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NAVIGATING UNCERTAINTY: DISASTER RISK MANAGEMENT AND RESILIENCE IN MALAYSIAN SMALL AND MEDIUM ENTERPRISES

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Abstract: *Small and Medium Enterprises (SMEs) constitute a crucial sector of Malaysia's economy, contributing approximately 38.9% to the nation's GDP and employing a substantial portion of the workforce. However, these enterprises face significant vulnerabilities to natural disasters, including floods, landslides, and haze incidents, which threaten their operational continuity and long-term sustainability. This study examines the multifaceted determinants influencing disaster risk management (DRM) adoption among Malaysian SMEs through a comprehensive conceptual framework. Drawing from established theoretical foundations including Protection Motivation Theory, Adaptive Capacity Theory, Institutional Theory, and Resource-Based View Theory, our framework integrates three interconnected components: input factors (organizational characteristics, technological capabilities, institutional support mechanisms, and financial resources), process factors (risk assessment and preparedness planning, response strategies, and monitoring and evaluation), and outcome factors (effectiveness of DRM practices, business continuity, and overall resilience). The framework provides a holistic lens to analyse the complex interplay between these factors, informing evidence-based policymaking, targeted support mechanisms, and capacity-building initiatives. This research contributes to the body of knowledge in disaster management, organizational*

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resilience, and SME development, serving as a foundation for future empirical research and practical applications aimed at enhancing the disaster resilience of Malaysian SMEs in an increasingly unpredictable business environment.

Keywords: *Disaster Risk Management, SMEs Malaysia, Organizational Resilience, Business Continuity, Natural Hazards, Risk Assessment*

Introduction

In an era characterized by escalating environmental challenges and climatic unpredictability, Small and Medium Enterprises (SMEs) in Malaysia face significant vulnerabilities alongside opportunities for transformation. The increasing frequency and intensity of natural disasters—such as devastating floods, treacherous landslides, and pervasive haze incidents—have highlighted the fragility of businesses in this dynamic economic landscape. Contributing approximately 38.9% to the nation's GDP and employing a substantial portion of the workforce, Malaysian SMEs are crucial to the country's economic resilience (SME Corp. Malaysia, 2020).

However, the potential of the SME sector is consistently threatened by the mounting risks associated with natural hazards. This situation necessitates a sophisticated, multifaceted approach to Disaster Risk Management (DRM) that transcends traditional reactive strategies, embracing proactive and comprehensive risk mitigation (Z. Auzzir, Haigh, & Amaratunga, 2018; Z. A. Auzzir, 2019). The complexity of DRM in Malaysia arises from multiple interconnected factors, including organizational characteristics, regulatory frameworks, resource accessibility, and cultural perceptions of risk. Many SMEs operate without robust risk assessment mechanisms, leaving them vulnerable to catastrophic disruptions that can undermine years of entrepreneurial investment (Z. A. Auzzir, 2019; Koporcic, Kukkamalla, Markovic, & Maran, 2025).

Historical events, such as the catastrophic floods of 2021 and recurring haze incidents from agricultural fires, underscore the critical nature of this challenge. These events illustrate that such challenges are not isolated environmental phenomena but significant economic disruptions, reinforcing the urgent need for a comprehensive DRM framework that integrates risk reduction, preparedness, response, and recovery strategies (Koporcic et al., 2025; Rosmadi, Ahmed, Mokhtar, & Lim, 2023; Shukri et al., 2023). Effective DRM among Malaysian SMEs is nuanced and multifaceted. Key barriers include limited organizational knowledge, constrained financial resources, and insufficient institutional support for implementing robust risk management practices (Lestari, Abd Hamid, Shamsuddin, Kurniasari, & Yaacob, 2024; Raikes, Smith, Baldwin, & Henstra, 2021; Rosmadi et al., 2023). This research aims to illuminate these complex dynamics, offering insights that can transform vulnerability into strategic resilience.

The study's objectives address critical knowledge gaps: first, to conduct a comprehensive analysis of current DRM practices within the SME sector; second, to identify key drivers facilitating the adoption of effective risk management strategies; and third, to develop a conceptual framework guiding policymakers, practitioners, and business leaders in enhancing sectoral resilience.

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Beyond academic discourse, this investigation has profound implications for national economic strategy. By understanding the intricate mechanisms influencing disaster risk management, stakeholders can develop targeted interventions that strengthen the SME ecosystem (Ibrahim, Salifu, & Peprah, 2023). These efforts aim not only to protect individual businesses but also to fortify the broader economic infrastructure against increasingly unpredictable environmental challenges (Koporcic et al., 2025; Manas, Zakuan, Saman, & Setapa, 2024).

