department for Business, Energy & Industrial Strategy (2022). Small Business Survey 2021.



fact that most of the companies surveyed that participated in the leadership and management service line are from the North East region, where less diverse leadership is found.

Firms with representation of non-White ethnic groups in the leadership showed higher ratios of technology adoption (76%) than those with only White representation (72%) (Figure 4-6). However, these differences were not statistically significant.<sup>33</sup>

**Table 4-21: Representation in leadership by ethnic group (owners, partners and directors)**

By region	Total	North East	North West	West Midlands	Yorkshire and Humber
<b>Sample bases</b>	155	22	79	28	26
<b>White British or Irish</b>	97%	95%	99%	96%	96%
<b>Any other White background</b>	12%	0%	16%	7%	12%
<b>Mixed/multiple ethnic background</b>	5%	0%	6%	4%	8%
<b>Asian or Asian British background</b>	10%	0%	6%	18%	19%
<b>Black or Black British background</b>	5%	5%	4%	7%	8%
<b>Another ethnic group not mentioned</b>	2%	0%	3%	0%	4%
<b>Don't know</b>	1%	5%	0%	0%	0%

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Sample bases</b>	46	29	4	23	85
<b>White British or Irish</b>	96%	97%	100%	100%	98%
<b>Any other White background</b>	7%	10%	25%	9%	13%
<b>Mixed/multiple ethnic background</b>	7%	3%	0%	9%	5%
<b>Asian or Asian British background</b>	11%	7%	25%	0%	11%

*Continues...*

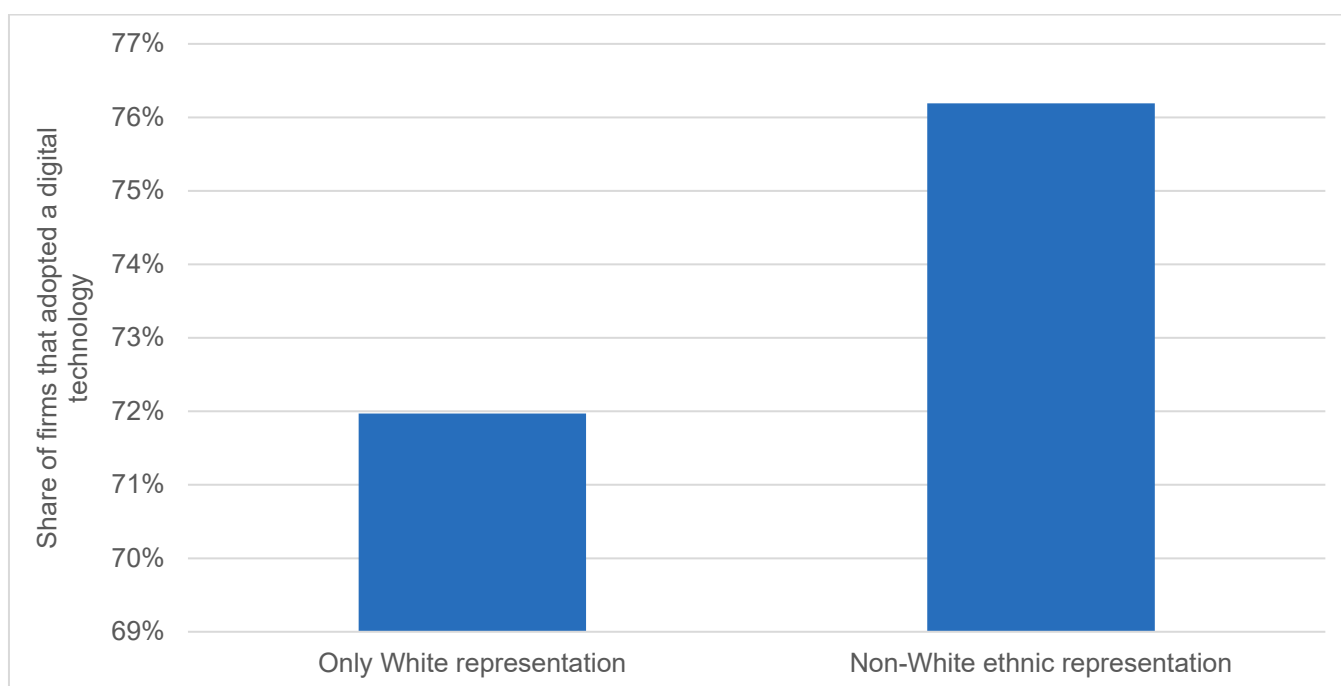
<sup>33</sup>  $\chi^2 (1, N = 153) = 0.162, p = .687.$

By type of support	Grant	Leadership and management	Student placement	Workforce development	Other adviser-based support
<b>Black or Black British background</b>	9%	3%	0%	9%	5%
<b>Another ethnic group not mentioned</b>	2%	0%	0%	4%	2%
<b>Don't know</b>	2%	3%	0%	0%	0%

Note: The sum of the number of firms by type of support is larger than the total, since some firms received more than one type of support.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

**Figure 4-6: Technology adoption ratios by gender representation in leadership**



Note: Number of observations = 153.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Overall, the surveyed firms with non-White ethnic representation were less likely to report benefits from technology adoption, although the number of firms in this category is small (15). Nonetheless, statistically significant differences were found between firms with and without non-White ethnic representation in terms of improved production planning efficiency and the identification of bottlenecks or other process issues (Table 4-22).

Areas where the firms surveyed with non-White ethnic representation tended to report greater benefits include: greater customisation, cost reduction and better customer satisfaction. However, the differences in these areas were not statistically significant (Table 4-22).

**Table 4-22: Benefits from technology adoption by ethnic representation in leadership**

Benefits	Total	Only White representation	Non-White ethnic representation	$\chi^2$ test (p value)
<b>Sample base</b>	110	95	15	110
<b>Improved production planning efficiency</b>	76%	79%	53%	0.032
<b>Better use of data to monitor/understand processes</b>	74%	76%	60%	0.197
<b>Identification of bottlenecks or other process issues</b>	52%	57%	20%	0.008
<b>Better asset utilisation</b>	67%	68%	53%	0.250
<b>Fewer defects and errors</b>	66%	66%	60%	0.633
<b>Improved factory safety or security</b>	26%	28%	13%	0.218
<b>Better inventory management</b>	57%	60%	40%	0.146
<b>Reduced cost</b>	69%	68%	73%	0.702
<b>Better customer satisfaction</b>	68%	68%	73%	0.702
<b>Greater customisation</b>	61%	59%	73%	0.289
<b>Development of new products or processes</b>	68%	68%	67%	0.892
<b>Other</b>	18%	16%	33%	0.102
<b>Average</b>	59%	60%	52%	N/A
<b>No benefits</b>	3%	2%	7%	0.313

Note: A small p-value (typically less than 0.05) suggests that the observed differences are statistically significant.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

In terms of business growth impacts, firms with more ethnically diverse leadership were more likely to report positive effects. The main differences were found in safeguarding employment, safeguarding exports, increases in profits and increases in turnover. In comparison, firms with only White representation in the leadership tended to report safeguarding profits and increases in employment more frequently. However, the differences were not statistically significant (Table 4-23).

**Table 4-23: Business growth impacts from technology adoption by ethnic representation in leadership**

Business growth impacts	Total	Only White representation	Non-White ethnic representation	$\chi^2$ test (p value)
<b>Sample base</b>	154	133	21	154
<b>Turnover has increased</b>	23%	23%	29%	0.621
<b>Turnover was maintained/safeguarded</b>	22%	23%	19%	0.621
<b>Profits increased</b>	23%	22%	29%	0.833
<b>Profits were maintained/safeguarded</b>	28%	29%	19%	0.833
<b>Headcount increased</b>	26%	27%	19%	0.651
<b>Headcount was maintained/safeguarded</b>	28%	26%	38%	0.651
<b>Productivity increased</b>	45%	44%	48%	0.956
<b>Productivity was maintained/safeguarded</b>	18%	17%	19%	0.956
<b>Exports have increased</b>	6%	5%	10%	0.275
<b>Exports have been maintained/safeguarded</b>	11%	10%	19%	0.275
<b>Column average</b>	23%	23%	25%	N/A

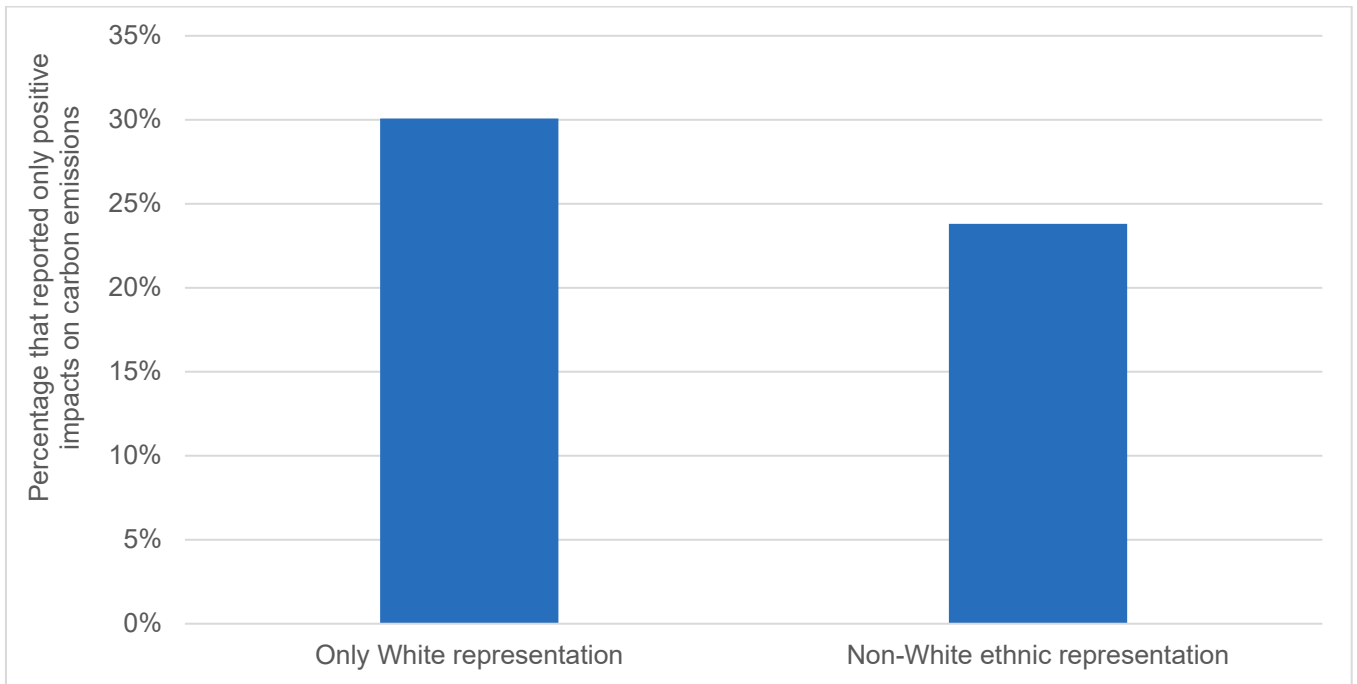
Note: A small p-value (typically less than 0.05) suggests that the observed differences are statistically significant.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

Firms with more ethnically diverse leadership were less likely to report only positive impacts on carbon emissions; however, the differences were not statistically significant (Figure 4-7).<sup>34</sup> The main sources of positive impacts where these firms are lagging behind include: awareness of energy and resource use; and changes in raw material use.

<sup>34</sup>  $\chi^2(4, N = 153) = 3.527, p = .474$ .

**Figure 4-7: Share of firms reporting only positive impacts on carbon emissions by ethnic representation in leadership**



Note: Number of observations = 154.

Source: Cambridge Industrial Innovation Policy – BMG Research, Beneficiary Survey, 2022.

