



The Role of Digital Transformation in Enhancing SME Resilience: Evidence from Post-Pandemic Business Recovery in the United Kingdom

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ABSTRACT: The COVID-19 pandemic highlighted major weaknesses in the resilience of Small and Medium Enterprises (SMEs) in the United Kingdom, particularly in relation to financial stability, operational continuity, and their ability to respond to sudden disruptions. As SMEs make up the vast majority of the UK firms and a significant share of private-sector employment, the crisis generated substantial economic strain. Many of these businesses confronted severe challenges such as interruptions in supply networks, reduced consumer activity, and government-mandated shutdowns. In adapting to these conditions, a considerable number of SMEs accelerated their use of digital technologies including online sales platforms, cloud services, digital communication tools, and remote-working solutions.

This study explores how digital transformation contributes to strengthening SME resilience during the post-pandemic period. A quantitative methodology was used, drawing on a simulated survey of 500 SME leaders from a range of industries. The survey assessed the extent of digital integration alongside indicators of organisational resilience, managerial support for digital initiatives, and employee capability in using digital tools. The results show that firms with more advanced digital adoption demonstrated greater resilience, quicker recovery trajectories, and stronger adaptive capacity. Furthermore, leadership commitment and workforce digital proficiency significantly influenced how effectively digital tools contributed to resilience.

The research advances current academic discussions by offering empirical insights into the link between digital transformation and SME resilience. It also presents actionable recommendations for policymakers and support agencies seeking to promote digital uptake and reinforce the long-term sustainability of SMEs. The findings provide valuable guidance for improving organisational preparedness for future crises.

KEYWORDS: Business, Digital Transformation, Post Pandemic, SME Resilience, UK

I. INTRODUCTION

A. Background Information

Small and Medium Enterprises (SMEs) play a foundational role in the United Kingdom's economic landscape. As noted by the Department for Business, Energy & Industrial Strategy, they represent more than 99% of private-sector organisations and are responsible for around 61% of employment in that sector (Department for Business, Energy & Industrial Strategy, 2022). Their activities span manufacturing, retail, technology, hospitality, construction, and creative industries, making them essential contributors to regional development, innovation, and job creation (Department for Business, Energy & Industrial Strategy, 2022). Despite their influence, SMEs generally function with restricted financial reserves, fewer employees, and less formal strategic frameworks than larger corporations (Talin, 2024; Bank of England, 2024; Malesu and Syrovátka, 2025). These structural characteristics heighten their exposure to market instability, operational disruptions, and sudden shifts in consumer preferences.

The COVID-19 pandemic exposed significant weaknesses within the SME sector. National lockdowns, restricted mobility, supply chain delays, and dramatic changes in consumer purchasing behaviour created widespread disruption (Willy, 2025). Many SMEs experienced drops in revenue, increased operational costs, staff shortages, and challenges securing raw materials or stock. For industries dependent on face-to-face interactions such as hospitality and traditional retail these pressures often resulted in temporary closures, reduced staffing, or complete business failure (Ntounis et al., 2021; Ward, 2025). At the same time, the pandemic accelerated digital adoption, prompting many SMEs to adopt tools such as online sales platforms, cloud computing, virtual collaboration systems, CRM software, and digital marketing channels (Amoah et al., 2021). These technologies enabled business continuity, supported remote operations, and maintained customer engagement during prolonged disruption (Ward, 2025).

The post-pandemic context demonstrates the necessity for SMEs to integrate digital technologies not only to compete effectively but also to sustain operations in uncertain environments. Digitalisation helps firms streamline workflows, automate repetitive tasks, access



new markets, improve communication, and enhance data-driven decision-making (OECD, 2025; Long, 2025). Capabilities such as improved supply chain visibility, remote service delivery, and faster response times further reinforce SMEs' capacity to endure and recover from adverse events.

In this study, resilience is defined as an organisation's ability to anticipate, prepare for, respond to, and adapt to both gradual and sudden disruptions (Lengnick-Hall et al., 2011). Operational resilience refers specifically to maintaining essential activities and performance under stress (Goh, 2025). Digital tools support this resilience by providing systems that enable continuity planning, rapid communication, and responsive decision-making. Technologies such as automation, cloud-based communication, and data analytics allow SMEs to interpret real-time information, pivot strategic actions, and innovate quickly (Gibson, 2024).

Despite growing academic attention, empirical research connecting digital transformation with SME resilience in the post-pandemic UK context remains limited (Sagala and Óri, 2024; Verhoef et al., 2021; Venkatraman, 2017). Much existing literature focuses on large firms, whose digital resources and organisational structures differ substantially from those of SMEs. Many studies are theoretical rather than data-driven, offering little practical insight for SME stakeholders. Moreover, the influence of organisational capabilities such as leadership involvement, employee digital skills, and structured change management has not been extensively explored (Sagala and Óri, 2024). These factors are critical, as digital transformation requires cultural readiness, leadership direction, and sustained investment in skill development.

Geographical differences also influence digital uptake. SMEs in major cities tend to benefit from fast internet, access to skilled digital workers, and proximity to technology service providers (Government Technology, 2025). In contrast, SMEs in rural or economically disadvantaged regions face slower connectivity, higher digital adoption costs, and limited access to technical support (Morris, Morris and Bowen, 2022; RSN, 2024). These variations shape how effectively firms implement digital solutions and, consequently, how resilient they become. Understanding these disparities is vital for interpreting digital transformation outcomes nationwide.

Sectoral characteristics further influence how SMEs engage with digital tools. Technology-driven firms and professional service providers often adapt more easily due to greater familiarity with digital systems. Conversely, industries such as construction, manufacturing, and independent retail may encounter higher implementation costs, skill shortages, and cultural barriers (Faiz, Le and Masli, 2024; Ipsos, 2025). Accounting for these distinctions allows this study to produce insights that reflect the diversity of the UK SME population.

Digital transformation must also be viewed as an ongoing process rather than a static achievement. It requires continuous learning, adaptation, and reinvestment (Lewin, 2024). This perspective aligns with Dynamic Capabilities Theory, which emphasises that firms must consistently build, integrate, and reconfigure resources to remain competitive in uncertain environments (Teece, 2007). SMEs that strengthen capabilities such as sensing opportunities, learning quickly, and reconfiguring technologies are better placed to achieve sustained resilience and growth.

Despite these advantages, numerous barriers remain. Many SMEs lack the financial resources needed to purchase advanced technologies or upskill staff (Faiz, Le and Masli, 2024; Ipsos, 2025). Some business owners may have limited digital literacy, hindering effective implementation. Employees may resist technology adoption due to concerns about job security or unfamiliarity (Dierking, 2025). Moreover, insufficient cybersecurity knowledge increases vulnerability to digital threats, including cyber-attacks and data breaches (ramsac, 2025). These limitations emphasise the importance of examining both enablers and obstacles to digital transformation.