The importance of this research extends beyond immediate risk mitigation; it represents a critical step toward creating a more adaptive and responsive economic model that recognizes uncertainty as an inherent characteristic of contemporary business environments (Koporcic et al., 2025; Manas et al., 2024). By fostering a culture of proactive risk management, Malaysian SMEs can transform potential vulnerabilities into opportunities for innovation and strategic adaptation (Z. Auzzir et al., 2018; Manas et al., 2024; Rosmadi et al., 2023).

The path to enhanced disaster resilience is complex, requiring a holistic approach that integrates technological innovation, policy development, organizational learning, and cultural transformation (Manas et al., 2024; Rosmadi et al., 2023). For Malaysian SMEs, this journey represents both a challenge and an extraordinary opportunity to redefine economic sustainability amid unprecedented environmental uncertainty. By embracing sophisticated DRM strategies, these enterprises can protect themselves against potential disruptions and contribute to a more robust national economic framework. The future of Malaysia's economic resilience lies in the hands of its SMEs; their ability to anticipate, prepare for, and respond effectively to emerging risks will be pivotal in navigating the uncertain terrain of the 21st century.

Problem Statement

In the dynamic landscape of emerging economies, SMEs stand as critical pillars of economic resilience and growth. Yet, these vital economic actors face a complex web of challenges that threaten their sustainability and long-term viability. Particularly in Malaysia, where SMEs constitute 97.2% of all business establishments and contribute 38.9% to the national GDP, the imperative of robust risk management has never been more crucial (Manas et al., 2024; SME Corp. Malaysia, 2020).

The fundamental challenge confronting Malaysian SMEs is the systemic vulnerability arising from inadequate risk management practices. This vulnerability is multifaceted, stemming from limited resources, insufficient knowledge of comprehensive risk management frameworks, and a critical lack of tailored guidelines that address the unique ecosystem of small businesses (Lestari et al., 2024; Rosmadi et al., 2023; Shukri et al., 2023). The consequences extend far beyond individual enterprises, potentially undermining broader economic stability and development(Lestari et al., 2024; Raikes et al., 2021).

Disaster risk emerges as a particularly significant threat to SME sustainability. Malaysia's geographical and climatic characteristics expose businesses to a range of natural hazards, including floods, earthquakes, and landslides. The 2021 floods serve as a stark illustration of the profound economic and social vulnerabilities faced by Malaysia, with devastating consequences that far exceeded initial estimates. According to the document, the flood losses

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in 2021 were substantially higher than the mentioned RM2.6 billion, with independent research suggesting potential losses of up to RM20 billion. The floods affected approximately 160,000 people across multiple states, with Selangor bearing the brunt of the damage, suffering losses of RM3.1 billion, including RM1 billion in housing damage and RM0.89 billion in manufacturing property losses (Rosmadi et al., 2023).

While the government has responded by establishing the National Disaster Management Agency (NADMA) in 2015 and implementing national resilience strategies, a critical gap persists in translating these macro-level initiatives into practical, actionable frameworks for Small and Medium Enterprises (SMEs). The research highlights significant challenges in disaster management, including inadequate coordination, limited manpower and assets, insufficient public awareness, and constrained institutional authority (Rosmadi et al., 2023; Shukri et al., 2023).

The complexity of risk management is further compounded by the intricate relationship between information governance and strategic decision-making. Poor information management can significantly impair an organization's ability to identify, assess, and respond to potential risks (Z. Auzzir et al., 2018; Lestari et al., 2024). For SMEs operating with constrained resources, this challenge is particularly acute. They often lack the technical expertise and financial reserves necessary to develop sophisticated risk mitigation strategies, leaving them exceptionally vulnerable to operational disruptions and potential business failure (Habibi Rad, Mojtahedi, & Ostwald, 2021; Lestari et al., 2024; Raikes et al., 2021).

A holistic DRM approach emerges as a potential solution to these interconnected challenges. Such a framework would integrate comprehensive risk assessment, information governance principles, and adaptive strategies tailored to the specific context of SMEs in developing economies (Z. A. Auzzir, 2019; kumar Sahoo, Mohanty, & Mohanty, 2025; Supriadi, Sui Pheng, Supriadi, & Sui Pheng, 2018; Tehler et al., 2024). The objective is not merely to prevent disasters but to build organizational resilience—enabling businesses to anticipate, respond to, and recover from unexpected challenges.

