

Emerging Technologies: Challenges and Risks for Business Environments

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Abstract: In recent times, there has been a rise in the adoption of emerging technologies within the global business landscape. However, it has also been reported that this could be associated with significant and overwhelming risk and challenges. The aim of this study is to explore the risks and challenges of adopting emerging technologies for businesses. The study adopted a systematic literature review methodology which is based on the retrieval of relevant studies from databases such as Scopus, Web of Science, and IEEE Xplore using relevant keywords and Boolean operators to form a search string. The study selection process adhered to the PRISMA framework. The study included 11 relevant studies for review and reported challenges such as limited funding, lack of skilled personnel, poor strategic planning, cyber-attack, and complexity. Some factors that influence the severity and nature of these challenges and risks also include the size of business, nature of sector, and geographical location. However, this study makes practical recommendations such as context-specific approach, quality leaderships, and cybersecurity. The finding of this study will contribute towards an increase in the adoption rate of emerging technology with very limited risks and challenges for businesses.

Keywords: *Emerging Technology Risk, Technology Challenges, Artificial Intelligence, Blockchain, Data Analytics.*

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I. INTRODUCTION

➤ Background

There has been an increase in the adoption rate of emerging technologies in contemporary times. This is due to the rapid proliferation of these technologies that have the potential to shape the future of the global business landscape. According to a report by Needham (2024), it is expected that the total global spending on digital transformation hits over \$4 trillion by 2027. In addition, Markets and Markets (2024) also claimed that the CAGR of the digital transformation market is expected to reach 26.7% by 2030. This growth and uptake can be attributed to the advantages associated with digital transformation for organizations and businesses. For instance, businesses have reported 30% cost savings after integrating Artificial Intelligence (AI) (Markets and Markets, 2024).

However, it is essential to acknowledge the fact that there are also challenges and risks of adopting emerging technologies for businesses. Andrew (2023) reported that up to 70% of change efforts in business, including digital transformation for fail, with reasons such as governance quality. This was also supported by Jan (2019) who emphasized the importance of better change management. This implies that, although the adoption of emerging technologies holds important advantages for businesses, it can also be associated with some challenges such as

resistance, cyber-attacks, and high implementation costs (Telukdarie et al., 2024). Without proper management strategies, these challenges may outweigh the benefits of the technologies for businesses. Although, some studies have identified various risks and challenges (Yaacob et al., 2023; Tamvada et al., 2022), however, there has been limited focus on businesses, especially SMEs. Therefore, this study aims to explore the risks and challenges associated with adopting emerging technologies for businesses. The outcome of this study will include different recommendations that could be adopted to address the risks and challenges identified. The findings of the study is relevant to a challenge and risk-free adoption of emerging technologies for businesses.

➤ Aim

This study aims to critically explore the challenges and risks of adopting emerging technologies in business environments.

➤ Objectives

- To explore the risks and challenges faced by business while adopting emerging technologies
- To explore the factors that influence the challenges and risks of adopting emerging technologies for businesses
- To make recommendations on how to overcome challenges and mitigate the risks associated with the adoption of emerging technologies for businesses.

II. METHODOLOGY

This study adopted the systematic review methodology and adheres to the principles of the PRISMA framework. The PRISMA framework helps to systematically identify and select studies that are relevant to established aim and objectives (Anghelescu et al., 2023). The systematic review methodology usually involves the retrieval of studies from relevant databases using search strings. The databases used in this study include: Web of Science, Scopus, and IEEE Xplore, while the search strings include “emerging technology” OR “advanced technology” OR “disruptive technology” AND “adoption” OR “implementation” OR “integration” AND “business” OR “organisation” OR “enterprise” OR “firm” AND “risk” OR “challenge” OR “barrier” OR “obstacle”. The search strings allowed access to numerous studies; however, selection was made based only on the inclusion and exclusion criteria. The inclusion and exclusion criteria are predefined requirements that must be met by individual studies before the decision to either include or exclude it. The inclusion criteria include only peer-reviewed journals; studies that address the risks and challenges of emerging technologies adoption for businesses; studies published between 2013 and 2025, and studies that adopted either of

qualitative, quantitative, or mixed methodology. Any study that does not meet these requirements were excluded.

There was a rigorous screening and selection process that adhered to the PRISMA framework to ensure that only quality and relevant studies were eventually included for review. Upon inclusion, studies were subjected to full-text review. After this, the content analysis method was adopted to extract information and data that provide insight into the risks and challenges associated with the adoption of emerging technologies for businesses. The extracted data was then critically discussed based on the objectives of this study. Since this study does not involve human or animal subject, there was no critical ethical consideration, however, the ethical principles of integrity, transparency, and loyalty were all adhered to. The included studies were acknowledged and properly cited to prevent the unethical practice of plagiarism.