## 5 Revisiting the Made Smarter Adoption theory of change

A review of the North West Adoption Pilot Programme evaluation, the survey questionnaire and interviews with business advisers from the four regions currently deploying the MSA programme have led to the identification of various opportunities regarding future programme design, monitoring and evaluation.

### 5.1 Opportunities identified in the programme design

Four main opportunity areas were identified in the programme design: (i) improving the definition of programme objectives; (ii) expanding the available service lines; (iii) increasing grant support flexibility; and (iv) ensuring a minimum level of delivery standardisation across regions.

#### (i) Improving the definition of programme objectives

Steer’s evaluation highlighted the need to improve the “SMARTness” of the programme objectives. As the programme is rolled out to other regions, it is important to define measurable objectives for each region and for the programme as a whole. Some suggestions of specific objectives addressed by the programme service lines are provided in Table 5-1 (see also the theory of change of the programme presented in Figure 3-1); however, specific targets, such as the number of firms to be supported and time frames, need to be included.

**Table 5-1: Revised programme objectives**

North West Pilot objectives, as stated in the ToC from Figure 3-1	Suggestions of revised objectives for the MSA programme
<ul style="list-style-type: none"> <li>• Raise awareness of, and drive the diffusion and adoption of, transformational IDT technologies within North West SMEs;</li> <li>• Create an ecosystem for national rollout, including an established network of support, effective customer journey, project champions and case studies; and</li> <li>• Demonstrate what can be achieved, making the case for IDT support while also learning lessons to support a national rollout.</li> </ul>	<ul style="list-style-type: none"> <li>• Raise awareness of transformational IDT technologies in SMEs;</li> <li>• Improve SME capabilities for the adoption and use of IDTs;</li> <li>• Increase the adoption of IDTs in SMEs;</li> <li>• Increase SME productivity and profitability through the adoption of IDTs;</li> <li>• Improve supply chain management among SMEs through the adoption of IDTs; and</li> <li>• Improve resource efficiency among SMEs through the adoption of IDTs.</li> </ul>

(ii) Expanding the available service lines

**Supply chains and sustainability**

Strengthening supply chains and reducing the carbon emissions of the manufacturing sector are among the key expected impacts contained in the theory of change of the Made Smarter Adoption programme (see Figure 3-1). However, in practice, the programme does not have clear inputs or activities targeting these impacts, as highlighted in Steer’s evaluation report. This gap could be addressed by including specific work streams on these topics across different service lines, or at least as part of the specialist advice provided. For example, Box 5.1 presents the example of KYKLOS 4.0, an EU programme leveraging Industry 4.0 technologies for circular manufacturing.

**Box 5.1: International experience on digital manufacturing programmes for environmental sustainability and carbon emissions abatement**

**European Union**

[KYKLOS 4.0](#) is a technology demonstrator initiative launched by the European Commission to support the development and adoption of innovative solutions leveraging Industry 4.0 technologies for circular manufacturing.

KYKLOS 4.0 aims to develop an innovative circular manufacturing ecosystem based on elements including:

- Data management and analytics tools;
- Supporting toolkits and frameworks;
- Technology validation pilots and demonstration activities;
- Additive manufacturing simulation modules; and
- Automated refurbishment certification.

**Digital skills of the workforce**

Skills shortages are among the key barriers faced by firms when adopting, and benefiting from, IDT technologies.<sup>35</sup> According to Steer’s report, student placement was the service line that experienced the largest self-reported impact on productivity in businesses. The survey results from Section 4 endorse this suggestion and show that the largest proportion of firms that reported moderate positive impacts on skills (100%) was found among those participating in the student placement service, although the sample size is small (four firms) in total.

When discussing student placements with the consulted business advisers, the majority of interviewees saw them as a useful and missed opportunity to address skills gaps in SMEs. In

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<sup>35</sup> World Economic Forum (2020). *The Future of Jobs Report 2020*.

addition, business advisers provided suggestions on how MSA could expand its skills development offer to address the significant skills shortages that they have seen across beneficiary SMEs in all of the regions interviewed, including:

- Funding for in-house training;
- Contributions towards apprenticeships;
- Flexible, on-demand/bespoke training courses and modular programmes; and
- Online training introductory courses.

Considering all these inputs, an opportunity has been identified to reinstate the student placements (in a format that can address the key operational challenges around resource needs and matching difficulties between firms and interns), as well as expanding the programme's support for skills development at the shop-floor level. This could include developing new service lines (e.g. online and in-person training courses) or partnering with existing programmes and services.

Although a common practice is to refer firms to skills development support available beyond Made Smarter, some regions are better equipped than others to offer skills development support. In the West Midlands, for example, a shortage of external training providers was highlighted by programme advisers, while in Yorkshire a shortage of system integration consultancy services was mentioned.

Box 5.2 presents examples of international training programmes in digital manufacturing: the EU Digital Skills Jobs Platform; Skillnet Ireland; and Singapore's SkillsFuture Series. These provide examples of the topics and proficiency levels usually covered; how the training offer across regions could be presented in a centralised online platform, including the offer from universities (EU Digital Skills Jobs Platform); skills assessment tools (Skillnet); and partnerships with private-sector providers and universities (SkillsFuture, Skillnet).

### **Box 5.2: International experience on digital manufacturing training programmes**

#### **European Union**

The European Commission has developed the [Digital Skills and Jobs Platform](#), which includes a [training catalogue](#) in different areas, including digital manufacturing. It also provides information on the funding available across member states.

#### **Ireland**

[Skillnet](#) Ireland allocates funding for businesses to understand their skills needs and support the upskilling of their staff. Key areas covered by this initiative include digital skills and "climate-ready" skills. Funding is allocated through learning networks, which are groups of businesses within the same industry sector or region with similar training needs, so they can receive subsidised training.



## Singapore

[SkillsFuture](#) is a life-long learning initiative of the Government of Singapore [SkillsFuture Series](#); part of this initiative is a list of short, industry-relevant training programmes on emerging skills at three proficiency levels: basic, intermediate and advanced. One of the eight categories of the SkillsFuture Series is advanced manufacturing.

[Courses in advanced manufacturing](#) include topics such as digital twins, machine learning, the Internet of Things, 5G networks and smart sensing technology. Courses are delivered by Singaporean universities, both online and in person. Participants can apply for financial support from [SkillsFuture Credit](#) to cover part of the fees.

## Networking

Although the [InterAct network](#) is contributing to connecting IDT stakeholders across disciplines and sectors, firms could benefit from a specific networking service line within the MSA programme. This could make it easier for them to connect and share experiences with other firms, universities and technology providers across regions, without the need for direct involvement and guidance from business advisers. The consulted advisers also highlighted opportunities to leverage linkages with Made Smarter innovation.

In terms of networking for staff involved in the delivery of the MSA programme, the consulted advisers confirmed that, although some communication exists between some regions, there are opportunities to formalise spaces for experience sharing across advisers nationally, for example, annual conferences or meetings where advisers and managers can share their experiences. Opportunities were also identified to take better advantage, across regions, of the lessons learned in the implementation of the North West Pilot, as there are no formal mechanisms to share these with new regions implementing the programme.

### (iii) Increasing grant support flexibility

Considering the underspend identified in the evaluation of the North West Adoption Pilot Programme, Steer's report suggested to "remove the £20k cap limit on grants, and instead deploy a net grant equivalent limit of up to 50% or £70k grant value (whichever is lower)". However, insights from adviser interviews suggest that the size of the grant is right for the current needs of beneficiary firms based on their digitalisation readiness level when first engaging in the programme.<sup>36</sup> In this regard, there is a perception that the current size of the grant is well suited to the adoption of data systems and software projects that often represent the first step in the digitalisation journey of businesses with low digital maturity. A match-funded level of 50% is also perceived as appropriate to generate commitment from beneficiary firms.

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<sup>36</sup> Self-reported digital maturity among all 155 consulted firms (see **Table 3-2**) varies between "very mature/very high digital readiness" (10%), "fairly mature/high digital readiness" (43%), "fairly immature/low digital readiness" (32%) and "not at all mature/very low digital readiness" (16%).

In exceptional cases, the interviewees suggested, involving larger investments in advanced technologies (for example, automation, CNC machines or additive manufacturing projects), larger grants or 0% interest loans may be needed, either as part of MSA or when referring firms to alternative support. Box 5.3 presents examples of digital adoption programmes with similar levels of funding; in particular, the Canadian programme Boost Your Business Technology also provides 0% interest loans.

Conversations with business advisers also highlighted the opportunity to support firms throughout their digitalisation journey by using grants for more than one project or providing interest-free loans for second projects. This would enable beneficiary firms to advance their digitalisation roadmap further than is currently possible within the existing programme structure. This is relevant, as firms often struggle to invest in digitalisation projects on their own, not because of a lack of alternative funding availability but because they do not always understand the business value of digital technologies and cannot build convincing business cases. Additionally, firms often have limited visibility when it comes to the business support mechanisms available in their regions. These are two key barriers addressed by Made Smarter, which often works as a one-stop-shop to guide businesses in their digitalisation journeys (enabled through grant awards and business advice) and/or refer them to other support programmes regionally. Advisers report that expert consultancy advice and support for the creation of digitalisation roadmaps are perceived by firms as some of the most beneficial features of Made Smarter. Grants work as the enabling mechanism for firms to kick-start their transformation journey, but this cannot be done without first receiving expert guidance and advice.

### **Box 5.3: International experience on digital adoption programmes**

#### **Canada**

The [Boost Your Business Technology](#) grant offers support to Canadian-owned SMEs that want to adopt new digital technologies. Eligible businesses can leverage the grant to pay for the services of a digital adviser. The grant covers up to 90% of the eligible cost of retaining the services of a digital adviser, up to a maximum grant value of \$15,000 (~£9.6,000) per SME, to develop a digital adoption plan.

Businesses also have the opportunity to secure a 0% interest loan for up to CAD\$100,000 (~£64,000) from the Business Development Bank of Canada to facilitate the acquisition of new technology. Businesses also have the option to leverage the knowledge of post-secondary students and recent graduates through subsidised work placements.

#### **Germany**

[Digital Jetzt](#) is a programme under the supervision of the German Federal Ministry for Economic Affairs and Energy supporting SMEs investing in digital technologies and skills.

The [maximum size of the grant is €50,000](#) and the eligibility criteria include having a digitalisation plan.

### **Singapore**

The [Productivity Solutions Grant](#) supports businesses in the adoption of pre-scoped IT solutions, equipment and consultancy services that improve productivity. The maximum support level for SMEs is 70%. The cost of [pre-scoped solutions](#) and equipment for advanced manufacturing ranges between S\$4,000 (~£2,500) and S\$50,000 (~£31,000). These are listed along relevant courses from the [SkillsFuture](#) initiative.

#### **(iv) Ensuring a minimum level of delivery standardisation across regions**

Conversations with project managers and advisers across the four regions currently delivering the Made Smarter Adoption programme highlighted the following key messages and opportunities:

- Each region has a different level of funding available to deliver the MSA programme.
- Regions have a high degree of autonomy and flexibility to design bespoke versions of the programme that suit both the characteristics of the manufacturing sector and business support system within the region and the level of funding and resources allocated to the programme. This leads to variations in how service lines are implemented and offered in each region, which represents a challenge for the comparability of programme impact monitoring and evaluation results across regions.
- Advisers perceive the need to achieve a higher level of standardisation in the design and implementation of MSA across regions, compared to current practice, while maintaining flexibility to address the specific needs of regions and firms and complement existing regional business support ecosystems. Key priority areas for standardisation identified from interviews include:
  - Digital readiness assessment and progress monitoring;
  - Data collection;
  - Common methodology or delivery model, including service lines and support journey (e.g. workshop content, frequency and requirements for one-to-one support);
  - Adviser profiles and delivery team composition (e.g. balance between business, manufacturing and technical expertise), which could also be more standardised; and
  - Monitoring of consultancy activity.

