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Strength in Small Packages: SMEs Thrive via Disaster Management Strategies

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Abstract: This study conducts a systematic literature review to examine how small and medium-sized enterprises (SMEs) can enhance resilience and adaptability through disaster management strategies. Using the PRISMA framework, relevant studies published between 2010 and 2023 were retrieved from Scopus, Web of Science, and Google Scholar. The findings reveal three dominant thematic areas: (1) preparedness and continuity planning, (2) the use of digital technologies and innovation, and (3) the role of government and institutional support in post-disaster recovery. The review highlights several innovative and sustainable strategies adopted by resilient SMEs, including digital transformation for business continuity, collaborative networks with public and private stakeholders, and proactive risk mitigation practices. These strategies demonstrate that SMEs are not only capable of surviving disasters but can also achieve long-term sustainability when supported by appropriate technological and policy frameworks. This study contributes to the literature by synthesizing fragmented findings into an integrated framework of disaster resilience strategies for SMEs and by identifying critical research gaps related to technology-driven solutions and policy interventions. The results provide practical implications for SME owners, policymakers, and development agencies seeking to strengthen disaster preparedness and resilience in vulnerable business sectors.

Keywords: SMEs, disaster management; resilience; business continuity; digital innovation; policy support

Introduction

Small and Medium Enterprises (SMEs) are generally regarded as the backbone of economies globally. They immensely contribute to employment, innovation, and GDP growth. According to the World Bank, SMEs comprise about 90% of businesses and over 50% of employment worldwide, with even larger shares in developing economies. Despite their vital role, SMEs are more vulnerable to external shocks—such as natural disasters, economic crises, and technological disruptions—compared to larger enterprises. These businesses usually have limited resources and less formal organisational structures, making it difficult for them to cope with disasters.

The occurrence and intensity of disasters in recent years can be attributed to factors such as climate change, geopolitical instability, and pandemics like COVID-19. According to the United Nations Office for Disaster Risk Reduction (UNDRR), economic losses due to natural disasters surged in the last decade, reaching an average of \$250-300 billion annually. The COVID-19 pandemic brought unprecedented disruptions to global supply chains and severely impacted SMEs, many of which faced closures due to the sudden economic downturn.

These disasters highlight the vulnerability of SMEs, which often lack the resources or risk management frameworks to absorb such shocks. When natural disasters such as earthquakes, floods, or hurricanes occur, many SMEs are ill-equipped to deal with the immediate aftermath or the recovery process. Economic disruptions stemming from financial crises or inflation spikes can also paralyse SME operations, as they often have low profit margins and minimal financial buffers. Similarly, technological disruptions, such as cyberattacks or data breaches, present increasing risks for SMEs in the digital age, where reliance on online platforms is growing.

Besides the immediate financial and operational impacts, disasters affect the long-term sustainability of the SMEs. It is estimated through research that 25% to 40% of SMEs fail to reopen after a major disaster. This presses the critical need for disaster management strategies at their immediate response to building long-term resilience.

The Vital Role of Disaster Management in SMEs

Disaster Management is a broad approach that encompasses preparation, response, and recovery from disasters. While disaster management is often associated with larger enterprises or government agencies, it is equally important, if not more so, for SMEs. Unlike large corporations, which often have dedicated teams and resources for risk management, SMEs usually have to operate on tight budgets with limited human capital. They are thus less likely to have formal strategies for managing disasters.

Apart from this, other factors contributing to the lack of preparedness by SMEs include the issues of unavailability of information and financial constraints, which seem to make them perceive formal disaster management strategies as necessary only for larger companies. Many SMEs adopt a reactive rather than a proactive stance in managing the risks they face, that is, addressing problems only when they have arisen. In so doing, such firms often incur greater disruption, higher recovery costs, and sometimes even business failure.

On the contrary, SMEs that adopt proactive disaster management-green light-integrate risk assessment, preparedness, and recovery into business operations-are resilient. These firms will not only survive disasters but also continue to prosper on the emergence of new opportunities, such as diversifying product lines or exploiting new markets. Disaster management should, therefore, be considered as a thesis not only for survival but also for achievement of growth and competitive advantage.