Literature Review

Understanding the complex landscape of DRM in SMEs requires a nuanced, interdisciplinary approach that synthesizes theoretical perspectives from organizational behavior, environmental studies, and risk management sciences. The conceptual framework for comprehending SMEs' environmental investment and disaster resilience is rooted in multiple theoretical domains that illuminate the intricate decision-making processes and strategic behaviors of these critical economic entities. To provide a clear structure, this review first outlines the core theoretical foundations before examining the empirical literature on the specific factors influencing DRM.

Theoretical Foundations

The landscape of disaster risk management for Small and Medium Enterprises (SMEs) is inherently complex, demanding a multifaceted theoretical approach that can capture the nuanced interactions between organizational capabilities, environmental challenges, and strategic responses (Manas et al., 2024). Understanding these intricate dynamics requires a sophisticated theoretical lens that goes beyond simplistic linear models of risk management.

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The Protection Motivation Theory (PMT) emerges as a foundational framework, offering deep insights into how organizations perceive and process potential threats. Originating from psychological research on individual risk perception, this theory provides a powerful lens for understanding organizational decision-making processes. In research focused on flood risks, the PMT has been used to explore why people living in flood-prone areas either decide to take protective actions or refrain from doing so. Studies indicate that coping appraisal, especially factors like self-efficacy (the belief in one's ability to perform a behaviour) and response efficacy (the belief that the behaviour will effectively reduce risk), is a stronger motivator for taking protective actions than the assessment of threats (Bubeck, Botzen, Kreibich, & Aerts, 2013). When applied to SMEs, it reveals the complex cognitive mechanisms that drive risk management strategies. Businesses do not merely react to threats; they engage in sophisticated threat appraisals that weigh potential severity, likelihood, and available coping mechanisms.

Complementing this psychological perspective, Institutional theory introduces a broader contextual understanding. It illuminates how organizational practices are not developed in isolation but are profoundly shaped by external pressures and institutional environments (DiMaggio & Powell, 1983; Scott, 2008). For Malaysian SMEs, this means recognizing that risk management strategies are influenced by a complex interplay of regulatory frameworks, industry norms, and peer expectations (Baah et al., 2021; Caldera, Desha, & Dawes, 2019). The theory explains why some organizations adopt innovative risk management approaches while others remain constrained by traditional practices.

The Resource-Based View (RBV) adds another critical dimension to this theoretical exploration. It shifts the focus from external conditions to internal organizational capabilities, emphasizing that resilience is fundamentally about strategic resource deployment (Barney, 1991; Wernerfelt, 1984). This theory emphasizes the critical role of organizational resources and capabilities in the pursuit of environmental initiatives, suggesting that internal assets are pivotal in achieving sustainable outcomes (Alam, Du, Rahman, Yazdifar, & Abbasi, 2022; Baah et al., 2021). In the context of disaster risk management, RBV reveals how tangible and intangible resources—ranging from financial capital to organizational knowledge—become crucial determinants of an enterprise's ability to withstand and recover from potential disruptions (Koporcic et al., 2025; kumar Sahoo et al., 2025; Lestari et al., 2024).

While these theories provide robust lenses for analysis, their direct application to SMEs in developing economies reveals critical gaps. General models of organizational behaviour and strategy often presume a level of resource availability, formal planning structures, and stable institutional support that is absent for many SMEs in contexts like Malaysia (Hossain et al., 2022). Consequently, existing DRM frameworks may fail to capture the unique vulnerabilities and adaptive capacities of these enterprises, highlighting the need for an integrated model that is sensitive to the specific resource constraints and institutional realities they face. The journey of understanding disaster risk management is, at its core, a journey of understanding organizational potential. These theoretical perspectives invite us to look beyond traditional risk mitigation, toward a more dynamic vision of organizational capability - one that embraces complexity, values learning, and recognizes resilience as a continuous, creative process.

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Input Factors Influencing Disaster Risk Management in SMEs

DRM in SMEs is shaped by various input factors that influence their readiness and strength in facing potential disasters. These factors fall into four main categories: organizational characteristics, technological capabilities, institutional support mechanisms, and financial resources.

Organizational Characteristics

Organizational characteristics refer to the internal aspects of a business, including its culture, management commitment, and employee training. A strong organizational culture that prioritizes risk management is vital for encouraging employee involvement and preparedness. This commitment boosts DRM practices, as highlighted by research from Gabriel et al. (2019) and Dahl & Tschopp (2019). When management actively promotes preparedness, it creates an environment where employees are more likely to engage in risk mitigation efforts. This engagement ultimately strengthens resilience against disasters.

