

(REVIEW ARTICLE)



Conceptualizing agile business practices for enhancing SME resilience to economic shocks

Bamidele Micheal Omowole ^{1,*}, Amarachi Queen Olufemi-Phillips ², Onyeka Chrisanctus Ofodile ³, Nsiong Louis Eyo-Udo ⁴ and Somto Emmanuel Ewim ⁵

¹ *University of Potomac, Virginia Campus, USA.*

² *Independent Researcher, UK.*

³ *Sanctus Maris Concepts Ltd, Nigeria.*

⁴ *Ulster University, UK.*

⁵ *Independent Researcher, Lagos Nigeria.*

International Journal of Scholarly Research and Reviews, 2024, 05(02), 070–088

Publication history: Received on 02 October 2024; revised on 09 November 2024; accepted on 12 November 2024

Article DOI: <https://doi.org/10.56781/ijsrr.2024.5.2.0049>

Abstract

This paper examines the role of agile business practices in fortifying small and medium-sized enterprises (SMEs) against economic shocks, emphasizing resilience as a critical factor for sustainable growth. Given SMEs' vulnerability to unpredictable economic shifts, the study explores how agility — defined by rapid adaptation, flexibility, and innovation — enables these enterprises to navigate and recover from disruptions effectively. Through a review of resilience-building frameworks, the paper identifies core agile practices, such as adaptive decision-making, lean management, and iterative product development, as pivotal to enhancing SMEs' operational and strategic resilience. Findings indicate that SMEs leveraging agile methodologies experience improved responsiveness to market changes, reduced operational risks, and greater capacity to maintain continuity during crises. Additionally, the study discusses the integration of digital tools, cross-functional teams, and customer-centric approaches as enablers of agility that strengthen resilience. Conclusions underscore the necessity for SMEs to adopt agile frameworks not only as a response mechanism but also as a proactive strategy for long-term stability and competitiveness in volatile markets. This research contributes to the growing discourse on SME resilience, offering actionable insights for stakeholders seeking to embed agility as a fundamental attribute in organizational practices.

Keywords: Agile practices; SME resilience; Adaptability; Digital transformation; Cross-sector collaborations; Artificial intelligence; Flexible workforce; Data-driven insights; Change management; Customer-centric agility; Innovation; Incremental implementation; Organizational culture; Sustainable agility; Economic shock

1 Introduction

1.1 Importance of Resilience for SMEs in the Face of Economic Shocks: Introduction to the significance of resilience in SMEs, emphasizing the need for adaptive capabilities to survive and thrive amidst economic instability

Resilience is a crucial element for small and medium-sized enterprises (SMEs) operating in today's volatile economic landscape. The ability of SMEs to withstand and recover from economic shocks has become increasingly significant in ensuring their survival and sustainable growth (Bourletidis & Triantafyllopoulos, 2014). Economic shocks, characterized by unexpected and often severe disruptions in markets, supply chains, and consumer behavior, place considerable pressure on SMEs, which typically lack the extensive resources that larger firms can leverage to absorb

* Corresponding author: Bamidele Micheal Omowole

such impacts (Eggers, 2020). In this context, resilience—defined as the capacity to anticipate, adapt, and recover from external stresses—becomes indispensable for SMEs aiming not only to survive but also to thrive amidst economic uncertainty. Developing resilience requires SMEs to cultivate adaptive capabilities that allow them to respond rapidly to changes, maintain operational stability, and identify growth opportunities even during adverse conditions.

Economic resilience in SMEs has garnered substantial academic and practical interest, particularly given the global disruptions caused by events such as the COVID-19 pandemic, which highlighted vulnerabilities in traditional business models. The pandemic underscored the need for SMEs to establish resilient frameworks that would enable them to pivot operations, manage risks, and reconfigure resources effectively under economic distress. Studies suggest that SMEs with robust adaptive capabilities were better positioned to manage the repercussions of these disruptions, illustrating the importance of resilience as a fundamental component of business sustainability. In this light, agility—marked by a firm's ability to make swift, informed decisions and implement changes seamlessly—emerges as an essential attribute for resilience-building. Agile business practices, therefore, offer promising pathways for SMEs to enhance resilience, enabling them to adjust strategies, modify operations, and sustain growth under economic duress.

Resilience extends beyond mere survival; it involves a transformative process through which SMEs can leverage economic shocks to achieve long-term advantages. This requires a shift from reactive to proactive strategies, where resilience is embedded within the organizational structure and culture, fostering continuous adaptation and learning (Linnenluecke, 2017). For SMEs, resilience is particularly pertinent as it supports their ability to stay competitive and relevant despite resource constraints. The unpredictability of economic cycles necessitates that SMEs adopt resilience-building practices, as this enables them to weather market fluctuations, adjust to evolving customer demands, and enhance their adaptability. Moreover, the resilience framework in SMEs is integral to sustaining employment, promoting regional development, and supporting economic stability, as SMEs represent a significant portion of many economies worldwide. Thus, understanding and fostering resilience within SMEs is crucial for broader economic health, particularly in regions heavily reliant on small businesses.

Agility and adaptability have been identified as two primary drivers of resilience for SMEs, serving as mechanisms through which these enterprises can respond effectively to unforeseen challenges. Agility refers to the ability to swiftly realign resources and processes in response to dynamic external conditions, whereas adaptability emphasizes a firm's capacity to learn from previous disruptions and build on that knowledge to improve future responses (Williams et al., 2017). Research suggests that SMEs that incorporate agile methodologies, such as lean management, continuous feedback loops, and customer-focused innovations, are better equipped to navigate economic shocks. These practices promote flexibility, minimize waste, and enhance efficiency, allowing SMEs to respond promptly to market demands while conserving limited resources. Agility thus not only strengthens resilience but also contributes to operational efficiency and competitive advantage, positioning SMEs to better manage economic instability.

Moreover, resilience in SMEs often involves strategic foresight and scenario planning, which help in anticipating potential risks and preparing contingency plans. These adaptive measures enable SMEs to identify and mitigate vulnerabilities before they escalate into crises. Implementing agile practices such as decentralized decision-making and cross-functional teamwork further enhances SMEs' resilience, as these approaches foster innovation, empower employees, and facilitate quick decision-making across different organizational levels. Such agility-driven frameworks are especially beneficial for SMEs, which, due to their size, can leverage their structural flexibility to adapt faster than larger counterparts. Consequently, resilience strategies embedded in agility can help SMEs maintain their strategic direction and organizational coherence even when confronted with significant economic disruptions.

Digital transformation and the adoption of advanced technologies have also proven to be pivotal in enhancing the resilience of SMEs. Digital tools and platforms enable SMEs to improve their operational efficiencies, expand market reach, and establish real-time communication channels, all of which are crucial in adapting to rapidly changing market conditions. For example, cloud computing, data analytics, and customer relationship management (CRM) systems empower SMEs to monitor business performance, anticipate customer needs, and adjust service delivery models in response to economic fluctuations (Ritter & Pedersen, 2020). In leveraging digital technologies, SMEs can enhance their resilience by gaining access to critical insights and streamlining processes, which in turn supports adaptive decision-making and allows for faster, more effective responses to economic shocks. By integrating technology into their resilience frameworks, SMEs can improve agility, strengthen customer relationships, and foster innovation, all of which are essential for long-term sustainability.

The resilience of SMEs is not only a matter of internal adaptability but also a function of external support systems. Collaborations with stakeholders, including suppliers, customers, financial institutions, and government bodies, play a pivotal role in building resilience, as these relationships offer resources, market insights, and financial assistance

during periods of economic stress (Brown & Mason, 2017). Establishing strong networks and partnerships enables SMEs to access diverse resources that bolster their resilience, such as emergency funding, supply chain support, and mentorship opportunities. These networks provide SMEs with the flexibility to manage economic shocks effectively, allowing them to share risks, reduce costs, and benefit from collective expertise. Therefore, resilience in SMEs is a multifaceted concept that encompasses both internal adaptability and external resource acquisition, underscoring the importance of a holistic approach to resilience-building.

Resilience is a fundamental attribute for SMEs aiming to remain competitive in the face of economic shocks. Adaptive capabilities, agility, and digital transformation are essential components of resilient SMEs, allowing them to navigate disruptions, optimize operations, and capitalize on new opportunities. Resilience provides SMEs with a strategic advantage, equipping them to withstand economic volatility and emerge stronger in its aftermath. As the global economic environment continues to evolve unpredictably, fostering resilience within SMEs through agile practices, digital integration, and strategic partnerships is vital for sustaining economic growth and ensuring business continuity in diverse and challenging market conditions.

1.2 Objectives of the Review

The primary objective of this review is to investigate the role of agile business practices in fostering resilience within small and medium-sized enterprises (SMEs), focusing specifically on how these practices can support SMEs in responding to economic shocks and long-term sustainability. In the context of increasingly volatile markets, the review aims to provide an in-depth analysis of the mechanisms through which agility contributes to resilience, with particular attention to frameworks that enhance adaptability and preparedness for disruption. SMEs, which often operate with limited resources, face significant challenges in maintaining operational continuity during economic shocks. This review, therefore, intends to bridge the knowledge gap surrounding the specific agility strategies that enable SMEs to weather economic uncertainties, thus contributing to the broader discourse on resilience-building in small business environments.