The Role of Technology and Digital Tools

Of the most important areas that could give a distinct fillip to disaster management in SMEs, the use of technology and digital tools ranks high. Digitalisation has completely changed the working aspects of businesses and opened a series of tools for SMEs that may be used to enhance their disaster preparedness and response capabilities. For instance, cloud computing has presented the opportunity for businesses to store their vital data offsite for continuity in case there is damage to the physical infrastructure. On the other hand, mobile communication platforms are other opportunities that allow for real-time decision-making and coordination in crisis situations, while data analytics can help SMEs in the assessment of risk and coming up with ways of mitigating those risks. New technologies like AI and IoT now offer added opportunities that could further strengthen the resilience of SMEs. AI-powered tools can predict the time of disaster events, optimize resource utilization, and hasten the recovery process, while IoT sensors can monitor, in real time and unbroken, the status of their supply chains, infrastructures, and other business-critical assets. In fact, most of these technologies remain diffused within the SME community, let alone in developing countries, due to cost barriers and technical knowledge.

Government Support and Policy Frameworks

Apart from the use of technology, SMEs also require stringent institutional support in enhancing their disaster management capabilities. This involves state actors in providing the needed policy frameworks that can substantially finance assistance and training programs towards enabling SMEs to prepare for disasters and recover afterwards. In quite a number of countries, especially those with developing economies, grants, low-interest loans, and tax incentives have been initiated by governments to help them through calamities. For example, various governments, with the spread of the COVID-19 virus, announced plans to implement stimulus packages targeting SMEs. The measures put in place have indeed helped businesses pay payroll costs, sustain business and even switch to new models of doing business. Other countries have initiated disaster management frameworks incorporating SMEs, which highlight guidelines on risk evaluations, crisis communication, and recovery plans.

However, its effectiveness varies greatly across regions. In countries with weaker institutional environments, for instance, very little and sometimes no support is given to SMEs, which are proven to be left on their own in disasters. Even within the more developed economies, the complex and sometimes bureaucratic nature of access to government assistance discourages SMEs from it. There is a need for support mechanisms that are more streamlined, accessible, and targeted at the unique needs of SMEs.

Rationale for a Systematic Review

Disaster management for SMEs is an increasingly important area of study in which an increasing number of studies are being conducted; therefore, the literature should be systematically reviewed to synthesize current knowledge and determine gaps in research. While individual studies have indeed shed light on various specific aspects of SME disaster management, little or no effort has been made to synthesise such findings into a coherent understanding of how SMEs might survive and prosper through effective strategies in disaster management.

This review will therefore bridge that gap through a systematic review of the literature on disaster management in SMEs, focusing on thematic concerns of preparedness, response, recovery, and resilience. It now seeks to answer such research questions as:

What are the key challenges SMEs face in disaster management, and how do these challenges vary across different regions and industries?

What strategies have been proven effective in helping SMEs recover and thrive after disasters, particularly in terms of technological adoption, financial management, and policy support?

How can SMEs leverage emerging technologies and digital tools to enhance their disaster management capabilities?

What role do governments and policy frameworks play in supporting SMEs' disaster preparedness and recovery?

Significance for the Academic Community and Industry

For the academic community, this review contributes to the existing body of knowledge on SME resilience and disaster management. By identifying the gaps in current research, it offers a roadmap for future studies, particularly in under-researched areas such as the long-term impact of disaster management strategies on SME sustainability, the role of technology in disaster management, and the effectiveness of government support mechanisms.

For industry stakeholders, including SME owners, policymakers, and disaster management professionals, this review provides practical insights into how SMEs can better prepare for and recover from disasters. It highlights the importance of adopting a proactive approach to disaster management, integrating risk assessment, digital tools, and government support into business operations. Moreover, it underscores the need for policies that are tailored to the unique needs of SMEs, recognizing their limited resources and capacity to cope with disasters.

In conclusion, the increasing frequency and intensity of disasters, coupled with the vulnerabilities inherent in SMEs, make disaster management a critical area of study. By systematically reviewing the literature on this topic, this paper aims to provide a comprehensive understanding of how SMEs can survive and thrive through effective disaster management strategies, offering both theoretical contributions and practical implications.

Method

This study adopted a Systematic Literature Review (SLR) approach guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework (Moher et al., 2009) to ensure transparency, rigor, and replicability. The review process comprised the following stages: review protocol development, literature search, screening and eligibility assessment, data extraction, quality appraisal using the CASP tool, and thematic synthesis.

Review Protocol

A review protocol was developed prior to the literature search to guide the identification, screening, and synthesis of relevant studies. The protocol was structured according to PRISMA standards and aimed to address the following research questions:

What challenges do SMEs face in disaster management?

What strategies enable SMEs to recover and sustain operations after disasters?

How do technology and government support contribute to SME resilience?