In Malaysia, the importance of these organizational characteristics is especially significant. SMEs with strong leadership commitment to risk management, comprehensive employee training programs, and clear risk management policies show enhanced disaster preparedness capabilities Raikes et al. (2021). For example, Zainuddin et al. (2022) found that SMEs with proactive cultures toward risk management can better anticipate and respond to possible hazards, thus minimizing the impacts of disasters on their operations.

Technological Capabilities

Technological capabilities are crucial in improving the effectiveness of DRM in SMEs. Utilizing advanced technologies for disaster risk assessments, early warning systems, and response strategies enhances data collection and analysis. The growing need for innovative solutions in disaster management, particularly in urban settings where traditional methods may be insufficient (Han & Zang, 2025). It highlights the integration of various technologies, which is often overlooked in existing research. These improvements allow SMEs to make informed decisions regarding disaster preparedness (Chan, Jalaluddin, & Asni, 2023). Therefore, Habibi Rad et al. (2021) highlighted six key research areas that represent the application of I4.0 technologies in disaster management: artificial intelligence (AI), big data analytics, the Internet of Things (IoT), prefabrication and modularization, robotics, and cyber-physical systems (CPS). Compared to traditional methods, these new approaches have several advantages, such as using machine learning and data analysis to identify risks, leveraging data from various sources to enhance understanding and response capabilities, and integrating physical processes with computation to enhance the intelligence and resilience of infrastructure.

However, the integration of technology into DRM practices presents challenges. Many Malaysian SMEs encounter obstacles such as high implementation costs, a lack of technical expertise, and limited technological infrastructure (Abdulaziz et al., 2023; Habibi Rad et al., 2021; kumar Sahoo et al., 2025; Lestari et al., 2024). The overall adoption rate of advanced technologies among Malaysian SMEs is approximately 20% across different sectors. This figure highlights a significant technological integration gap, indicating that the majority of Malaysian SMEs are still struggling to adopt and effectively implement advanced technological solutions in their risk management frameworks (Abdulaziz et al., 2023; Lestari et al., 2024).

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Institutional Support Mechanisms

Institutional support mechanisms, including government policies, funding programs, and training resources, are essential for helping SMEs implement effective DRM strategies. Raikes et al. (2021) reveals that traditional disaster management approaches are inadequate for addressing complex, systemic risks. Government practitioners emphasize the importance of integrating disaster risk reduction with human development by targeting vulnerabilities, enhancing community agency, and promoting cross-sector collaboration. Their study provides insights into mechanisms for developing more holistic, adaptive disaster risk institutional support mechanisms that considers social, economic, and environmental factors. In Malaysia, government initiatives like the SME Transformation Program are designed to offer the necessary infrastructure for SMEs to establish robust risk management frameworks (Z. A. Auzzir, 2019; Lestari et al., 2024; Manas et al., 2024).

Research highlights that access to training, funding, and resources from both governmental and non-governmental organizations significantly improves SMEs' ability to manage disaster risks effectively (Fuchs & Hager, 2020). By ensuring availability of essential resources and knowledge, institutional support mechanisms are pivotal in empowering SMEs to execute comprehensive DRM strategies (Ibrahim et al., 2023). Carrington, Ranse, and Hammad (2021) examines the impact of disasters on emergency department (ED) resources through the lens of the Sendai Framework for Disaster Risk Reduction, revealing significant challenges in patient transfers, building design, human resource management, communications, space utilization, equipment availability, and emergency power reliability. The study highlights the critical need for comprehensive disaster preparedness strategies and institutional support that address resource deficits and improve ED resilience.

Financial Resources

Financial resources and allocation significantly impact disaster risk reduction (DRR) by providing critical support mechanisms such as cash transfers, compensation for agricultural losses, and strategic funding to help victims and vulnerable populations recover from flood disasters. For example, Malaysia government allocated RM80 million in Budget 2022 to the Ministry of Agriculture and Food Industries (MAFI) for Tabung Bencana Pertanian and provides cash transfers to affected families (e.g., RM1,000 per family during recent floods), aim to build resilience, ensure food security, and enable rapid recovery by offering flexible financial assistance (Shukri et al., 2023). However, financial limitations significantly constrain effective DRM practices, with the allocation of resources heavily influenced by objective factors such as geographical flood risk exposure, historical vulnerability, and socio-economic indicators. Karim and Noy (2020) reveals that sub-districts with higher poverty rates and greater coastal flood risks are more likely to receive targeted disaster risk reduction funding, demonstrating a strategic approach to resource allocation that prioritizes areas of greatest vulnerability. Despite these targeted efforts, the persistent challenges of limited financial resources, which continue to impede comprehensive risk assessments and proactive disaster preparedness initiatives in developing regions (Karim & Noy, 2020; Lestari et al., 2024).

