

A Proposed Framework for Assessing the Readiness of AI in Small and Medium Enterprises (SMEs) in Malaysia

Wendy Teoh Ming Yen¹, Tan Lay Hong², Yuen Yee Yen³

Abstract

Small and Medium Enterprises (SMEs) have become increasingly important to Malaysia's economy in recent years. They contribute significantly to GDP growth, job creation, and innovation. However, SMEs often face various challenges such as limited resources, market competition, and technological barriers. In this digital age, integrating Artificial Intelligence (AI) has tremendous potential to overcome these challenges and drive SMEs towards sustainable growth and competitiveness. Despite this, it remains unclear whether Malaysian SMEs are ready to adopt and use AI technologies. This research aims to bridge this gap by investigating the readiness of Malaysian SMEs to embrace AI, the factors that influence their readiness, and the potential impact of AI integration on their business performance and competitiveness. This initiative aligns with the National Science, Technology, and Innovation Policy (NSTIP) 2021-2030, i.e., promoting the development and readiness of local technology. This study proposes a conceptual framework to provide a detailed understanding of the readiness of Malaysian SMEs to adopt AI, analyze the factors that influence AI readiness, and evaluate the potential impact of AI integration on their business performance and competitiveness. The findings will inform future research initiatives aimed at enhancing SME competitiveness and fostering innovation in Malaysia's business ecosystem.

Keywords: *Assessing the Readiness of AI, Medium Enterprises (SMEs).*

Introduction

Today, every industry participant must be equipped with the latest technology, including AI, to stay competitive. This has transformed the way organizations, including SMEs, conduct business (Lada et al., 2023). In Malaysia, it is acknowledged that skilled human resources, process optimization, and technological readiness are important factors for AI readiness among SMEs. However, there is a lack of comprehensive research that combines these factors into a framework specifically designed for Malaysian SMEs. Besides, the lack of fundamental understanding of AI capabilities and inadequate resources also hinder AI integration in Malaysian SMEs (Rosa et al., 2021). As a result, SMEs are in the high pressure to implement effective growth plans that strengthen their business sustainability and competitiveness with constantly involving technological and innovation.

Furthermore, existing studies often focus on individual aspects, such as skill development or technological infrastructure readiness, without considering the interconnected nature of these factors in driving successful AI readiness. Consequently, there is a research gap in understanding how these factors interact and influence each other within Malaysia's unique socio-economic and technological landscape, making it difficult to develop effective AI readiness strategies for the Malaysian SMEs.

Conceptual Model And Background

Artificial intelligence (AI)

Artificial intelligence (AI) refers to the area of computer science that aims to create intelligent machines capable of performing tasks that typically require human intelligence, such as analyzing and interpreting data, learning from experiences, making decisions, and solving problems like human cognition (Joiner, 2018). AI systems rely on algorithms, machine learning techniques, and large datasets to acquire knowledge, improve performance, and adapt to changing circumstances (Xu et al., 2021). The field of AI encompasses

¹ Institute of Technology Management and Entrepreneurship, Universiti Teknikal Malaysia Melaka, Malaysia.

² Faculty of Technology Management and Technopreneurship, Universiti Teknikal Malaysia Melaka, Malaysia.

³ Faculty of Business, Multimedia University, Malaysia.

various subfields, including natural language processing, computer vision, robotics, expert systems, and neural networks, and it finds applications in diverse domains such as healthcare, finance, transportation, gaming, SMEs, and marketing strategy (Baabdullah et al., 2021, Ma and Sun, 2020, Mikalef et al., 2023, Moradi and Dass, 2022, Rosa et al., 2021, Thayyib et al., 2023). Artificial intelligence technology may offer several advantages to SMEs, including streamlining internal processes, improving decision-making, and enhancing productivity (Bettoni et al., 2021; Ragazou et al., 2023; Wu et al., 2023). Nevertheless, previous research has highlighted the constraints and limitations of applying AI among SME participants (Hansen and Bøgh, 2021; Moradi and Dass, 2022; Ulrich and Frank, 2021). As a result, the discourse surrounding AI and SMEs has expanded.

