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KANDUNGAN

Artificial Intelligence Adoption in the Small and Medium Enterprises (SMEs): Challenges and Recommendations

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ABSTRACT

The adoption of artificial intelligence (AI) in small and medium enterprises (SMEs) is increasingly recognized as a vital component for enhancing operational efficiency, customer engagement, and competitive advantage in a rapidly evolving digital landscape. This conceptual paper investigates the challenges SMEs face in adopting AI technologies, including lack of awareness, high implementation costs, resistance to change, insufficient technological skills, lack of digital strategy and the complexities of change management. Through a comprehensive review of existing literature, this study identifies key barriers to AI adoption and proposes actionable recommendations to facilitate the integration of AI within SMEs. The findings reveal that while SMEs can significantly benefit from AI such as improved decision-making and enhanced customer experiences but many remain hesitant to invest due to perceived complexities and resource limitations. The research highlights the importance of fostering a supportive organizational culture, investing in training programs, securing financial resources, collaboration with technology partners and incremental implementation to enable effective AI implementation. This study contributes to the understanding of AI adoption in SMEs by providing a framework that addresses specific challenges and recommendations. The implications extend beyond individual enterprises, as successful AI integration in SMEs can drive economic growth, job creation, and innovation at the community and national levels.

KEYWORDS: Artificial Intelligence, Small and Medium Enterprises, AI Adoption, Challenges, Recommendations.

1 INTRODUCTION

The integration of artificial intelligence (AI) into small and medium enterprises (SMEs) represents a transformative shift in the business landscape, with profound implications for operational efficiency, customer engagement, and overall competitiveness. As SMEs constitute a significant portion of the global economy, their ability to leverage AI technologies is crucial not only for their survival but also for the economic vitality of communities and

nations. The importance of this topic is underscored by the increasing reliance on digital solutions in the wake of the COVID-19 pandemic, which has accelerated the need for SMEs to adapt to rapidly changing market conditions. However, a notable gap exists in understanding the specific barriers that hinder AI adoption among SMEs, particularly in terms of resourceallocation, technological expertise, and organizational culture (Rozman, 2023; Lu, Wijayaratna, Huang & Qiu, 2022).

In today's digital economy, the adoption of AI is viewed as a critical factor for enhancing business agility and resilience. SMEs that successfully implement AI technologies can streamline operations, reduce costs, and improve decision-making processes, thereby positioning themselves favourably against larger competitors (Lutfi, Alsyouf, Almaiah, Alrawad, Abdo, Al-Khasawneh, & Saad, M., 2022; Li, Peng, Liu, Di, Liu, Pei & Zhou, 2023). The societal implications are significant, as the success of SMEs contributes to job creation, innovation, and economic diversification. However, many SMEs still perceive AI as a complex and daunting challenge, leading to a reluctance toinvest in these technologies. This perception creates a gap in the discourse surrounding AI, where the focus often remains on large enterprises, leaving SMEs at a disadvantage in harnessing the benefits of AI (Lu et al., 2022).

2 LITERATURE REVIEW

Previous studies have explored various dimensions of AI adoption in SMEs, identifying both opportunities and challenges. For instance, research has shown that SMEs that implement AI can achieve substantial improvements in efficiency and customer engagement. However, barriers such as lack of technical expertise, high implementation costs, and concerns about data security continue to impede widespread adoption. Furthermore, studies have highlighted the importance of tailored training programs and resources to equip SMEs with the necessary skills to leverage AI effectively.
The influence of AI on the current business environment is particularly pronounced in the context of the post- pandemic recovery. SMEs that adopt AI technologies can better navigate uncertainties and adapt to changing consumer behaviours (Kim & Seo, 2023; Ridho, 2023). For instance, AI-driven analytics can provide insights into market trends, enabling SMEs to make informed strategic decisions. Furthermore, AI applications, such as chatbots and automated customer service systems, enhance customer interactions and satisfaction, which is vital for retaining clientele in a competitive market (Budiarto, Rahmawati, Prabowo, Djajanto, Widodo & Herawan, 2018; Crockett, Gerber, Latham, & Colyer, 2023). However, the disparity in AI adoption rates between SMEs and larger firms highlights the need for targeted support and resources to bridge this gap (Gladysz, 2023; Abdullah et al., 2018).

2.1 ARTIFICIAL INTELLIGENT

AI can be defined as “Systems that display intelligent behaviour by analysing their environment and taking actions with some degree of autonomy to achieve specific goals” (Sheikh, Prins, & Schnjrers, 2023). Meanwhile, Madan & Ashok (2022) defined AI as “a cluster of digital technologies that enable machines to learn and solve cognitive problems autonomously without human intervention”. Therefore, for this article, AI can be defined as an intelligent system that display behaviour by analysing their environment and taking actions with some degree of autonomy to achieve specific goals comprise a cluster of digital technologies that enable machines to learn and solve cognitive problems autonomously without human intervention.