Financial literacy is a critical component for SMEs to enhance their resilience, particularly during economic crises, by enabling entrepreneurs to develop sustainable business strategies and effectively manage financial resources. A comprehensive framework that integrates five key competency areas: choice and use of financial services, financial and business

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management, risk and insurance, financial landscape, and financial resilience, with a specific focus on helping SMEs navigate economic uncertainties (Aassouli & Ahmed, 2023). The effective financial literacy programs should go beyond traditional financial education by incorporating digital literacy, sustainable finance considerations, and strategies for business model transition and revenue resilience. (Aassouli & Ahmed, 2023; kumar Sahoo et al., 2025). Therefore, addressing these financial constraints is critical for enabling SMEs to implement effective DRM practices and secure their long-term sustainability.

Process Factors in Disaster Risk Management for Malaysian SMEs

SMEs face complex challenges in managing disaster risks. Process factors are the key activities and policies that help these businesses handle potential disasters effectively. These factors influence how SMEs store resources, manage risks, respond to emergencies, and recover from unexpected events.

Risk Assessment and Preparedness Planning

Risk assessment forms the foundation of disaster management for SMEs. It's like creating a detailed map that helps businesses navigate potential hazards before they become critical problems. The process involves identifying possible disasters, estimating their potential impacts, and developing comprehensive preparedness plans. Rosmadi et al. (2023) emphasizes that effective risk assessment and preparedness planning requires a holistic approach addressing four critical challenges: inadequate coordination and communication, insufficient manpower and assets, limited public awareness, and constrained power and authority among local government agencies, with the ultimate goal of developing a more resilient and adaptive flood management strategy that integrates both structural and non-structural measures.

Tehler et al. (2024) examines 97 scientific methods for assessing disaster risks, revealing a fragmented research landscape with limited evidence of effectiveness. Most methods are developed in isolation, rarely building upon previous work, and lack robust evaluation of their practical utility. The authors argue for a more systematic, evidence-based approach to developing and validating disaster risk management methods. In the Malaysian context, SMEs must approach risk assessment systematically. This means carefully recognizing specific risks like floods, economic downturns, or technological failures (Z. Auzzir et al., 2018). Understanding the unique challenges is crucial. SMEs need to dig deep into their operational weaknesses, supply chain vulnerabilities, and workforce limitations (Alam et al., 2022; Z. Auzzir et al., 2018). By creating detailed plans that address these specific vulnerabilities, businesses can significantly improve their preparedness (Koporcic et al., 2025; Supriadi et al., 2018). When SMEs actively assess and plan for potential risks, they dramatically reduce recovery times and build resilience against unexpected disasters.

Response Strategies

Response strategies are the critical action plans that kick in during an actual disaster. These strategies are essentially the emergency playbook that keeps businesses functioning during challenging times. For SMEs, developing clear standard operating procedures for emergency response is absolutely essential. The key is creating a communication framework that ensures everyone knows their role and how to respond when disaster strikes. For example, the response strategies for flood risk management in Kumasi Metropolis pivot on a comprehensive governance-driven approach that emphasizes shifting from reactive to proactive institutional

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measures (PIMs), encompassing training, awareness, planning, infrastructure development, enforcement, and monitoring (Ibrahim et al., 2023).

Developing robust recovery strategies is equally important. SMEs must outline exactly how they'll restore operations after a major disruption. This involves carefully mapping out resource requirements, establishing realistic recovery timelines, and creating communication protocols (Lestari et al., 2024; Rosmadi et al., 2023). A well-designed communication policy ensures that employees, customers, and stakeholders stay informed during critical moments. Strong response frameworks not only help SMEs manage immediate disaster impacts but also build long-term organizational resilience (Koporcic et al., 2025; kumar Sahoo et al., 2025).

Monitoring and Evaluation

Monitoring and evaluation serve as the critical feedback mechanism in disaster risk management. Think of M&E as the organization's early warning system and continuous improvement tool. It helps SMEs track the effectiveness of their risk management plans, identifying what works and what needs adjustment. Ibrahim et al. (2023) examines governance principles shaping flood risk management in Kumasi, Ghana, revealing that while some proactive institutional measures exist, significant weaknesses in governance principles like transparency, accountability, and community participation undermine effective disaster risk reduction.