III. RESULTS

The literature search result is presented in the PRISMA flow chart below. Initially, 39 studies were retrieved from the databases. However, after the application of the inclusion and exclusion criteria, 11 relevant studies were eventually included.

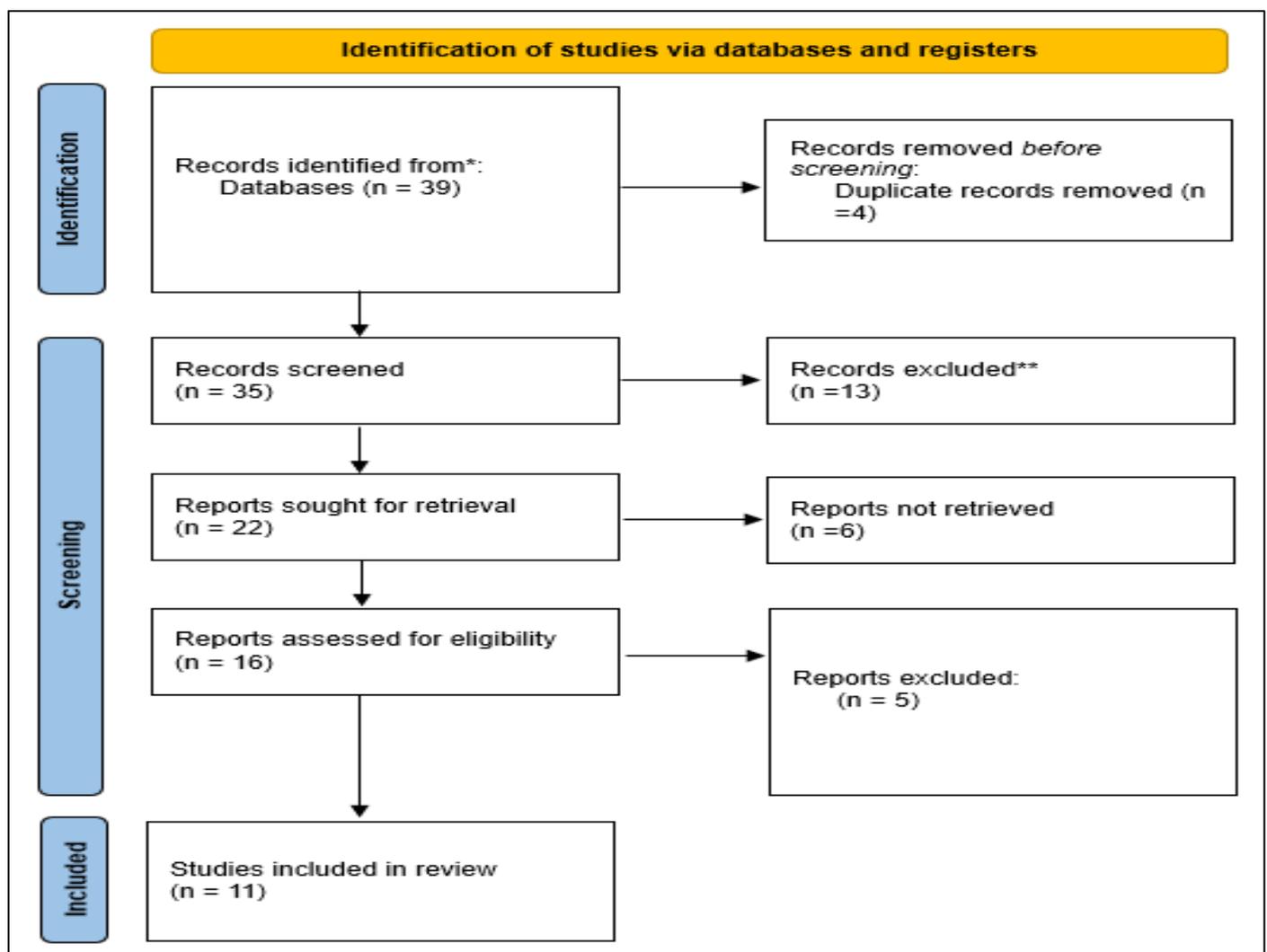


Fig 1 Study Selection Process (Page et al., 2021)

The chart below also shows the distribution of the included studies based on the year of publication. Majority of the studies (28%) included were published in 2022.