Artificial intelligence (AI) is a multifaceted domain that encompasses various definitions and interpretations, reflecting its complexity and the breadth of its applications. At its core, AI can be understood as the capability of machines and computer systems to perform tasks that typically require human intelligence. This includes functions such as reasoning, learning, problem-solving, perception, and language understanding (Liu, Shapira &Yue., 2021; Gode, 2023; Shabbir & Anwer, 2018). The definitions of AI vary significantly across different contexts, but they generally converge on the idea that AI systems are designed to simulate cognitive functions traditionally associated with human beings (Liu et al., 2021; Hassani Silva, Unger, TajMazinani, & Feely, 2020). One of the foundational aspects of AI is its reliance on advanced technologies, including machine learning, natural language processing, and robotics (Gode, 2023; Shabbir & Anwer, 2018). These technologies enable AI systems to analyse vast amounts of data, learn from experiences, and make autonomous decisions without explicit programming for every possible scenario (Shabbir & Anwer, 2018; Hassani et al., 2020). For instance, machine learning allows AI to improve its performance over time by identifying patterns and making predictions based on data inputs (Shabbir & Anwer, 2018; Hassani et al., 2020). This characteristic of self-improvement is a defining feature of AI, distinguishing it from traditional computational methods that require manual updates and interventions.

2.2 SMALL AND MEDIUM ENTERPRISES (SMEs)

Small and Medium Enterprises (SMEs) are defined variably across countries, but they generally refer to businesses with a limited number of employees and a certain threshold of revenue. According to the European Commission, SMEs are defined as enterprises with fewer than 250 employees, with small enterprises having fewer than 50 employees and medium-sized enterprises having fewer than 250 employees (Liu et al., 2021). In the United States, the Small Business Administration (SBA) defines SMEs based on industry-specific standards, often considering businesses with fewer than 500 employees as small (Gode, 2023).

SMEs are significant contributors to employment. In many countries, they account for a substantial portion of total employment. For instance, the OECD reports that SMEs represent approximately 70% of total employment in its member countries (Shabbir & Anwer, 2018). This job creation is essential for economic stability and growth, particularly in developing economies where large corporations may not have a significant presence. SMEs contribute to economic diversification by operating in various sectors, including manufacturing, services, and agriculture. This diversification helps reduce economic vulnerability and enhances resilience against economic shocks (Monett, Lewis, Porisson, Bach, Baldassarre, Granato & Winfield, 2020). By fostering a diverse business landscape, SMEs can stimulate local economies and promote sustainable development.

Small and Medium Enterprises (SMEs) are a cornerstone of Malaysia's economy, contributing significantly to employment, innovation, and economic growth. Defined by the Malaysian government, SMEs are businesses with fewer than 250 employees and annual sales not exceeding RM50 million (approximately USD 12 million) (Tan, 2011). They account for 98.5% of all registered businesses in the country, underscoring their vital role in the economic landscape (Jaish, Murdipi, Razak, & Alwi, 2023).

SMEs in Malaysia contribute approximately 38.9% to the national Gross Domestic Product (GDP), amounting to RM552.3 billion in 2019, which reflects a notable increase from previous years (Jaish et al., 2023). This contribution is essential for fostering economic resilience and diversification, particularly in the face of global economic challenges. The sectors in which Malaysian SMEs operate are diverse, including manufacturing, services, agriculture, and information and communication technology (ICT) (Tan, 2011).

SMEs are significant job creators, providing employment to around 66% of the Malaysian workforce (Jaish et al., 2023). They are also pivotal in driving innovation, as they tend to be more agile and adaptable compared to larger corporations. Research indicates that SMEs

are responsible for a substantial share of new product developments and technological advancements in Malaysia (Yuen & Ng, 2021). However, the global competitiveness of Malaysian SMEs in innovation has faced challenges, with a declining innovation index noted in recent years (Yuen & Ng, 2021).

2.3 THE ADOPTION OF AI IN THE SMEs

AI plays a pivotal role in reshaping the operational frameworks of SMEs. By automating routine tasks and providing data-driven insights, AI enables SMEs to allocate resources more effectively and focus on strategic growth initiatives (Dabbous, Barakat, & Sayegh, 2021). Moreover, AI can enhance the customer experience through personalized marketing and improved service delivery, which are essential for building brand loyalty and competitive advantage (Lutfi, 2022; He & Zhou, 2022). However, the successful integration of AI requires a cultural shift within organizations, emphasizing innovation and adaptability (Weber, 2023; Lemos, Ferreira, Zopounidis, Galariotis & Ferreira, 2022).

Several factors influence the adoption of AI technologies in SMEs, including organizational culture, leadership commitment, and access to financial resources. Research indicates that a supportive organizational culture that encourages experimentation and innovation is crucial for successful AI integration (Kaiyue, 2023). Additionally, the commitment of leadership to invest in AI initiatives significantly impacts the willingness of SMEs to embrace these technologies (Duan, Edwards, & Dwivedi, 2019; Dwivedi, Hughes, Ismagilova, Aarts, Coombs, Crick, & Williams, 2021). However, many SMEs face constraints that limit their ability to invest in AI, highlighting the need for external support and funding mechanisms (Tjoa & Guan, 2021; Brock & Wangenheim, 2020)

2.5 CHALLENGES OF THE AI ADOPTION IN SMEs

Previous literatures indicates that there are various challenges towards the AI adoption in the SMEs. Among the barriers and challenges are:

I. **Lack of Awareness:** Some of the SMEs are unaware and ignorant of the existence of AI and the AI capabilities in assisting their business. This is one of the most important barriers in the adoption of AI for their businesses (Rosa, Liliawati, Efendi, Ingalagi, Mutkekar, Kulkarni 2021).