The review further seeks to examine existing literature on resilience frameworks, offering insights into how these can be operationalized within the unique context of SMEs. Agility in business practices—characterized by adaptive processes, rapid decision-making, and flexibility in resource management—is emphasized as a critical component in ensuring resilience. By analyzing current frameworks and identifying core agile practices, this review aims to establish a comprehensive understanding of the approaches that SMEs can adopt to achieve resilience against economic shocks. The focus on agility within resilience frameworks is motivated by research highlighting the advantages of agility in enhancing responsiveness to crises, facilitating continuous learning, and supporting growth, even under adverse conditions.

This review also intends to provide practical implications for SMEs, shedding light on agile methodologies that are adaptable to resource-constrained environments. For instance, lean management and iterative development approaches offer scalable solutions for SMEs seeking to enhance resilience without substantial financial investments. The objective is not only to explore agility's role in response to immediate disruptions but also to underscore its potential as a proactive resilience-building strategy that fosters long-term stability and competitiveness. Additionally, the review will evaluate the relevance of digital transformation and technological integration in enhancing agility. As SMEs increasingly adopt digital tools, the agility and resilience afforded by digitalization are pivotal in supporting real-time adaptation and improving operational efficiency.

By focusing on agility, this review aims to contribute to the resilience literature by articulating a framework suited for SMEs that balances flexibility, risk management, and sustainability. In alignment with recent studies, this review emphasizes that agility is not merely a reactionary measure but a strategic asset that SMEs can cultivate to navigate complex environments. Furthermore, the review seeks to highlight the importance of embedding resilience within the organizational culture of SMEs, promoting a mindset geared toward proactive planning, continuous innovation, and adaptation. In this respect, the objectives include evaluating various case studies, identifying best practices, and offering recommendations for SMEs aiming to integrate agility into their resilience frameworks effectively.

The exploration of resilience frameworks also necessitates an assessment of external factors that influence SME resilience. Networks and partnerships, for example, are critical as they provide SMEs with access to additional resources, market insights, and collaborative opportunities that support resilience. This review seeks to analyze the role of such collaborations in building resilience, particularly in how external relationships facilitate agility through shared knowledge and risk mitigation. Understanding these dynamics is essential for SMEs seeking to leverage both internal and external resources to navigate economic shocks. By examining the intersection of agility and

collaborative networks, this review aims to offer a nuanced perspective on the diverse resilience strategies available to SMEs.

The literature further indicates that the development of resilience in SMEs is not solely dependent on internal agility but is also influenced by regulatory and policy environments. Therefore, this review includes an objective to investigate how governmental policies and industry regulations impact SMEs' ability to adopt agile practices and enhance resilience. Policies that support digital transformation, for instance, are found to facilitate agility by enabling SMEs to access new technologies, thereby improving their adaptability to economic changes. Consequently, this review aims to present a comprehensive discussion on the role of supportive policies in fostering resilience, which is crucial for policymakers and business leaders alike.

This review is structured to address the multifaceted nature of resilience in SMEs, focusing on agility as a foundational element. By exploring resilience-building frameworks, adaptive methodologies, and external enablers, this review seeks to provide actionable insights for SMEs and contribute to the scholarly understanding of resilience in resource-constrained contexts. The ultimate objective is to offer a holistic overview of how agile business practices can bolster SME resilience, enabling them to remain competitive and sustainable in the face of economic instability.

1.3 Clarification of the review's aims and scope, focusing on agile business practices that enhance SMEs' ability to adapt and respond effectively to economic challenges

The primary aim of this review is to elucidate the role of agile business practices in enhancing the adaptability and responsiveness of small and medium-sized enterprises (SMEs) to economic challenges. SMEs are often positioned within highly competitive and volatile environments where rapid changes in market demands, regulatory pressures, and resource constraints can create substantial vulnerabilities. These enterprises, characterized by limited financial and operational resources compared to larger corporations, face unique challenges in sustaining business continuity during periods of economic instability. This review focuses on agile methodologies—specifically those practices that enable SMEs to maintain flexibility, swiftly respond to market changes, and foster innovation—to highlight their potential as resilience-enhancing tools. By clarifying the scope of agile practices that align with the structural and resource capacities of SMEs, this review aims to contribute to the growing discourse on resilience and agility in the context of small businesses.

In recent years, the concept of agility has gained traction in both academic and practical settings as a framework that enables enterprises to respond efficiently to disruptions. While agile practices have been widely implemented in large organizations, their relevance to SMEs remains an area of active research, especially concerning how such practices can be tailored to suit smaller operational scales. Agile practices, including iterative development, lean management, and decentralized decision-making, are designed to facilitate rapid adaptation and innovation. This review examines the feasibility and benefits of these practices within SMEs, exploring how they can enhance resilience by enabling firms to pivot strategies, streamline operations, and proactively manage risks. Consequently, this review offers a framework that integrates agile methodologies into SME business models as a proactive resilience strategy rather than a mere response to disruption.

Agility in business practices has often been associated with digital transformation, which, while beneficial, can be challenging for SMEs due to cost and technical skill limitations. This review addresses this challenge by exploring scalable digital tools, such as cloud-based systems and digital project management platforms, which support agile operations without imposing unsustainable demands on smaller firms. By clarifying how digital tools can enhance agility, this review underscores the importance of digital flexibility as a means for SMEs to enhance operational efficiency and customer responsiveness even with limited resources. Thus, the review highlights the relevance of agile digital solutions that align with the financial and technical capacities of SMEs, ensuring that recommendations are both realistic and actionable for small business leaders.

Another significant aspect of this review is its focus on external factors that influence the resilience of SMEs. SMEs operate within networks that include suppliers, customers, financial institutions, and regulatory bodies. This review emphasizes the role of agile partnerships and collaborations as critical enablers of resilience. Through adaptive and flexible relationships, SMEs can leverage resources, market insights, and knowledge from external stakeholders, strengthening their capacity to navigate economic fluctuations. Agile collaborations, such as flexible supply chain arrangements and customer-focused service models, allow SMEs to share risks, reduce operational costs, and remain competitive during periods of economic stress. In this context, agility extends beyond internal practices to include networked agility, where resilience is bolstered through a cohesive ecosystem of supportive relationships. The scope of this review also includes evaluating how agility can function as a proactive strategy for resilience-building within

SMEs. While traditional resilience approaches have focused on risk management and reactive measures, agility introduces a forward-looking perspective that encourages continuous improvement, innovation, and strategic alignment with market trends. Agile business practices foster a culture of adaptability, where SMEs are encouraged to learn from past disruptions and integrate those insights into their future strategies. For instance, methodologies like lean startup and design thinking promote iterative processes and customer feedback loops, enabling SMEs to fine-tune their products and services based on real-time insights. By focusing on proactive resilience, this review positions agility as a sustainable approach that helps SMEs build robust business models capable of withstanding the complexities of today's economic landscapes.

Finally, this review intends to contribute to the scholarly understanding of resilience in SMEs by providing a comprehensive analysis of agile practices that are both relevant and feasible for smaller firms. By assessing case studies, empirical research, and theoretical perspectives, the review offers a nuanced framework for understanding agility within SMEs. The findings aim to support future research and practical applications, presenting a balanced view of how agile practices can be integrated into SME business models to enhance resilience. This review underscores that agility, when adapted to the specific context of SMEs, provides a foundation for long-term stability, innovation, and competitiveness, ensuring that these enterprises can thrive amidst economic challenges.

1.4 Current Challenges in Building Resilience for SMEs: Discussion of challenges SMEs face when encountering economic shocks, such as limited financial resources, market volatility, supply chain disruptions, and limited access to recovery support

Small and medium-sized enterprises (SMEs) face a distinct set of challenges when attempting to build resilience against economic shocks. Unlike large corporations, which often possess considerable financial resources and extensive support networks, SMEs typically operate under significant constraints that limit their ability to effectively respond to sudden disruptions. Economic shocks, such as market volatility, supply chain disruptions, and regulatory changes, can create severe hardships for these enterprises, particularly when compounded by limited financial reserves and restricted access to recovery resources. In this context, building resilience is not only challenging but crucial, as resilience determines an SME's capacity to withstand, adapt to, and recover from adverse economic conditions.

One of the foremost challenges for SMEs in building resilience lies in their limited financial resources. SMEs generally lack the capital buffers that larger organizations can rely on during economic downturns. As a result, even short-term disruptions can threaten their survival, forcing SMEs to make difficult decisions that often involve reducing operational costs or cutting staff. These actions, while necessary for immediate survival, can impede an SME's long-term growth and stability, thereby weakening its resilience to future shocks. Additionally, limited financial flexibility restricts an SME's ability to invest in resilience-building measures, such as technology upgrades or diversification strategies, which are often essential for adapting to volatile economic conditions.

Market volatility poses another significant challenge, as SMEs are often more vulnerable to fluctuations in demand and supply than their larger counterparts. With less market power, SMEs typically face higher risks from changes in consumer behavior, commodity prices, and competition. For instance, during periods of economic recession, consumer spending may decline sharply, reducing revenue streams for SMEs that rely heavily on steady sales. Market volatility can also lead to price instability in raw materials and other resources critical to an SME's operations. Without the ability to absorb these price shifts, SMEs may struggle to maintain profitability, leading to further instability and reduced resilience in the face of economic shocks.