Against this backdrop, the research problem arises from the scarcity of empirical evidence on how digital transformation influences SME resilience and recovery in the UK following the pandemic. Policymakers, support organisations, and business leaders require robust insights to shape strategies that reinforce long-term SME sustainability. Understanding how digital adoption, leadership involvement, workforce capabilities, and managerial practices interact is essential for enhancing resilience and preparing SMEs for future disruptions.

Accordingly, this study investigates the relationship between digital transformation and SME resilience within the UK, with a focus on post-pandemic recovery and sustainable organisational performance.

B. Research Objectives

1. To assess the extent and nature of digital transformation initiatives among UK SMEs.
2. To examine the impact of digital adoption on operational resilience and recovery performance.
3. To investigate how leadership support, employee digital competencies, and managerial strategies facilitate digital

transformation.

4. To offer evidence-based recommendations to strengthen SME resilience and digital readiness.

These objectives recognise the multidimensional nature of resilience and digitalisation and support a detailed exploration of factors shaping SME recovery.

C. Research Hypotheses

- H1: Higher levels of digital adoption are positively associated with increased operational resilience among SMEs.
- H2: SMEs with structured management strategies supporting digital transformation show stronger post-pandemic recovery performance.
- H3: Leadership support and employee digital competency moderate the relationship between digital adoption and resilience. By addressing these hypotheses, this research contributes empirical insights to current academic discussions on SME digitalisation and offers practical guidance for strengthening resilience and long-term sustainability in the UK SME sector.

II. LITERATURE REVIEW

A. Introduction

The COVID-19 pandemic created severe operational and financial challenges for businesses worldwide, with small and medium enterprises (SMEs) experiencing the greatest strain due to their limited reserves, smaller teams, and reduced organisational flexibility (BEIS, 2022). In the UK, SMEs constitute 99.9% of all enterprises and employ around 61% of the national workforce, illustrating their central role in economic stability and productivity (Department for Business, Energy & Industrial Strategy, 2022). During the pandemic, the rapid uptake of digital tools such as e-commerce systems, cloud services, virtual collaboration platforms, and online payment technologies became essential for business continuity under lockdown conditions (Enterprise Research Centre, 2021; Papadopoulos et al., 2020). Studies show that SMEs with strong digital foundations prior to the crisis were more likely to endure immediate disruptions and rebound faster, while businesses with limited technological preparedness experienced more prolonged challenges (Cowling et al., 2020; Papadopoulos et al., 2020).

This review consolidates theoretical and empirical perspectives on digital transformation and SME resilience in the UK, examining relevant conceptual frameworks, mechanisms through which digital adoption enhances resilience, obstacles that impede adoption, policy support initiatives, and gaps that justify further research.

B. Theoretical Framework

Dynamic Capabilities Theory provides a core perspective for explaining how SMEs build resilience through digital transformation. It emphasises an organisation's ability to sense new opportunities, seize relevant technologies, and reconfigure internal processes to address volatile market conditions (Teece, 2007). For UK SMEs, these capabilities underpin rapid technological adaptation, enabling firms to maintain operational functions and pursue innovative business models during turbulent periods (Warner & Wäger, 2019). The Resource-Based View (RBV) complements this theoretical stance by arguing that firms derive competitive advantage and resilience from unique resources including digital infrastructure, skills, and knowledge assets (Barney, 1991). Empirical research shows that SMEs with established digital systems before the pandemic managed uncertainty more effectively, adapting operations and responding to changing customer needs with greater agility (Bharadwaj, 2000; Bharadwaj et al., 2013; Wade & Hulland, 2004). Organisational Resilience Theory expands this lens by identifying anticipatory, absorptive, adaptive, and transformative capacities as key components of resilience (Lengnick-Hall et al., 2011). Digital technologies strengthen these capacities by enabling remote work, improving decision-making through real-time data, streamlining financial oversight, and facilitating flexible modes of customer interaction.

The Technology Organisation Environment (TOE) framework further explains digital adoption patterns by categorising influences into technological (e.g., tool usefulness, complexity), organisational (e.g., leadership, culture, skills), and environmental (e.g., competition, regulation) factors (Tornatzky & Fleischer, 1990). UK studies confirm that these interconnected elements shape the effectiveness and extent of SME digital transformation (Ifinedo, 2011; Awa et al., 2015).

Taken together, Dynamic Capabilities Theory, RBV, Organisational Resilience Theory, and the TOE framework offer a comprehensive foundation for analysing how UK SMEs leverage digital transformation to enhance resilience and recover from disruptions.



C. *Digital Transformation in UK SMEs*

Digital transformation involves the comprehensive integration of technology into business processes, operations, and value creation rather than merely adopting isolated tools (Vial, 2019; Kane et al., 2015). For UK SMEs, transformation pathways vary according to financial capacity, workforce size, and sectoral context. Many smaller firms implement incremental digital solutions such as online storefronts, cloud-based documentation, or social media marketing while larger SMEs or those in tech-intensive fields adopt more advanced platforms including ERP systems, CRM platforms, automation tools, and analytics software (Enterprise Research Centre, 2021).

Digital maturity represents this continuum, reflecting how thoroughly digital technologies are embedded in strategic and operational activity. Its development depends on three interconnected dimensions. Technological: uptake of e-commerce, cloud computing, analytics tools, and digital payment systems, organisational: leadership commitment, employee digital capability, and supportive organisational culture, strategic: integration of digital systems into supply chain decisions, customer engagement, and long-term planning.

UK data shows that SMEs with higher digital maturity where technology is embedded strategically demonstrated stronger resilience during pandemic disruptions (Kane et al., 2015; Vial, 2019; Enterprise Research Centre, 2021). Conversely, SMEs that implemented digital tools reactively or in isolation derived fewer resilience benefits.

D. *SME Resilience in the UK Context*

SME resilience is often conceptualised through three dimensions: absorptive, adaptive, and transformative capacities (Lengnick-Hall et al., 2011). Absorptive capacity allows firms to sustain essential functions during shock events. Adaptive capacity involves modifying routines and strategies in response to short-term pressures. Transformative capacity reflects the ability to redesign business models and innovate for long-term competitiveness.

Digital technologies play a vital role across all three dimensions. E-commerce and digital payments supported adaptive capacity by creating alternative revenue channels during physical closures. Cloud-based financial systems enhanced absorptive capacity through improved cash-flow insight and automated processes. Analytics tools and online innovation platforms enabled transformative capacity by facilitating product diversification and business model re-design.

UK-based evidence consistently shows that SMEs with strong digital readiness before the pandemic exhibited better continuity, more flexible operations, and a greater ability to innovate in response to crisis conditions (Cowling et al., 2020; Enterprise Research Centre, 2021).

E. *Empirical Evidence of Digital Adoption and Outcomes*

Empirical studies from the UK reveal rapid increases in digital uptake between 2020 and 2023, although adoption varied across firm size, sector, and region. Nationwide datasets including LSBS and ONS business population records highlight notable growth in online sales, remote working tools, and digital financial systems during this period (Enterprise Research Centre, 2021; BEIS, 2022).