- Centralisation of some processes was also identified as an opportunity area. These include: marketing and advertising; registration and first assessment of firms (through the programme website); training for programme delivery; database of accredited technology, training and consultancy providers; and coordination of student placements. Centralisation of technology expertise has also been recommended by some advisers: not every team needs an expert in every technology and these could be accessed on demand across the country from a central pool.
- Some effective practices identified include:
  - Collaboration with universities to access expertise, provide courses on technical skills;
  - Workshops demonstrating technologies in collaboration with technology providers;
  - Digital readiness assessments conducted at the beginning of the engagement with MSA, at 6 months and 12 months later;
  - Providing training courses in cyber-security;
  - Establishing project-specific progress indicators defined in collaboration with participant firms;
  - Visits to premises of peer firms (from other sectors) participating in Made Smarter; and
  - A combination of advisers with manufacturing/business expertise, as well as technology specialists.

## 5.2 Opportunities identified in monitoring and evaluation

Various opportunities have been identified around the way the Made Smarter Adoption programme is monitored and evaluated, particularly in five main areas: (i) beneficiary firms' survey design; (ii) case studies' selection; (iii) diversity in firms; (iv) long-term quantification of programme impact; and (v) short-term qualitative impact assessment through regional advisers.

### (i) Beneficiary firms' survey design

Evaluation of the programme has involved a beneficiary firms' survey that covers the following topics (see Appendix B for full survey questionnaire):

- Awareness of the programme
- Access to the programme

- Satisfaction with the programme
- Impacts
  - IDT adoption
  - IDT diffusion
  - Turnover and profits
  - Employee growth
  - Productivity
  - Exports
  - Future impacts
  - Carbon emissions
  - Technology providers
  - Expertise providers
- Diversity

The survey questionnaire is comprehensive and relevant; however, there are opportunities to increase its focus on understanding outputs, outcomes and impacts. Questions related to satisfaction with the programme represent approximately one-third of the questionnaire, and, despite its relevance, most of this information could be collected more effectively by the regions as part of their regular monitoring of the programme. This would need a mechanism to ensure impartiality and independence of the satisfaction results. This would help to inform the programme design and delivery in real time. This could be done, for example, using the Made Smarter programme website to collect feedback from participant firms. It would also free up time in the questionnaire to improve the quality and depth of responses collected and allow for the inclusion of additional questions related to the outputs, outcomes and impacts of the programme and on diversity in firms.

The usefulness of questions related to the relationships with technology providers also needs to be critically assessed, as these do not seem to have been analysed in the previous programme evaluation.

Overall, the length of the current survey represents a methodological challenge for interviewers, who may have to sacrifice response time availability to ensure survey completion. Furthermore, a long survey can generate negative attitudes among interviewees, who are often time constrained.

A summary of topics and/or questions that could be added or removed from the current survey is shown in Table 5-2. These modifications represent an opportunity to increase the survey’s relevance for process or impact evaluation.

**Table 5-2: Suggested amendments to existing beneficiary firms’ survey (see Appendix B for full survey questionnaire)**

New topics/questions that could be added or refined	Old topics/questions that could be removed or omitted
<p>Awareness of digital technologies and their benefits:</p> <ul style="list-style-type: none"> <li>• Have you increased your awareness of the cost of digital technologies as a result of participating in Made Smarter Adoption?</li> <li>• Have you increased your awareness of the benefits of adopting digital technologies as a result of participating in MSA?</li> </ul> <p>Type of digital technologies adopted:</p> <ul style="list-style-type: none"> <li>• Define a list of types of technology in collaboration with programme advisers.</li> <li>• One-stop-shop</li> <li>• Have you accessed other programmes’ support as a result of participating in MSA?</li> </ul>	<ul style="list-style-type: none"> <li>• Q1. How did you first find out about the Made Smarter Adoption programme?</li> <li>• Q2. How easy was it for you to get information on the MSA programme?</li> <li>• Q4. Were any of the following among your reasons for contacting the MSA programme?</li> <li>• Q5C. Thinking about how well the MSA programme responded to your needs, which of the following statements best applies?</li> <li>• Module “Satisfaction with the Programme” (Q6–Q21).</li> <li>• Q37. Have you recommended that others join Made Smarter?</li> <li>• Q38. Have you discussed the new technologies implemented through Made Smarter with others outside your firm?</li> <li>• Q54. Which of the following sources of advice will you use in the future when investing in new technologies?</li> </ul>

The current survey approach to investigate dissatisfaction with the programme is based around open questions where interviewees can explain their reasoning in detail. However, this can lead to insights that are difficult to synthesise and/or categorise. There is an opportunity to modify this approach and provide predefined sets of answer choices, including an “other” option where firms can explain their reasoning. This could help to better establish whether the dissatisfaction shown by a small number of firms (see Section 3) arises from programme limitations or simply because of inadequate expectations from firms that may not be suitable for participation in MSA (e.g. because of the type of industry/sector, industrial processes or other reasons).

**(ii) Case studies’ selection**

Based on the methodology note of the North West Pilot evaluation by Steer, it is not clear to what extent the selection of case studies was informed by survey data analysis rather than specific themes or interventions. Moving forwards, we would recommend following a sequential design, using findings from the survey data to select case studies. Different pathways to impact could be identified from analysing the relationships between interventions and different impacts reported by firms (as shown in Section 4), for example, the types of technology adopted, business functions where these technologies are adopted, and the benefits arising from these. Case studies would then provide qualitative insights on the particular conditions that shape these pathways.

In order to understand the process of change as a result of participation in MSA in each region, successful and unsuccessful cases could be chosen, in collaboration with business advisers, according to the type of intervention (grant, leadership and management, student placement and workforce development). Success could be defined by a combination of variables, including:

- Short-term benefits (e.g. improved production planning, better use of data);
- Business growth impacts (e.g. increases in turnover, headcount and productivity);
- Skills development;
- Supply chain improvements; and
- Positive impacts on carbon emissions.

Insights from the adviser interviews suggest that digital readiness levels are another important feature to consider in the selection of firms for developing case studies. Advisers highlighted how successful technology adoption depends on people and culture. Thus, there are also opportunities to use case studies to better understand the experience of workers in the use of digital technologies and their learning journey. We recommend that case studies consider interviews with both managers and shop-floor employees.

### (iii) Diversity in firms

Insights on staff diversity were only captured for leadership positions in this project. However, a more comprehensive approach would include asking the gender and ethnic background of the staff involved in MSA and whether the firm has a diversity and inclusion policy in place. This would help to better understand the gender gaps among participating firms.

**Table 5-3: National and international practices on measuring diversity**

Impact variable	Firm-level indicator	Measurement approach	Source
<b>Diversity</b>	Gender equality	<ul style="list-style-type: none"> <li>• Participation of women in leadership positions</li> <li>• Self-reported by firms</li> </ul>	<a href="#">ILO (2020). Impact of ILO SCORE Training on management practices, working conditions and business results in Peruvian SMEs</a>
	Firm diversity	<ul style="list-style-type: none"> <li>• Percentage of partners/directors from minority ethnic groups</li> <li>• Based on data from the annual Small Business Survey</li> </ul>	<a href="#">Neil Lee, Migrant and ethnic diversity, cities and innovation: Firm effects or city effects?, Journal of Economic Geography, Volume 15, Issue 4, July 2015, Pages 769–796.</a>
	Diversity and inclusion policy	<ul style="list-style-type: none"> <li>• Self-reported by firms: Has a diversity and inclusion policy in place?</li> </ul>	<a href="#">ELFA (2021). D&amp;I Policy Report 2021: A Post-Pandemic Review.</a>



#### (iv) Long-term quantification of programme impact

The difficulty collecting productivity data from firms was highlighted during this project. Steer's evaluation used self-reported firm data on turnover divided by the number of workers. In order to identify ways to improve these estimates, we reviewed impact evaluations assessing this metric in the United Kingdom and beyond. Common practices identified include (see Table 5-4):

- Using turnover per employee data as a proxy for labour productivity (similar to Steer's evaluation approach);
- Using business identification numbers to link evaluation survey data with broader firm databases that contain information on value added or turnover, such as Fame; and
- Constructing value added per employee measure based on turnover data.

Insights from the adviser interviews indicate that turnover and profit data tend to be easier to capture. Wherever possible, we suggest linking survey data with broader firm databases, for example, collaborating with the ONS to identify participant firms in the Annual Business Survey data.

Estimating broader long-term economy impacts based on firm-level data was another challenge identified in this project. Steer's evaluation involved merging the database of Made Smarter Adoption Pilot Programme beneficiaries via enterprise reference number with the Business Structure Database (BSD). However, BSD proved to be insufficient to conduct the quasi-experimental analysis originally intended in Steer's evaluation. Based on common practices followed in national and international impact evaluations, some ways to improve the counterfactual impact evaluation include:

- Using other databases, such as Fame or the Business Structure Database (BSD), to link evaluation data to standardised measures of turnover and other firm characteristics that may help to build a matching score;
- Converting turnover to gross value-added data using the ONS Annual Business Survey data (Table 5-4); and
- Considering that long-term impacts on variables such as gross value added and productivity may take at least 3 years to realise.



**Table 5-4: National and international practices on measuring productivity impacts**

Impact variable	Firm-level indicator	Measurement approach	Source
<b>Gross value added</b>	Turnover	<ul style="list-style-type: none"> <li>Identifying the proportion of the survey sample that identified a turnover effect, and the average gross effect, where realised.</li> <li>Applying the proportion of the survey sample with the benefit to the population.</li> <li>Adjusting the gross population effect to net by applying the additionality ratios derived from the survey.</li> <li>Converting turnover to GVA data using ONS Annual Business Survey data (i.e. GVA represents 34% of turnover).</li> </ul>	<a href="#">SQW (2019)</a> . Evaluation of the Innovation Vouchers Programme. Report to Invest Northern Ireland, pp. 52-53)
	Turnover	<ul style="list-style-type: none"> <li>From the Annual Business Survey, the average ratio of GVA to turnover for each four-digit sector over the period of interest is computed. GVA for each business is estimated by multiplying the turnover by the sector-specific GVA-to-turnover ratio.</li> <li>This calculation assumes that selling similar amounts of similar products (i.e. within a sector) will lead to a similar level of value added to the economy.</li> </ul>	<a href="#">BIS (2016)</a> . <a href="#">The Manufacturing Advisory Service (MAS) – Impact Analysis Methodology Study</a>
<b>Productivity</b>	Value added per employee	<ul style="list-style-type: none"> <li>Based on data from the US Census of Manufacturers.</li> </ul>	<a href="#">Lipscomb, C. A., et al. (2018)</a> . <a href="#">Evaluating the Impact of Manufacturing Extension Services on Establishment Performance</a> . <i>Economic Development Quarterly</i> , 32(1), 29–43.
	Value added per employee	<ul style="list-style-type: none"> <li>Based on data from the Financial Reports and Statistics on Belgian and Luxembourg Companies (BELFIRST) database of Bureau van Dijk Electronic Publishing. A database that contains detailed financial information of over 390,000 firms of all sizes.</li> </ul>	<a href="#">Van Cauwenberge, P. et al. (2013)</a> . <a href="#">An Evaluation of Public Spending: The Effectiveness of a Government-Supported Networking Program in Flanders</a> . <i>Environment and Planning C: Government and Policy</i> , 31(1), 24–38.
	Turnover per employee	<ul style="list-style-type: none"> <li>Measure use as proxy of productivity.</li> <li>Based on data from the Fame database.</li> </ul>	<a href="#">BEIS (2021)</a> . <a href="#">Impact evaluation of Sharing in Growth</a>
	Sales	<ul style="list-style-type: none"> <li>Establishment productivity is measured by value added based on firm panel data from the Institute for Employment Research.</li> <li>Value-added measure is constructed from the sales minus the costs for purchased materials and services and is depreciated by the product price index for different sectors.</li> <li>Capital is not directly measured in the data set but approximated by a perpetual inventory method.</li> </ul>	<a href="#">Zwick, T. (2006)</a> . <a href="#">The impact of training intensity on establishment productivity</a> , <i>Industrial Relations</i> , vol. 45 (1), pp. 26–46.