Supply chain disruptions further exacerbate the challenges of resilience-building for SMEs. Supply chains have become increasingly globalized and complex, making SMEs vulnerable to disruptions that occur at any point within these networks. Events such as natural disasters, geopolitical conflicts, or pandemics can halt the flow of essential goods, forcing SMEs to delay production or seek alternative suppliers. Unlike larger companies with diversified supply chains, SMEs often depend on a small number of suppliers and lack the bargaining power to negotiate favorable terms during disruptions. Consequently, when supply chain interruptions occur, SMEs are disproportionately impacted, facing extended delays and increased costs that undermine their ability to operate sustainably.

Access to recovery support presents another considerable challenge for SMEs aiming to build resilience. Recovery resources, such as government aid, financial grants, and consultancy support, are often crucial for enabling enterprises to recover from economic shocks. However, SMEs may encounter obstacles in accessing these resources due to bureaucratic hurdles, eligibility criteria, or limited awareness of available assistance. In many cases, recovery support is geared more toward larger firms that have established networks and legal teams capable of navigating

complex application processes. SMEs, on the other hand, may lack the administrative capacity to pursue such support, leaving them more vulnerable to prolonged recovery times and heightened risks of permanent closure. The disparity in access to recovery resources underscores the need for more targeted support measures that address the unique constraints faced by SMEs.

In addition to these structural challenges, SMEs often face limitations in terms of human resources and expertise. Smaller firms typically operate with lean staffing models, which may lack specialized roles in areas such as risk management, finance, or strategic planning. This lack of in-house expertise can hinder an SME's ability to effectively identify and mitigate potential risks before they escalate into significant disruptions. Moreover, when crises do occur, SMEs may struggle to respond swiftly and strategically due to limited knowledge and experience in crisis management. Without sufficient expertise, SMEs are often left to navigate complex challenges with limited guidance, resulting in reactive rather than proactive resilience-building efforts.

Technology adoption represents an additional barrier to resilience-building, as SMEs often have limited access to digital tools and platforms that could enhance their adaptability. Digital transformation has been widely recognized as a pathway to resilience, enabling firms to leverage data analytics, automation, and remote work capabilities. However, many SMEs encounter financial and technical obstacles to implementing these technologies. The cost of digital transformation can be prohibitive, and SMEs may lack the technical skills or support needed to integrate new tools effectively into their operations. As a result, SMEs that cannot access digital solutions are at a disadvantage in building resilience, particularly in sectors where technological adaptation is essential for competitiveness.

Furthermore, SMEs may struggle to maintain strong relationships with stakeholders, including suppliers, customers, and financial partners, during periods of economic distress. Relationships with these stakeholders are crucial for resilience, as they can provide essential support, flexibility, and resources in times of need. However, economic shocks can strain these relationships, especially if SMEs are forced to delay payments or alter contractual agreements. In such cases, maintaining stakeholder trust becomes challenging, and SMEs may find it increasingly difficult to secure favorable terms or reliable partnerships moving forward. The erosion of these relationships can lead to a cycle of vulnerability, where SMEs become progressively more isolated and less capable of accessing the resources needed for resilience.

SMEs encounter a complex web of challenges in their efforts to build resilience against economic shocks. Limited financial resources, market volatility, supply chain disruptions, and restricted access to recovery support all contribute to the heightened vulnerabilities of SMEs. Additionally, factors such as limited expertise, technology adoption barriers, and strained stakeholder relationships further complicate resilience-building efforts. These challenges underscore the need for tailored resilience strategies that align with the specific constraints and capacities of SMEs. By addressing these challenges and investing in targeted resilience-building measures, SMEs can better prepare to navigate future economic uncertainties and sustain long-term growth.

2 Literature Review

2.1 Concept of Agile Business Practices: Exploration of the fundamental principles of agility in business, including flexibility, adaptability, rapid decision-making, and customer-centric approaches as they apply to SMEs

Agile business practices, initially developed within the software development industry, have become increasingly influential across various sectors, including small and medium-sized enterprises (SMEs). The core principles of agility—flexibility, adaptability, rapid decision-making, and a customer-centric focus—are paramount for SMEs striving to maintain competitiveness in turbulent markets. This literature review explores these foundational aspects of agile business practices and how they manifest within SMEs, examining the theoretical and practical applications and aligning them with current academic insights.

Flexibility, as a principle of agile business practices, is integral to SMEs' success. Unlike larger corporations with established processes and hierarchical structures, SMEs benefit from a flexibility that enables swift strategic pivots. According to the work of Dingsøy et al. (2018), flexibility allows SMEs to modify product lines, services, and even core strategies in response to external market shifts or internal operational constraints. This elasticity is critical for SMEs that often lack the financial cushion to withstand prolonged periods of market decline. Further, an agile framework, such as Scrum or Kanban, can enhance organizational flexibility by promoting iterative processes, which in turn support ongoing adjustments in project scope based on client feedback and team assessments. This capability is seen as an enabler for smaller firms, as it mitigates risks associated with rigid long-term planning.

Adaptability complements flexibility by enabling SMEs to not only react to but also anticipate changes within their respective markets. In highly competitive and rapidly evolving environments, SMEs must adapt to survive. Scholars have emphasized that agility is particularly beneficial to SMEs in terms of adapting to emerging technologies and fluctuating customer demands (Rigby, Sutherland & Noble, 2018). Empirical studies show that adaptable SMEs employ agile methodologies, such as continuous deployment and feedback loops, to iterate products rapidly, which fosters responsiveness to market trends (Cooper & Sommer, 2016). This adaptability extends beyond product development and is evident in other operational domains, including marketing and customer service, where agile methods help SMEs align closely with customer expectations.

The principle of rapid decision-making further underscores the agile model's suitability for SMEs. Decision-making speed is particularly significant in small firms where time and resources are often constrained. According to Rigby et al. (2020), agile practices advocate for decentralized decision-making, which distributes authority across team members, enabling quicker responses to unforeseen challenges. This decentralization has been shown to foster an organizational culture that encourages innovation and expedites critical decisions, minimizing the delays associated with traditional hierarchical models (Conforto & Amaral, 2016). Rapid decision-making processes are reinforced by tools such as daily stand-ups, sprint planning sessions, and retrospective reviews, which provide regular intervals for team assessment and strategic realignment (Ghezzi & Cavallo, 2020). Through such methods, agile approaches empower SMEs to capitalize on time-sensitive market opportunities, fostering a proactive rather than reactive business orientation.

A customer-centric approach is fundamental to agile business practices and is particularly advantageous for SMEs, whose customer relations can significantly influence their market positioning. Agile methodologies emphasize the inclusion of customer feedback at various stages of the development and delivery process, a practice that enhances the alignment between the firm's offerings and client expectations. Customer feedback loops, for example, allow SMEs to deliver products or services that more accurately reflect market demands, leading to increased customer satisfaction and loyalty. SMEs that prioritize customer-centric agility can achieve higher rates of customer retention, as iterative feedback mechanisms ensure the final product or service is tailored to customer needs. Additionally, customer-centric practices enable SMEs to establish a unique value proposition that differentiates them from competitors, leveraging agility as a means to strengthen their brand positioning and market relevance.

In synthesizing these agile principles, a growing body of research indicates that SMEs adopting agile practices benefit from improved resilience and adaptability, which are essential in navigating uncertain economic landscapes (Cohn, 2010). While challenges remain in implementing agile frameworks—such as resource limitations and workforce resistance—numerous case studies have documented successful agile transformations in SMEs (Gren, Torkar & Feldt, 2017). It is clear from the literature that agile business practices foster an organizational mindset conducive to continuous improvement, innovation, and sustained growth. Moreover, the scalability of agile methodologies allows SMEs to integrate these practices incrementally, addressing specific organizational needs without overwhelming limited resources. Ultimately, the evidence suggests that agility not only enhances SMEs' operational efficiency but also aligns with the strategic imperatives of resilience, innovation, and customer satisfaction.

2.2 Key Agile Strategies for Enhancing Resilience: Analysis of agile strategies that SMEs can employ to build resilience, such as lean management, iterative processes, cross-functional teams, and decentralized decision-making

The growing complexity and uncertainty of modern business environments demand that small and medium-sized enterprises (SMEs) employ agile strategies to enhance resilience and adaptability. These agile strategies, including lean management, iterative processes, cross-functional teams, and decentralized decision-making, collectively empower SMEs to respond quickly and effectively to external challenges and shifts in market conditions. Through an analysis of current academic literature, this review elucidates how these strategies facilitate organizational resilience in SMEs, ensuring sustained growth and competitive advantage.

Lean management serves as a foundation for agility by prioritizing efficiency, waste reduction, and a customer-centered approach. Originally developed in manufacturing, lean management has since permeated various industries, providing a framework for SMEs to optimize resource utilization and reduce operational bottlenecks. Lean management's emphasis on continuous improvement aligns closely with resilience, enabling SMEs to adapt their processes continually in response to customer feedback and shifting demand (Bhamu & Sangwan, 2014). For instance, lean practices, such as just-in-time inventory and value stream mapping, allow firms to maximize resource allocation and minimize waste, thereby enhancing operational flexibility and resilience (Womack & Jones, 1997). By minimizing

non-essential activities and focusing on value-adding tasks, lean management enables SMEs to respond swiftly to disruptions while maintaining operational continuity (Liker & Convis, 2012).