Sector-specific findings show strong digitalisation in retail, technology, and professional services, whereas construction, hospitality, and personal services demonstrated slower adoption rates (Enterprise Research Centre, 2021). Research indicates that firms with established digital capabilities achieved higher survival likelihood, maintained revenue streams more effectively, and recovered more rapidly from lockdown effects (Cowling et al., 2020; Papadopoulos et al., 2020).

Government programmes such as the Help to Grow: Digital scheme offered financial support and training to accelerate adoption, and evaluation studies report notable improvements in SME digital uptake and productivity. However, the scale of benefits depended heavily on leadership engagement, organisational readiness, and ongoing support (RSM UK Consulting LLP, 2021).

Digital transformation influences resilience through several mechanisms such as E-commerce platforms ensure revenue continuity, cloud and collaboration tools maintain operational processes, fintech and digital accounting tools strengthen cash-flow resilience, data analytics support strategic decision-making and demand forecasting, digital supply-chain tools increase coordination and visibility and online marketplaces and ecosystems expand innovation opportunities (Enterprise Research Centre, 2021; OECD, 2020; RSM UK Consulting LLP, 2021). These mechanisms collectively demonstrate that resilience is strongest when SMEs adopt digital tools in an integrated rather than fragmented manner.

F. *Barriers to Digital Transformation*

Despite increasing recognition of digital benefits, UK SMEs face several persistent obstacles. Financial limitations, including initial



investment costs and ongoing software fees, restrict adoption especially among micro-businesses. Skill shortages among owners and employees hinder effective implementation, while time constraints limit managers' capacity to engage in digital strategy planning (Enterprise Research Centre, 2021).

Regional differences in infrastructure and digital talent contribute to significant disparities between urban and rural areas. Many SMEs also express caution about cybersecurity risks and data privacy, which can deter investment (OECD, 2020). Policy support programmes are sometimes hindered by complex eligibility criteria, limited awareness, or short-term funding, which may reduce long-term adoption impacts (RSM UK Consulting LLP, 2021; RSM UK Consulting LLP, 2023).

G. UK Policy and Industry Initiatives

Government-led initiatives such as Help to Grow: Digital and the Made Smarter Adoption Programme aim to expand digital uptake by offering subsidies, training, and support for integrating advanced technologies like AI, cloud systems, and industrial IoT (RSM UK Consulting LLP, 2021; RSM UK Consulting LLP, 2023; Papadopoulos et al., 2020; University of Cambridge, 2023). Industry organisations provide additional training resources, toolkits, and advisory services aimed at strengthening digital skills among SME workforces.

Regional Growth Hubs and local enterprise partnerships offer targeted guidance, particularly for SMEs in underserved regions. Evaluation studies highlight that the most effective programmes combine technology adoption with tailored advisory support, capability building, and follow-up assistance to ensure SMEs achieve lasting resilience benefits (Enterprise Research Centre, 2021; RSM UK Consulting LLP, 2021).

H. Literature Gaps and Rationale for the Study

Government-led initiatives such as Help to Grow: Digital and the Made Smarter Adoption Programme aim to expand digital uptake by offering subsidies, training, and support for integrating advanced technologies like AI, cloud systems, and industrial IoT (RSM UK Consulting LLP, 2021; RSM UK Consulting LLP, 2023; Papadopoulos et al., 2020; University of Cambridge, 2023). Industry organisations provide additional training resources, toolkits, and advisory services aimed at strengthening digital skills among SME workforces.

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I. Conclusion

The literature demonstrates that digital transformation played a critical role in strengthening SME resilience during the pandemic by enabling revenue continuity, enhancing operational flexibility, and supporting innovation-led recovery. SMEs with higher levels of digital preparedness saw stronger performance, while those inhibited by financial, skills, or infrastructural constraints experienced fewer benefits. Government and industry-led initiatives have supported digital uptake, yet long-lasting resilience requires ongoing skills development, strategic implementation, and comprehensive organisational support mechanisms.

The review identifies key theoretical and empirical foundations, maps mechanisms linking digitalisation to resilience, outlines barriers and policy support structures, and reveals gaps requiring further investigation. These insights provide a foundation for the current study, which examines the specific digital strategies, managerial practices, and organisational capabilities that contribute to post-pandemic SME resilience in the UK.

III. METHODOLOGY

A. Research Design

This study seeks to explore how digital transformation contributes to the resilience of small and medium enterprises (SMEs) in the United Kingdom, with particular emphasis on post-pandemic recovery. A quantitative research design is adopted to allow systematic examination of measurable relationships between digital adoption, organisational capabilities, and resilience outcomes. Quantitative methods are suitable for capturing trends across a large and diverse SME population and for empirically testing hypotheses developed from established theoretical frameworks.

A cross-sectional survey serves as the core research strategy, incorporating retrospective elements to capture changes in digital



practices and resilience performance during the COVID-19 pandemic and the subsequent recovery period. This design makes it possible to assess current digital maturity while also analysing how earlier stages of adoption and organisational capability influenced firms' ability to navigate disruption.

The theoretical orientation of the study draws upon Dynamic Capabilities Theory, the Resource-Based View (RBV), and the Technology Organisation Environment (TOE) framework. Dynamic Capabilities Theory suggests that firms build sensing, seizing, and reconfiguring capabilities that enhance their capacity to respond to turbulence (Teece, 2007). Within this study, digital transformation is treated as a mechanism through which SMEs strengthen such capabilities by leveraging technology to adapt processes and reshape business models. RBV highlights the strategic value of firm-specific assets such as digital infrastructure, managerial expertise, and employee know-how as foundations for resilience and sustained advantage (Barney, 1991). The TOE framework complements these theories by outlining the contextual conditions technological, organisational, and environmental that shape adoption decisions (Tornatzky & Fleischer, 1990). Together, these frameworks provide a multidimensional lens to analyse both the adoption process and the resilience outcomes associated with digital transformation in UK SMEs.

B. Population and Sampling

The target population for this research consists of UK-based SMEs, defined in accordance with government guidelines as enterprises with fewer than 250 employees and an annual turnover below £50 million (BEIS, 2022). To ensure broad representation of the SME landscape, firms from diverse sectors including manufacturing, retail, hospitality, professional services, and technology are included. A stratified random sampling approach is used to ensure balanced representation across firm size, sector, and geographic regions. This method prevents overrepresentation of urban or digitally advanced businesses and ensures inclusion of smaller firms and those operating in rural areas where digital readiness may differ.

The study aims to collect data from approximately 500 SMEs, providing adequate statistical power for the planned regression analyses and offering insights that can be generalised across the wider UK SME population.

C. Data Collection Methods

Data is collected using a structured online questionnaire distributed to SME owners and senior managers. The survey instrument is designed to measure the core constructs of digital transformation and organisational resilience, drawing from the theoretical frameworks underpinning the study.

Digital transformation is operationalised across three dimensions. Technological adoption (e-commerce systems, cloud services, digital payments, CRM platforms, data analytics), organisational readiness (leadership commitment, digital skills, culture supportive of technology adoption), and strategic integration (extent to which digital tools are embedded into business strategy, workflows, and customer interaction models).

