Leveraging Artificial Intelligence (AI) Technologies to Build SME Resilience amid the Global Covid-19 Pandemic

Abstract. As a result of Covid-19 and the ensuing sharp decline in economic activity, business leaders had to quickly adapt to a disruptive marketplace, changing consumer behaviour, and new internal processes. The crisis accelerated adoption of new technologies such as Artificial Intelligence (AI) which could help to improve business processes and evolve new business models, products and services. This exploratory research reports on a preliminary survey with 81 SME owners from various sectors who undertook a seven-week programme to build foundational knowledge on the opportunities of AI for their business and sector. Of those surveyed, 49% turned to AI due to the impact of Covid-19 on their business, sector, and economy. Our results demonstrate the extent of changes small businesses have made as a result of the pandemic, for example, 64% expanded existing services and developed new products and services, with 45% expanding existing product lines. We anticipate the research will directly contribute to existing knowledge by challenging prevailing beliefs about productivity and the role of digital technology adoption. We show that by contributing to the limited literature on micro-enterprise digital technology adoption and demonstrating how a dual approach of implementation of cutting-edge technologies and new management practices can help overcome repercussions of global crises. Our findings suggest that SMEs are currently facing a wide variety of business challenges. However, the integration of a newly developed AI innovation may enable them to overcome these challenges, if adopted with the right level of support.

Keywords: COVID, Artificial Intelligence, SMEs

1 Background

Small to medium sized enterprises (SMEs) employ more than 87 million people across the EU and are considered the strength of the EU economy. Furthermore, in 2019 there are 5.6 million micro-businesses in the UK accounting for 96% of all businesses [1]. However, support targeted at micro-businesses to assist in their increased productivity and subsequent continued contribution to the economy is often fragmented and not always relevant to the challenges they face [2]. As a result of Covid-19 and the sharp drop-in economic activity which followed, business leaders had to quickly adapt to a disruptive marketplace, changing consumer behaviour, and new internal processes. The crisis accelerated the adoption of new technologies such as Artificial Intelligence (AI) which could help to improve business processes, enabling them to create new business models, products, and services. However, with adoption comes further challenges, for as Beckinsale and Ram [3] highlighted failure to successfully implement and exploit digital technologies are due in part to management limitations.

This limitation can result in the organisation not viewing digital technologies in a strategic manner and thus implementation will be ad hoc and unformulated [3]–[6]. In addition, Beckinsale and Ram [3] believe that within a micro-enterprise the failure to successfully implement and exploit digital technologies are due in part to management limitations and with new technological adoption comes new challenges especially for resource-constrained businesses who lack the internal technological expertise, finances, and time to leverage and maximise the value of AI.

Dandridge and Levenburg [7] and Fink and Disterer [8] all maintain that research surrounding digital technologies adoption and in particular digital within small businesses is reasonably well established, however, they also dispute that the same can be said for literature in relation to digital technology adoption and the micro-business. Simmons *et al.* [9], [10] believes that although limited in relation to MBs, the importance of digital adoption has an increased standing in literature within the arena.

2 Research Gap

The lack of research available in this area has resulted in practitioners, whilst understanding the importance of digital technologies and AI in particular, feeling ill equipped to maximise on the opportunities these platforms have to offer. The lack of guidance within this arena places considerable pressure on micro businesses to adopt the latest technologies even when they are unclear as to how to maximise these Kalakota and Robinson [11] and Jeyaraj *et al* [12]. Furthermore, the sectoral differences can have a detrimental impact when imposing a one-size fits all digital strategy [13].

Existing literature highlights that MBs have not exploited digital technologies to its maximum potential because they were either incapable, unable or unwilling. Moreover, there were very few examples of effective adoption and application [14]. Had the adoption been the result of a planned strategy of adoption rather than in response to competitive pressures and 'media hype' then the results may have been different [15]. Fitzgerald et al [16] believes that digital technology adoption occurs in isolated incidents within an organisation, and not usually seen holistically. Moreover, Simmons et al, [9] argues that by adopting digital solutions the micro business can leverage its strengths and thus create competitive advantage. However, as the attitudes of the owner manager have been cited as having a direct impact on adoption and productivity, both positive and negative does adoption of technology automatically ensure competitive advantage? Gray [17] would argue that an understanding of the micro-business owners work motivations is essential in order to ensure this.