Artificial Intelligence (AI) in Malaysian SMEs

The Malaysian government's decision to prioritize the development of AI skills among SMEs is a strategic move, given that these businesses constitute 98.5% of all enterprises in Malaysia and contribute 38% to the nation's GDP (In 2021, 1,226,494 small businesses contributed RM500 billion to Malaysia's GDP) (Department of Statistics, 2022). The advancements in big data, machine learning, and automation will have significant effects on countries, businesses, and communities. By 2021, the integration of AI is anticipated to double the pace of innovation and increase productivity by 60% in Malaysia (GetITAdmin, 2022). In particular, the relationship between AI and SMEs in Malaysia is marked by the potential for innovation, efficiency, and growth.

The rapid growth of digital technology has led to significant advancements in various fields, such as products, services, and processes, as indicated by Iansiti and Lakhani (2020), and innovative business models, as mentioned by Sjodin et al. (2020). In this transformative era, Artificial Intelligence (AI) plays a crucial and pioneering role in exploring new possibilities and frontiers, as emphasized by Lu et al. (2022). From a marketing standpoint, the development of machine learning and big data analytics has made AI a potential tool for marketers to gain insights into consumer behavior, optimize marketing campaigns, and enhance overall business performance, as demonstrated by Davenport et al. (2020), Huang and Rust (2022), and Verma et al. (2021). By leveraging AI, marketers can make informed decisions and deliver personalized experiences to customers, as highlighted by Kumar et al. (2021), by utilizing the capabilities of machine learning and data analytics, SME marketers can gain valuable insights into customer behavior and preferences, which can be used to create more personalized, efficient, and effective marketing campaigns (Ma and Sun, 2020; Sarath Kumar Boddu et al., 2022; Volkmar et al., 2022). This information is critical for decision-making, regardless of the size of the SME or the products and services offered. However, there is limited research that addresses the key factors that influence the readiness and acceptance of artificial intelligence (AI) in local SMEs.

AI Readiness

AI or technological readiness is a multifaceted concept and it is defined as the ability and/or willingness of a firm to adopt new technologies both internally (technology infrastructure) and externally (existing in the market) to achieve its goals and transformation (Richey et al. 2007). There is a highly complexity of the AI applications being used in the firms especially on the organization's digital transformation process, therefore, SMEs must carefully plan to keep up with competitors and with investors' demands.

People

Skill Human Resources

According to Autor and Dorn (2013), technological advancements demand specialized, "higher-level" knowledge and abilities, resulting in new skill requirements, a phenomenon referred to as "skill-based technological change." Literature has long acknowledged the significance of skills as a crucial element in the advancement and implementation of AI. However, there is a dearth of empirical research examining the characteristics of skill requirements in work environments facilitated by AI. Recent publications have focused on the skill disparities that occur when humans collaborate with AI, such as when workers attempt

to comprehend AI-generated forecasts (Borch and Min, 2022) or when they verify AI decisions without grasping the rationale behind them (Anthony, 2021). A major impediment to progress in comprehending and quantifying the influence of AI on employment is inadequate comprehension of the necessary competencies and the paucity of detailed data, such as AI skill taxonomies (Frank et al., 2019). In addition, the inability to determine the specific skills required in AI-driven settings impedes the creation of potent interventions aimed at enhancing workers' abilities. In other words, SME employees who possess strong adaptability skills can quickly learn to leverage AI tools, adapt their job roles to work alongside AI systems, and acquire new skills as required (Lada et al., 2023).

The availability of skilled human resources that are capable of understanding, implementing, and managing AI technologies is crucial. SMEs require employees with expertise in data analysis, machine learning, and AI development to effectively utilize AI solutions. Investing in training programs to upskill existing employees or hiring new talents with relevant expertise can enhance AI readiness. Therefore, the following hypothesis is put forth:

H1a: There is a relationship between skilled human resources and AI readiness among SMEs.

User Experience

SMEs must consider the experience and expertise of the individuals who will be using AI technologies to serve customers. User-friendly AI interfaces and intuitive design are essential to ensure smooth integration into existing workflows and maximize the benefits of AI readiness. To prove this, the following hypothesis is developed:

H1b: There is a relationship between user experience and AI readiness among SMEs.