This protocol ensured consistency and minimized selection bias throughout the review process.

Search Strategy

A comprehensive search was conducted using three major academic databases: Scopus, Web of Science, and Google Scholar, selected for their broad coverage of peer-reviewed research in business, management, and disaster studies (Booth et al., 2016).

The search employed combinations of the following keywords using Boolean operators:

“Disaster management” AND “SMEs”

“Business continuity” AND “SMEs”

“Risk mitigation” AND “Small and Medium Enterprises”

“Post-disaster recovery” AND “resilience” AND “SMEs”

“Crisis management” AND “SME adaptation”

Boolean operators (AND/OR) were applied to ensure both specificity and breadth of retrieval.”

Time Frame and Language Criteria

The review included studies published between 2010 and 2023, reflecting recent developments in disaster management and resilience, particularly in relation to climate change and global crises such as COVID-19. Only articles published in English were included due to resource limitations, which may introduce language bias.

Grey Literature

Grey literature was included to capture policy-oriented and practice-based evidence not available in academic journals. Sources were restricted to reputable international and governmental organizations, including:

United Nations Office for Disaster Risk Reduction (UNDRR)

International Labour Organization (ILO)

World Bank

Grey literature was included only if it:

Focused explicitly on SMEs and disaster management,

Provided empirical or policy-based analysis,

Was published between 2010–2023,

Presented methodological transparency.

Opinion pieces, blogs, and non-systematic reports were excluded.

Inclusion and Exclusion Criteria

Inclusion criteria:

- Studies focusing explicitly on disaster management, resilience, preparedness, response, or recovery in SMEs.
- Peer-reviewed journal articles, conference papers, and selected grey literature from reputable institutions.
- Studies published between 2010 and 2023.

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- Studies conducted in both developed and developing countries.
 - Studies addressing natural and/or man-made disasters.

Exclusion Criteria:

- Studies focusing solely on large enterprises or multinational corporations.
- Studies centered on public institutions or non-SME sectors.
- Articles lacking methodological clarity or empirical findings.
- Duplicate records across databases.
- Non-English publications.
- Studies published before 2010.
- These criteria were applied during the PRISMA screening and eligibility stages.

Screening Process (PRISMA Flow)

The screening process followed the PRISMA flow diagram consisting of four stages: identification, screening, eligibility, and inclusion.

- Identification: Records were retrieved from the selected databases and grey literature sources.
- Screening: Titles and abstracts were reviewed to remove irrelevant and duplicate studies.
- Eligibility: Full texts were assessed using the inclusion and exclusion criteria.
- Inclusion: Only studies meeting all criteria and passing quality appraisal were included in the final synthesis.

Data Extraction

A standardized data extraction form was developed to systematically capture relevant information from each study:

- Publication year and country
- Industry sector and type of disaster
- Research design (qualitative, quantitative, mixed methods)
- Disaster management phase (preparedness, response, recovery, resilience)
- Use of technology
- Government and institutional support
- Identified challenges and barriers

Two reviewers independently extracted the data. Discrepancies were resolved through discussion and, where necessary, consultation with a third reviewer.

Quality Assessment (CASP Tools)

The quality of the included studies was assessed using the Critical Appraisal Skills Programme (CASP) tool (Critical Appraisal Skills Programme, 2018), a widely recognized framework for evaluating the methodological rigor of research studies. Each study was evaluated based on the following criteria:

- Clarity of research objectives
- Appropriateness of research design
- Rigor of data collection and analysis
- Validity and reliability of findings
- Relevance to SME disaster management

Studies failing to meet more than two of these criteria were excluded to ensure methodological robustness.

Data Synthesis Method

A thematic analysis approach (Braun & Clarke, 2006) was applied to synthesize the findings:

Familiarization with the data

Initial coding

Theme development

Theme refinement

Narrative synthesis

The final themes included preparedness strategies, technological integration, recovery and resilience mechanisms, and government support. A meta-analysis was not conducted due to the predominance of qualitative studies.

Result and Discussion

The findings of this systematic literature review are organized according to four major thematic areas derived from the thematic synthesis: (1) preparedness and risk assessment, (2) technological integration and digital tools, (3) government and institutional support, and (4) financial constraints and resource limitations. These themes collectively explain how SMEs manage disasters and identify strategies that enhance resilience and long-term sustainability.