Implementing systematic tracking allows SMEs to create responsive and adaptive disaster management strategies. Feedback loops become crucial in this process, providing insights from employees and stakeholders about the effectiveness of existing practices. Regular assessments ensure that risk management processes remain relevant and effective, even as new challenges emerge (Koporcic et al., 2025). By focusing on continuous monitoring and evaluation, SMEs can significantly enhance their disaster preparedness, creating more robust and adaptable organizational systems. The complexity of disaster risk management requires SMEs to be proactive, strategic, and flexible. By focusing on comprehensive risk assessment, developing clear response strategies, and maintaining robust monitoring mechanisms, Malaysian SMEs can build resilience in an increasingly unpredictable business environment (Alam et al., 2022; Samuel, 2024; Tehler et al., 2024).

Outcome Factors in Disaster Risk Management for Malaysian SMEs

SMEs operate in a complex and dynamic business landscape that demands sophisticated approaches to disaster risk management. Outcome factors represent the critical results and impacts of DRM practices, providing a comprehensive assessment of an organization's ability to navigate and survive potential challenges. These factors serve as essential indicators of an SME's strategic effectiveness, organizational resilience, and long-term sustainability.

Effectiveness of DRM Practices

The effectiveness of DRM practices emerges as a primary indicator of an SME's operational robustness and strategic preparedness. Malaysia faces significant challenges in flood risk management due to inadequate coordination, limited resources, and low public awareness. Rosmadi et al. (2023) identifies four key problem areas: coordination issues, insufficient manpower and assets, poor public awareness, and limited institutional authority. The authors recommend a holistic approach involving improved institutional structures, capacity building,

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and community engagement to enhance flood disaster preparedness and response. This dimension goes beyond mere risk identification, focusing on an organization's capacity to minimize potential disaster impacts and enhance recovery mechanisms. Manas et al. (2024) highlight the critical role of Enterprise Risk Management (ERM) frameworks in determining organizational performance.

The effectiveness of DRM practices hinges on a holistic approach that integrates early warning systems, community preparedness, infrastructure resilience, and coordinated response efforts. Well-implemented policies that prioritize risk assessment, public education, and strategic resource allocation can significantly mitigate damage and loss of life during natural disasters, with success depending on the synergistic interaction of technological advancements, social capital, and targeted vulnerability reduction strategies (Samuel, 2024). Operational efficiency represents another critical indicator, evaluating an organization's capacity to maintain productivity levels during and after challenging circumstances (Koporcic et al., 2025; Lestari et al., 2024).

Empirical research consistently demonstrates that SMEs implementing comprehensive DRM strategies experience significantly reduced operational disruptions. These organizations develop a remarkable ability to navigate complex challenges, ultimately translating strategic preparedness into improved business performance and competitive advantage (Alam et al., 2022; Z. A. Auzzir, 2019; Koporcic et al., 2025; kumar Sahoo et al., 2025).

Business Continuity

Business continuity represents a critical outcome factor that reflects an SME's fundamental capacity to maintain core operations during and after potential disaster scenarios. Effective continuity planning ensures that essential organizational functions remain operational, minimizing potential revenue losses and maintaining stakeholder confidence (Supriadi et al., 2018).

SMEs that invest strategically in business continuity planning develop a significant competitive advantage. Supriadi et al. (2018) posits that Business Continuity Management (BCM) has transitioned from a technical disaster recovery framework into a comprehensive, strategic approach to organizational resilience. By prioritizing thorough risk evaluations, strategic planning, and ongoing adaptation, BCM equips organizations with a solid framework to ensure operational continuity amidst crises.

Key components of robust business continuity strategies include well-defined emergency response protocols that enable swift and organized reactions to unexpected events. Strategic resource allocation emerges as another crucial element, involving the intelligent deployment of personnel and financial assets during crisis periods (Z. A. Auzzir, 2019; Koporcic et al., 2025). Comprehensive communication plans further support these efforts, ensuring transparent and timely information dissemination to employees, customers, and other critical stakeholders.

Overall Resilience

Overall Resilience emerges as a dynamic, multifaceted approach that integrates disaster risk reduction with human development, characterized by adaptive capacity, stakeholder engagement, and a culture of continuous learning across social, economic, and organizational

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systems (Ibrahim et al., 2023; Manas et al., 2024; Raikes et al., 2021). This holistic framework emphasizes the critical importance of proactively addressing vulnerabilities, enhancing human agency, and developing collaborative governance mechanisms that enable communities and organizations to anticipate, respond to, and recover from complex, evolving risks while continuously improving their strategic capabilities (Raikes et al., 2021).