Another agile strategy that promotes resilience in SMEs is the use of iterative processes. Iterative processes, often associated with agile methodologies such as Scrum and Kanban, allow organizations to implement small, incremental changes, thereby reducing the risk associated with large-scale adjustments (Manifesto, A., 2001). The iterative approach enhances resilience by enabling SMEs to experiment, test, and refine their strategies in real-time, thus facilitating continuous adaptation to market shifts. This cyclical process of planning, executing, and assessing empowers teams to make incremental improvements that collectively contribute to overall strategic resilience (Cooper & Sommer, 2016). For SMEs, iterative processes are particularly beneficial because they provide a structured yet flexible approach to problem-solving, allowing firms to pivot quickly in response to evolving challenges (Denning, 2018). Studies have shown that iterative strategies not only improve responsiveness but also promote a learning culture within SMEs, fostering resilience through ongoing skill enhancement and knowledge acquisition (Rigby, Sutherland & Noble, 2018).

Cross-functional teams represent another crucial component of agile resilience strategies within SMEs. The interdisciplinary nature of cross-functional teams brings diverse skills and perspectives together, fostering innovation and enhancing the firm's ability to respond to complex problems. According to Ghezzi and Cavallo (2020), cross-functional collaboration enables SMEs to break down traditional silos, encouraging knowledge sharing and promoting a holistic view of organizational challenges. This collaboration is essential in times of crisis, as cross-functional teams are equipped to devise innovative solutions that address multifaceted issues (Teece, 2018). Furthermore, cross-functional teams align closely with agile values by fostering a shared sense of purpose and accountability, thereby facilitating a more coordinated and resilient organizational response (Gren, Torkar & Feldt, 2017). Research also suggests that cross-functional teams are instrumental in enhancing employee engagement and morale, as team members gain a sense of ownership and empowerment through active participation in decision-making processes (Drury-Grogan, Conboy & Acton, 2017). This empowerment contributes to organizational resilience, as motivated teams are more likely to proactively address and overcome challenges.

Decentralized decision-making further supports resilience by empowering employees at all levels to make informed decisions in real time. Decentralization reduces dependency on hierarchical approval processes, thereby increasing the speed and agility with which SMEs can respond to sudden changes. Rigby et al. (2020) posit that decentralized decision-making fosters a sense of autonomy and accountability, which are essential for cultivating resilience in volatile environments. Through this empowerment, employees develop problem-solving skills and assume greater responsibility for outcomes, which, in turn, supports a culture of resilience and adaptability (Cohn, 2010). Additionally, decentralized structures enable SMEs to leverage the collective knowledge and expertise of their workforce, resulting in faster, more effective responses to dynamic challenges (Conforto & Amaral, 2016). Empirical studies indicate that organizations with decentralized decision-making are better equipped to navigate crises, as decentralized systems allow for localized, responsive actions that align with overarching strategic goals (Ghezzi & Cavallo, 2020).

Agile strategies such as lean management, iterative processes, cross-functional teams, and decentralized decision-making are instrumental in enhancing the resilience of SMEs. By fostering efficiency, adaptability, and a culture of innovation, these strategies equip SMEs to withstand disruptions and capitalize on emerging opportunities. Lean management enables optimized resource use and waste reduction; iterative processes provide a framework for continuous adaptation; cross-functional teams enhance problem-solving capabilities through interdisciplinary collaboration; and decentralized decision-making empowers rapid responses to dynamic conditions. Collectively, these agile strategies not only fortify SMEs against immediate challenges but also position them for sustained resilience and growth in the long term. As global market conditions continue to evolve, the adoption of these agile strategies will likely become increasingly critical for SMEs striving to maintain competitive advantage and operational sustainability.

2.3 Role of Technology and Innovation in Agile Practices: Examination of how technology and innovation, such as digital platforms, data analytics, and automation, enable agility in SMEs, fostering resilience by enhancing adaptability and resource management

The role of technology and innovation in shaping agile practices within small and medium-sized enterprises (SMEs) has gained considerable attention in recent academic discourse. Agile methodologies, which emphasize flexibility, responsiveness, and customer-centric approaches, are increasingly supported by technological advancements such as digital platforms, data analytics, and automation. These technologies not only facilitate agile processes but also

enhance resilience by improving adaptability and resource management within SMEs. This review explores the contributions of key technologies in fostering agile practices in SMEs, emphasizing their roles in strategic decision-making, operational efficiency, and long-term sustainability.

Digital platforms have been instrumental in enabling SMEs to implement agile practices by providing a robust infrastructure for collaboration, communication, and customer engagement. The adoption of digital platforms allows SMEs to connect with customers, suppliers, and partners seamlessly, fostering agility by facilitating real-time information sharing and collaboration. Through these platforms, SMEs can quickly adapt to market trends and customer preferences, which is essential for maintaining a competitive edge in rapidly changing environments. Digital platforms not only support operational agility but also encourage innovation by enabling SMEs to access a wider pool of knowledge and resources. This digital interconnectivity allows firms to innovate and adapt, thus reinforcing resilience through enhanced market responsiveness and customer satisfaction.

Data analytics is another critical technological tool that empowers SMEs to refine agile practices by providing insights that guide decision-making. The integration of data analytics enables firms to analyze customer behaviors, market trends, and operational performance, thus supporting informed, rapid decision-making processes that are core to agile methodologies. Data-driven insights allow SMEs to identify and mitigate risks proactively, adapt their strategies in real time, and optimize resource allocation. SMEs that leverage data analytics achieve a level of agility that enhances their resilience in competitive markets by responding swiftly to both opportunities and challenges. Additionally, predictive analytics enables SMEs to forecast potential disruptions, allowing them to implement preemptive measures and maintain operational stability.

Automation further supports agile practices in SMEs by streamlining repetitive processes, freeing up resources, and allowing employees to focus on higher-value tasks that drive innovation and adaptability. Automation technologies such as robotic process automation (RPA) and artificial intelligence (AI) allow SMEs to improve efficiency and reduce human error, which is essential for maintaining agility in operations. Automation facilitates rapid iteration by enabling SMEs to deploy, test, and refine processes with minimal downtime, thus reinforcing the agile principle of continuous improvement. For example, AI-driven automation can enhance customer service agility by providing real-time responses and personalized experiences, which strengthens customer relations and builds resilience in market positioning. By adopting automation, SMEs not only optimize their workflows but also foster an organizational culture that is responsive to innovation and change, contributing to sustainable agility.

Moreover, the convergence of digital platforms, data analytics, and automation within agile practices has proven particularly effective in supporting resource management in SMEs. Efficient resource management is critical for SMEs, which often operate with limited budgets and manpower. Digital platforms and data analytics provide SMEs with tools to track, allocate, and utilize resources effectively, ensuring that resource constraints do not impede agile practices. For instance, cloud-based platforms enable SMEs to scale resources up or down based on demand, reducing costs associated with over-provisioning or underutilization. Cloud computing also enhances resilience by ensuring data availability and system functionality, even during disruptions. Automation further contributes to resource optimization by reducing labor costs and minimizing waste, thereby supporting the agile objective of delivering maximum value with minimal resources.

The integration of these technologies within agile practices fosters an adaptive and resilient organizational culture, which is essential for long-term sustainability. In highly volatile markets, the ability to pivot quickly in response to emerging trends and challenges is a competitive advantage that technology-enabled agility provides. Furthermore, the use of data analytics and automation fosters a proactive approach to resilience, as SMEs can anticipate market shifts and respond before their effects fully materialize. Digital platforms, by contrast, enhance resilience by supporting external collaboration, enabling SMEs to co-create value with stakeholders, and expanding their innovation potential through collective knowledge. This interconnectedness not only reinforces agility but also strengthens the SME's position in an ecosystem of partners and customers, further fortifying resilience.

Technology and innovation play a transformative role in enabling agile practices that enhance resilience in SMEs. Digital platforms facilitate seamless communication and market responsiveness, data analytics supports informed decision-making, and automation optimizes resource management and efficiency. Collectively, these technologies enable SMEs to maintain agility, adaptability, and a customer-centric focus, which are critical for surviving and thriving in a dynamic business environment. The strategic use of these technologies fosters an organizational culture that is resilient, adaptive, and continuously improving, ensuring that SMEs are well-positioned to navigate the uncertainties of the modern marketplace.

2.4 Case Studies of Agile Practices in SMEs Responding to Economic Shocks: Review of case studies where SMEs have successfully implemented agile practices to withstand economic disruptions, highlighting best practices, outcomes, and lessons learned

The increasing volatility of global markets has underscored the need for resilience within small and medium-sized enterprises (SMEs), particularly as they face economic disruptions. Agile practices, characterized by flexibility, rapid decision-making, and responsiveness to change, have proven instrumental in enabling SMEs to navigate and withstand economic shocks. A review of case studies demonstrates how agile methodologies have been implemented successfully within SMEs, offering valuable insights into best practices, outcomes, and lessons learned from real-world applications. This literature review examines these case studies, focusing on the effectiveness of agile practices in promoting resilience and sustainability for SMEs during times of economic adversity.

Several case studies illustrate how SMEs have adopted agile practices to adapt to economic challenges. A prominent example is found in the hospitality sector, where SMEs faced unprecedented financial strain during the COVID-19 pandemic. Research by Bartik et al. (2020) highlights how small hospitality businesses adopted agile methodologies, such as flexible workforce management and rapid product adaptation, to maintain operations amidst lockdowns and social distancing regulations. By reallocating resources and diversifying service offerings (e.g., transitioning from in-person dining to takeaway and delivery services), these SMEs demonstrated resilience through an agile response to external restrictions. This adaptation not only mitigated revenue losses but also allowed SMEs to build new revenue streams, exemplifying agile best practices in resource optimization and strategic flexibility.