Study Selection: Following the PRISMA screening process, 45 studies published between 2010 and 2023 were included in the final synthesis. These studies covered a wide range of disaster contexts, including natural disasters (floods, earthquakes, hurricanes), economic crises, and health emergencies such as the COVID-19 pandemic. The studies were conducted across diverse geographical regions, including North America, Europe, Asia, and Africa, ensuring representation from both developed and developing economies.

Methodologically, 27 studies employed qualitative approaches (case studies and interviews), 18 used quantitative survey-based methods, and several adopted mixed-method designs. Across regions, SMEs consistently exhibited limited financial and organizational capacity to implement formal disaster management systems, highlighting structural vulnerabilities common to small enterprises.

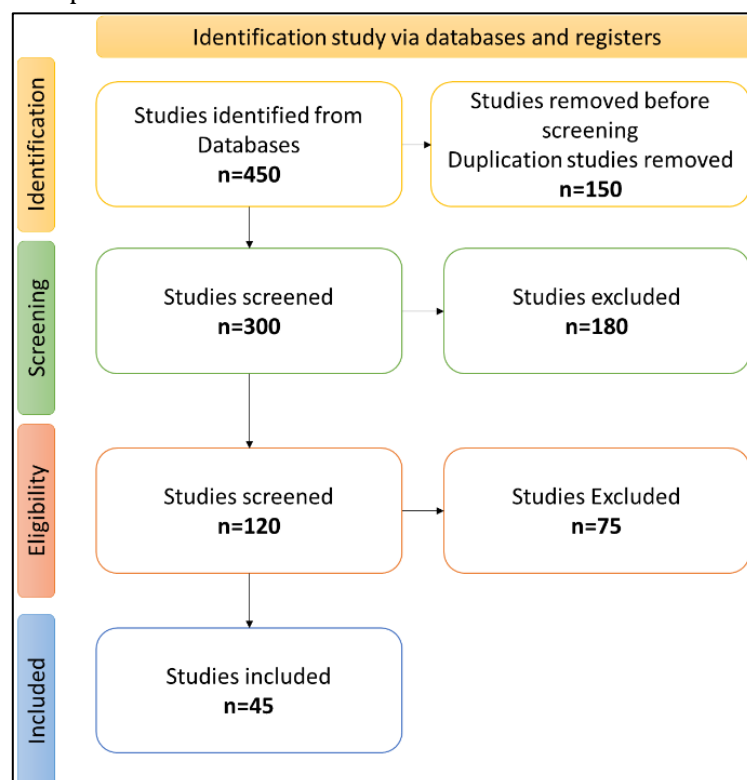


Figure 1. Prisma Flow Diagram

Source: Author's own data analysis

Preparedness and Risk Assessment: Preparedness and risk assessment emerged as a central determinant of SME resilience. The literature consistently demonstrates that SMEs engaging in proactive risk identification and continuity planning experience shorter recovery times and reduced business interruption (Herbane, 2010; Cerullo & Cerullo, 2014). These practices include business continuity planning, staff training, insurance coverage, and supply chain risk assessment.

However, the majority of SMEs, particularly in developing countries, continue to adopt reactive rather than proactive approaches. Okere et al. (2019) reported that only 30% of SMEs in Nigeria had formal disaster preparedness plans, mainly due to limited awareness and financial constraints. This gap indicates a persistent disconnect between recognized best practices and actual implementation. The findings suggest that preparedness is not merely a technical issue but also an institutional and educational challenge requiring targeted capacity-building initiatives.

Technological Integration and Digital Tools: Technological integration represents one of the most innovative and rapidly evolving strategies for SME disaster resilience. Several studies confirm that the use of digital tools such as cloud computing, mobile communication platforms, and data analytics significantly enhances business continuity during crises. Teo et al. (2020) showed that cloud-based systems enabled SMEs in Singapore to maintain operations during COVID-19 disruptions.

Emerging technologies, including artificial intelligence (AI) and the Internet of Things (IoT), were identified as promising tools for predictive risk analysis and real-time monitoring of infrastructure and supply chains. These technologies enable SMEs to anticipate disruptions and allocate resources more effectively. Despite their potential, adoption remains limited due to high costs, lack of technical expertise, and concerns regarding data security. This highlights a technological divide between large firms and SMEs and underscores the need for affordable and scalable digital solutions tailored to small enterprises.

Government and Institutional Support: Government and institutional support plays a critical role in determining SME recovery outcomes. The literature reveals contrasting experiences across countries. In Germany, government-sponsored recovery programs provided timely financial assistance and business continuity training, significantly improving SME resilience (Wenzel et al., 2020). In contrast, SMEs in many developing countries faced bureaucratic barriers, complex eligibility criteria, and limited access to targeted support (Ha et al., 2018; Okere et al., 2019).