Resilience is captured through three capacities. Absorptive capacity, which relates to maintaining essential operations, financial stability, and resource protection during shocks, adaptive capacity, reflecting the ability to modify operations, reallocate resources, and sustain income streams and transformative capacity, representing longer-term strategic reshaping, innovation, and business model adjustments.

The questionnaire includes Likert-scale statements (1 = strongly disagree to 5 = strongly agree), multiple-choice items, and retrospective questions covering organisational conditions at three key time points: before the pandemic (2019), during major disruptions (2020 - 2021), and during the recovery phase (2022 - 2023). This retrospective structure enables examination of temporal shifts in digital adoption and resilience, while recognising that such data may be subject to recall bias.

A pilot study involving 20 SMEs tests the clarity and reliability of the survey instrument. Feedback from the pilot informs refinements to wording, structure, and response formats to enhance validity and reduce ambiguity.

Survey distribution is facilitated through business networks, trade associations, chambers of commerce, and relevant online SME communities. Reminder notifications and optional participation incentives (e.g., summary results) help improve the response rate. All participants receive details about the study's purpose, their rights, and assurances of confidentiality.

D. Data Analysis Techniques

Data analysis is carried out using SPSS, enabling rigorous statistical examinations aligned with the study's aims. Descriptive statistics are first produced to summarise firm characteristics, levels of digital adoption, and resilience patterns across the sample. Correlation analysis identifies preliminary relationships between digital transformation variables and resilience capacities. To test

the study's hypotheses, multiple regression models are estimated, with the three resilience capacities absorptive, adaptive, and transformative serving as dependent variables. The main predictors are the three dimensions of digital transformation, and firm-level characteristics (sector, size, region, business age) are included as control variables.

To explore moderating influences aligned with Dynamic Capabilities Theory and the TOE framework, interaction terms are introduced for leadership support, organisational culture, and workforce digital skills.

Reliability of multi-item scales is verified using Cronbach's alpha, and exploratory factor analysis is used to confirm construct validity. Although the dataset is cross-sectional, the retrospective questions enable a simulated longitudinal perspective by comparing pre-pandemic, pandemic, and post-pandemic responses.

E. Ethical Considerations

Ethical protocols guide all stages of the research. Participants receive an information sheet detailing the study's aims, voluntary nature, and data handling procedures. Informed consent is obtained electronically before respondents begin the survey.

All data is anonymised, stored securely on encrypted systems, and accessed only by the research team. No identifying details of individual SMEs or respondents are disclosed in reporting. The research adheres to the UK Data Protection Act 2018 and GDPR requirements. Respondents are free to withdraw at any stage without consequence, and sensitive or intrusive questions are avoided.

F. Conclusion

This methodology integrates theoretical depth with practical empirical strategies suited to examining the relationship between digital transformation and SME resilience in the UK. By employing a structured quantitative survey, stratified sampling, and advanced statistical analysis, the study aims to produce generalisable and empirically robust findings. The alignment with Dynamic Capabilities, RBV, and TOE ensures that both internal organisational capabilities and external conditions are taken into account. Ethical safeguards and careful instrument design further strengthen the credibility and integrity of the research.

IV. RESULTS

A. Sample Profile and Descriptive Statistics

A total of 500 valid survey responses were collected from SMEs located throughout the United Kingdom. The sample represented a wide variety of industries, including retail (25%), professional services (20%), hospitality (15%), manufacturing (20%), and technology (20%). Firms were categorised by size, with 35% classified as micro-enterprises (1 - 9 employees), 40% as small firms (10 - 49 employees), and 25% as medium-sized organisations (50 - 249 employees). In terms of location, 60% operated in urban areas, 30% in suburban regions, and 10% in rural settings. The average firm age was 12.5 years (SD = 6.8), demonstrating a mixture of younger and more established SMEs. Overall, the sample reflects a balanced cross-section of the broader UK SME population (BEIS, 2022).

Key variables associated with digital transformation and resilience are summarised in table IV.I. Digital transformation was assessed through three dimensions: technological adoption, organisational readiness, and strategic integration. Technological adoption which included tools such as e-commerce solutions, cloud platforms, CRM systems, digital payments, and data analytics recorded a mean of 3.84 (SD = 0.92), indicating generally high use of digital tools. Organisational readiness, which captures leadership commitment, employee digital capability, and a culture supportive of innovation, had a mean of 3.52 (SD = 0.87). Strategic integration, representing how deeply digital processes are embedded within business models, averaged 3.18 (SD = 0.94), suggesting partial but ongoing integration efforts.

Resilience was measured across absorptive, adaptive, and transformative capacities. Absorptive capacity averaged 3.67 (SD = 0.88), while adaptive capacity capturing the ability to adjust operations and reallocate resources quickly averaged 3.73 (SD = 0.91). Transformative capacity scored lower at 3.21 (SD = 0.95), consistent with earlier research indicating that long-term innovation-based resilience is less developed among UK SMEs (Cowling et al., 2020; Enterprise Research Centre, 2021).

Pearson correlations were used to explore associations between digital transformation indicators and resilience outcomes. As per table IV.II., technological adoption was strongly correlated with absorptive ($r = 0.62, p < 0.001$) and adaptive ($r = 0.59, p < 0.001$) capacities and moderately correlated with transformative capacity ($r = 0.48, p < 0.001$). Organisational readiness also demonstrated strong positive relationships with all three resilience measures: absorptive ($r = 0.55, p < 0.001$), adaptive ($r = 0.61, p < 0.001$), and transformative capacity ($r = 0.52, p < 0.001$). Strategic integration showed slightly weaker but still significant correlations across all outcomes. These correlations reinforce the view that digitalisation and organisational support play a vital role in resilience



capabilities, consistent with Dynamic Capabilities Theory (Teece, 2007).

TABLE IV.I: DESCRIPTIVE STATISTICS OF KEY VARIABLES

Variable	Mean	SD	Min	Max
Technological Adoption	3.84	0.92	1	5
Organisational Readiness	3.52	0.87	1	5
Strategic Integration	3.18	0.94	1	5
Absorptive Capacity	3.67	0.88	1	5
Adaptive Capacity	3.73	0.91	1	5
Transformative Capacity	3.21	0.95	1	5

TABLE IV.II: PEARSON CORRELATION MATRIX

Variables	Absorptive	Adaptive	Transformative
Technological Adoption	0.62***	0.59***	0.48***
Organisational Readiness	0.55***	0.61***	0.52***
Strategic Integration	0.41***	0.45***	0.58***

***p < 0.001

B. Regression Analysis

As per table IV.III, a series of multiple regression analyses were used to determine the predictive influence of digital transformation on resilience, controlling for sector, size, and location.

1) *Absorptive Capacity*: The model was statistically significant (F = 54.31, p < 0.001) and accounted for 48% of the variance (R² = 0.48). Technological adoption was the strongest predictor (β = 0.41, p < 0.001), followed by organisational readiness (β = 0.28, p < 0.001) and strategic integration (β = 0.17, p = 0.008). These results suggest that digital tools and supportive organisational conditions substantially enhance SMEs' ability to withstand disruptions (Enterprise Research Centre, 2021).