It could be argued that the skills-shortages regarding digital solutions is a critical factor in successfully adopting such technologies [11], [18](Simpson and Docherty, 2004). This is especially the case within MBs, as they frequently have minimal or no training in utilising digital technologies nor are they fully briefed in the capabilities of such systems and thus do not utilise them fully [19], [20].

Throughout the literature review, it became apparent that literature on micro-business and digital adoption is highly fragmented and little is known about the intersection of increased productivity and digital technology. Also, it has been argued

that technical knowledge alone is not sufficient to increase productivity and thereby growth within a business; knowing how to relate this to business capabilities is what truly propels productivity and thus financial growth. This clearly raises the issue of the need to explore the impact of new technology adoption on productivity within MBs, in order to truly close the gap between research and practice in this area and thus provide the support that MB practitioners' require in order.

This exploratory research aims to investigate small firm owners response to the Covid-19 pandemic and technology adoption in terms of where they perceive AI to fit within their digital strategy and potentially contribute toward their recovery strategy. Importantly, we explore the resources required for SMEs to leverage this cutting-edge technology.

3 AI-related Readiness, Knowledge, and Skills

Delegates AI-readiness was analysed with regard to having the appropriate infrastructure to support AI integration, the suitable management and governance mechanisms to sustain AI solutions, the ability to maximise the value AI could provide, and whether their team of employees are ready to implement and work with AI (see Fig. 1).

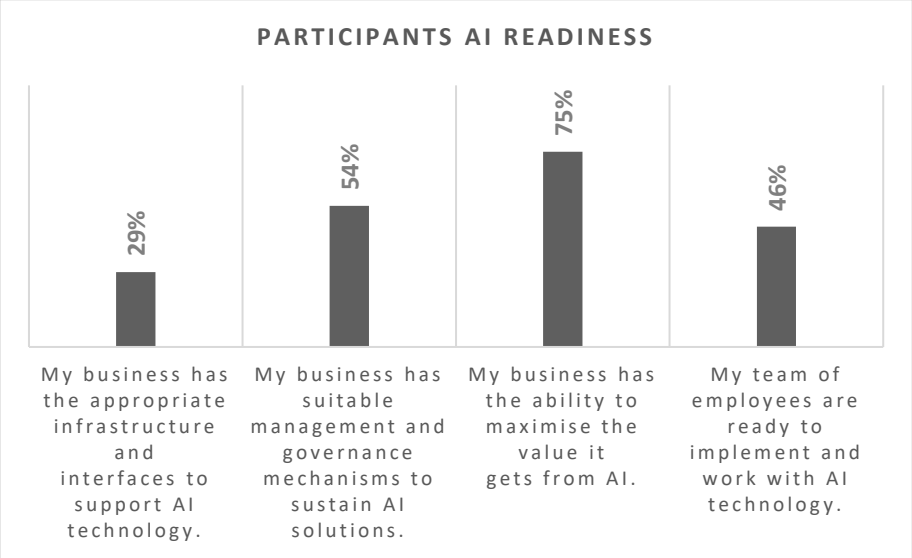

Fig. 1. AI readiness of participants, their knowledge, and skills.

The results indicate that, despite having limited resources and mechanisms in place to support AI technology at present, the majority of respondents have the ability to maximise the value that AI brings.

4 External Impacts: Covid-19

The external economic impact of Covid-19 on beneficiaries' motivation to adopt AI and seek support on how to implement this technology was investigated. The results highlighted below suggest that almost half of participants turned to AI due to the impact of Covid-19 on their business, sector, and economy, see Table 1.

Table 1. Summary of results from the survey

Conclusion 1	Conclusion 2
The impact of Covid-19 on small firms motivated **49%** of beneficiaries **to explore the opportunities of AI for their business**.	The impact of Covid-19 on small firms motivated **40%** of **beneficiaries to seek support on the opportunities of AI for their business**.

We conducted a preliminary, exploratory survey with 81 small firm owners from various sectors who undertook a seven-week programme to build foundational knowledge on the opportunities of AI for their business and sector. Of those surveyed, the results highlighted that 49% beneficiaries turned to AI due to the impact of Covid-19 on their business, sector, and economy. The analysis of the findings provides a strong indication of the changes small businesses have made as a result of the pandemic, for example 64% expanded existing services and developed new products and services, with 45% expanding existing product lines, see Fig. 2.