These findings suggest that policy effectiveness depends not only on the availability of resources but also on the accessibility and relevance of support mechanisms. Targeted SME-focused policies, simplified administrative procedures, and training programs aligned with SME capacities are necessary to strengthen institutional resilience frameworks.

Financial Constraints and Resource Limitations: Financial fragility remains one of the most persistent barriers to effective disaster management among SMEs. Most SMEs operate with limited cash reserves and restricted access to formal credit, making investments in preparedness measures such as insurance and infrastructure reinforcement difficult (Gibb & Buchanan, 2006; Cerullo & Cerullo, 2014).

In developing economies, this challenge is exacerbated by weak financial systems and reliance on informal lending networks. Okere et al. (2019) found that only 25% of Nigerian SMEs accessed formal credit during disaster recovery. While insurance and government-backed financing programs can mitigate losses, many SMEs remain underinsured or uninsured. These findings highlight the importance of expanding affordable insurance schemes and preferential financing programs tailored to SMEs operating in high-risk environments.

Quality of Evidence: Quality appraisal using the CASP tool indicated that most studies demonstrated sound methodological rigor, with clearly defined objectives and appropriate data collection methods. Qualitative studies provided rich contextual insights into SME decision-

making and resilience strategies, particularly through case studies and interviews (Herbane, 2010; Gibb & Buchanan, 2006).

Nevertheless, limitations were observed in several studies, including small sample sizes and lack of longitudinal data, which restrict generalizability and prevent assessment of long-term sustainability effects. These gaps suggest the need for future research employing longitudinal and mixed-method designs to better capture the dynamic nature of SME disaster resilience.

Synthesis and Implications

Collectively, the findings indicate that SME disaster resilience depends on the interaction between preparedness practices, technological innovation, institutional support, and financial capacity. SMEs that integrate digital tools with structured preparedness plans and benefit from accessible government programs demonstrate stronger adaptive capacity and long-term sustainability.

The review extends existing disaster management and resilience theory by emphasizing the transformative role of digital technologies and integrated policy frameworks. It also reveals significant gaps in the literature regarding technology-driven resilience and SME-specific policy design, pointing to directions for future research and practice.

Implications for Research, Practice, and Society: This study provides important implications for academic research, managerial practice, and public policy by translating theoretical insights into practical strategies for strengthening disaster resilience among SMEs.

Implications for Research

This review contributes to disaster management and resilience theory by synthesizing fragmented evidence into an integrated framework linking preparedness, technological innovation, institutional support, and financial capacity. The findings highlight the growing importance of digital transformation (e.g., cloud computing, artificial intelligence, and IoT) in enhancing SME resilience, extending traditional disaster management models that have focused primarily on risk assessment and recovery planning.

Future research should prioritize:

Longitudinal studies to examine how disaster management strategies influence SME sustainability over time.

Technology-driven resilience models, particularly the role of AI and data analytics in predictive risk management.

Context-specific policy analysis, comparing disaster recovery mechanisms in developed and developing economies.

Mixed-method approaches that integrate quantitative performance indicators with qualitative insights into organizational behavior.

These directions will strengthen the theoretical understanding of resilience as a dynamic and adaptive capability in SMEs rather than a static preparedness outcome.

Implications for Practice (SMEs and Practitioners)

For SME owners and managers, the findings emphasize the necessity of adopting a proactive disaster management approach. Practical strategies include:

Developing business continuity and contingency plans aligned with identified risk profiles.

Investing in affordable digital tools (cloud platforms, mobile communication systems, and e-commerce channels) to ensure operational continuity during disruptions.

Participating in training programs on crisis management and risk assessment.

Building collaborative networks with suppliers, customers, and local institutions to enhance collective resilience.

Disaster management practitioners and consultants are encouraged to design SME-specific frameworks that account for limited resources and organizational simplicity. Existing disaster

management models, often developed for large organizations, should be adapted into scalable and cost-effective tools suitable for small enterprises.

Implications for Policy and Society

At the policy level, the findings demonstrate that effective disaster resilience among SMEs requires not only financial assistance but also institutional accessibility. Governments and development agencies should:

Simplify administrative procedures for disaster relief and recovery programs.

Design targeted financial instruments such as micro-insurance schemes and preferential credit facilities for SMEs in disaster-prone areas.