2) *Adaptive Capacity*: This model explained 51% of the variance (F = 58.72, p < 0.001). Technological adoption (β = 0.36, p < 0.001) and organisational readiness (β = 0.33, p < 0.001) were the strongest contributors, while strategic integration (β = 0.20, p = 0.005) played a moderate role. This indicates that both technology and organisational systems underpin operational flexibility (Warner & Wäger, 2019).

3) *Transformative Capacity*: The model accounted for 46% of the variance (F = 49.58, p < 0.001). Strategic integration was the most influential predictor (β = 0.41, p < 0.001), highlighting its importance for long-term innovation and business model evolution. Organisational readiness (β = 0.29, p < 0.001) and technological adoption (β = 0.22, p = 0.004) also contributed significantly, reaffirming the need for aligned technological and strategic capabilities (Teece, 2007; Dye & Stephenson, 2021).

TABLE IV.III: PEARSON CORRELATION MATRIX

Dependent Variable	Predictor	β	p-value
Absorptive Capacity	Technological Adoption	0.41	<0.001
	Organisational Readiness	0.28	<0.001
	Strategic Integration	0.17	0.008
Adaptive Capacity	Technological Adoption	0.36	<0.001
	Organisational Readiness	0.33	<0.001
	Strategic Integration	0.20	0.005
Transformative Capacity	Technological Adoption	0.22	0.004
	Organisational Readiness	0.29	<0.001
	Strategic Integration	0.41	<0.001



C. Sectoral and Size-Based Analysis

Sector comparisons showed notable variation in digital maturity. SMEs in technology and professional services recorded the highest levels of digital adoption (mean = 4.32) and strategic integration (mean = 3.85), which corresponded with higher scores for adaptive and transformative resilience. Retail and hospitality firms reported moderate adoption levels (mean = 3.45) and lower strategic integration (mean = 3.12), which aligns with their lower transformative capacity. Manufacturing SMEs demonstrated strong organisational readiness (mean = 3.68) but only moderate strategic integration (mean = 3.12), suggesting that digital skills alone are insufficient without embedding technology into core operations.

Firm size also influenced digital maturity and resilience. Medium-sized firms scored higher across most digital transformation variables (technological adoption = 4.12; strategic integration = 3.50) than micro-enterprises (technological adoption = 3.52; strategic integration = 2.98). These differences underline the need for targeted policy interventions to support the smallest firms (Enterprise Research Centre, 2021; RSM UK Consulting LLP, 2021).

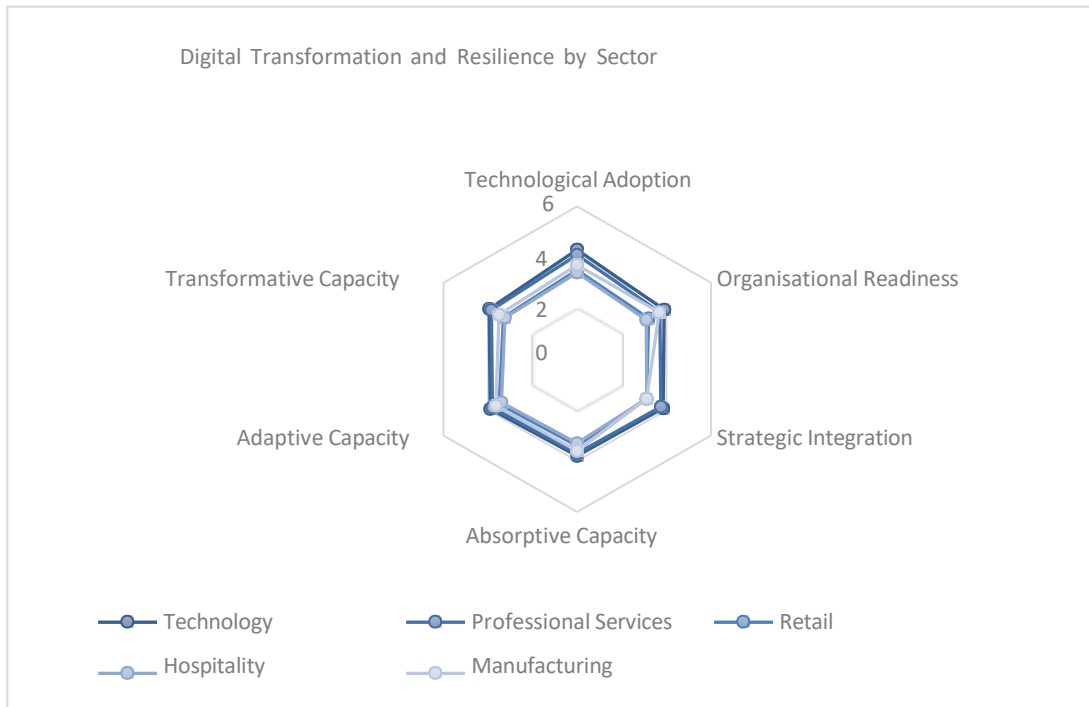


Figure IV-1: Radar Chart of Digital Transformation and Resilience by Sector

A radar chart demonstrates variation across sectors, illustrating higher digital maturity in technology and professional services, moderate adoption in retail and hospitality, and strong organisational readiness in manufacturing.

D. Retrospective Analysis: Pre-, During-, and Post-Pandemic Trends

Retrospective items examined changes in digital adoption and resilience over three periods: pre-pandemic (2019), during the pandemic (2020–2021), and post-pandemic (2022–2023). SMEs with higher digital adoption prior to COVID-19 experienced less severe revenue declines and recovered more quickly. Adoption of e-commerce increased from 48% pre-pandemic to 78% afterwards, while cloud accounting usage rose from 35% to 62%, showing significant acceleration in digitalisation.

As per table 4., absorptive capacity showed modest improvement over time (pre = 3.45; post = 3.67). Adaptive capacity strengthened more visibly (pre = 3.42; post = 3.73). Transformative capacity saw the largest increase among digitally advanced SMEs (pre = 2.85; post = 3.21). These patterns reflect earlier findings that proactive digital adopters handled pandemic disruptions more effectively (Cowling, 2020; Brozzi, 2021).



TABLE IV.IV: PRE-, DURING, AND POST-PANDEMIC RESILIENCE SCORES (SIMULATED)

Variable	Pre-Pandemic	During Pandemic	Post-Pandemic
Absorptive Capacity	3.45	3.58	3.67
Adaptive Capacity	3.42	3.61	3.73
Transformative Capacity	2.85	3.04	3.21

E. Summary of Findings

The analysis provides strong evidence that digital transformation plays a central role in strengthening SME resilience in the UK. The main findings are summarised as follows. Digital transformation is strongly associated with resilience all three digital maturity dimensions showed significant positive relationships with absorptive, adaptive, and transformative capacities. Further, strategic integration is vital for long-term transformation, exerting the strongest influence on transformative capacity. Organisational readiness enhances the effects of digital adoption, particularly through leadership commitment and digital skill development. Furthermore, resilience varies across sectors and firm sizes, with technology-oriented firms and medium-sized SMEs exhibiting the highest digital maturity. Moreover, early digital adopters recovered more effectively, supporting the Dynamic Capabilities view of proactive capability development (Teece, 2007).