	Sales per worker	<ul style="list-style-type: none"> <li>Based on a panel data set, combining the list of all companies that applied for the programme with the Tokyo Shoko Research data.</li> </ul>	<a href="#">Takahashi, K., Hashimoto, Y. (2022). Small grant subsidy application effects on productivity improvement: evidence from Japanese SMEs</a>
<b>Profits</b>	Profits	<ul style="list-style-type: none"> <li>Profits were estimated using industry average profit margins applied to the net present value of revenue attributable to the programme.</li> </ul>	<a href="#">Goss Gilroy (2013). Evaluation of the NRC Industrial Research Assistance Program</a>

The interviews with business advisers highlighted the additional key messages/opportunities for long-term impact assessment:

- Improvements in turnover, profitability (for example, EBIT, EBITDA) and employment are perceived as the best impact measures of Made Smarter Adoption by interviewees. Other measurable impacts highlighted by advisers include expansion in production capacity and improved efficiency, as well as gross value added (GVA). Measuring productivity improvements is perceived as more challenging, since the understanding of productivity varies across firms.
- A multi-metric approach has been suggested to capture the full impact of Made Smarter and to account for value that could be hidden under one individual metric. For example, profitability might increase as a result of improved energy efficiency from digital technology adoption, but this is not necessarily perceived as an improvement in productivity.
- The attribution of specific impacts to MSA is perceived as a challenge. Case studies were commonly cited as a way to illustrate impacts on awareness and readiness that may be more difficult to quantify.
- Beyond technology adoption, Made Smarter advisory services are helping manufacturing SMEs to assess their main challenges and to access support to address these. The value of such support often goes unreported. In this regard, advisers perceive Made Smarter as not only about technology adoption but also about improving business practices and skills within firms. Impact metrics need to account for this.

#### (v) Short-term qualitative impact assessment through local advisers

While long-term business growth impacts might not be fully visible before at least 3 years, there are opportunities to carry out systematic qualitative assessments of business digital readiness and maturity by employing standard tools and methodologies. Section 5.3 presents additional metrics of short-term benefits and their potential positive correlation with long-term impact measures.

The consulted stakeholders confirmed that there is currently no standardised methodology to assess, monitor and compare the digital readiness of beneficiary firms across MSA. Although regions tend to follow the British Standards Institution (BSI) PAS 1040:2019 guide to assess

digital readiness, implementation varies: while every region conducts a readiness assessment at the first engagement with the programme, not every region uses it to estimate progress once the projects have finished. Additionally, the results from these assessments are not formally communicated.

The accuracy of digital readiness tools could be a potential weakness if they were to be used as a proxy for programme impact, given that they are currently based on the judgement of advisers. There is, however, an opportunity for regional programme managers to jointly define with DBT the goal and scope of digital readiness assessments as a short-term impact/progress metric and to standardise it accordingly.

For example, using the Smart Industry Readiness Index (SIRI), a 2019 report by Singapore's Economic Development Board mapped 200 surveyed firms against the 16 dimensions of the SIRI assessment, relative to other companies (see Box 5.4). Local advisers across UK regions who are in close contact with firms could perform such assessments on a yearly basis to map progress against well-defined qualitative digital readiness/maturity categories to create a national benchmark. This could help to identify regional sectoral differences and help to better tailor the support needed in each region.

A number of tools and standards already exist in the UK ecosystem to perform this task, including:

- DRL Tool – North West Pilot;
- 4Manufacturing Diagnostic Tool;
- Scottish Manufacturing Advisory Service Diagnostic Tool; and the
- British Standards Institution (BSI) PAS 1040:2019 guide to assess digital readiness.

#### **Box 5.4: Smart Industry Readiness Index (SIRI)**

The Smart Industry Readiness Index is a framework that has been developed by the Economic Development Board of Singapore (EDB) in collaboration with TUV SÜD to provide firms with a framework for starting, scaling and sustaining Industry 4.0 transformation.

The index has three layers; each firm is initially divided into the three “building blocks” of process, technology and organisation. These are then subdivided into 8 “pillars of focus”, which in turn map onto 16 dimensions of assessment, which are assessed into 6 bands. What these bands represent varies depending upon the dimension of assessment; for example, the process dimensions are assessed from “undefined” to “intelligent”, but the automation dimensions go from “none” through to “basic” and “full” to “converged.”

The index is intended to be used using a “LEAD” framework:

1. Learn key concepts of Industry 4.0 and establish a common language;

2. Evaluate the current state of facilities using 16 dimensions of assessment;
3. Architect a comprehensive transformation roadmap using the index as a checklist and bands of maturity to give immediate steps; and
4. Deliver transformation initiatives and use the index to measure and refine these things.

SIRI considers all aspects of the firm, including some dimensions not seen in other frameworks, such as horizontal and vertical integration. The focus is on technology and processes and there is more of a focus on how digital technologies are used in different functional areas of the firm. It also provides clear guidance to firms on how to use the index, which is very useful.

Source: EDB (2017). [The Singapore Smart Industry Readiness Index](#).

### 5.3 A firm-level pathway towards productivity improvements

One of the main objectives of this project is to contribute to a better understanding of how Made Smarter Adoption can lead to productivity improvements. The different impact evaluations reviewed highlight how, after an intervention is in place, productivity improvements and similar outcomes may take (at least) between 3 and 5 years to be realised.<sup>37</sup> Figure 5-1 summarises a revised theory of change of how the Made Smarter service lines may impact firm productivity in the mid- to long term.

In the first instance, participation in Made Smarter is likely to produce three first-order outputs, which were confirmed by the consulted business advisers:

1. Increased awareness of the net benefits of digital technologies;
2. Improved knowledge of how to access digital technologies and related services; and
3. Greater interest in adopting IDT.

In turn, increased awareness and interest can result in three second-order outputs:

1. Developed digital transformation strategy/roadmap;
2. Improved capabilities for adopting IDT, both on the shop-floor and in the leadership; and
3. Increased investment and adoption of IDTs.

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<sup>37</sup> See, for example: BIS (2016). [The Manufacturing Advisory Service \(MAS\) - Impact Analysis Methodology Study](#); Bakhshi, H. et al. (2011). [Creating innovation in small and medium-sized enterprises: evaluating the short-term effects of the creative credits pilot](#). National Endowment for Science, Technology and the Arts (NESTA); Valbonesi, P. and Biagi, F. (2016). [Incentivising Innovation and Adoption of ICT: ICT Innovation Voucher Programmes](#).

Once a firm has improved its IDT capabilities and adopted IDTs in its operations, some first-order outcomes may emerge. These include:

- Better asset utilisation;
- Better inventory management;
- Better use of data;
- Development of new products, services and business models;
- Fewer defects and errors;
- Identification of bottlenecks or other process issues;
- Improved factory safety and security;
- Improved production planning efficiency;
- Improved supply chain management;
- Improved use of materials; and
- Lower energy use in manufacturing processes.

These first-order outcomes, in turn, would lead to one or more of the following second-order outcomes:

- Improved production and delivery capacity;
- Reduced costs; and
- Business diversification.

Labour productivity can be measured as a ratio of value added and labour inputs. Labour-sensitive productivity improvements would thus focus on increasing a firm's value added rather than reducing labour inputs. This is the focus of the theory of change presented in Figure 5-1. The potential second-level outcomes identified could lead to either increased turnover or improved profit margins, or both, thus increasing a firm's value added and productivity.

The survey results presented in Section 4 indicate that factors associated with increases in productivity include:

- The adoption of printing and scanning technologies and the adoption of database and data-capture solutions;
- The application of technologies or solutions in product and process design and development;

- Participation in the grant service line; and
- Gender diversity in leadership (through profit increases).

Table 5-5 presents the associations between short-term benefits and turnover and productivity increases. Statistically significant associations are found between turnover increases and cost reductions and the development of new products or processes. Significant associations are also found between productivity increases and better asset utilisation, cost reductions, greater customisation and the development of new products or processes.

“Other” benefits linked to increases in turnover or productivity include: employee satisfaction, increased profit margin, skills development, and engagements with external partners.

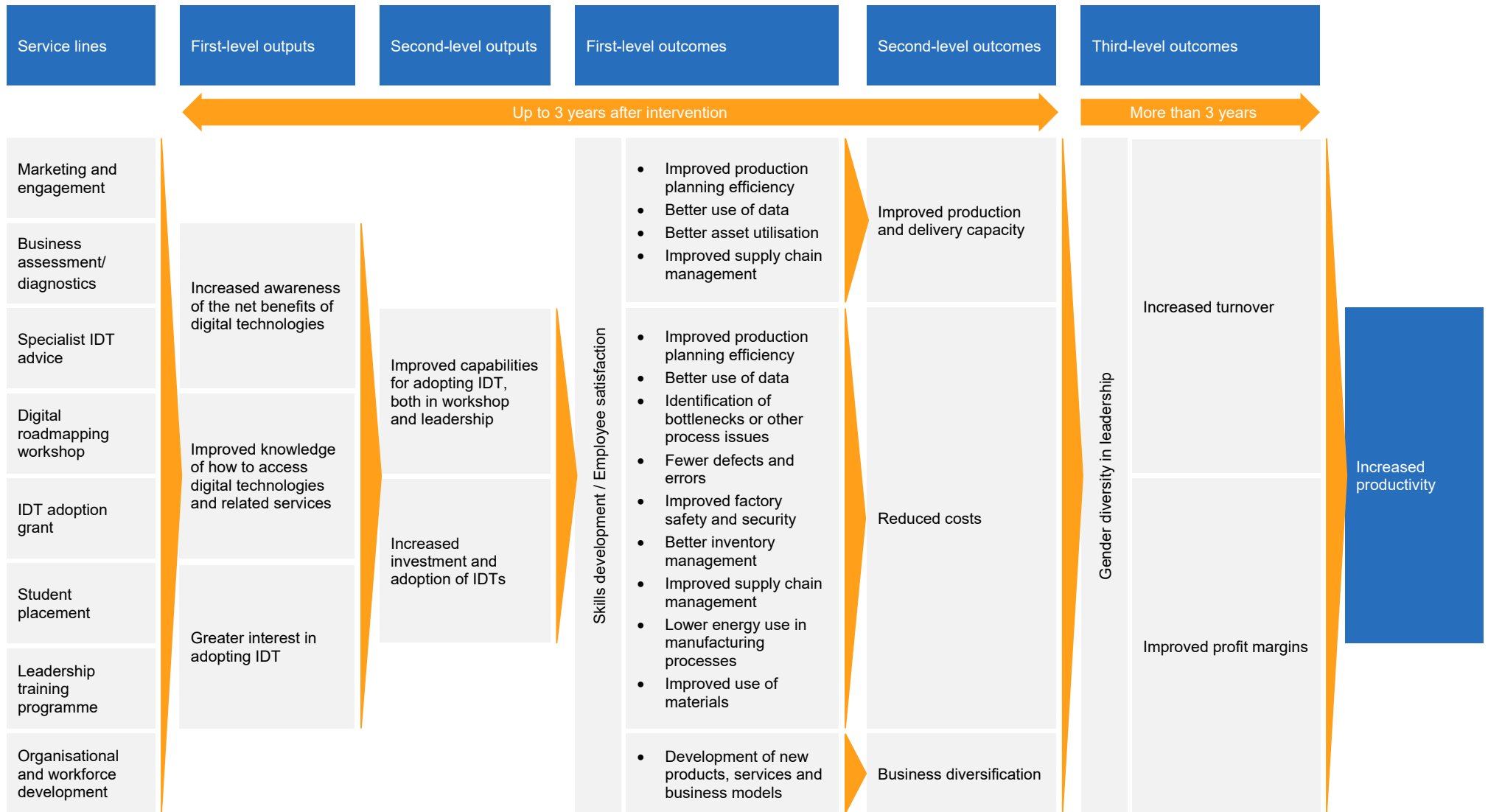
**Table 5-5: Association between short-term benefits and increases in turnover and productivity**

Short-term benefit	Turnover increased	χ <sup>2</sup> test (p value)	Productivity increased	χ <sup>2</sup> test (p value)
Improved production planning efficiency	29%	0.902	62%	0.106
Better use of data to monitor/understand processes	30%	0.299	57%	0.700
Identification of bottlenecks or other process issues	34%	0.387	64%	0.208
Better asset utilisation	30%	0.747	66%	0.013
Fewer defects and errors	33%	0.383	63%	0.121
Improved factory safety or security	34%	0.401	66%	0.377
Better inventory management	32%	0.481	63%	0.225
Reduced cost	36%	0.028	68%	0.002
Better customer satisfaction	33%	0.096	63%	0.057
Greater customisation	36%	0.200	60%	0.013
Development of new products or processes	36%	0.016	65%	0.012
Other	38%	0.174	67%	0.662

Note: A small p-value (typically less than 0.05) suggests that the observed differences are statistically significant.