Moreover, we asked beneficiaries to express both the positive and negative impacts the Covid-19 pandemic has had on their business. Responses are highlighted in Table 2. Findings suggest that small firms are currently facing a wide variety of business challenges. However, the integration of a newly developed AI innovation may enable them to overcome these challenges, if adopted with the right level of support. This finding will be further tested by adopting a mixed method case study approach to examine whether AI has effectively supported them to improve their operations and functioning, working toward recovery in the current economic crisis.

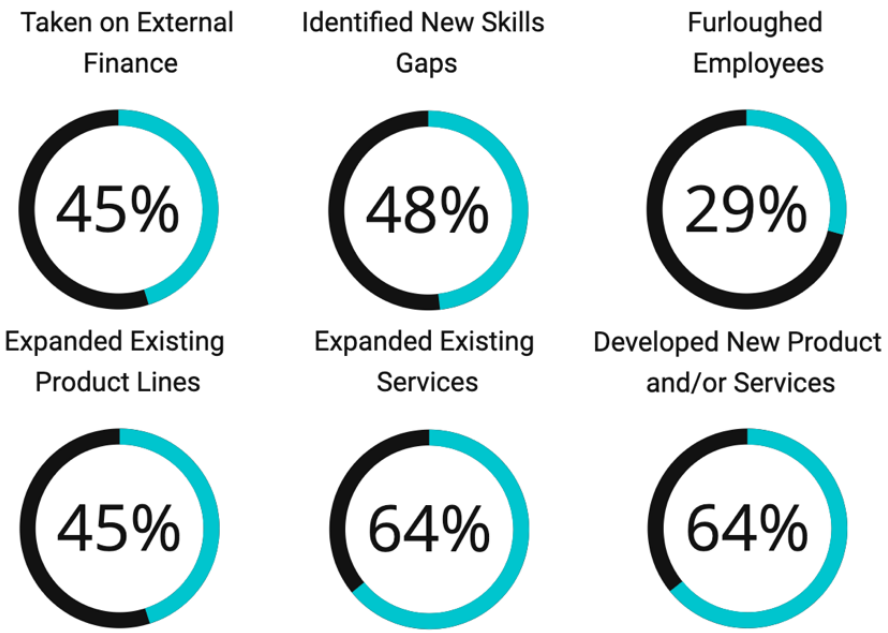

Fig. 2. Results of preliminary, exploratory survey with 81 small firm owners from various sectors.

Table 2. Beneficiaries responses to express both the positive and negative impacts the Covid-19 pandemic

Positive	Negative
Increased product/service demand due to changing consumer behaviour	Decreased product/service demand due to changing consumer behaviour
Provided small firm owners the time to start up and launch their company	Disrupted the supply chain
Ability to work more flexibly including in remote locations without a full office in operation This has led to increased technical skills across the workforce due to adoption of remote technology and platforms	Limited the opportunities for networking with others in the industry and demoing
Time saved due to lack of travelling to meetings. More efficient use of time including more time spent on products refinement	Reduced employee productivity and interaction including meeting face-to-face
Technology adoption	Limited investment opportunities
Increased employment number	Decreased turnover
Personal development including increased focus	Decreased advertising spend budgets and spend due to limited return on investment (e.g., in the travel industry)
Improved sustainability	Delayed progress, momentum, and impacted other partners

5 Contribution to Knowledge

We anticipate the research will directly contribute to existing knowledge by challenging prevailing beliefs about productivity and the role of adoption of digital technologies. Not only will this research build on the work of Jones et al. [18], by contributing to the limited literature on micro-enterprise digital technology adoption by Fink and Disterer [8], it will also contribute to the body of knowledge that exists in this arena. Also, in addition to quantitative data, we plan to incorporate open ended questionnaires from the participants to apply advance natural language processing [21, 22] techniques and deep learning methods [23] to better understand learning behaviour of the SMEs and their sentiments [25–26] by demonstrating how a dual approach of implementation of cutting-edge technologies and new management practices can help overcome repercussions of global crises.

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