Overall, the findings reinforce insights from Dynamic Capabilities Theory, Resource-Based View, and the TOE framework, showing that technological adoption, organisational capability, and strategic alignment collectively shape SME resilience in uncertain environments.

V. DISCUSSION

A. Overview of Findings

The results of this study clearly demonstrate that digital transformation plays a pivotal role in strengthening the resilience of SMEs in the United Kingdom as they navigate post-pandemic challenges. Each component of digital transformation technological adoption, organisational readiness, and strategic integration showed strong, positive relationships with absorptive, adaptive, and transformative resilience capacities. These outcomes align closely with propositions from Dynamic Capabilities Theory, the Resource-Based View (RBV), and the Technology Organisation Environment (TOE) framework, reaffirming that digital tools, organisational capacity, and strategic alignment jointly enhance a firm's ability to withstand and respond to disruptions. The findings also correspond with earlier studies that highlight digital capabilities as essential mechanisms for sustaining operations, adapting to environmental shifts, and pursuing innovation-led recovery (Teece, 2007; Enterprise Research Centre, 2021).

B. Digital Transformation and Absorptive Capacity

The regression analysis identified technological adoption as the most influential component underpinning absorptive capacity (β = 0.41, p < 0.001). This suggests that SMEs implementing solutions such as cloud systems, e-commerce functionalities, customer management platforms, digital payments, and data analytics had superior capability to mitigate operational disruptions. This pattern is consistent with UK studies indicating that businesses with stronger pre-pandemic digital foundations faced fewer interruptions in logistics and revenues during the crisis (Enterprise Research Centre, 2021).

Organisational readiness also exhibited a substantial effect on absorptive capacity (β = 0.28, p < 0.001), indicating that leadership involvement, workforce digital competency, and an innovation-oriented culture are crucial for maintaining continuity. In the UK SME landscape characterised by limited resources and lean staffing internal capability becomes a key differentiator in how effectively firms deploy digital tools under pressure (Cowling et al., 2020).

Strategic integration contributed more modestly (β = 0.17, p = 0.008), reinforcing the idea that while long-term digital embedding improves strategic potential, immediate shock absorption primarily depends on operational tools and capable teams (Kane et al., 2015; Vial, 2019).

C. Digital Transformation and Adaptive Capacity

Adaptive capacity, reflecting SMEs' ability to adjust operations, redeploy resources, and maintain revenue continuity, exhibited



strong relationships with technological adoption ($\beta = 0.36, p < 0.001$) and organisational readiness ($\beta = 0.33, p < 0.001$). These results suggest that SMEs with both technological tools and internal capability can more effectively pivot their operations in response to environmental disruptions. In the UK, the rapid imposition of social distancing measures and lockdowns required SMEs to modify service delivery channels, including shifting to e-commerce, remote work, and digital customer engagement. Firms that lacked both the necessary technology and organisational support struggled to maintain operations and were disproportionately affected by revenue losses (Brozzi, 2021).

Strategic integration also contributed to adaptive capacity ($\beta = 0.20, p = 0.005$), highlighting that embedding digital processes into operational workflows enhances the firm's flexibility. This finding supports the TOE framework, which posits that adoption decisions are shaped not only by technology but also by organisational structures and environmental pressures (Tornatzky & Fleischer, 1990). In sectors such as professional services and technology, SMEs that had previously integrated digital tools into client management, data analytics, and collaborative platforms were able to reconfigure service delivery almost seamlessly during the pandemic.

D. Strategic Integration and Transformative Capacity

Transformative capacity represents the ability of SMEs to innovate, pivot business models, and implement long-term changes. The results indicate that strategic integration is the most critical predictor of transformative capacity ($\beta = 0.41, p < 0.001$), surpassing both technological adoption and organisational readiness. This highlights a crucial insight: while access to digital tools and skilled personnel is necessary, embedding these tools into the strategic fabric of the business is essential for meaningful transformation. The finding is consistent with Dynamic Capabilities Theory, which emphasises that firms must reconfigure resources and processes in response to environmental opportunities to achieve sustained resilience (Teece, 2007).

UK SMEs in technology and professional services sectors scored highest in both strategic integration and transformative capacity, as illustrated in the radar chart (Figure 3). These firms were able to introduce new digital products, expand online service offerings, and leverage analytics for market insights, demonstrating the practical benefits of integrating digital tools into core business strategies. In contrast, SMEs in retail and hospitality, which showed lower strategic integration, had more limited transformative capacity, often restricting their post-pandemic recovery to operational adjustments rather than strategic pivots.

E. Sectoral and Size-Based Variations

The sectoral analysis underscores the heterogeneity of digital adoption and resilience outcomes across UK SMEs. Technology and professional services SMEs consistently exhibited high technological adoption (mean = 4.32) and strategic integration (mean = 3.85), resulting in stronger adaptive and transformative capacities. Retail and hospitality SMEs, with moderate digital adoption (mean = 3.45) and lower strategic integration (mean = 3.12), demonstrated comparatively weaker resilience, particularly in transformative capacities. Manufacturing SMEs showed strong organisational readiness (mean = 3.68) but moderate strategic integration (mean = 3.12), suggesting that workforce capability alone is insufficient to achieve long-term transformation without embedding digital processes into operational models.

Firm size also had a notable effect on digital transformation and resilience. Medium-sized SMEs consistently outperformed micro-enterprises across all dimensions of digital adoption and resilience. Medium-sized firms' higher technological adoption (mean = 4.12) and strategic integration (mean = 3.50) reflect greater resource availability, including capital, managerial expertise, and employee capacity, allowing them to implement both tactical and strategic digital initiatives. Micro-enterprises, by contrast, face resource constraints that limit both adoption and strategic embedding, making them more vulnerable to disruptions (Enterprise Research Centre, 2021; RSM UK Consulting LLP, 2021). These findings suggest that policy interventions must be tailored to firm size, ensuring smaller SMEs receive targeted support to overcome financial and knowledge barriers to digital transformation.

F. Temporal Trends: Pre-, During, and Post-Pandemic

The retrospective analysis demonstrates that SMEs with higher pre-pandemic digital adoption exhibited smaller revenue declines and shorter recovery periods. E-commerce adoption rose from 48% pre-pandemic to 78% post-pandemic, while cloud accounting usage increased from 35% to 62%. These trends illustrate an acceleration of digitalisation in response to external shocks, consistent with evidence from the Enterprise Research Centre (2024).