Similarly, in the retail sector, the adoption of digital platforms as part of agile transformation was crucial for SMEs during economic downturns. A case study by Wenzel, Stanske, and Lieberman (2020) reveals how SMEs in retail rapidly shifted to online platforms to offset losses from decreased foot traffic in physical stores. Leveraging e-commerce technologies, these SMEs engaged in agile practices by implementing iterative feedback loops with customers, refining their product offerings, and personalizing online customer experiences. These agile adjustments were essential for maintaining customer engagement and continuity of operations despite external economic pressures. The outcomes from this case emphasize the effectiveness of agile practices in enhancing digital adaptability, ensuring that SMEs can sustain their customer base even in times of economic uncertainty.

In the manufacturing industry, agile practices have similarly enabled SMEs to cope with supply chain disruptions, which are common during economic downturns. A study conducted by Ivanov and Dolgui (2020) on manufacturing SMEs in Europe demonstrates the application of agile supply chain strategies, such as on-demand production and supplier diversification, to maintain operational continuity. By adopting just-in-time inventory practices and establishing multiple supplier partnerships, these SMEs mitigated risks associated with delayed shipments and shortages of raw materials. This agile approach enabled manufacturing SMEs to respond dynamically to fluctuations in supply and demand, reducing operational costs and ensuring continued production. The success of these practices underscores the value of agility in supply chain management for enhancing the resilience of SMEs amid economic disruptions.

Another notable case is from the technology sector, where SMEs implemented agile project management frameworks to counteract the financial impact of economic recessions. According to a study by Conforto and Amaral (2016), technology-based SMEs in Brazil utilized agile project management practices, including frequent sprint reviews and decentralized decision-making, to adapt their project scopes to shifting financial constraints. By incorporating customer feedback at each stage of project development, these SMEs minimized the risk of costly project failures, thus safeguarding their financial stability. The outcomes from this case illustrate how agile methodologies can reduce project risks and improve resource allocation, reinforcing the economic resilience of SMEs facing financial pressures.

Lessons learned from these case studies reveal key best practices that contribute to the successful implementation of agile methodologies in SMEs. Firstly, flexibility in resource allocation emerged as a critical factor, as evidenced by SMEs in the hospitality and retail sectors that rapidly adjusted their service offerings and sales channels in response to economic restrictions. Secondly, customer-centricity, particularly in digital environments, played a significant role in ensuring customer retention and satisfaction during periods of reduced physical interaction. Additionally, the importance of decentralized decision-making was evident in the technology sector case study, where agile frameworks empowered teams to make independent decisions, thus enhancing responsiveness to financial constraints. These best practices underscore the relevance of agility in enabling SMEs to remain adaptable and resilient during economic challenges.

The outcomes from these cases indicate that SMEs can achieve substantial benefits through the integration of agile practices, including improved operational continuity, cost savings, and customer loyalty. However, challenges in adopting agility also emerged from these studies. For instance, SMEs in traditional sectors like manufacturing faced initial resistance to agile transformations due to entrenched practices and limited technological infrastructure. Similarly, SMEs in the retail sector encountered difficulties in digital transformation, particularly among firms that previously relied heavily on physical sales channels. These challenges highlight the need for targeted support and training to facilitate agile adoption in SMEs, particularly in sectors that may be less accustomed to rapid technological change.

Case studies of agile practices in SMEs responding to economic shocks provide valuable insights into the strategies that enable resilience and adaptability. The successful adoption of agile methodologies—such as flexible resource management, digital platform utilization, agile supply chain practices, and customer-centered project management—demonstrates the potential of agility to safeguard SMEs against economic disruptions. Best practices identified from these case studies include the importance of flexibility, customer-centricity, and decentralized decision-making, all of which enhance the capacity of SMEs to respond to shifting market dynamics. The lessons learned from these cases emphasize the strategic value of agility for SMEs, particularly as economic uncertainties continue to shape the global business environment. The evidence suggests that with appropriate agile strategies, SMEs can not only survive economic shocks but also position themselves for long-term growth and stability.

3 Benefits and Challenges

3.1 Benefits of Agile Practices for SME Resilience: Discussion of the benefits of adopting agile practices for resilience, such as increased adaptability, faster recovery, cost savings, and improved customer satisfaction

The adoption of agile practices has emerged as a valuable strategy for small and medium-sized enterprises (SMEs) striving to increase resilience in a highly volatile business environment. Agile methodologies, characterized by principles of adaptability, customer focus, and iterative progress, offer a range of benefits that bolster SMEs' capacity to withstand and recover from economic shocks. This section discusses the primary advantages of agile practices for SME resilience, including increased adaptability, faster recovery, cost savings, and improved customer satisfaction, alongside the challenges that SMEs may face in implementing these practices effectively.

One of the principal benefits of agile practices for SMEs is enhanced adaptability, which is crucial for survival and growth in unpredictable markets. Unlike larger firms, SMEs often lack the financial and human resources to withstand prolonged periods of economic stress. The iterative and flexible nature of agile methodologies allows SMEs to pivot their operations swiftly in response to external shifts, thereby maintaining competitiveness and minimizing potential losses. Agile frameworks such as Scrum and Kanban enable SMEs to implement small, incremental changes based on customer feedback and market analysis, which significantly enhances their ability to adapt to evolving demands. This adaptability extends to resource allocation as well, allowing SMEs to redirect limited resources to high-priority areas as needed, thus optimizing their response to market disruptions.

Agile practices also contribute to faster recovery from economic downturns or market disruptions by promoting rapid decision-making and iterative progress. In traditional models, decision-making often involves multiple levels of approval, which can delay responses to sudden challenges. Agile methodologies empower teams to make timely decisions within defined frameworks, thereby accelerating the response rate and reducing downtime. For instance, daily stand-ups and sprint reviews allow teams to assess progress regularly and address obstacles immediately, which is instrumental in reducing recovery times during economic shocks. In sectors such as retail and hospitality, where agility is crucial for adapting service offerings and customer engagement strategies, agile practices have been shown to enhance operational continuity during crises, facilitating quicker recovery.

Cost savings represent another significant advantage of agile practices for SMEs, particularly for those with constrained budgets. By reducing waste and emphasizing value-driven processes, agile methodologies allow SMEs to achieve their objectives with fewer resources. Lean management principles embedded within agile frameworks encourage businesses to focus on essential activities, eliminating non-value-added tasks that drain time and money. For example, just-in-time inventory and iterative production processes prevent overproduction and reduce storage costs, thus aligning operational expenses with actual demand. Agile practices also minimize the risk of large-scale project failures by promoting incremental development, ensuring that any resource adjustments are made promptly and aligned with customer requirements, thereby maximizing the return on investment for SMEs.

Improved customer satisfaction is a further benefit of agile practices, as these methodologies emphasize close alignment with customer needs through continuous feedback loops. Agile practices enable SMEs to engage with customers throughout the product or service development process, allowing for real-time adjustments based on customer preferences and feedback. This customer-centric approach not only enhances customer loyalty but also positions SMEs to anticipate and meet market demands more effectively. By regularly integrating customer insights, SMEs can create tailored solutions that meet or exceed expectations, which is especially advantageous in competitive markets. Empirical studies have indicated that SMEs that employ agile customer engagement practices report higher levels of customer satisfaction and retention, as they are better equipped to provide personalized and relevant experiences.

However, while the benefits of agile practices are clear, SMEs often encounter challenges when implementing these methodologies, especially regarding resource limitations and cultural resistance. Unlike larger enterprises, SMEs may lack the budget for comprehensive training in agile methodologies, which can lead to suboptimal implementations and inconsistencies in agile practices across teams. The shift from traditional hierarchical structures to agile frameworks also demands a cultural transformation that some SMEs may find difficult to achieve. Resistance to change is a common challenge, as employees accustomed to established workflows may be reluctant to adopt agile practices, which emphasize autonomy and flexibility. Without strong leadership and effective change management, SMEs may struggle to fully embrace agility, thereby limiting the potential benefits of these practices.

Additionally, the scalability of agile practices can be challenging for SMEs with limited technological infrastructure. Agile methodologies often rely on digital tools for task management, communication, and customer engagement, but some SMEs may not have access to the necessary technology or expertise to support these tools effectively. For instance, adopting platforms for data analytics or customer relationship management (CRM) systems may require substantial investment, which may not be feasible for all SMEs. This technological gap can hinder the agile transformation process, as effective agile practices depend heavily on real-time data and digital collaboration tools to facilitate rapid iteration and decision-making. Consequently, SMEs without the technological resources to support agile practices may find it difficult to sustain these methodologies long-term.

The adoption of agile practices offers SMEs substantial benefits for building resilience, including enhanced adaptability, faster recovery from disruptions, cost savings, and improved customer satisfaction. These advantages collectively strengthen SMEs' ability to withstand economic shocks and align closely with their strategic goals. However, SMEs must also contend with challenges such as resource constraints, resistance to cultural change, and limited technological infrastructure, which can impede the effective implementation of agile practices. To address these challenges, SMEs may need targeted support in the form of training, leadership guidance, and investment in digital tools to fully capitalize on the potential of agile methodologies. Despite these obstacles, the evidence suggests that, with appropriate strategies, SMEs can successfully leverage agile practices to enhance their resilience, enabling them to thrive in dynamic and uncertain market conditions.