Promote digital infrastructure and subsidized technology adoption for small businesses.

Integrate SME resilience into national disaster risk reduction and economic development strategies.

From a societal perspective, strengthening SME resilience has direct economic and social impacts. SMEs play a critical role in employment generation and local economic stability; therefore, their ability to withstand disasters contributes to community resilience, poverty reduction, and continuity of essential goods and services. Improved SME disaster preparedness can also influence public attitudes toward risk awareness and responsible business practices, thereby enhancing overall quality of life in vulnerable regions.

Risks and Opportunities for Sustainability

This review identifies both risks and opportunities related to disaster resilience and sustainability. Financial fragility, limited technological capacity, and policy barriers represent key risks that threaten SME survival during crises. Conversely, opportunities arise through digital innovation, public-private collaboration, and inclusive policy frameworks.

Embedding disaster resilience into sustainability strategies enables SMEs to transform crisis management into long-term competitive advantage. By integrating risk identification with innovation and institutional support, SMEs can move beyond short-term recovery toward sustainable business development.

Limitations

While this review has provided an overview that is valuable in the management of disasters in SMEs, the work is not without its limitations. There is the limitation that studies are in English; this might have excluded relevant research from other, native English-speaking regions. Much emphasis has been on peer-reviewed articles, probably missing significant findings from grey literature included such as industry reports or government publications. As such, Booth et al. (2016) note that many of the included studies in this work solely depend on self-reported data by SME owners, which may introduce bias. These biases may have resulted from cases where some respondents overreported their disaster preparedness, and others underreported their actual access to financial resources. Thus, future studies should use more objective measures of disaster preparedness and resilience, such as a longitudinal study which would track the long-term recovery of SMEs after disasters.

Future Research Directions

This review identifies several areas for future research. It will also be necessary to conduct further research into the role of emerging technologies, including AI and IoT, in managing disasters for SMEs. While these technologies have shown great promise, few studies have been conducted in regards to their practical applications in disaster-prone regions of the world, especially within developing countries (Nugroho et al., 2020). In this regard, future studies should investigate how SMEs can overcome such barriers to adoption and ultimately determine the long-term business continuity and resilience. Another area of future studies should be the long-term absorptive capacity of disaster management strategies in assessing their effects on SME sustainability. Most of the studies reviewed in this work focused on the immediate period after disasters struck; there was minimal attention to how SMEs normally perform in years succeeding

crises. Longitudinal studies of SME recovery and growth from such events could yield insights into the longer-term efficiency and effectiveness of various disaster management strategies. Finally, further research is needed on the role that government and institutional support may play in ensuring effective disaster management among SMEs, especially in developing regions. The future research should also elaborate on how policymakers could design accessible and effective supporting programs for SMEs and measure the efficiency of such support programs in long-term business resilience.

Conclusion

This systematic literature review examined disaster management strategies that enhance resilience and adaptability among small and medium-sized enterprises (SMEs). By synthesizing findings from 45 studies published between 2010 and 2023, this review identified four dominant thematic areas: preparedness and risk assessment, technological integration, government and institutional support, and financial capacity.

The findings demonstrate that SMEs adopting proactive preparedness measures, such as business continuity planning and staff training, experience shorter recovery periods and reduced operational disruptions. Furthermore, digital technologies—including cloud computing, artificial intelligence, and data analytics—emerge as innovative and transformative tools that enable SMEs to maintain operations and anticipate risks during crises. Government policies and institutional support also play a crucial role, particularly when recovery programs are accessible, targeted, and aligned with SME capacities. However, persistent financial constraints and limited access to formal credit continue to hinder the implementation of effective disaster management practices, especially in developing economies.

This review contributes to the literature by integrating fragmented evidence into a coherent framework of SME disaster resilience and by highlighting the growing importance of technology-driven and policy-supported strategies. The findings extend existing disaster management theories by emphasizing resilience as a dynamic capability shaped by innovation, collaboration, and institutional environments.

Despite its contributions, this study is subject to limitations. The review was restricted to English-language publications and relied primarily on qualitative evidence, limiting generalizability. Future research should employ longitudinal and mixed-method designs to better understand the long-term sustainability of disaster management strategies and to evaluate the effectiveness of emerging technologies in different socio-economic contexts.

In conclusion, strengthening SME disaster resilience requires an integrated approach that combines preparedness planning, digital innovation, supportive public policies, and financial inclusion. Such an approach not only enhances business survival during crises but also contributes to broader economic stability and societal resilience.

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