



Exploring Challenges For Artificial Intelligence Readiness in SMEs in Sri Lanka

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Abstract

AI technology adoption looks pretty challenging for the SME sector. Studies explain the challenges and barriers; AI readiness is context-based, and there is limited context-specific research on how Sri Lanka's socioeconomic and infrastructural conditions shape these issues. Existing global models of AI readiness often fail to capture these localised realities, making them less applicable in the Sri Lankan Context. The study aims to identify and analyse challenges to AI adoption in Sri Lankan SMEs and assess AI-readiness among SMEs in Sri Lanka. The researcher applied qualitative research methodology to analyse the key factors. A purposive sampling method was used to select the research respondents. An in-depth interview was conducted to collect primary data from the subject. The researcher utilised coding and thematic analysis to analyse the data. The findings revealed three key factors, namely AI knowledge, macro environment, and microenvironment, that influence the artificial intelligence readiness of SMEs. The challenge of AI knowledge consists of AI awareness, AI benefits, and AI technology implementation. Macro environmental factors include AI ethics, AI society, economic, political, legal (Regulation), competition, and technological factors. The micro environment includes organisational structure, culture, financial, human resources, and data strategy. The result of the study reveals that Small and Medium Enterprises (SMEs) in Sri Lanka face considerable challenges in adopting AI technology; most SMEs in Sri Lanka are not fully ready to embrace AI technology. In addition, the researcher found that AI applications vary for specific sectors, and most SMEs do not have explicit knowledge about AI applications. This finding emphasised the need for academic inquiry into the role of education and training programs to address gaps in AI knowledge and awareness, which are foundational for SMEs' successful adoption of AI technologies. Furthermore, the findings underscore the importance of studying external factors such as AI ethics, AI society, Economic, Political, and legal (Regulation) challenges, Data Strategy, Competition, and Technological challenges to understand better how macro-environmental conditions shape SMEs' AI strategies.

Keywords: Artificial intelligence, AI knowledge, Macro environment, Microenvironment, SME

Introduction

Artificial Intelligence (AI) Readiness refers to an organisation's ability to adopt and integrate AI technologies to achieve strategic goals effectively. It encompasses having the proper technological infrastructure, high-quality and accessible data, a skilled workforce, and strong leadership support. AI readiness also involves aligning processes with AI-driven workflows, addressing ethical considerations like bias and transparency, and fostering a culture that embraces innovation and change (Sotamaa, Reiman, & Kauppila, 2024). Organisations can leverage AI to drive efficiency, innovation, and competitive advantage in a rapidly evolving landscape by prioritising these elements. Artificial intelligence (AI) readiness in small and medium-sized enterprises (SMEs) refers to their capacity to adopt and integrate AI technologies into business operations to enhance efficiency, innovation, and competitiveness. AI readiness in SMEs depends on various factors, including access to appropriate technological infrastructure, the availability of high-quality data, and the development of skills and knowledge among employees (Gladysz et al., 2024). Leadership commitment and the strategic alignment of AI with organisational objectives are critical for successful implementation. Small and Medium Enterprises (SMEs) in Sri Lanka play a vital role in the country's economy, contributing significantly to employment generation, income distribution, and regional development Accounting for over 75% of the total enterprises and 50% of the GDP and providing nearly 45% of employment, SMEs are integral to the socioeconomic fabric of the nation (Sri Lanka Export Development Board, 2021). They operate across diverse sectors, including agriculture, manufacturing, and services, often bridging rural economies and urban markets. Small and Medium Enterprises (SMEs) in Sri Lanka face numerous problems and challenges that hinder their growth and sustainability despite their crucial economic role. Limited access to finance is a significant barrier, as many SMEs struggle to meet formal financial institutions' collateral requirements and credit evaluation criteria (Sriyani, 2022). Regulatory and bureaucratic hurdles and a lack of awareness about available government support programs exacerbate these difficulties (Priyanath, 2010). These challenges of SMEs hinder AI adoption. Al Dhaheri, Ahmad, and Papastathopoulos (2024) applied Dynamic capability theory and revealed that market turbulence and competitive intensity influence AI in SMEs. Sotamaa, Reiman, and Kauppila (2024) explained risk management in the era of artificial intelligence in Manufacturing SMEs. They explained macro and microenvironmental risk factors that affect AI adoption. Schwaek et al. (2024) described the factors affecting AI adoption as eight clusters based on technology, environment, and organisational theory: compatibility, infrastructure, knowledge, resources, culture, competition, regulation, and ecosystem. Gladysz et al. (2023) investigated the obstacles to AI as Social, Economic, Ethical, Data, Managerial, Political, Legal and Technological factors. Lada et al. (2023) examined the challenges of adopting artificial intelligence (AI) in SMEs. Huang (2024) found the obstacles to AI adoption in SMEs. Verma et al. (2021) employed the Systematic review method to explore AI in marketing in SMEs, and Wang et al. (2022) described the drivers, challenges and barriers of SMEs to adopt AI. They developed a model with internal and external aspects for the intelligence transformation of SMEs.