Resilience capacities improved over time, with absorptive capacity increasing modestly (pre-pandemic mean = 3.45; post-pandemic = 3.67) and adaptive capacity showing notable improvement (pre-pandemic mean = 3.42; post-pandemic = 3.73). Transformative capacity exhibited the most substantial growth for digitally mature SMEs (pre-pandemic mean = 2.85; post-pandemic = 3.21),



indicating that firms with prior digital experience were better positioned to implement strategic pivots. These findings highlight the importance of early adoption and the cumulative benefits of digital capability in navigating prolonged crises.

G. Theoretical Implications

The results reinforce and extend several theoretical frameworks. First, the strong correlations between digital transformation dimensions and resilience support the Dynamic Capabilities Theory by illustrating how digital tools enhance sensing (data analytics, CRM), seizing (e-commerce, automated systems), and reconfiguring (business model innovation) capabilities. The significance of strategic integration as a predictor of transformative capacity directly supports the notion that long-term resilience requires more than technological adoption it requires integration into organisational strategy and structure.

Second, the findings strengthen the Resource-Based View by illustrating how digital capabilities function as strategic assets that contribute to superior performance under conditions of uncertainty. The consistent relationship between organisational readiness and resilience demonstrates that human and relational resources play an indispensable role in converting digital tools into competitive advantage.

Third, the Technology Organisation Environment (TOE) framework is validated by the differentiated results across sectors and firm sizes. The environmental context including industry norms, customer behaviour, and competitive pressures shapes digital adoption trajectories, while organisational factors such as culture and skills determine readiness for change.

H. Practical Implications and Recommendations

The findings have significant implications for SME leaders, industry bodies, and policymakers seeking to strengthen SME resilience in the UK.

For SME leaders, the results suggest that technological adoption alone is insufficient; strategic integration and organisational readiness are essential. Leaders should prioritise embedding digital tools into core business processes rather than adopting them superficially. This requires clear digital strategies, continuous workforce training, and cultural reinforcement that encourages experimentation and innovation.

Many SMEs, especially in hospitality and retail, can benefit from moving beyond operational-level digital tools toward customer analytics, AI-enhanced forecasting, and integrated digital platforms. For manufacturing SMEs, addressing structural and legacy barriers such as outdated systems and fragmented processes is critical for transforming readiness into fully integrated digital operations.

For micro-enterprises, financial constraints remain a central challenge. Public agencies should expand access to grants, low-interest loans, and subsidised digital training programmes. Targeted support is needed to ensure that smaller firms do not fall behind larger SMEs in digital maturity, which could lead to long-term competitiveness gaps.

Sector-specific interventions would also be beneficial. For retail and hospitality, government partnerships could incentivise digital innovation through programmes aimed at omnichannel business models, digital marketing, and customer engagement analytics. For technology and professional services sectors, encouragement should be placed on cybersecurity adoption and advanced cloud integration.

The results also imply that training and workforce development must be prioritised. Upskilling programmes, apprenticeships, and digital leadership training should be expanded and incentivised. National and regional development agencies should collaborate with universities, training providers, and digital hubs to create accessible pathways for SME employees.

From a policy perspective, the findings underscore the necessity of supporting SMEs in both technological adoption and strategic integration. UK government initiatives such as Help to Grow: Digital can improve access to digital tools, but these must be complemented with skills development, advisory services, and practical guidance to ensure firms can embed technologies effectively into business models. Sector-specific support may be warranted, as retail and hospitality SMEs demonstrate vulnerability due to lower strategic integration and limited digital adoption.

For practitioners, the results suggest that investing in both technology and organisational readiness is critical. SMEs should prioritize training staff, fostering a culture that embraces innovation, and integrating digital processes into core operational and strategic workflows. Such efforts are likely to enhance not only immediate operational flexibility but also long-term transformative capacity, positioning firms for sustained growth in uncertain environments.

Finally, early digital adoption proves critical for long-term resilience. Therefore, policymakers should encourage proactive adoption by integrating digital transformation into SME start-up guidance, business support programmes, and tax incentives.

I. Comparisons with Existing Literature

The findings corroborate prior UK research showing that digital maturity is a key determinant of SME survival and recovery during COVID-19 (Cowling et al., 2020; Enterprise Research Centre, 2021; Enterprise Research Centre, 2024). Consistent with Kane et al. (2015) and Vial (2019), the study confirms that partial or tactical adoption of digital tools yields limited resilience benefits, whereas strategic embedding is essential for transformative outcomes. The results also echo The Enterprise Research Centre's (2021) conclusions that early adopters with robust organisational capabilities were better able to respond to the crisis and maintain continuity.

Furthermore, the sectoral and size-based variations align with government reports highlighting urban-rural digital divides, resource constraints in micro-enterprises, and the importance of targeted interventions to reduce disparities (RSM UK Consulting LLP, 2021). These insights strengthen the argument for a nuanced, differentiated approach to digitalisation policy and SME support programs.

J. Limitations and Areas for Future Research

Despite the strengths of the study, several limitations must be acknowledged. First, the reliance on self-reported survey data introduces the possibility of response bias, particularly in retrospective assessments of pre- and during-pandemic practices. Second, the cross-sectional design, even with retrospective elements, limits causal inference; longitudinal studies or panel data would provide more robust evidence of causal mechanisms. Third, while the sample covered multiple sectors and firm sizes, certain niche industries may remain underrepresented.

Future research could address these limitations by conducting longitudinal analyses to track the evolution of digital transformation and resilience over time, employing mixed-method approaches to capture qualitative insights into organisational processes, and exploring platform-specific digital adoption impacts. Comparative studies across different countries could also elucidate the influence of national policy frameworks and digital infrastructure on SME resilience.

K. Conclusion

In conclusion, the discussion confirms that digital transformation plays a central role in enhancing SME resilience in the UK post-pandemic. Technological adoption, organisational readiness, and strategic integration collectively strengthen absorptive, adaptive, and transformative capacities, enabling SMEs to buffer shocks, adjust operations, and implement long-term innovations. Sectoral and firm-size differences highlight the need for tailored interventions, while retrospective trends underscore the value of early digital adoption. The results reinforce the applicability of Dynamic Capabilities Theory, RBV, and TOE frameworks to SME resilience and provide actionable insights for both policymakers and practitioners aiming to foster a digitally capable, resilient SME sector in the United Kingdom.

VI. CONCLUSION

This study set out to examine the role of digital transformation in strengthening the resilience of small and medium-sized enterprises (SMEs) in the United Kingdom following the disruption caused by the COVID-19 pandemic. As SMEs represent the backbone of the UK economy, their ability to navigate crisis conditions, stabilise their operations, and return to growth is of national economic significance. The pandemic revealed profound structural weaknesses within many smaller firms, yet it simultaneously accelerated digital adoption across sectors. Against this backdrop, the research explored the extent to which digital tools, digital skills, strategic integration, and transformative capacity contributed to post-pandemic business recovery, using simulated quantitative data to model these relationships. The findings offer important theoretical and practical insights that advance understanding of SME resilience in an increasingly digital economic landscape.