Source: Cambridge Industrial Innovation Policy – BMG Beneficiary Survey, 2022.

**Figure 5-1: Firm-level pathway towards productivity improvements**



Source: Cambridge Industrial Innovation Policy, 2022.

## 6 Recommendations

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The following recommendations are based on the analysis presented in this report, classified in three main areas: (i) suggested changes to the programme's theory of change; (ii) recommendations on programme design; and (iii) recommendations on the future programme impact monitoring and measurement approach.

### (i) Suggested changes to the programme's theory of change

- Based on the analysis presented in this report, Figure 6-1 summarises suggested changes to the initial theory of change, which could be adopted by the Made Smarter team in future. The suggested changes would help to improve the logic between objectives, inputs, activities, outputs, outcomes and impacts and help to build the impact narrative of the programme.

### (ii) Recommendations on programme design

- **Define measurable programme objectives.** In line with the revised theory of change presented in Figure 6-1 and insights from the interviews, the programme could standardise and formalise the measurable objectives and key performance indicators for each region and the programme as a whole in order to improve impact comparability across regions. Defining specific measurable objectives is beyond the scope of this project.
- **Formalise Made Smarter Adoption's "one-stop-shop" role.** Insights from the interviews indicate that, in practice, MSA functions as a one-stop-shop for manufacturing SMEs. However, this is highly dependent on the specific knowledge and networks of advisers. Formalising this approach would provide more tools and information to advisers and make it easier for manufacturers to access relevant support beyond MSA. This would also contribute to providing coherence and coordinating efforts across different government levels and entities. This is particularly important considering different budgets and delivery approaches across regions and the overlap with regional-based initiatives such as LCR4.0 Start revealed in Steer's report. A one-stop-shop approach could help to keep track of companies redirected towards other programmes that could later qualify for Made Smarter support.
- **Expand service lines to cover sustainability, network development, supply chain management and shop-floor digital skills.** There are opportunities to expand or create new service lines in four key areas: environmental sustainability, networking, skills development and supply chain management. This could involve developing new service lines or referring firms to existing programmes and services as, the interviews suggested, already happens in some regions, particularly in environmental sustainability and skills development.



Based on interviews with advisers, ways in which MSA could expand and standardise its skills development offer, include:

- Reinstating student placements with some changes, such as centralised coordination and financial contributions of the firms;
- Funding for in-house training within firms;
- Formalising a programme of apprenticeships;
- Flexible, on-demand/bespoke training courses; and
- Online training introductory courses.

Current service lines related to skills development are mostly targeted at leaders and managers within SMEs. The alternative training methods described here could also cover shop-floor staff, including supervisory managers, as suggested by business advisers.

- **Allow grants to be used in multiple projects, enable funding for larger projects when needed, and create specific business account management roles.** Advisers perceive that the size of the grant is right for the current needs of firms. However, in exceptional cases involving larger investments in advanced technologies (for example, automation and additive manufacturing projects), larger grants or 0% interest loans may be needed, either as part of MSA or when referring firms to alternative support. Advisers also highlighted the opportunity to support firms throughout their digitalisation journey by using grants for more than one project or providing interest-free loans for second projects.

Establishing specific account management roles, functions that are currently conducted by advisers, could help to provide more support in grant applications and better follow-up regarding the progress of participant firms.

- **Define a minimum level of standardisation, centralise duplicated processes and enable the diffusion of best practices.** A key observation from this analysis is that each region has its own tailored design of the MSA programme, adapted to budgetary constraints and regional characteristics. Further work on this area could be targeted at: standardising the way that delivery objectives and funding are defined/allocated at regional level; homogenising the definition of what constitutes a service line, as established by the MSA programme; standardising the use of digital readiness assessments; and systematising firm-level data collection for comparability.

Insights from the interviews indicate that advisers perceive the need to achieve some level of standardisation in the design and implementation of MSA across regions, while maintaining flexibility to adapt to the existing business support ecosystem and address the specific needs of firms within each region.

Centralising some processes could be considered, in consultation with regional programme managers, to avoid unnecessary duplication and maximise effectiveness. These could include: marketing and advertising; registration and initial assessment of firms (through the programme website); training for programme delivery; a database of accredited technology suppliers, training and consultancy providers; and coordination of student placements. Centralisation of highly specialised technology expertise could also be considered, as not all delivery teams need an expert in every technology, which could be accessed on an on-demand basis across the country.

Communication exists between some regions; however, opportunities exist to formalise spaces for experience sharing, including annual conferences or meetings where advisers and managers can share their knowledge. Interviews with advisers highlighted, for example, that more could be done to take better advantage, across regions, of the lessons learned in the implementation of the North West Pilot.

(iii) Recommendations on the future programme impact monitoring and measurement approach

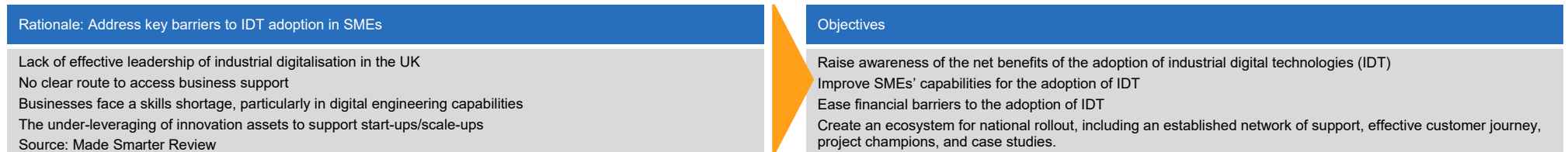
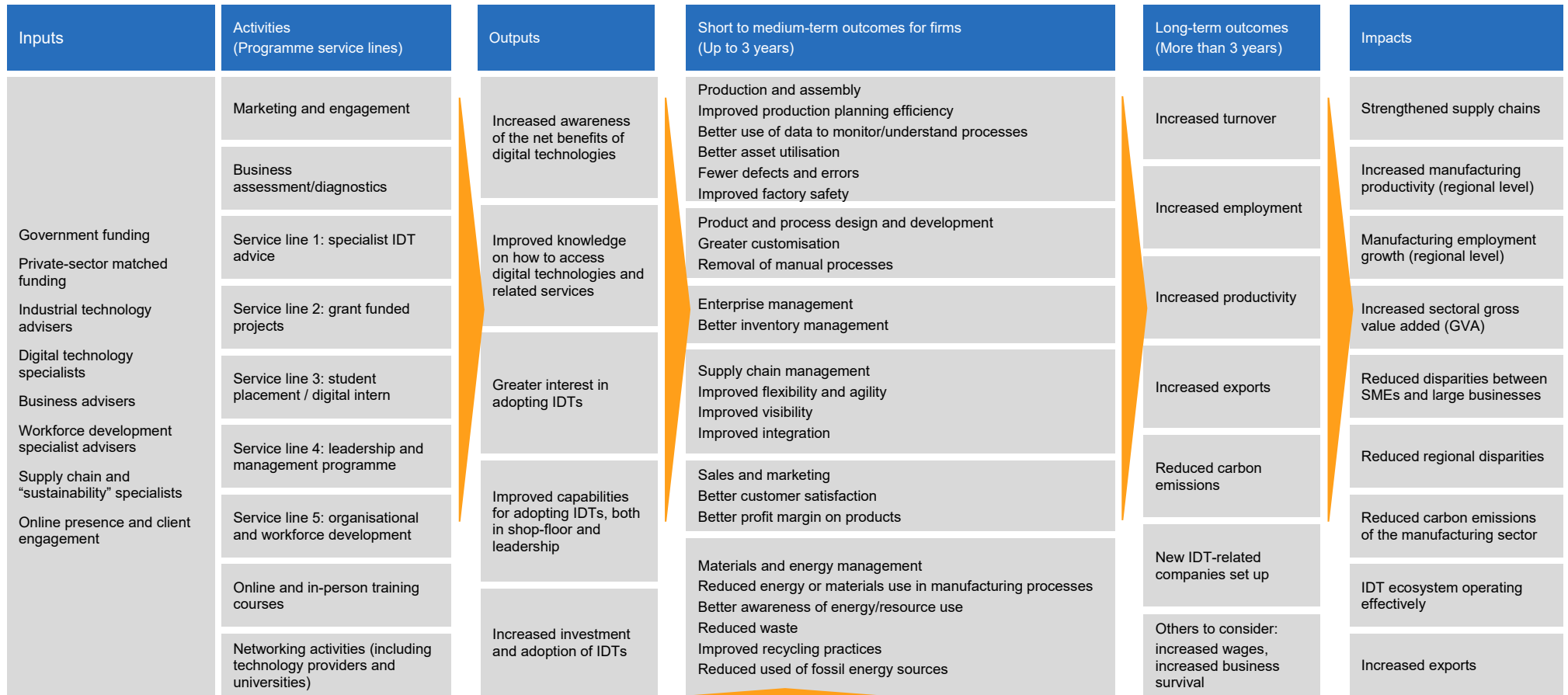
- **Shorten and re-focus the beneficiary firms' survey to better understand programme outputs, outcomes and impacts.** The survey questionnaire is comprehensive and relevant; however, there are opportunities to increase its focus on understanding outputs, outcomes and impacts. Questions related to satisfaction with the programme represent approximately one-third of the questionnaire, and, despite its relevance, most of this information could be collected more effectively by the regions as part of their regular monitoring of the programme. This would help to inform the programme design and delivery in real time. It would also free up time in the questionnaire to improve the quality and depth of responses collected and allow for the inclusion of additional questions related to the outputs, outcomes and impacts of the programme and on diversity in firms, in line with suggestions included in Table 5-2.
- **Leverage the programme website for collecting monitoring data.** An opportunity highlighted by advisors and identified from the analysis of administrative databases is the need to standardise what, when and how firm data is collected. The MSA website could be used for this purpose, allowing firms to upload their data in a use-friendly and secure way. This system could also be utilised to collect feedback directly from firms about their satisfaction with the programme instead of doing this as part of the evaluation surveys.
- **Leverage regional advisers to collect relevant case studies and carry out short-term qualitative impact assessments.** Given the close connection between advisers and beneficiary firms, the former could be tasked with the responsibility of carrying out qualitative digital readiness/maturity evaluations of firms on a yearly basis. This would require the consensual selection of a readiness/maturity index or tool from the ones already used within the programme and a mechanism to minimise assessment bias.