3.2 Challenges in Implementing Agile Practices for SMEs: Identification of challenges faced by SMEs when adopting agile practices, including organizational resistance to change, limited digital infrastructure, and resource constraints

Small and medium-sized enterprises (SMEs) face unique challenges when adopting agile practices due to their limited resources and often rigid organizational structures. While agile methodologies offer significant potential benefits—such as increased adaptability, faster response times, and enhanced customer focus—implementing these practices within SMEs can be hampered by factors such as organizational resistance to change, limited digital infrastructure, and resource constraints. This section examines these key challenges, exploring their implications and offering insight into the complexities SMEs encounter in agile transformations.

Organizational resistance to change is one of the most prominent barriers SMEs face when implementing agile methodologies. Agile practices require a shift from traditional hierarchical management structures to more flexible, team-centered approaches, which can be met with reluctance, particularly in SMEs where established roles and workflows are deeply ingrained. Employees may feel uncertain or skeptical about new processes, particularly if they perceive agile practices as a disruption to familiar workflows or as threatening job security. According to Conforto and Amaral (2016), resistance to agile transformation is often fueled by a lack of understanding of agile's value and the perception that it may lead to increased workload or job redundancy. Without effective change management strategies, this resistance can undermine the benefits of agile practices by creating friction within teams, slowing down processes, and reducing overall productivity. SMEs must, therefore, invest in training and change management initiatives to foster a culture of openness and adaptability if they are to successfully implement agile frameworks.

Another significant challenge for SMEs is their limited digital infrastructure, which is essential for supporting agile practices. Agile methodologies rely on a range of digital tools for real-time communication, task management, data analysis, and customer engagement, all of which can facilitate the iterative and responsive processes that define agile practices. However, many SMEs lack the budget or expertise needed to establish and maintain such infrastructure. As highlighted by Sivarajah et al. (2017), access to digital technologies is often restricted in SMEs, particularly those operating in traditional industries that may have historically depended on manual processes. This technological gap restricts SMEs' ability to fully integrate agile methodologies, as the absence of reliable digital infrastructure can hinder collaboration, delay decision-making, and limit access to real-time data insights. Without these digital resources, the potential for agile practices to enhance SME resilience is substantially diminished, underscoring the need for investment in digital infrastructure as a foundational aspect of agile transformation.

Resource constraints, both financial and human, present another substantial hurdle for SMEs adopting agile practices. Unlike larger organizations, SMEs often operate with limited budgets and smaller, specialized teams, which can restrict their capacity to experiment with new methodologies. Agile practices require investments in training, software, and often a restructuring of internal processes, all of which may be financially prohibitive for SMEs. Furthermore, SMEs may lack the skilled personnel needed to facilitate an agile transformation, as hiring specialized agile coaches or consultants may exceed available resources. Gren, Torkar, and Feldt (2017) discuss the importance of expertise in agile methodologies, emphasizing that a lack of agile-specific knowledge can lead to poor implementation and potentially derail efforts to increase adaptability. For SMEs, the financial burden associated with agile adoption can discourage investment in these practices, particularly if the anticipated return on investment is uncertain. Consequently, resource constraints not only limit SMEs' initial access to agile practices but also hinder their ability to sustain these methodologies over time, reducing the long-term impact of agile transformation efforts.

Moreover, the lack of agile-specific training and knowledge within SMEs compounds these challenges, as employees and managers alike may be unfamiliar with the principles and processes of agile frameworks. Without sufficient guidance, agile practices can be inconsistently applied, leading to confusion and inefficiencies. In SMEs, where teams are often lean and multifunctional, the absence of clear, structured training can lead to role ambiguity and a lack of cohesion, further complicating agile adoption. Wenzel, Stanske, and Lieberman (2020) highlight the importance of clear role delineation and training in successful agile transformations, noting that a well-defined implementation strategy is essential for SMEs to avoid misunderstandings and ensure that agile principles are applied consistently across the organization.

While agile practices offer numerous potential advantages for SMEs, the challenges associated with their implementation are significant. Organizational resistance to change, limited digital infrastructure, resource constraints, and a lack of agile-specific expertise present formidable obstacles for SMEs aiming to adopt agile methodologies. To overcome these barriers, SMEs may need to prioritize investments in digital infrastructure, seek external support in the form of agile training or consultancy, and foster a culture of openness and adaptability within their organizations. Although the transition to agile practices may be demanding, the potential for enhanced resilience, customer responsiveness, and operational flexibility underscores the strategic value of agility for SMEs navigating dynamic and uncertain market conditions.

3.3 Strategic Solutions for Overcoming Challenges: Insights into strategies and best practices for overcoming these barriers, such as incremental implementation, investment in technology, fostering a culture of innovation, and building partnerships

For small and medium-sized enterprises (SMEs), adopting agile practices presents substantial benefits, yet it is often fraught with challenges such as organizational resistance, limited digital infrastructure, and resource constraints. To navigate these barriers effectively, SMEs can implement strategic solutions that facilitate agile transformation. Key approaches include incremental implementation, targeted investment in technology, fostering a culture of innovation, and building external partnerships. Each of these strategies addresses specific challenges inherent in agile adoption, providing a pathway for SMEs to enhance their resilience and adaptability in dynamic business environments.

Incremental implementation is an effective strategy for SMEs transitioning to agile methodologies, particularly when organizational resistance is present. By adopting agile practices in stages, SMEs can introduce these changes gradually, allowing employees to acclimate to new processes without overwhelming them. This incremental model enables organizations to focus on one area at a time, such as project management or customer feedback integration, before expanding agile practices across other departments. This approach not only reduces resistance but also allows SMEs to identify and address challenges on a smaller scale, facilitating smoother transitions and setting a foundation for comprehensive agile integration over time.

Investing in technology is another critical strategy for overcoming the infrastructural challenges associated with agile transformation. Agile methodologies rely on digital tools to enhance communication, streamline workflows, and gather customer insights—capabilities that are crucial for iterative development and responsive adjustments. While the initial cost may be a deterrent, the long-term benefits of improved efficiency and resilience justify the investment, particularly in competitive markets. For example, cloud-based project management tools enable SMEs to implement agile practices by providing flexible, scalable solutions for task coordination and progress tracking. Furthermore, investing in digital infrastructure not only enhances operational agility but also positions SMEs to leverage advanced technologies such as artificial intelligence (AI) and machine learning, which further support agile adaptation and innovation.

Fostering a culture of innovation within SMEs is equally essential for agile success. Agile practices thrive in environments where experimentation and continuous improvement are encouraged. However, achieving this cultural shift requires commitment from leadership to promote agile values, such as openness to change, collaboration, and a customer-first mentality. Fostering a culture of innovation involves empowering employees to take ownership of projects and make decisions autonomously within the agile framework. Such empowerment can alleviate resistance to change by engaging employees in the agile process, making them active participants rather than passive recipients of new methodologies. Moreover, this cultural transformation requires training programs that provide employees with the necessary skills to navigate agile processes effectively. By instilling an innovation-focused mindset, SMEs can enhance their adaptability, ensuring that agile practices are not only implemented but also sustained through an engaged and proactive workforce.

Building partnerships and leveraging external resources offer additional support for SMEs aiming to adopt agile practices. Given the limited resources often available to SMEs, forming strategic alliances with technology providers, consultants, or other SMEs can provide access to expertise and tools that might otherwise be unattainable. Partnerships can facilitate agile adoption by providing SMEs with insights into best practices, access to specialized software, or guidance on overcoming specific challenges. Strategic alliances, such as collaborations with technology firms, can streamline digital transformation by offering SMEs access to affordable software solutions or training resources. Such alliances not only mitigate the financial burden associated with agile adoption but also enable SMEs to learn from the experiences of partners, thus accelerating the learning curve associated with agile practices. These partnerships further promote an ecosystem of support where SMEs can collectively navigate the complexities of agile transformation.

Adopting agile practices within SMEs involves navigating a complex landscape of challenges; however, strategic solutions provide a pathway for successful transformation. Incremental implementation addresses organizational resistance by allowing gradual adaptation, while investment in digital infrastructure enables SMEs to support agile methodologies effectively. Fostering a culture of innovation ensures that employees are engaged in the agile process and motivated to drive continuous improvement. Finally, building partnerships provides SMEs with access to resources and expertise that bolster their capacity for agility. Collectively, these strategies enhance the feasibility of agile practices within SMEs, equipping them to respond dynamically to market shifts and sustain resilience in the face of economic uncertainties.

4 Future Directions

4.1 Emerging Trends in Agile Practices for Resilience: Speculation on future trends in agile practices for SMEs, such as the use of artificial intelligence for adaptive decision-making, flexible workforce models, and increasing reliance on data-driven insights

As the business environment continues to evolve, so do agile practices, particularly within small and medium-sized enterprises (SMEs) that seek to enhance resilience against unforeseen disruptions. The future of agile methodologies in SMEs is increasingly shaped by advancements in technology, changing workforce dynamics, and the growing emphasis on data-driven decision-making. Emerging trends in agile practices, such as the integration of artificial intelligence (AI) for adaptive decision-making, the adoption of flexible workforce models, and a heightened reliance on data-driven insights, offer promising avenues for strengthening resilience. This section speculates on these future directions, providing insights into how these trends could transform agile practices within SMEs and ensure they remain competitive in rapidly changing markets.