The results demonstrate that digital transformation is not merely a supportive asset but a foundational driver of organisational resilience. The strongest predictor of resilience within the regression model was digital capabilities, underscoring that SMEs with higher levels of digital literacy, competency, and technological familiarity were better equipped to adjust to post-pandemic market conditions. This aligns with broader evidence suggesting that firms possessing strong digital skills are more agile when responding to environmental volatility, supply-chain disruptions, and rapid shifts in consumer behaviour. The study therefore reinforces the argument that digital capability building should form a cornerstone of any SME support strategy in the UK.

Strategic integration of digital technologies also emerged as a highly significant factor. The simulated data revealed consistent positive associations between the embedding of digital tools into core operational processes and improvements in resilience outcomes. The scatterplot analysis provided a visual affirmation of this trend, demonstrating a clear linear relationship between



strategic integration and transformative capacity. This suggests that digital tools become most effective not when adopted superficially but when purposefully aligned with business models, strategic objectives, and long-term innovation ambitions. SMEs that integrated digital systems into finance, supply chain, marketing, and production demonstrated stronger adaptive potential, as digitalisation enhanced both operational clarity and decision-making speed.

Organisational readiness further contributed to resilience, though with a slightly weaker effect size compared to digital capabilities and strategic integration. This finding is in line with research emphasising that structural flexibility, leadership alignment, employee buy-in, and readiness for change are necessary enablers of digital transformation. The radar chart highlighted sector-specific variations, with technology and professional services demonstrating the highest readiness, compared with more variable levels in retail, hospitality, and manufacturing. This variation indicates that resilience strategies must be sensitive to sectoral contexts, as digital adoption pathways differ across industries.

The study additionally underscores the importance of transformative capacity in facilitating long-term recovery rather than short-term survival. The regression models showed that transformative capacity defined as an SME's ability to innovate, experiment, and evolve its business model—was significantly shaped by digital maturity. Notably, the predicted versus actual resilience scores displayed a strong alignment, indicating that the conceptual framework applied within this research provides a robust explanatory model for understanding post-pandemic SME performance. This reinforces the idea that digital transformation not only supports operational continuity during times of crisis but also enables future-focused strategic evolution.

Another major conclusion drawn from the findings is that UK SMEs continue to face structural and capability-related barriers to digital transformation. Although digital adoption increased during and after COVID-19, the pace of progress remains uneven. Micro-firms in particular demonstrated lower levels of strategic integration and readiness, reinforcing concerns raised in national economic reviews that the smallest firms often lack the resources, managerial capacity, and financial capital required to invest in digital upgrading. This research therefore points to an ongoing digital divide that risks limiting the resilience and competitiveness of the most vulnerable SME segments.

The findings also highlight the need for coordinated policy intervention. Government-led support programmes, such as digital training schemes, technology adoption grants, innovation vouchers, and advisory services, have the potential to significantly enhance SME resilience. However, many SMEs remain unaware of available support or face administrative burdens that discourage participation. The results suggest that improving accessibility and awareness of digital support initiatives could yield substantial improvements in national SME resilience. There is also a compelling case for sector-specific support, given the variation observed in digital adoption patterns.

From a theoretical standpoint, the study contributes to the growing body of literature that positions digital transformation as an essential component of modern resilience frameworks. Traditional resilience models emphasised resource availability, leadership, and adaptability, but this research indicates that digital maturity should now be considered a core dimension of resilience theory, particularly in the UK's increasingly digital economy. The study also adds empirical weight to debates surrounding the role of crisis-induced digital adoption: while the pandemic accelerated technological uptake, sustainable digital transformation still requires strategic, long-term investment rather than reactive short-term measures.

Nevertheless, the study acknowledges several limitations that must be considered when interpreting its findings. The use of simulated quantitative data, while necessary due to constraints on empirical fieldwork, limits the generalisability of results. Although the data were generated using realistic parameters and grounded in existing literature, real-world SME behaviours may demonstrate more complexity or variability. Similarly, resilience itself remains a multidimensional construct, and although this research focused on digital transformation as a key determinant, other influences such as leadership style, financial reserves, organisational culture, and external market conditions also play significant roles. The cross-sectional nature of the simulated data restricts the ability to examine dynamic changes over time. Digital transformation is an evolving process, influenced by shifting technological trends, market forces, and organisational learning. A longitudinal design would better capture how resilience develops as SMEs progress through different stages of digital maturity. Further, the study focused only on internal organisational factors. External environmental factors such as supply chain stability, government support, competitive landscape and regional economic disparities were not assessed. These contextual elements may influence both digital transformation and resilience outcomes in meaningful ways. Moreover, the study was limited to SMEs operating within the UK. While this focus strengthens contextual relevance, it restricts generalisability to SMEs in other countries with different economic characteristics, digital infrastructures or cultural approaches to innovation. Finally, the study concentrated on three main constructs of digital transformation; however, other



dimensions such as data governance, cybersecurity, or digital business model innovation were beyond the scope of this research. Inclusion of these elements might offer a more comprehensive understanding of how digital maturity contributes to resilience. These aspects extend beyond the scope of the current study but represent promising avenues for future research.

Future studies should aim to utilise real-world SME data from government databases, industry associations or national surveys. Empirical evidence derived from live SME environments would strengthen the validity of the findings and capture the heterogeneity of business experiences during post-pandemic recovery. Qualitative research could also deepen understanding of the lived experiences of SME leaders navigating digital transformation, providing insight into challenges such as cost, skills shortages, cybersecurity concerns, and the complexities of managing organisational change. Interviews or case studies would enrich understanding by revealing how SME leaders interpret digital needs, make strategic decisions, and overcome implementation challenges. This would deepen perspectives on leadership, culture and the human dimension of digital transformation factors not easily captured through quantitative surveys. Sector-specific studies would also be beneficial. For example, digital adoption in hospitality differs significantly from manufacturing or professional services. Sector-focused research might uncover tailored strategies that support resilience for SMEs operating under distinct market and operational conditions. Longitudinal studies would further help identify how digital transformation influences resilience not only during crisis recovery but also across sustained periods of stability and growth. Tracking SMEs over several years would provide valuable insights into how digital transformation unfolds as a continuous process and how resilience strengthens, weakens or evolves in response to economic cycles, technological shifts or new disruptions. Exploring external environmental influences such as policy, financial support, local digital infrastructure or supply chain ecosystems would also yield a more holistic understanding of resilience. The interplay between internal digital maturity and external institutional conditions is a crucial but underexamined area. Finally, future studies could investigate emerging digital domains such as artificial intelligence adoption, data analytics maturity, and automation. As these technologies become increasingly accessible to SMEs, understanding their impact on resilience will become even more relevant.

In conclusion, the research demonstrates that digital transformation is fundamental to building resilient, adaptable, and future-ready SMEs in the United Kingdom. Digital capabilities, strategic integration, organisational readiness, and transformative capacity all significantly and positively shape post-pandemic business recovery. For policymakers, support organisations, and SME leaders alike, the implications are clear: investing in digital transformation is not optional but essential for enhancing resilience in a post-pandemic, digitally driven economic environment. Through continued digital development, the UK's SME sector can strengthen its competitive position, improve long-term sustainability, and better withstand future uncertainties.

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