- Collect only tangible impact data from firms (turnover, profit and employment) and establish a multi-metric approach to long-term impact measurement. The difficulty collecting productivity data from firms was highlighted during this project; it was attributed to the inconsistency in how firms define and understand this measure. It is therefore recommended to avoid direct survey questions about productivity and instead focus on tangible metrics that firms can relate to. A review of international approaches to address this challenge provides the following suggested approaches (see Table 5-4):
  - Using turnover or profit per employee data as a proxy for labour productivity (similar to Steer's evaluation approach);
  - Using business identification numbers to link evaluation survey data with broader firm databases that contain information on value added or turnover, such as Fame; and
  - Constructing value added per employee measure based on turnover data (for example, using the ONS Annual Business Survey data).

Insights from adviser interviews indicate that turnover, profit and employment data tend to be easier to capture from firms. Wherever possible, we suggest linking survey data with broader firm databases, for example, collaborating with the ONS to identify participant firms in the Annual Business Survey data.

Evidence from this study highlights the need for a multi-metric approach to long-term impact measurement in order to capture the full impact of Made Smarter Adoption, to account for value that could be hidden beyond one individual metric and to minimise attribution difficulties. Outside economic metrics, future impact assessments could also account for the value of broader business advisory, not only in terms of technology adoption but also in relation to how the programme helps businesses to upgrade operational practices and skills. This could be done by, for example, adding survey questions such as those suggested in Table 5-2.

Figure 6-1: Suggested changes to the made smarter adoption programme theory of change (in red)



Source: Cambridge Industrial Innovation Policy, 2022.

## Appendix A. Glossary

- **Additive manufacturing (3D printing).** Method encompassing multiple techniques used to build solid parts by adding material in layers. This stands in contrast to typical manufacturing processes in which material is removed or formed.
- **Asset utilisation.** Metric of how efficiently assets are being used.
- **Automation of processes.** The use of machines and computers that can operate without needing human control.
- **Cloud-based systems.** Computing systems delivered over the Internet (“the cloud”).
- **Customer relations management (CRM) systems.** Technology solutions for administering and analysing interactions with customers.
- **Customer satisfaction.** A measure of how goods and services supplied by an enterprise fulfil the needs and expectations of their customers.
- **Customisation.** The action of making or changing something according to the needs of the buyer or user.
- **Data systems.** Computer software platforms used to track and document business processes.
- **Digitisation of processes.** The adoption of digital technologies into processes.
- **Enterprise management.** Tools and strategies used to administer, monitor and improve business operations.
- **Enterprise planning resource (EPR) system.** Software used by organisations to manage day-to-day business activities such as accounting, procurement, project management, risk management and compliance, and supply chain operations.
- **Factory safety or security.** Preventing work-related death, injury and ill health in factories.
- **Inventory management.** The process of tracking and controlling raw materials and finished goods across business processes.
- **Materials and energy management.** The planning and operation of energy and materials production, distribution, storage and consumption.
- **Monitoring systems.** Applying advanced technology in order to collect and analyse data from machines to improve their performance.

- **Scanning devices.** An industrial scanner is a device that incorporates light, sensor, lens, data-decoding and transaction systems in its design, built for processing the data contained in barcodes.
- **Product and process design and development.** Conceptualising, modelling, creating and commercialising new or improved products or processes.
- **Production and assembly.** A manufacturing process whereby raw materials are transformed into a good.
- **Production planning efficiency.** The degree to which an enterprise fulfils its production requirements as economically as possible.
- **Sales and marketing.** Business functions involving building awareness of a brand and organisation and turning this awareness into profits.
- **Supply chain management.** Management of the flow of goods, data and finances related to a product or service, from the procurement of raw materials to the delivery of the product at its final destination.

Source: Azure; Cambridge Dictionary; Emeritus; Health and Safety Executive; IGI Global; MATICS; Oracle; Policy Links (2017, 2019); Thread in Motion.

# Appendix B. Survey questionnaire 2022

## Awareness of the programme – all firms

### 1. ASK ALL

**How did you first find out about the Made Smarter Adoption programme?**

READ OUT AND CODE ONE ONLY ALL, S/C

Through media coverage	1
Through a peer/colleague	2
At a business networking event	3
Through direct marketing materials	4
Through a direct approach from a business adviser	5
Through an Internet search	6
Other (PLEASE SPECIFY)	7
Dnro: Can't recall	8

## Accessing the programme – all firms

### 2. ASK ALL

**How easy was it for you to get information on the Made Smarter Adoption programme?**

READ OUT AND CODE ONE ONLY ALL, S/C

Very easy	1
Fairly easy	2
Neither easy nor difficult	3
Fairly difficult	4
Very difficult	5
DNRO: Don't know	6

2a. WHERE DIFFICULT (Q2/4, 5)

**Why was it difficult?**

PROBE FULLY AND WRITE IN VERBATIM

3. ASK ALL

**Were any of the following reasons for contacting the Made Smarter Adoption programme?**

READ OUT AND CODE ALL THAT APPLY ALL/ MC

To understand how my business might benefit from digitalisation	1
To access support to develop a digitalisation strategy	2
To access leadership and management development to support the business to implement a digitalisation project or programme	3
To identify a student placement to enable the business to implement a digitalisation project or programme	4
To access support to develop the digital skills of the workforce	5
To access financial support to enable me to invest in new capital equipment	6
Other – please specify	7
DNRO: Can't recall reason	8

4. ASK ALL

**Before you decided to contact the Made Smarter Adoption programme for help, back then, what was stopping you from investing in industrial digital technologies (IDTs)?**

PROBE FULLY AND CODE ALL THAT APPLY. AFTER EACH RESPONSE ASK “ANYTHING ELSE”

Lack of time to dedicate to finding/implementing new technologies	1
Not a priority for the business/Insufficient support from leadership	2
You did not think it was worth the cost of investment, given the likely benefits	3
External funding was not available	4
Internal funding was not available	5
You did not have the skills to design and implement new technologies	6
You did not know where to get impartial advice on technology solutions	7
You did not know what solutions were available	8



You had concerns over cyber-security	9
You were concerned about a loss of intellectual property	10
You had slow Internet connection speeds	11
You had legacy infrastructure/processes, which make it difficult to adopt new technologies	12
Other (please specify)	95
DNRO: Can't recall	96

## 5. ASK ALL

ASK ALL

**Prior to joining the Made Smarter Adoption programme, how would you describe your level of digital maturity? This is about your readiness to adopt new technologies, in terms of your business processes, existing capital equipment, staff skills levels and company strategy. Would you say it was...**

READ OUT AND CODE ONE ONLY

Very mature/very high digital readiness	1
Fairly mature/high digital readiness	2
Fairly immature/Low digital readiness	3
Not at all mature/very low digital readiness	4
DNRO: Don't know	5

### 5a. ASK ALL

**Thinking about how well the Made Smarter Adoption programme responded to your needs, which of the following statements best applies?**

READ OUT AND CODE ONE ONLY

It is well suited to firms like ours	1
It is better suited to firms with a higher level of digital readiness than us	2
It is better suited to firms with lower digital readiness than us	3
Digital readiness is not relevant to the programme's ability to meet firms' needs	4
DNRO: Don't know	5

5b. UNLESS DON'T KNOW (Q5c/1, 2, 3)

**Why do you say that?**

PROBE FULLY AND WRITE IN VERBATIM

**Satisfaction with the programme**

6. ASK ALL

**How satisfied or dissatisfied are you with your experience of the Made Smarter Adoption programme in terms of its ability to?**

READ OUT AND CODE ONE PER ROW. PROBE FOR VERY OR FAIRLY, ALL, S/C PER ROW

	Very satisfied	Fairly satisfied	Fairly dissatisfied	Very dissatisfied	DNRO: Don't know/too difficult to say
Diagnose your business's digitalisation requirements	1	2	3	4	5
Identify sensible solutions to address your digitalisation requirements	1	2	4	5	6
Support your company with business planning/ digital strategy	1	2	3	4	5
Work more effectively with your key supply chains	1	2	3	4	5
Identify solutions to address your resource efficiency requirements	1	2	3	4	5

7. FOR UP TO TWO STATEMENTS IN Q6 WHERE FAIRLY DISSATISFIED OR VERY DISSATISFIED (Q6/3, 4) – RANDOMLY SELECTED

**Why do you say that you are dissatisfied with your experience of the programme relating to...?**

PROBE FULLY AND WRITE IN VERBATIM

8. For all firms in the NE and for those firms in NW, WM and Y&H that receive leadership and management development <L&M? = yes> [REGION: North East OR TYPE REF: 5, 9, 10]

**The following statements all relate to the application process to join the leadership and management programme. How far do you agree or disagree with each?**

READ OUT AND CODE PER ROW S/C PER ROW

STATEMENTS REORDERED	Strongly agree	Agree	Disagree	Strongly disagree	DNRO: Don't know/too difficult to say
The criteria for joining the programme were clear	1	2	3	4	5
The application process was straightforward	1	2	3	4	5
The help we received to make an application to join the programme met our needs	1	2	3	4	5
The decision-making process was conducted in a timely fashion	1	2	3	4	5

9. ASK ALL IN NE OR IF RECEIVED <L&M? = yes> [TYPE REF: 5, 9, 10]:

**How satisfied or dissatisfied are you with your experience to date of the leadership and management programme?**

READ OUT AND CODE ONE ONLY ALL, S/C

Very satisfied	1
Fairly satisfied	2
Neither satisfied not dissatisfied	3
Fairly dissatisfied	4
Very Dissatisfied	5
DNRO: Don't know	6

10. WHERE FAIRLY DISSATISFIED OR VERY DISSATISFIED (Q9/4, 5)

**Why do you say that you are dissatisfied with the leadership and management programme?**

PROBE FULLY AND WRITE IN VERBATIM

**11.** For those firms that have received a student placement <Student = yes> [TYPE REF: 3, 4, 8]

**The following statements all relate to the application process to identify a student placement/digital intern. How far do you agree or disagree with each?**

READ OUT AND CODE PER ROW SUPPORT = STUDENT, S/C PER ROW

	Strongly agree	Agree	Disagree	Strongly disagree	DNRO: Don't know/too difficult to say
The matching process was straightforward	1	2	3	4	5
The support we received to find a student placement met our needs	1	2	3	4	5
The criteria for matching students to our needs were clear	1	2	3	4	5
The decision-making process was conducted in a timely fashion	1	2	3	4	5

**12.** ASK IF RECEIVED <STUDENT = YES> [TYPE REF: 3, 4, 8]:

12a.