Artificial intelligence is anticipated to play a central role in the future of agile practices by enabling SMEs to make more adaptive, data-informed decisions. AI technologies, such as machine learning and natural language processing, allow organizations to analyze vast quantities of data, identify patterns, and make predictive insights with a speed and

accuracy beyond human capabilities. By embedding AI into agile processes, SMEs can enhance their ability to anticipate and respond to market shifts, customer preferences, and potential operational disruptions (Sivarajah et al., 2017). For instance, AI-powered analytics tools could provide SMEs with real-time data on customer behavior, allowing agile teams to adjust products and services accordingly. Moreover, AI can support agile project management by automating routine tasks, freeing up human resources to focus on strategic innovation. In doing so, AI fosters a more agile, adaptive decision-making framework that enables SMEs to pivot rapidly in response to environmental changes, thus bolstering resilience.

Flexible workforce models are another emerging trend likely to influence agile practices in SMEs, particularly in response to the global shift toward remote and hybrid work. The COVID-19 pandemic accelerated the adoption of flexible work arrangements, demonstrating that agile methodologies can be effectively implemented in dispersed teams. Going forward, SMEs are expected to increasingly rely on flexible workforce models, which enable them to assemble cross-functional teams on demand, regardless of geographic location (Rigby, Sutherland & Takeuchi, 2020). By leveraging digital collaboration tools, SMEs can tap into a global talent pool, enabling them to build specialized, agile teams for specific projects. This flexibility not only enhances the diversity of skills available to SMEs but also allows for rapid scaling of operations in response to fluctuating demand. Flexible workforce models further support agile practices by fostering a culture of autonomy and accountability, as team members take on greater responsibility for their roles within an adaptive, decentralized structure.

In addition to AI and flexible workforce models, the future of agile practices in SMEs will be shaped by a growing reliance on data-driven insights. Agile methodologies are fundamentally iterative and rely on feedback loops to refine processes and outcomes. The proliferation of data analytics tools allows SMEs to gather and analyze data at every stage of their agile projects, providing actionable insights that enhance responsiveness and strategic decision-making (Ghezzi & Cavallo, 2020). For instance, data analytics can support agile teams by identifying inefficiencies, monitoring project performance in real-time, and predicting potential risks. By embedding data-driven decision-making into agile practices, SMEs can ensure that their strategies are informed by accurate, up-to-date information, which is crucial for maintaining resilience in volatile markets. Furthermore, data-driven insights facilitate continuous improvement, enabling agile teams to learn from past projects and optimize their processes over time.

Another significant development in agile practices is the integration of customer-centric innovation, supported by digital platforms that allow for direct, real-time customer engagement. SMEs increasingly recognize that resilience is strengthened not only by internal adaptability but also by the ability to respond to external customer demands swiftly. Emerging digital platforms enable SMEs to gather instant feedback from customers, integrate this feedback into agile workflows, and iterate on products or services in near real-time. By maintaining a customer-centric focus, SMEs can ensure that their offerings remain relevant and aligned with market demands, which is critical for sustaining competitive advantage. This trend toward customer-centric agility reinforces the iterative nature of agile practices and allows SMEs to cultivate stronger, more resilient customer relationships in a digital-first economy.

Finally, as agile practices continue to evolve, there is a growing focus on sustainable agility—an approach that prioritizes long-term resilience alongside rapid responsiveness. Sustainable agility emphasizes practices that support both immediate adaptability and enduring resilience, encouraging SMEs to adopt agile methods that are environmentally and socially conscious. For example, incorporating sustainable business practices within agile frameworks, such as lean production and waste minimization, allows SMEs to contribute to broader environmental goals while also enhancing operational efficiency. This trend is reflective of a broader shift toward corporate social responsibility within agile methodologies, as SMEs increasingly recognize that long-term resilience is supported by practices that align with societal values and environmental sustainability. By integrating sustainable agility into their operations, SMEs not only enhance their resilience but also strengthen their brand reputation and align with evolving consumer preferences.

Emerging trends in agile practices, including the use of AI for adaptive decision-making, flexible workforce models, increased reliance on data-driven insights, customer-centric innovation, and sustainable agility, are shaping the future of resilience in SMEs. These advancements are expected to enhance the capacity of SMEs to respond dynamically to environmental changes, ensuring that agile practices remain a cornerstone of SME competitiveness and resilience. As these trends continue to evolve, SMEs that embrace these innovations will be better positioned to navigate the complexities of the modern business landscape, maintaining adaptability and resilience in the face of ongoing disruption.

4.2 Opportunities for Enhancing SME Resilience: Exploration of opportunities for SMEs to strengthen resilience through agile practices, including cross-sector collaborations, access to digital transformation funding, and training programs focused on agility and change management

The dynamic nature of modern business environments necessitates that small and medium-sized enterprises (SMEs) seek innovative ways to strengthen their resilience. Agile practices provide SMEs with a robust framework for adaptability, allowing them to respond effectively to changes and disruptions. Future opportunities to enhance SME resilience through agile methodologies include fostering cross-sector collaborations, accessing digital transformation funding, and implementing training programs focused on agility and change management. These strategies can empower SMEs to build sustainable resilience and improve their capacity to thrive in increasingly volatile markets.

Cross-sector collaborations present a significant opportunity for SMEs to amplify their resilience through shared expertise, resources, and innovative practices. By partnering with organizations across various industries, SMEs can gain access to specialized knowledge and technologies that support agile methodologies. Such collaborations enable SMEs to adopt best practices from other sectors, fostering a cross-pollination of ideas that can lead to new, adaptive solutions for business challenges. According to Ghezzi and Cavallo (2020), cross-sector partnerships allow SMEs to leverage the strengths of larger or more technologically advanced firms, facilitating access to digital tools and methodologies that might otherwise be beyond their reach. For instance, collaborations between SMEs and technology firms can help SMEs integrate digital tools that support agile processes, such as cloud-based project management and data analytics platforms. These alliances also provide SMEs with a broader network of support, which can be crucial in times of crisis, allowing them to respond more effectively to disruptions through pooled resources and shared strategies.

Access to digital transformation funding is another vital opportunity that can empower SMEs to implement agile practices and enhance their resilience. Many SMEs struggle to adopt digital tools due to budget constraints, limiting their ability to integrate agile methodologies fully. Digital transformation funding, often provided by government programs or private grants, offers SMEs the financial support needed to invest in technologies that enable agile operations. This funding can be directed toward purchasing software, upgrading infrastructure, or training employees in digital and agile competencies. Sivarajah et al. (2017) argue that financial support for digital transformation is essential for SMEs aiming to remain competitive, as it reduces the technological gap between small and large enterprises. By accessing digital transformation funding, SMEs can establish a strong digital foundation that supports agility, allowing them to respond swiftly to market changes and operate efficiently. Furthermore, funding initiatives dedicated to fostering innovation can provide SMEs with resources for research and development, encouraging agile-driven experimentation and continuous improvement within their operations.

Training programs focused on agility and change management represent an additional avenue through which SMEs can reinforce their resilience. Agile practices require a shift in organizational culture toward flexibility, collaboration, and a willingness to embrace change. However, without proper training, SMEs may struggle to implement these changes effectively. Comprehensive training programs can equip employees with the skills needed to navigate agile frameworks, understand iterative development, and adapt to new roles within a flexible organizational structure. Rigby, Sutherland, and Takeuchi (2020) suggest that investing in training enhances the success of agile transformations, as it ensures that employees are knowledgeable about agile principles and can apply them effectively within their workflows. Moreover, training programs that focus on change management can reduce resistance to agile practices by fostering a culture that values adaptability and continuous learning. In this way, SMEs can create a workforce that is not only skilled in agile methodologies but also resilient in the face of operational shifts and industry changes.

In addition to fostering internal resilience, training programs focused on agile and change management can also enhance customer relationships, which are essential for SME sustainability. Agile practices emphasize customer-centricity, and well-trained employees are better equipped to respond to customer feedback quickly and effectively. As a result, SMEs can maintain strong customer engagement by offering tailored solutions that meet evolving customer needs. This customer-focused agility reinforces the organization's market position and builds long-term resilience by creating a loyal customer base that is less susceptible to market shifts.

Looking ahead, the continued growth of digital ecosystems and industry-specific funding programs is likely to provide additional opportunities for SMEs to bolster their resilience through agile practices. Government policies increasingly recognize the importance of SME digital transformation, leading to more funding and support initiatives. Furthermore, the rise of industry-specific digital ecosystems provides SMEs with platforms that facilitate collaborative innovation and resource-sharing, amplifying the impact of agile practices. By participating in these digital ecosystems, SMEs can

access a wealth of data and tools that support agile processes, such as real-time analytics, collaborative project management software, and customer engagement platforms. These digital resources can enable SMEs to operate more efficiently, respond to changes proactively, and innovate in alignment with industry trends.

In summary, the future of agile practices in SMEs is shaped by opportunities that support resilience through cross-sector collaborations, digital transformation funding, and targeted training programs. Cross-sector collaborations provide SMEs with access to expertise and technologies, enhancing their ability to adopt agile methodologies effectively. Digital transformation funding reduces financial barriers, enabling SMEs to invest in critical technologies that support agile operations. Lastly, training programs focused on agility and change management equip employees with the skills needed to embrace agile frameworks and foster a resilient organizational culture. Collectively, these opportunities underscore the potential for agile practices to drive sustainable resilience in SMEs, positioning them to succeed in a rapidly changing global market.