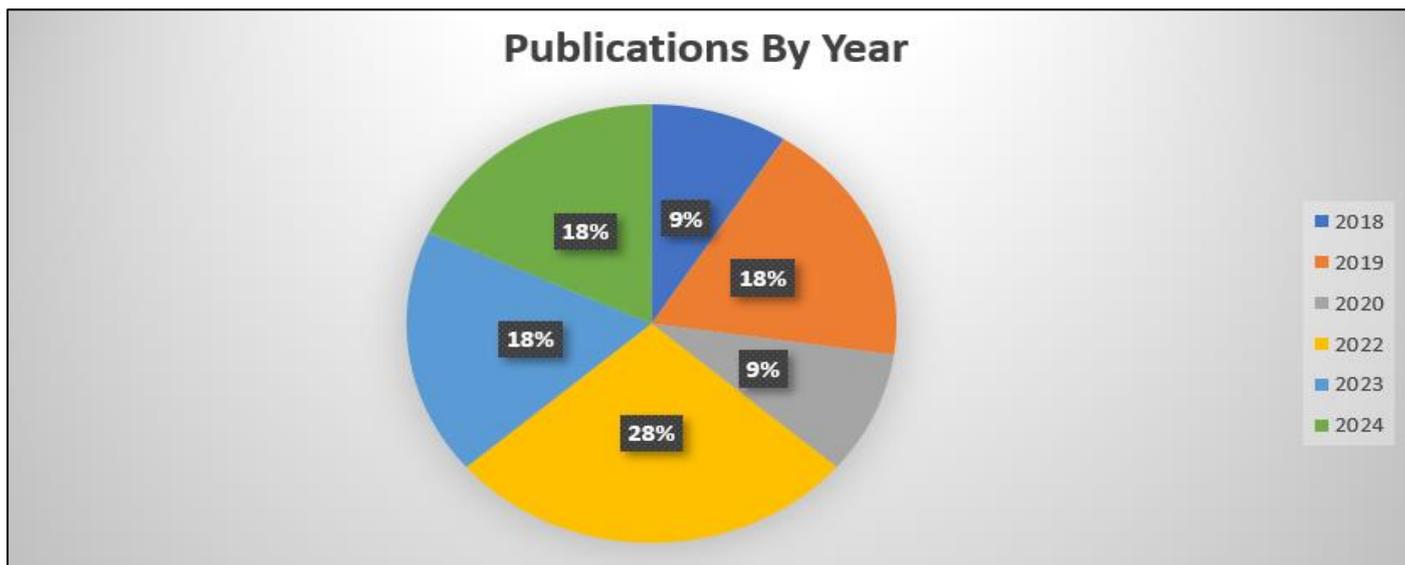


Fig 2 Distribution of Studies, by Year
(Source: Author)

Figure 3 shows the distribution of studies based on the methodology adopted. Majority (50%) of the studies included adopted the literature review methodology while 40% and 10% adopted the quantitative and interview methodology respectively.