**How satisfied or dissatisfied are you with your experience of the advice and support provided through the student placement/digital intern scheme?**

READ OUT AND CODE ONE ONLY ALL, S/C

Very satisfied	1
Fairly satisfied	2
Neither satisfied not dissatisfied	3
Fairly dissatisfied	4
Very Dissatisfied	5
DNRO: Don't know	6

12b. WHERE FAIRLY DISSATISFIED OR VERY DISSATISFIED (Q12/4, 5)

**Why do you say that you are dissatisfied with the student placement/digital intern scheme?**

PROBE FULLY AND WRITE IN VERBATIM

**13. ASK IF RECEIVED <Student = yes> [TYPE REF: 3, 4, 8]:**

**In which of the following ways did the student placement/digital intern benefit your company?**

READ OUT AND CODE ALL THAT APPLY, M/C

We were able to access knowledge/skills that we had previously been unable to recruit for	1
The student(s) investigated projects that we otherwise wouldn't have had time or money for	2
The student(s) brought a fresh perspective and new ideas	3
There have not been any benefits to date, and we do not foresee any benefits	4
There have not been any benefits to date, but we expect some benefits in the future	5
Other (please specify)	6
DNRO: Don't know	7

**13a. WHERE NO BENEFITS TO DATE OR FORESEEN (Q13b/4)**

**Why do you say that there have not been any benefits and that you do not foresee any?**

PROBE FULLY AND WRITE IN VERBATIM

**14. NORTH WEST ONLY: For those firms that receive support to develop the digital skills of the workforce <OWD<sup>38</sup> Support? = yes> [TYPE REF: 2, 4, 7, 10]**

**The following statements all relate to support to develop your workforces' digital skills. How far do you agree or disagree with each?**

READ OUT AND CODE PER ROW SUPPORT = GRANT, S/C PER ROW

	Strongly agree	Agree	Disagree	Strongly disagree	DNRO: Don't know/too difficult to say
The process for accessing the support was straightforward	1	2	3	4	5
The criteria for accessing the support were clear	1	2	3	4	5
The decision-making process to access the support was conducted in a timely fashion	1	2	3	4	5
The support helped to upskill workers	1	2	3	4	5

<sup>38</sup> Organisational Workforce Development

15. NORTH WEST ONLY: ASK IF RECEIVED <OWD Support? = yes> [TYPE REF: 2, 4, 7, 10] ):

**How satisfied or dissatisfied are you with your experience of the workforce skills support that you have received?**

READ OUT AND CODE ONE ONLY ALL, S/C

Very satisfied	1
Fairly satisfied	2
Neither satisfied not dissatisfied	3
Fairly dissatisfied	4
Very Dissatisfied	5
DNRO: Don't know	6

16. WHERE FAIRLY DISSATISFIED OR VERY DISSATISFIED (Q15/4,5)

**Why do you say that you are dissatisfied with the workforce skills support?**

PROBE FULLY AND WRITE IN VERBATIM

17. ASK ALL

**The following statements all relate to adviser-based support to progress your adoption of digital technology. How far do you agree or disagree with each?**

READ OUT AND CODE PER ROW, S/C PER ROW

	Strongly agree	Agree	Disagree	Strongly disagree	DNRO: Don't know/too difficult to say
The process for accessing the support was straightforward	1	2	3	4	5
The criteria for accessing the support were clear	1	2	3	4	5
The decision-making process to access the support was conducted in a timely fashion	1	2	3	4	5
The advice received was of high quality and supported your progress with technology adoption	1	2	3	4	5

**18. ASK ALL**

**How satisfied or dissatisfied are you with the advice-based support that you have received?**

READ OUT AND CODE ONE ONLY ALL, S/C

Very satisfied	1
Fairly satisfied	2
Neither satisfied not dissatisfied	3
Fairly dissatisfied	4
Very Dissatisfied	5
DNRO: Don't know	6

**19. WHERE FAIRLY DISSATISFIED OR VERY DISSATISFIED (Q18/4,5)**

**Why do you say that you are dissatisfied with the advice-based support?**

PROBE FULLY AND WRITE IN VERBATIM

**20. For those firms that applied for a capital grant <Grant? = yes> [TYPE REF: 6, 7, 8, 9, 10]**

**The following statements all relate to the grant application process. How far do you agree or disagree with each?**

READ OUT AND CODE PER ROW SUPPORT = GRANT, S/C PER ROW

	Strongly agree	Agree	Disagree	Strongly disagree	DNRO: Don't know/too difficult to say
The grant application process was straightforward	1	2	3	4	5
The support we received to make a grant application met our needs	1	2	3	4	5
The criteria for awarding a grant were clear	1	2	3	4	5
The appraisal and decision-making process was conducted in a timely fashion	1	2	3	4	5

**21. ASK IF APPLIED <Grant? = yes> [TYPE REF: 6, 7, 8, 9, 10]**

**How satisfied or dissatisfied are you with your experience of the advice and support you received as part of the grant application process?**

READ OUT AND CODE ONE ONLY ALL, S/C

Very satisfied	1
Fairly satisfied	2
Neither satisfied not dissatisfied	3
Fairly dissatisfied	4
Very Dissatisfied	5
DNRO: Don't know	6

**21a. WHERE FAIRLY DISSATISFIED OR VERY DISSATISFIED (Q21/4, 5)**

**Why do you say that you are dissatisfied with the advice and support you received as part of the grant application process?**

PROBE FULLY AND WRITE IN VERBATIM

**22. ASK IF APPLIED <Grant? = yes> [TYPE REF: 6, 7, 8, 9, 10]:**

**22B. Was your application successful?**

CODE ONE ONLY, S/C

Yes – my application(s) was/were successful	1
No – my application(s) was not/were not successful	2
Some were successful and some were unsuccessful	3
DNRO: Don't know	4

**23. ASK IF APPLIED <Grant? = yes> [TYPE REF: 6, 7, 8, 9, 10]:**

**In the 12 months prior to seeking a grant from the Made Smarter programme, did you seek to raise (internally or externally) finances to invest in the digitalisation of your business?**

CODE ONE ONLY SUPPORT = GRANT, S/C

Yes	1
-----	---



No	2
Don't know	3

23a. ASK IF APPLIED FOR OTHER FUNDING (Q23/1)

**How much funding did you seek from this source?**

PROBE FOR AN APPROXIMATION OF AMOUNT OF FUNDING SOUGHT

£ \_\_\_\_\_

X unsure Y refused

INTERVIEWER TO RE-ENTER FIGURE AS TEXT, E.G. 3 THOUSAND; 300 THOUSAND; 3 MILLION; 30 MILLION, ETC.

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24. ASK IF APPLIED FOR OTHER FUNDING (Q23/1)

**What other source(s) did you seek this funding from?**

READ OUT AND CODE ONE ONLY FOR EACH, S/C

	Yes	No	DNRO: Don't know
Company funds	1	2	3
Public-sector grant	1	2	3
Public-sector loan	1	2	3
Private-sector loan (bank loan)	1	2	3
Friends/family personal loan	1	2	3
Other (please specify)	1	2	

25. ASK IF APPLIED FOR OTHER FUNDING (Q23/1)

**Did you experience any difficulties in trying to arrange this finance?**

CODE ONE ONLY S/C

Yes	1
No	2
DNRO: Don't know	3

**26. WHERE EXPERIENCED DIFFICULTIES (Q26/1)**

**What difficulties did you experience in trying to arrange finance?**

PROBE FULLY AND CODE ALL THAT APPLY M/C

Unaware of where to get finance	1
Not sure which financial products/funders are right for the business	2
Did not meet fund provider's criteria	3
Poor business credit history or insufficient credit history (not been in business long enough)	4
Insufficient/no security	5
Other (please specify)	95
DNRO: Don't know/refused	97

**27. ASK IF MADE SMARTER APPLICATIONS SUCCESSFUL (Q22B/1, 3)**

**Without the financial assistance provided by Made Smarter, would you have gone ahead with your digitalisation projects/programmes...?**

READ OUT. MULTI CODE ALLOWED FOR CODES 1, 2, 3; CODE ONE ONLY FOR 4, 5, 6

...on a smaller scale	1
... at a slower pace	2
... to a lower "quality" (e.g. a solution that works in the short term but which is less future-proofed)	3
... at the same scale, pace and quality	4
Or not gone ahead with the projects at all	5
DNRO: Don't know	6

**28. ASK IF MADE SMARTER APPLICATIONS SUCCESSFUL (Q22B/1, 3)**

**Why is that?**

PROBE FULLY AND WRITE IN VERBATIM

28a. ASK FOR EACH GRANT RECEIVED

**Thinking about the Made Smarter grant that you received, would the project have gone ahead at the same scope, speed and quality if the grant you received had been for less?**

READ OUT AND CODE ONE ONLY ALL, S/C

It would not have gone ahead at a lower grant level	1
It would still have gone ahead with less of the funding	2 [please specify % amount]
DNRO: Prefer not to say	3
DNRO: Don't know	4

29. ASK IF MADE SMARTER APPLICATIONS UNSUCCESSFUL (Q22B/2, 3)

**You said earlier that you were unsuccessful with regard to [Q22B/3: some of] your Made Smarter grant application. Which statement best describes what happened with regard to the grant application(s) that was/were not successful? The project went/is going ahead...**

READ OUT. MULTI CODE ALLOWED FOR 2, 3, 4; CODE ONE ONLY FOR 1, 5, 6, 7 ASK FOR EVERY REJECTED GRANT

... as planned	1
... at a slower pace than planned	2
... on a smaller scale	3
... to a lower "quality" (e.g. a less bespoke solution)	4
Or the project has been cancelled and will not go ahead	5
It has been cancelled for now but may be implemented at a later date	6
DNRO: None of these, other	7

**30. ASK ALL**

**To what extent do you agree or disagree with the following statements...? Thanks to your participation in Made Smarter...**

READ OUT AND CODE PER ROW, S/C PER ROW

	Strongly agree	Agree	Disagree	Strongly disagree	DNRO: Don't know/too difficult to say
We have a better understanding of the costs and benefits of digital technologies	1	2	3	4	5
We have a better understanding of how to implement digital technologies	1	2	3	4	5

**Impacts – actions taken forward**

**31.**

31a. ASK ALL

**What would you say is the most significant thing that your firm is doing as a result of its engagement with the Made Smarter Adoption programme?**

PROBE FULLY AND WRITE IN VERBATIM

31b. ASK ALL

**As a result of the time and resources invested in Made Smarter participation, did you have to delay or forego any of the following...?**

READ OUT AND CODE ONE ONLY FOR EACH, S/C

	Delayed	Foregone	No, neither	DNRO: Don't know
Purchase of capital equipment	1	2	3	4
Maintenance of capital equipment	1	2	3	4
Hiring of new staff	1	2	3	4
R&D investment	1	2	3	4
Was there anything else you had to delay or forego? (please specify)	1	2	3	4

## Impacts – IDT adoption

### 32. ASK ALL

The following statements all relate to your company's attitude to technology adoption. How far do you agree or disagree with each? As a result of your participation in Made Smarter...

READ OUT AND CODE PER ROW, S/C PER ROW

	Strongly agree	Agree	Disagree	Strongly disagree	DNRO: Don't know/too difficult to say
We have a greater appetite for new technology adoption	1	2	3	4	5
We have a more strategic or more rigorous approach to technology investment decisions	1	2	3	4	5
We are better equipped to make technology investments (e.g. more knowledge/awareness, improved investment processes, etc.)	1	2	3	4	5
We plan to make further technology investments in the future	1	2	3	4	5

### 33. ASK ALL

**(NEW)** What digital technologies or solutions, if any, have you adopted as a result of your participation in Made Smarter?

PROBE FULLY AND WRITE IN

None	96
Don't know	97

### 34. IF ADOPTED ANY (Q31=NOT 96, NOT 97)

**(NEW)** In which business area(s) did you apply this(ese) technology(ies)?

READ OUT AND CODE ALL THAT APPLY, M/C

Enterprise management	1
Materials and energy management	2
Production and assembly	3

<b>Product and process design and development</b>	4
<b>Sales and marketing</b>	5
<b>Supply chain management</b>	6
<b>Other (please specify)</b>	7
<b>You did not adopt any digital technology</b>	8
<b>DNRO: Don't know</b>	9

**35. IF ADOPTED ANY (Q31=NOT 96, NOT 97)**

**Which of the following benefits have you experienced as a result of your participation in Made Smarter?**

READ OUT AND CODE ALL THAT APPLY, M/C ROTATE

<b>Improved production planning efficiency</b>	1
<b>Better use of data to monitor/understand processes</b>	2
<b>Identification of bottlenecks or other process issues</b>	3
<b>Better asset utilisation</b>	4
<b>Fewer defects and errors</b>	5
<b>Improved factory safety or security</b>	6
<b>Better inventory management</b>	7
<b>Reduced cost</b>	8
<b>Better customer satisfaction</b>	9
<b>Greater customisation</b>	10
<b>Development of new products or processes</b>	11
<b>Other (please specify)</b>	12
<b>No benefits</b>	13
<b>DNRO: Don't know</b>	14

**36. IF ADOPTED ANY (Q31=NOT 96, NOT 97)**

**(NEW) Which of the following benefits have you experienced in your supply chain as a result of your participation in Made Smarter?**

READ OUT AND CODE ALL THAT APPLY, M/C

<b>Improved agility to quickly adjust strategy</b>	1
<b>Improved flexibility to respond to uncertainties and customer expectations</b>	2
<b>Improved integration and communication with suppliers</b>	3

Improved visibility of parts, components or products	4
DNRO: Too soon to say/don't know	5
DNRO: Not applicable	6

## Impacts – IDT diffusion

### 37. ASK ALL

**Have you recommended others to join Made Smarter?**

Yes	1
No	2

### 38. ASK ALL

**Have you discussed the new technologies implemented through Made Smarter with others outside your firm?**

Yes	1
No	2

## Impacts – turnover and profits

READ OUT: I'm now going to ask you some questions about the impact of Made Smarter on a number of aspects within your firm over the period of April 2021 to March 2022. When answering, please try to leave aside the effects of COVID-19, Brexit and other events not related to Made Smarter

### 39. ASK ALL

**Which of the following best describes the effect on the firm's turnover (either direct or indirect) of your participation in Made Smarter from April 2021 to March 2022?**

READ OUT AND CODE ONE ONLY ALL, S/C

Yes, turnover increased	1 [NW, WM, Y&H ONLY: please specify by how much, in £....]
Yes, turnover was maintained/safeguarded	2 [NW, WM, Y&H ONLY: please specify by how much may have been lost otherwise, in £....]