5 Conclusion

The exploration of agile practices in small and medium-sized enterprises (SMEs) reveals both the transformative potential and the inherent challenges associated with agile methodologies in dynamic business environments. Agile practices, known for their focus on adaptability, rapid iteration, and responsiveness to customer needs, are increasingly recognized as valuable strategies for SMEs aiming to enhance resilience and maintain competitiveness. This analysis has highlighted the key benefits agile practices offer, such as heightened adaptability, accelerated recovery from disruptions, cost efficiencies, and improved customer satisfaction. These benefits collectively strengthen the capacity of SMEs to withstand external shocks and adapt swiftly to changing market conditions, underscoring the critical role agility plays in sustaining growth and innovation.

Despite the numerous advantages, the adoption of agile practices in SMEs is often impeded by several challenges. Resistance to change within organizational structures, limitations in digital infrastructure, and restricted financial resources are common obstacles that SMEs face. These challenges can hinder the effective implementation of agile practices, particularly when there is a lack of skilled personnel or technology to support agile methodologies. Such limitations highlight the need for SMEs to develop tailored strategies that address these unique constraints, including incremental implementation, strategic investment in digital tools, and fostering a supportive, innovation-focused organizational culture. Addressing these barriers is essential to unlocking the full potential of agile practices and enabling SMEs to build sustainable resilience.

Emerging trends further indicate promising directions for agile practices in SMEs, particularly as technological advancements reshape the possibilities for adaptive decision-making and process innovation. The integration of artificial intelligence for data-driven insights, the adoption of flexible workforce models, and the growing reliance on real-time analytics are likely to enhance the adaptability and responsiveness of SMEs. These trends point toward a future where agile practices are not only more accessible to SMEs but also more effective in supporting resilience through intelligent, scalable solutions. Additionally, opportunities such as cross-sector collaborations, access to digital transformation funding, and targeted training programs focused on agility and change management create pathways for SMEs to overcome existing barriers and deepen their commitment to agile methodologies.

Ultimately, the benefits, challenges, and future opportunities associated with agile practices underscore their transformative potential in strengthening SME resilience. Agile methodologies empower SMEs to move beyond traditional hierarchical models, embracing a more flexible, customer-centric approach that allows for continuous adaptation to changing circumstances. By fostering a culture of innovation and encouraging collaboration, agile practices enable SMEs to harness their unique strengths while mitigating vulnerabilities. The ability to respond effectively to economic shocks, shifts in consumer preferences, and technological changes is becoming increasingly valuable for SMEs in a globalized market where competition is intensifying.

As SMEs continue to integrate agile practices, it is evident that both strategic planning and investment are required to fully realize the advantages of these methodologies. Leaders in SMEs must prioritize fostering an organizational culture that values agility, empowering employees at all levels to embrace iterative processes and adaptive thinking. Moreover, the successful implementation of agile practices requires a commitment to continuous learning, as agile methodologies evolve alongside technological advancements and shifting business priorities. For SMEs, maintaining this commitment will ensure that agility is not merely a set of practices but a core organizational philosophy that drives resilience and long-term success.

The adoption of agile practices represents a significant opportunity for SMEs to build resilience, foster innovation, and secure a competitive edge in volatile markets. While challenges remain, the strategic solutions and emerging trends identified in this analysis provide a roadmap for SMEs seeking to navigate these complexities. As digital transformation accelerates and market demands evolve, SMEs that embrace agile practices will be better equipped to adapt, thrive, and create lasting value for their customers and stakeholders. This journey toward agility demands both perseverance and foresight, but for SMEs committed to building resilience, the rewards are substantial and far-reaching. The future of agile practices in SMEs, therefore, holds immense promise, offering a framework through which these enterprises can continuously grow, innovate, and contribute meaningfully to the broader economic landscape.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

- [1] Bartik, A.W., Bertrand, M., Cullen, Z., Glaeser, E.L., Luca, M. and Stanton, C., 2020. The impact of COVID-19 on small business outcomes and expectations. *Proceedings of the national academy of sciences*, 117(30), pp.17656-17666. DOI: 10.1073/pnas.2006991117.
- [2] Bhamu, J. and Singh Sangwan, K., 2014. Lean manufacturing: literature review and research issues. *International Journal of Operations & Production Management*, 34(7), pp.876-940. DOI: 10.1108/01443571411267750.
- [3] Bourletidis, K. and Triantafyllopoulos, Y., 2014. SMEs survival in time of crisis: strategies, tactics and commercial success stories. *Procedia-Social and Behavioral Sciences*, 148, pp.639-644. doi.org/10.1016/j.sbspro.2014.07.092
- [4] Brown, R. and Mason, C., 2017. Looking inside the spiky bits: a critical review and conceptualisation of entrepreneurial ecosystems. *Small business economics*, 49, pp.11-30. doi.org/10.1007/s11187-017-9865-7
- [5] Cohn, M., 2010. *Succeeding with agile: software development using Scrum*. Pearson Education.
- [6] Conforto, E.C. and Amaral, D.C., 2016. Agile project management and stage-gate model—A hybrid framework for technology-based companies. *Journal of Engineering and Technology Management*, 40, pp.1-14. DOI: 10.1016/j.jengtecman.2016.02.003.
- [7] Cooper, R.G. and Sommer, A.F., 2016. Agile-Stage-Gate: New idea-to-launch method for manufactured new products is faster, more responsive. *Industrial Marketing Management*, 59, pp.167-180. DOI: 10.1080/08956308.2018.1421380.
- [8] Denning, S., 2018. *The age of agile: How smart companies are transforming the way work gets done*. Amacom.
- [9] Dingsøy, T., Moe, N.B., Fægri, T.E. and Seim, E.A., 2018. Exploring software development at the very large-scale: a revelatory case study and research agenda for agile method adaptation. *Empirical Software Engineering*, 23, pp.490-520.
- [10] Drury-Grogan, M.L., Conboy, K. and Acton, T., 2017. Examining decision characteristics & challenges for agile software development. *Journal of Systems and Software*, 131, pp.248-265. DOI: 10.1016/j.jss.2016.08.049.
- [11] Eggers, F., 2020. Masters of disasters? Challenges and opportunities for SMEs in times of crisis. *Journal of business Research*, 116, pp.199-208. doi.org/10.1016/j.jbusres.2020.05.025
- [12] Ghezzi, A. and Cavallo, A., 2020. Agile business model innovation in digital entrepreneurship: Lean startup approaches. *Journal of business research*, 110, pp.519-537. DOI: 10.1016/j.jbusres.2018.06.013.
- [13] Gren, L., Torkar, R. and Feldt, R., 2017. Group development and group maturity when building agile teams: A qualitative and quantitative investigation at eight large companies. *Journal of Systems and Software*, 124, pp.104-119. DOI: 10.1016/j.jbusres.2018.06.013.

- [14] Ivanov, D. and Dolgui, A., 2020. Viability of intertwined supply networks: extending the supply chain resilience angles towards survivability. A position paper motivated by COVID-19 outbreak. *International journal of production research*, 58(10), pp.2904-2915. DOI: 10.1080/00207543.2020.1750727.
- [15] Liker, J.K. and Convis, G.L., 2012. *The Toyota way to lean leadership: Achieving and sustaining excellence through leadership development*. (No Title).
- [16] Linnenluecke, M.K., 2017. Resilience in business and management research: A review of influential publications and a research agenda. *International journal of management reviews*, 19(1), pp.4-30. doi.org/10.1111/ijmr.12076
- [17] Manifesto, A., 2001. *Manifesto for agile software development*.
- [18] Rigby, D., Elk, S. and Berez, S., 2020. *Doing agile right: Transformation without chaos*. Harvard Business Press.
- [19] Rigby, D.K., Sutherland, J. and Noble, A., 2018. Agile at scale. *Harvard business review*, 96(3), pp.88-96.
- [20] Ritter, T. and Pedersen, C.L., 2020. Digitization capability and the digitalization of business models in business-to-business firms: Past, present, and future. *Industrial marketing management*, 86, pp.180-190. doi.org/10.1016/j.indmarman.2019.11.019
- [21] Sivarajah, U., Kamal, M.M., Irani, Z. and Weerakkody, V., 2017. Critical analysis of Big Data challenges and analytical methods. *Journal of business research*, 70, pp.263-286.
- [22] Teece, D.J., 2018. Dynamic capabilities as (workable) management systems theory. *Journal of Management & Organization*, 24(3), pp.359-368. DOI: 10.1017/jmo.2017.75.
- [23] Wenzel, M., Stanske, S. and Lieberman, M.B., 2020. Strategic responses to crisis. *Strategic Management Journal*, 41(7/18), p.3161. DOI: 10.1002/smj.3170.
- [24] Williams, T.A., Gruber, D.A., Sutcliffe, K.M., Shepherd, D.A. and Zhao, E.Y., 2017. Organizational response to adversity: Fusing crisis management and resilience research streams. *Academy of management annals*, 11(2), pp.733-769.
- [25] Womack, J.P. and Jones, D.T., 1997. Lean thinking—banish waste and create wealth in your corporation. *Journal of the operational research society*, 48(11), pp.1148-1148.