According to Lestari et al. (2024), SMEs maintained business resilience through two key strategies: first, by adopting technology and digital tools to adapt to changing market conditions and enhance operational flexibility, such as using e-commerce platforms, digital communication tools, and web portals for transactions. Second, SMEs leveraged government support, compliance cost management, and strategic resource reconfiguration to survive, with technology adoption serving as a critical moderating factor that enabled businesses to tap into digital consumer markets and ensure sales continuity during the crisis.

Koporcic et al. (2025) emphasizes that SMEs with higher resilience levels are better positioned to transform potential challenges into opportunities for growth and innovation. These organizations develop a dynamic approach to risk management that goes beyond mere survival, actively seeking opportunities for strategic development. The complex landscape of disaster risk management demands that Malaysian SMEs develop comprehensive, adaptive strategies. By focusing on DRM effectiveness, ensuring robust business continuity, and cultivating organizational resilience, businesses can create sustainable frameworks for navigating uncertain environments (Aassouli & Ahmed, 2023; Z. A. Auzzir, 2019; kumar Sahoo et al., 2025; Tehler et al., 2024).

Methodology

This study employs a conceptual research approach, utilizing a systematic review of existing literature as its primary methodology (Snyder, 2019). It does not involve the collection or analysis of new empirical data. The primary objective is to synthesize established theoretical foundations—including Protection Motivation Theory, Institutional Theory, and the Resource-Based View—with contemporary empirical findings from the fields of disaster management, organizational resilience, and SME development. By integrating these disparate streams of research, this paper develops a comprehensive conceptual framework tailored to the unique context of Malaysian SMEs. This framework is intended to serve as a robust foundation for future empirical research and to guide the development of evidence-based policies and practical interventions aimed at enhancing the disaster resilience of this vital economic sector (Snyder, 2019; Jaakkola, 2020).

Conceptual Framework for Disaster Risk Management in Malaysian SMEs

Based on the literature review, the conceptual framework for Disaster Risk Management (DRM) in Malaysian Small and Medium Enterprises (SMEs) can be organized into three main components: Input Factors, Process Factors, and Outcome Factors. Each of these components interacts dynamically to enhance the overall effectiveness of DRM practices, ultimately contributing to the resilience and sustainability of SMEs in the face of disasters.

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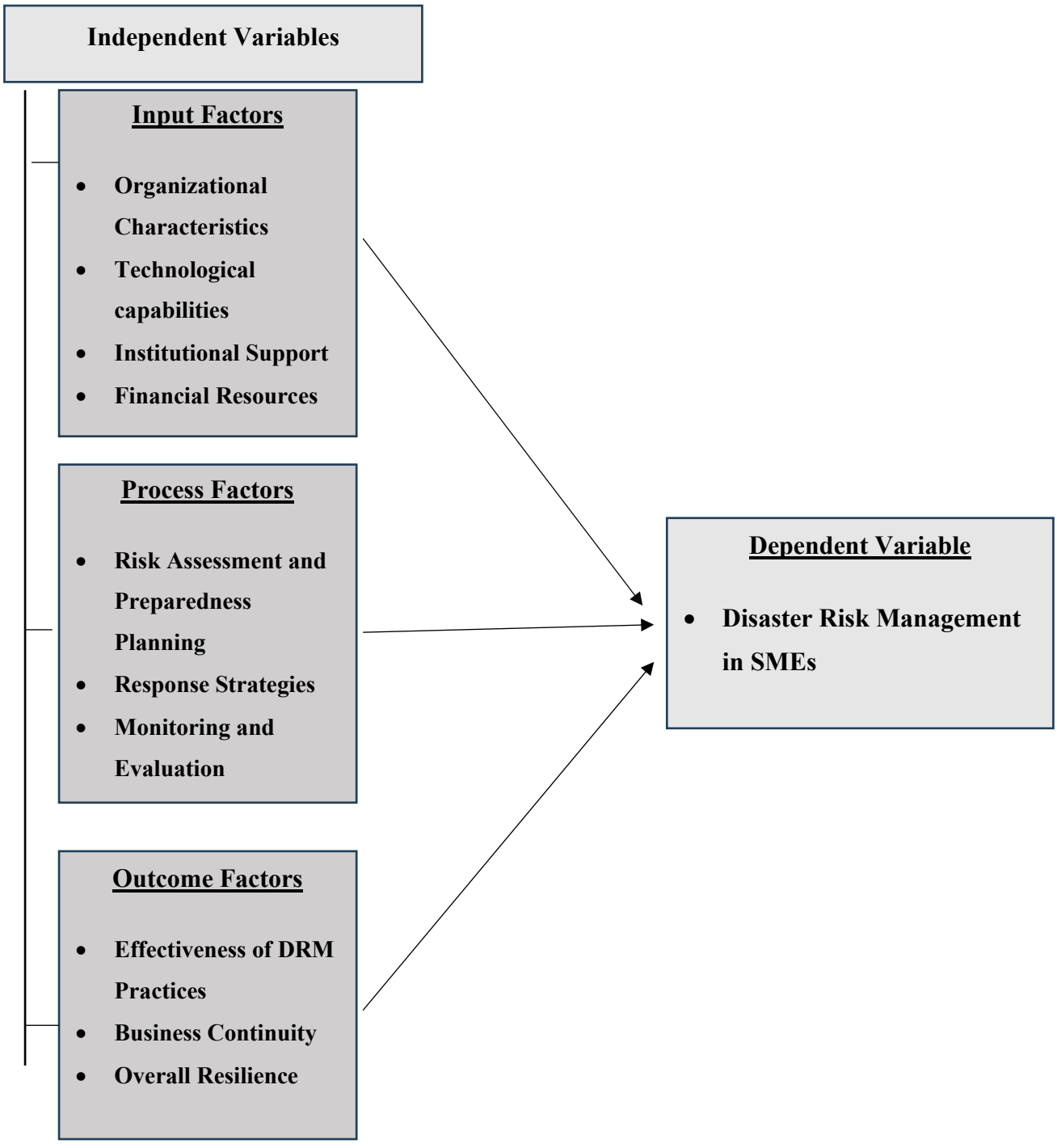