Process

Opportunities in the Value Chain

AI can help SMEs win competitive advantages or provide a means of survival in the fields of manufacturing, e-commerce, accounting, human resources, marketing, and customer relations (Akpan et al. 2021). The research on AI technology for SMEs primarily focuses on two key areas. The first is the gradual process improvement and optimization of internal operations within the organizational boundary. The second is the external AI-driven transformation, which can help SMEs develop new business models, organization strategies, and organizational cultures, as well as build business alliances and other strategic partnerships (Bai et al., 2021).

Artificial intelligence solutions can play a significant role in assisting manufacturing small and medium-sized enterprises (SMEs) in achieving automation, which can lead to process improvement and optimization (Dwivedi et al., 2021). By incorporating AI technology, SMEs can address the issue of labor shortages and strive to achieve world-class production standards and promotional activities with minimal manpower (Johnson et al., 2021). AI can automate customer management, collect and process advanced data to enhance trend analysis, logistics planning, and inventory management, reduce costs, increase sales, and improve profits. Furthermore, AI can save time minimize defects, avoid risks, and improve overall performance (Hansen and Bogh, 2021), allowing suppliers to create value closer to customer operations (Kohtamaki et al., 2019). During the pandemic, AI technology has provided new service modes for SMEs and has demonstrated asymptotic process improvement with the aid of image recognition and speech recognition.

In sum, SMEs need to identify areas within their value chain where AI can create value and improve efficiency. This may include automating repetitive tasks, optimizing production processes, enhancing customer service through chatbots or personalized recommendations, or streamlining supply chain management. Conducting a thorough analysis of business processes and identifying pain points can help SMEs pinpoint where AI can have the most significant impact. The following hypothesis is thus generated:

H2a: There is a relationship between opportunities in the value chain and AI readiness among SMEs.

Change Management

Change management plays a crucial role in the successful readiness of AI among SMEs. Implementing AI often requires changes in organizational processes and workflows. It's important for the management to plan carefully and continuously when introducing new technology to ensure that its goals are effectively achieved (Jalagat, 2016), as the SME employees are having less extensive training and limited skills when adopting new technologies, introducing digital products and service offerings, as well as new AI-based procedures (Lemos et al., 2022). Thus, SMEs need to ensure effective change management strategies especially in the human resources, leadership, IT infrastructure, know-how and knowledge, and organizational policies and management, are in place to facilitate the smooth transition to AI-powered operations. This may involve training employees, restructuring roles and responsibilities, and fostering a culture of innovation and continuous improvement (Hradecky et al., 2022). Therefore, the following hypothesis is generated:

H2b: There is a relationship between change management and AI readiness among SMEs.

Technology

Readiness of Devices and Infrastructure

The readiness of SMEs' devices and infrastructure to support AI implementation is critical. This includes having access to reliable internet connectivity, adequate computing resources, and compatible software and hardware systems. The inaugural AI Readiness Index released by Cisco reveals that a mere 13% of organizations in Malaysia have the necessary infrastructure, resources, and expertise to successfully deploy and harness the full potential of AI-powered technologies (Ignatius, 2023). This finding highlights the need for SMEs in Malaysia to invest in AI readiness and upskill their workforce to stay competitive in the ever-evolving digital landscape. Additionally, SMEs may need to invest in upgrading or modernizing their IT infrastructure to accommodate AI technologies effectively. Hence, the following hypothesis is developed:

H3a: There is a relationship between the readiness of devices and infrastructure and AI readiness among SMEs.

Integration with IoT and IoE

The integration of AI with the Internet of Things (IoT) and Internet of Everything (IoE) devices can unlock new possibilities for Malaysian SMEs (Ahmad Zaidi, 2017). Various studies have shown that AI-powered analytics can derive valuable insights from the vast amounts of data generated by IoT and IoE devices, enabling predictive maintenance, real-time monitoring, and personalized customer experiences. Ensuring compatibility and interoperability between AI systems and IoT/IoE devices is essential for maximizing their combined potential. To verify whether integration with IoT and IoE has a significant impact on AI readiness among SMEs, the following hypothesis is developed:

H3b: There is a relationship between integration with IoT and IoE and AI readiness among SMEs.