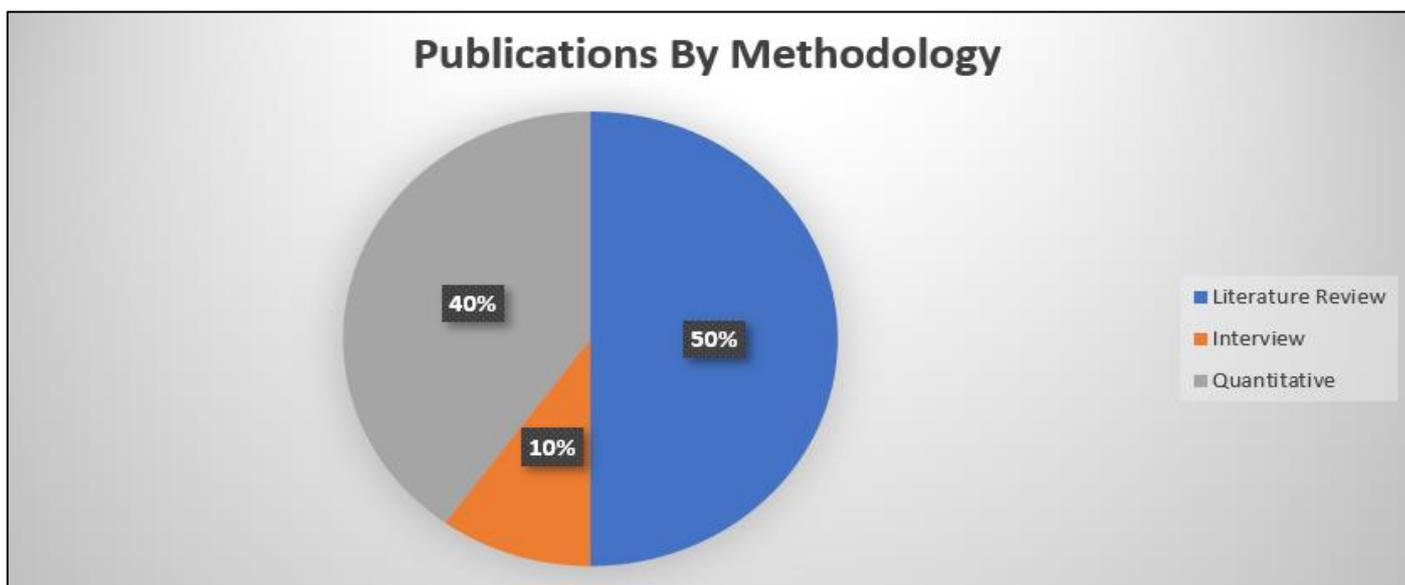


Fig 2 Distribution of Studies, by Methodology
(Source: Author)

Table 1 below is a presentation of the author, title, methodology, and summary of all included studies

Table 1 Studies Included for Systematic Review

Author (Year)	Title	Methodology	Summary
Aissa (2024)	“Technology Adoption Among SMEs: How Is It? And What Can Be Done to Strengthen It?”	Literature review	The paper identifies key challenges such as limited strategic integration, financial constraints, and inadequate institutional support in developing countries. It recommends policy reforms, capacity building, and tailored incentives to facilitate technology adoption.
Darren (2022)	“The Disruptive Nature of Technology on the Business	Literature review	While digital transformation promises efficiency and profit, the paper argues that success is

	Environment: A Flipside to the Disruptive Benefits”		incomplete without understanding and managing the technological challenges, knowledge gaps, and risks. It emphasizes the importance of knowledge transfer, regulatory frameworks, and proactive risk management in guiding businesses through digital disruption.
Griffy-Brown et al. (2019)	“Emerging Technologies and Risk: How Do We Optimize Enterprise Risk When Deploying Emerging Technologies?”	Interview	This paper investigates how organizations can optimize enterprise risk management (ERM) when deploying emerging technologies like AI, IoT, and blockchain. It highlights the dual nature of risk—upside (opportunity) and downside (threat)—which often go unrecognized in corporate governance strategies.
Hugh et al. (2020)	“New risks related to emerging technologies and reputation for corporate governance. Journal of Governance and Regulation”	Literature review	This study investigates the reputational and governance risks introduced by emerging technologies, with a strong focus on AI adoption. The paper identifies key risk categories—deep shift, digital, global, generational (e.g., millennials), and reputational risks—and discusses how boards of directors and executives must integrate risk governance frameworks to manage these challenges effectively.
Okwu et al. (2022)	“Emerging Technologies of Industry 4.0: Challenges and Opportunities”	Literature review	This study offers a comprehensive review of the emerging technologies driving Industry 4.0. It highlights critical challenges in developing countries such as lack of infrastructure, digital skills gaps, and policy limitations.
Prause (2019)	“Challenges of Industry 4.0 Technology Adoption for SMEs: The Case of Japan”	Quantitative	This study investigates the drivers and barriers of Industry 4.0 adoption among Japanese SMEs. The findings indicate that market uncertainty is a key motivator for adoption in the short, medium, and long term.
Raguseo (2018)	“Big data technologies: An empirical investigation on their adoption, benefits and risks for companies”	Quantitative	The paper explores how businesses are adapting to the data-driven revolution, focusing on adoption, strategic and operational benefits, and associated risks of big data technologies. Differences in adoption and benefit realization across company sizes and sectors are minimal, suggesting that firm size or sector may not significantly determine adoption outcomes.
Saeed et al. (2023)	“Digital Transformation and Cybersecurity Challenges for Businesses Resilience: Issues and Recommendations”	Literature review	The study highlights that while DT—driven by AI, big data, blockchain, and cloud computing—boosts productivity and efficiency, it significantly increases cybersecurity risks such as data breaches and unauthorized access.
Tamvada et al. (2022)	“Adopting new technology is a distant dream? The risks of implementing Industry 4.0 in emerging economy SMEs”	Quantitative	The study investigates the critical risks SMEs in emerging economies face when adopting Industry 4.0 technologies (e.g., IoT, robotics, big data, cybersecurity). Findings highlight financial and technological risks as the most significant barriers to adoption.
Telukdarie et al. (2024)	“Navigating Digital Challenges for SMEs: A Two-Tier Approach to Risks Mitigation and Sustainability”	Quantitative	This study addresses the digital transformation challenges faced by SMEs in developing countries due to limited skills, financial barriers, and lack of suitable technologies. It proposes a two-tier model: global analysis of SME digital systems using NLP, and localized evaluation of SMEs’ actual tech needs.
Yaacob et al. (2023)	“Managing Cybersecurity Risks in Emerging Technologies”	Literature review	The study explores cybersecurity risk management within emerging technologies, focusing on technical, organizational, and regulatory challenges.