Figure: 1 Conceptual framework of determinants of Disaster Risk Management in Malaysian SMEs

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By addressing input factors through strong organizational characteristics, technological capabilities, institutional support, and financial resources, SMEs can enhance their DRM practices. Implementing effective process factors such as risk assessment, response strategies, and monitoring mechanisms further strengthens their ability to manage disaster risks. Ultimately, the focus on outcome factors like Effectiveness of DRM Practices, business continuity planning, and overall resilience will enable Malaysian SMEs to thrive in an increasingly unpredictable business environment. This framework serves as a guide for SMEs to develop comprehensive, adaptive strategies for disaster risk management, ensuring their long-term sustainability and resilience.

Conclusions

This research has explored the determinants of DRM in SMEs within the Malaysian context, culminating in the development of a conceptual framework designed to enhance SMEs' resilience to disasters. As Malaysia faces an increasing frequency and intensity of natural hazards, understanding the factors that influence effective DRM practices is critical for safeguarding the economic viability of the SME sector, which is a cornerstone of the national economy.

The findings underscore that effective DRM among SMEs is influenced by a multifaceted interplay of organizational characteristics, technological capabilities, institutional support, and financial resources. Each determinant plays a pivotal role in shaping the preparedness and responsiveness of SMEs to disaster risks. The integration of these input factors into a coherent framework elucidates the pathways through which SMEs can build resilience.

By incorporating process factors such as risk assessment, preparedness planning, and monitoring mechanisms, the framework illustrates how SMEs can operationalize these determinants effectively. The resultant outcome factors—effectiveness of DRM practices, business continuity, and overall resilience—are essential indicators of success in confronting the challenges posed by disasters.

The implications of this research are significant for multiple stakeholders. For policymakers, the framework provides actionable insights into developing targeted support programs that address the unique challenges faced by SMEs in implementing DRM strategies. Furthermore, it highlights the importance of fostering a supportive institutional environment, enhancing access to technological innovation, and ensuring financial resilience. For practitioners, SMEs can utilize the framework as a roadmap to assess their current DRM practices, identify areas for improvement, and allocate resources efficiently to enhance their disaster preparedness.

While this research contributes to the existing body of knowledge on DRM, it also identifies avenues for future investigations. Empirical testing of the conceptual framework is necessary to validate the relationships among the various determinants. Longitudinal studies to track the evolution of DRM practices within SMEs over time will provide deeper insights into the dynamics of resilience. Furthermore, expanding the research to include diverse geographic contexts and industries will enrich the understanding of DRM determinants. By acknowledging and addressing the determinants outlined in this research, stakeholders can collaboratively enhance the capacity of SMEs, ultimately contributing to the sustainable development and economic stability of Malaysia in an increasingly uncertain world.

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