By addressing these factors comprehensively, SMEs can overcome barriers to AI readiness and harness the full potential of AI technologies to drive innovation, improve efficiency, and enhance competitiveness in the marketplace. Therefore, the research framework (see Figure 1) is depicted as follows:

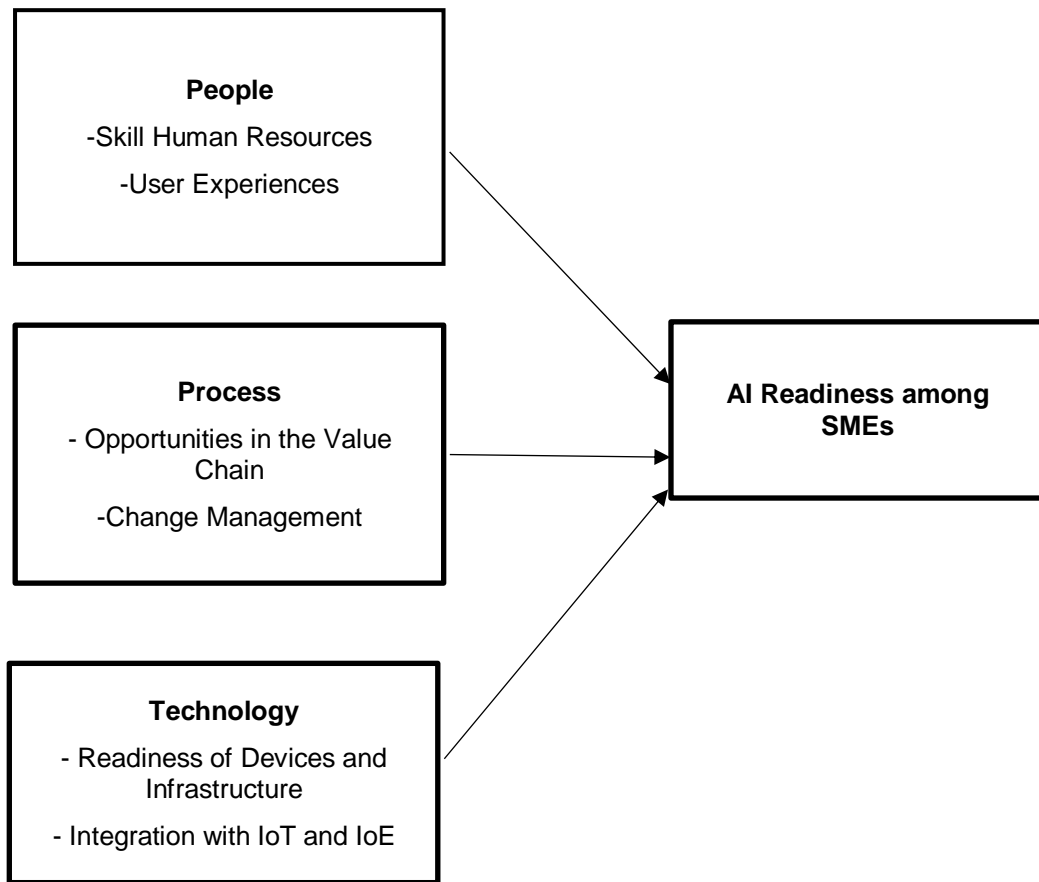


Figure 1: Research Framework On AI Readiness Among Smes In Malaysia

Conclusion And Implications

This study proposes an important AI readiness framework to the digital development of Malaysian SMEs. As Malaysia government actively encourages SMEs to empower AI in 2024 to accelerate Malaysia's progress as a technologically advanced knowledge economy, this proposed framework is important to improve the digital literacy of SMEs to create high-income employment opportunities by streamlining business process and resources through effective AI readiness. This proposed framework is also imperative to improve digital infrastructure, developing digital talent, and promoting digital entrepreneurship in SMEs to allows SME operators to make better preparation towards AI-led digital transformation in the next decades.

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