IV. DISCUSSIONS

The findings are discussed under the sections below

➤ *Challenges and Risks Associated with Adopting Emerging Technologies for Businesses*

The adoption of emerging technologies for businesses is associated with some risks and challenges. For instance, it has been claimed by Hugh et al. (2020) that small and medium-sized enterprises (SMEs) often encounter financial challenges while attempting to implement emerging technologies. Tamvada et al. (2020) and Telukdarie et al. (2024) supported this by also claiming that such financial issue is more critical in countries where there is limited and unevenly distributed resources. Furthermore, the financial constraint challenge is worsened by some organizational challenges. For instance, most SMEs do not have the right human labour and skilled professional that could drive the success of emerging technologies adoption (Yaacob et al., 2023). Prause (2019) further claimed that emerging technology is a complex system and without efficient strategic planning, SMEs might not have the internal capacity to manage such complex system. Lastly, the adoption of emerging technology for businesses might be associated with significant uncertainty and due to the vast array of options available, businesses are susceptible to making the wrong decision without careful planning (Okwu et al., 2022).

Risks associated with cybersecurity are a major concern, as digital transformation expands the attack surface. The rising number of data breaches and threatened cyber-attack is a critical concern that has been reported to be associated with digital transformation (Saeed et al., 2023; Yaacob et al., 2023). Many businesses do not also have the security frameworks and structures against these attacks. Lastly, advanced technologies are complex and despite their business advantage, organizations that do not have the right skilled labour may not be able to efficiently optimize such advantages (Prause, 2019; Raguseo, 2018). Therefore, businesses have to pay attention to these risks and implement mitigation strategies for desirable outcome.

➤ *Factors Influencing the Challenges and Risks of Adopting Emerging Technologies for Businesses*

There various factors that are associated with the challenges and risks identified in the previous section. These include business size, sector, and geographical location. These factors influence the nature and severity of the risks and challenges. In terms of size, Small and Medium-Sized have been reported to be more vulnerable to the risk and challenges (Tamvada et al., 2022). According to Tamvada et al. (2022), significant number of SMEs in developing countries often face financial constraints and technological barriers while adopting emerging technologies. This claim is supported by Telukdarie et al. (2024) who reported that SMEs may not have the needed infrastructure for a sustainable digital transformation.

Furthermore, sectoral difference has also been identified as a factor. Raguseo (2018) claimed that the risks associated with adopting emerging technologies depend on the

requirements of specific sectors. For instance, challenges such as the integration of technology into production line may be faced by manufacturing organizations while service-based business may face the challenges of data privacy and cyber-attack. Lastly, geographical location is also a critical factor since this influences the type of policy support and regulatory complexity that business may face. For instance, Prause (2019) reported that SMEs in Japan often face more intense challenges compared to their counterparts in Western countries. In addition, Saeed et al. (2023) claimed that businesses in developing countries are more vulnerable to cyber-attacks and threats.

➤ *Practical Recommendations*

To overcome the challenges and mitigate the risks of adopting emerging technologies, businesses must pursue tailored, strategic, and context-aware approaches. SMEs should develop digital strategies that are aligned with both their unique contexts and the global technological landscape. In doing so, Telukdarie et al. (2024) recommended a two-tier approach that first assesses digital needs at the local level and then integrates that knowledge with insights from the global technological frontier—ensuring both relevance and sustainability for digital initiatives. Practicing this kind of informed digital leadership is essential for organizations hoping to make emerging technologies work for them (Griffy et al., 2019).

Another essential recommendation is cybersecurity. According to Saeed (2023), businesses can adopt a staged cybersecurity framework for enhanced security against attacks. Aissa (2024) suggested a more holistic approach that involves continuous training of employees and personnel for a better outcome. There should also be a collaborative approach towards cybersecurity which will involve not only businesses, but also government bodies, research institutions, and tech vendors (Darren et al., 2022).

V. CONCLUSION

The risks and challenges associated with the adoption of emerging technologies for business have been identified and discussed in this study. More prominent risks and challenges include regulatory complexities, cyber-attacks, financial constraints, and skill gaps. The severity and nature of these risks and challenges have also been found to be influenced by some factors, including business size, sector type, and geographical location. However, the challenges and risks can be addressed through context-specific strategies, as emphasized in this study.

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