<b>No, there was no effect on turnover from</b>	3
<b>Turnover decreased</b>	4 [NW, WM, Y&H ONLY: please specify by how much, in £....]
<b>DNRO: Don't know</b>	5

39a. FOR FOLLOW-ON TO CODES 1, 2, 4:

INTERVIEWER TO RE-ENTER FIGURE AS TEXT, E.G. 3 THOUSAND; 300 THOUSAND; 3 MILLION; 30 MILLION ETC.

X Don't know Y Prefer not to say

39b. ASK ALL

**(NEW) Did participation in Made Smarter have an effect on the firm's profits (either direct or indirect) from April 2021 to March 2022?**

PROMPT AS NECESSARY AND CODE ONE ONLY ALL, S/C

<b>Yes, profits increased</b>	1 [NW, WM, Y&H ONLY: please specify by how much, in £....]
<b>Yes, profits were maintained/safeguarded</b>	2 [NW, WM, Y&H ONLY: please specify by how much may have been lost otherwise, in £....]
<b>No,</b>	3
<b>Profits decreased</b>	4 (NW, WM, Y&H ONLY: please specify by how much, in £...]
<b>DNRO: Don't know</b>	5

39c. FOR FOLLOW-ON TO CODES 1, 2, 4:

INTERVIEWER TO RE-ENTER FIGURE AS TEXT, E.G. 3 THOUSAND; 300 THOUSAND; 3 MILLION; 30 MILLION, ETC.

X Don't know Y Prefer not to say



## Impact – employee growth

### 40. ASK ALL

**Did participation in Made Smarter have an effect on the number of staff in your business (total FTEs), either direct or indirect, from April 2021 to March 2022?**

NOTE: FTE – Full-time equivalent

PROMPT AS NECESSARY CODE ONE ONLY ALL, S/C

<b>Yes, headcount increased</b>	1 [NW, WM, Y&H ONLY: please specify by how much, in FTEs]
<b>Yes, headcount was maintained/safeguarded</b>	2 [NW, WM, Y&H ONLY: please specify by how many may have been lost otherwise much, in FTEs]
<b>No,</b>	3
<b>Headcount decreased</b>	4 [NW, WM, Y&H ONLY: please specify by how much, in FTEs]
<b>DNRO: Don't know</b>	6

40a. ADDITIONAL FOR FOLLOW-ON TO CODES 1, 2, 4:

X Don't know Y Prefer not to say

--

### 41. ASK ALL

**To what extent has your participation in Made Smarter impacted the skill levels of your staff from April 2021 to March 2022? Has it had a ...?**

READ OUT AND CODE ONE ONLY ALL, S/C

<b>Significant positive impact</b>	1 [NW, WM, Y&H ONLY: Please specify how many employees were upskilled]
<b>Moderate positive impact</b>	2 [NW, WM, Y&H ONLY: Please specify how many employees were upskilled]
<b>No impact</b>	3
<b>Moderate negative impact</b>	4
<b>Significant negative impact</b>	5
<b>DNRO: Don't know</b>	6

41a. ADDITIONAL FOR FOLLOW-ON TO CODES 1, 2:

X Don't know Y Prefer not to say

--

**42. IF ANY UPSKILLING (Q40=1, 2)**

**(NEW) What type of skills did your staff develop or improve?**

READ OUT AND CODE ALL THAT APPLY, M/C

Technology use, monitoring and control	1
Processing and analysing data	2
Computer programming and coding abilities	3
Managerial skills IF NECESSARY: such as decision-making, leadership, technology trend monitoring, project management and strategic thinking	4
Production skills IF NECESSARY: such as lean manufacturing, operations management, quality management and supply chain management	5
Innovation skills IF NECESSARY: such as adaptability, creativity, critical thinking and engineering and design	6
Other (please specify)	7
DNRO: Don't know	8

## Impact – productivity

**43. ASK ALL**

**And which of the following best describes how, if at all, participation in Made Smarter affected the productivity (measured as profit per employee) of the firm from April 2021 to March 2022?**

IF REQUIRED: – for example, the cost per unit produced?

READ OUT AND CODE ONE ONLY ALL, S/C

Productivity increased	1
Productivity was maintained/safeguarded	2
There has been no effect on productivity	3
Productivity decreased	4
DNRO: Don't know	5

## Impact – exports

### 44. ASK ALL

**(Q46) Again, leaving aside the effects of COVID-19 and Brexit, did participation in Made Smarter have an effect on the level of exports of the firm from April 2021 to March 2022?**

PROMPT AS NECESSARY AND CODE ONE ONLY ALL, S/C

<b>Yes, exports have increased</b>	1 [NW, WM, Y&H ONLY: Please specify by how much, in £]
<b>Yes, exports have been maintained/safeguarded</b>	2
<b>No,</b>	3
<b>Exports have decreased</b>	4 [NW, WM, Y&H ONLY: Please specify by how much in £]
<b>DNRO: Don't know</b>	5

#### 44a. FOR FOLLOW-ON TO CODES 1,4:

INTERVIEWER TO RE-ENTER FIGURE AS TEXT, E.G. 3 THOUSAND; 300 THOUSAND; 3 MILLION; 30 MILLION, ETC.

X Don't know Y Prefer not to say

### 45. ASK ALL

**Why is this?**

PROBE FULLY AND WRITE IN VERBATIM

## Impact – future

### 46. ASK ALL

**(NEW) Do you expect your participation in Made Smarter to have positive impacts in the future (next 5 years) in any of these areas?**

READ OUT AND CODE ALL THAT APPLY ALL, M/C

Turnover	1
Profits	2
Employee growth	3
Skills	4
Productivity	5
Exports	6
No impact	7
DNRO: Don't know	8

## Impact – carbon

### 47. ASK ALL

**Has your participation in Made Smarter had any impacts on the carbon emissions of your company? These could be positive, negative or a mixture of both.**

IF REQUIRED: – this could be related to your energy consumption, type of fuel used, transport/logistics use, quantity/type of raw materials used

PROMPT AS NECESSARY AND CODE ONE ONLY ALL, S/C

Only positive impacts	1
Only negative impacts	2
Some positive, some negative impacts	3
No impact	4
DNRO: Don't know	5

**48. WHERE POSITIVE IMPACTS (Q47/1, 3)**

**Which of the following have caused these positive impacts...?**

READ OUT AND CODE ALL THAT APPLY, S/C

Lower energy use of manufacturing processes	1
Better awareness of energy/resource use	2
Change in raw material use (e.g. transition to different raw materials, recycling of existing materials or less wastage of raw materials)	3
Fewer product defects	4
More efficient use of logistics	5
Change in fuel type (e.g. shift towards electricity, rather than gas/diesel)	6
Other (please specify)	7

**49. WHERE NEGATIVE IMPACTS (Q47/2, 3)**

**Which of the following have caused these negative impacts...?**

READ OUT AND CODE ALL THAT APPLY, S/C

More energy-intensive processes/equipment	1
Production volumes have expanded	2
Change in raw material use (e.g. transition to more carbon-intensive raw materials)	3
More product defects	4
Expansion of logistics use (e.g. more overseas shipping)	5
Change in fuel type (e.g. shift away from electricity as a fuel source)	6
Other (please specify)	7

**50. WHERE BOTH POSITIVE AND NEGATIVE IMPACTS (Q47/3)**

**Would you say the overall impact on the firm's carbon emissions is positive, negative or neutral?**

READ OUT AND CODE ALL THAT APPLY, S/C

Positive	1
Negative	2
Neutral	3
DNRO: Don't know	4

## Impact – technology providers

### 51. ASK ALL

**In terms of your relationships with technology providers, as a result of participating in Made Smarter, ...**

READ OUT AND CODE ONE ONLY ALL, S/C

	Yes	No	DNRO: Don't know
Have you become aware of one or more new technology providers whom you were not previously aware of	1	2	3
Have you purchased a product from one or more providers that you had not purchased from previously	1	2	3
Have you deepened relationships with one or more providers that you had existing links with	1	2	3
Are you better able to choose the right technology supplier to meet your needs	1	2	3

### 52. WHERE YES TO A, B, C IN Q51

**What have been the benefits (if any) of these new or deepened relationships?**

READ OUT AND CODE ALL THAT APPLY, M/C

Access to lower-priced technology products	1
Access to higher-quality technology products	2
Better ability to compare products from a range of market providers	3
Access to products that are better tailored to the company's needs	4
Other [PLEASE SPECIFY]	5
No benefits	6
DNRO: Don't know	7

## Impact – expertise providers

### 53. ASK ALL

**Which of the following sources of advice will you use in the future when investing in new technologies? (assuming the Made Smarter Pilot has closed/ended)**

READ OUT AND CODE ALL THAT APPLY, M/C

Consultants	1
Technology providers	2
Experts within my company	3
Other professional services providers (e.g. accountants, lawyers)	4
None	5
Other (please specify)	6
DNRO: Don't know	7

## Diversity

### 54. ASK ALL

**This and the next two questions will help us to understand diversity among the firms adopting digital technologies.**

**(NEW) Thinking about all working owners or partners, and directors who are in day-to-day control of the business within the firm, how many are:**

PROMPT FOR AN ESTIMATE AND INPUT AS A NUMBER: WHERE NONE ENTER "0"

	n	DNRO: Don't know but some are	DNRO: Prefer not to say
Male	n	X	Y
Female	n	X	Y
Another gender identity	n	X	Y

**55. ASK ALL**

**(NEW) Which of the following ethnic groups are represented by the firm's working owners, partners and directors?**

READ OUT AND CODE ALL THAT APPLY, M/C.

White British or Irish	1
Any other White background	2
Mixed/multiple ethnic background	3
Asian or Asian British background	4
Black or Black British background	5
Another ethnic group not mentioned	6
Prefer not to say	7
Don't know	8

**56. IF ANY FEMALE NON-WHITE DIRECTORS (Q54/2=1+ AND Q55/3-6)**

**(NEW) Are any of the firm's working owners, partners and directors female and from a non-White background?**

Yes	1
No	2
Don't know	3
Prefer not to say	4

**57. ASK ALL**

**And, finally, would you be happy to possibly be contacted for a follow-up interview to gain a more detailed understanding of the impact of the Made Smarter Adoption programme on your business? Follow-up interviews may be conducted by another research consultancy, xxx, who are working on this evaluation with BMG.**

Yes	1
No	2

**Thank you for taking the time to complete the survey.**



**Report prepared for:**



Department for  
Business & Trade

**About us**

Cambridge Industrial Innovation Policy (CIIP) is a global, not-for-profit policy group based at the Institute for Manufacturing (IfM), University of Cambridge. CIIP works with governments and global organisations to promote industrial competitiveness and technological innovation. We offer new evidence, insights and tools based on the latest academic thinking and international best practices.

This report was delivered through IfM Engage, the knowledge transfer arm of the Institute for Manufacturing (IfM), University of Cambridge.

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