II. **High Cost of Adoption**: The SMEs feel that the cost of adoption towards AI and other technologies which related to AI are high. As such, the SMEs are staying away from the adoption of AI (Andersson, Tabares, Mikalef & Parida 2024)

III. **Resistance to Change:** Most of the SMEs have the resistance towards change, they are in the comfort zones of doing the business in the old fashion way. They are afraid to change by adopting technology and AI in their business operations due to the fear of the unknown and uncertainties (Li, Ashraf, Saba Amin & Safdar, 2023).

IV. **Lack of Technological Skills:** The adoption of AI needs a certain form of skills such as data analysis and technological skill to professionally apply the AI; nevertheless, most of the SMEs are shortage in these skills due to lack of financial resources to employ human resources expert on technological skills (Rosa et al.,2021).

V. **Lack of digital strategy:** Some of the SMEs are lack of a digital strategy in implementing their digital strategy. Most of SMEs lack the plans and policies that support researching into technologies and AI for their operations (Hess, Matt, Benlian, & Wiesbock, 2016).

VI. **Nature and size of businesses:** Other challenging issue concerning the adoption of AI by SMEs is the concept that AI is for the big firms and Multinational Enterprise. As such, they believe their businesses are still small and in the infancy stage, thus no need for AI adoption (Rosa et al.,2021).

3 CONCLUSIONS

In conclusion, while the integration of AI into SMEs presents significant challenges, including the lack of awareness, resource limitations, resistance to change, lack of technological skill, lack of digital strategy and the complexities of change management, the potential benefits are compelling. SMEs that successfully navigate these challenges can leverage AI to enhance their operational capabilities and drive innovation, positioning themselves for sustained growth in a competitive landscape.

4. RECOMMENDATIONS

The following recommendations are proposed:

I. **Understanding AI Technologies**: Before implementing AI, SMEs should invest in understanding the various AI technologies available, including machine learning, natural language processing, and automation tools. Familiarity with these technologies will enable SMEs to identify which solutions best fit their operational needs**(**Lee & Tajudeen**,** 2020**;** Indrasari, 2024). For instance, conversational AI, such as chatbots, can enhance customer service, while AI-driven analytics can improve decision-making processes (Ridho, 2023; Sharma, Singh, Islam & Dhir**,** 2024).

II. **Training and Capacity Building**: To facilitate successful AI adoption, SMEs must prioritize training and capacity building for their workforce. This includes providing employees with the necessary skills to work alongside AI systems and understand their functionalities. Research indicates that the lack of knowledge and skills is a significant barrier to AI implementation in SMEs (Oldemeyer, 2024). Therefore, investing in training programs can empower employees and foster a culture of innovation (Drydakis, 2022; Lu et al., 2022). Utilizing government programs by taking advantage of government initiatives and grants that support technology adoption. such as the Malaysia Digital Economy Corporation (MDEC) and Majlis Amanah Rakyat (MARA) programs.

III. **Financial Support and Investment:** Access to finance is a critical challenge for SMEs looking to adopt AI technologies. Malaysian SMEs should explore various funding options, including government grants, venture capital, and partnerships with technology providers (Enshassi, 2024). Financial institutions can also play a role by offering tailored financial products that support AI investments (Enshassi, 2024). Furthermore, SMEs should consider the long-term return on investment (ROI) that AI can provide, which can justify initial expenditures (Haridasan, 2024).

IV. **Collaboration with Technology Partners:** Forming partnerships with technology providers, research institutions and local universities can facilitate the adoption of AI. Collaborations can provide SMEs with access to expertise, resources, and advanced technologies that may otherwise be unavailable (Enshassi, 2024). Engaging in industry networks and forums can also help SMEs stay updated on AI trends and best practices (Tominc, 2024).

V. **Incremental Implementation:** Rather than a complete overhaul of existing systems, SMEs should consider an incremental approach to AI adoption. Starting with pilot projects allows SMEs to test AI applications on a smaller scale, assess their

effectiveness, and make necessary adjustments before full-scale implementation (Drydakis, 2022; Lu et al., 2022). This strategy minimizes risks and helps build confidence in AI technologies.

VI. **Continuous Evaluation and Adaptation:** Finally, SMEs should establish mechanisms for continuous evaluation of AI systems and their impact on business performance. Regular assessments can help identify areas for improvement and ensure that AI technologies remain aligned with business objectives (Rawashdeh, Bakhit, Abaalkhail, 2023; Oldemeyer, 2024). Adapting to changes in technology and market conditions will be crucialfor sustained success in AI adoption.

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