They also listed the drivers and barriers to the intelligence transformation of SMEs. Bettoni et al. (2021) developed an AI adoption model for SMEs, revealing five barriers prohibiting companies from adopting AI. Global studies emphasise financial constraints, technological limitations, and skills shortages as common challenges (Dwivedi & Pawsey, 2023). Research on the problems and challenges of Artificial Intelligence (AI) readiness in small and medium-sized enterprises (SMEs) in Sri Lanka is sparse, leaving critical gaps in understanding the unique barriers these businesses face. AI readiness in Sri Lanka's SMEs differs from the global context due to limited access to advanced digital infrastructure and a lower rate of technology adoption. There is limited context-specific research on how these issues are shaped by Sri Lanka's socio-economic and infrastructural conditions. Inadequate digital infrastructure, limited awareness of AI's potential, and the lack of localised AI solutions are underexplored in Sri Lanka. A more focused approach would ensure that AI initiatives are tailored to Sri Lanka's development needs and capabilities. These gaps highlight the need for regionally focused studies to provide tailored insights and practical strategies for enhancing AI readiness in Sri Lankan SMEs. Existing global models of AI readiness often fail to capture these localised realities, making them less applicable in the Sri Lankan Context. Additionally, cautious cultural attitudes and evolving policy frameworks further hinder the effective integration of AI in local SMEs. Previous research lacks a focused investigation into these region-specific barriers, resulting in a critical knowledge gap. Therefore, this study aims to assess the AI readiness of Sri Lankan SMEs and identify the key challenges impeding their ability to adopt AI technologies. This research tries to find out "what are the challenges facing the adoption of AI in SMEs? and Are the SMEs in Sri Lanka ready to adopt AI technology? ". The aims of the study are:

- To identify and analyses challenges to AI adoption in Sri Lankan SMEs
- To assess AI-readiness among SMEs in Sri Lanka

Literature Review

Artificial intelligence (AI)

AI has emerged as a transformative force across various disciplines, integrating advanced computational techniques to mimic human intelligence and decision-making processes. AI encompasses machine learning, natural language processing, and robotics, enabling applications such as predictive analytics, autonomous systems, and personalised experiences (Russell & Norvig, 2021). Its adoption in healthcare, finance, and education industries underscores its potential to optimise efficiency, but ethical concerns about bias, data privacy, and accountability remain central to ongoing discourse (Floridi et al., 2018). The evolution of AI continues to shape societal structures and presents opportunities and challenges for future development. AI readiness refers to the preparedness of organisations, governments, and societies to effectively adopt and leverage artificial intelligence technologies to achieve strategic goals. It encompasses technical infrastructure, a skilled workforce, governance frameworks, and ethical guidelines for integrating AI into systems and processes (Al Dhaheri, Ahmad, & Papastathopoulos, 2024).

Countries and organisations with higher AI readiness are better positioned to harness their potential for innovation, competitiveness, and public service delivery, while those lagging face risks of exacerbated inequalities and inefficiencies (Garg, Gupta, and Agarwal, 2023). Therefore, fostering AI readiness involves a multidimensional approach, including investments in education, research, infrastructure, and policies to ensure equitable and responsible use.

Small and Medium Enterprises (SMEs)

The definition of SMEs in Sri Lanka varies across institutions, typically based on criteria such as the number of employees, annual turnover, and capital investment. According to the Ministry of Industry and Commerce, SMEs are classified as enterprises with fewer than 300 employees and an annual turnover not exceeding LKR 750 million (Ministry of Industry and Commerce, 2020). Small and Medium-sized Enterprises (SMEs) play a pivotal role in driving economic growth, fostering innovation, and generating employment, particularly in developing economies. Defined by their size, revenue, and number of employees, SMEs contribute significantly to GDP and export performance, often serving as the backbone of local economies (OECD, 2020). These enterprises operate across diverse sectors, including agriculture, manufacturing, and services, and play a crucial role in regional development and poverty alleviation.

Technology-Organisation-Environment Framework (TOE framework)

The Technology-Organisation-Environment (TOE) Framework is a theoretical model developed by Tornatzky and Fleischner (1990) that explains how firms adopt and implement technological innovations. It suggests that three main factors influence technology adoption: Technological context, organisational context and environmental context (Baker, 2011). The Technological Context includes the available technologies within and outside the firm. This covers existing technologies such as infrastructure, compatibility, complexity, emerging technologies' potential for competitive advantage, and perceived benefits and risks of technology adoption. Organisational Context refers to the internal characteristics of the firm that affect adoption, such as the organisation's size. Larger firms may have more resources for adoption, structure centralised or decentralised decision-making, management support, and organisational culture. Environmental Context Considers external factors influencing adoption, including industry characteristics and market trends, such as the regulatory environment, government policies, and competitive pressure from rivals to innovate. The interplay between technology, the environment, and organisational theory highlights the dynamic relationship between technological advancements, ecological considerations, and organisational practices (Baker, 2011).

Macro and Micro Environment Theory

Macro and microenvironment theory examines the external and internal factors influencing an organization's operations and strategic decisions. The macro-environment encompasses broad external forces such as economic, political, social, technological, environmental, and legal factors, often analysed using frameworks like PESTEL (Gillespie, 2011). Understanding the interplay between these environments is crucial for businesses to align their strategies effectively and ensure sustainability in a competitive market.

Organisations must continuously monitor macro and micro environmental factors to remain agile and responsive to changes. AI readiness is influenced by both macro and micro environmental factors, as outlined in business and technological adaptation theories. Based on PESTEL analysis (Political, Economic, Social, Technological, Environmental, and Legal factors), the macro-environment shapes the broader external forces affecting AI adoption.

Diffusion of Innovation Theory

The diffusion of innovation theory, developed by Rogers (2003), explains how new ideas, products, or practices spread within a social system over time. It identifies five key adopter categories: innovators, early adopters, early majority, late majority, and laggards, each with distinct characteristics and adoption behaviours. The theory emphasises that the adoption process is influenced by factors such as the perceived relative advantage, compatibility, complexity, trialability, and observability of the innovation. The Diffusion of Innovation (DOI) Theory provides a framework for understanding AI readiness by explaining how new technologies are adopted within organisations and societies (Rogers, 2003).

Critical Review of Literature

The Technology-Organisation-Environment (TOE) framework provides a broad structure for understanding AI readiness among Sri Lanka's SMEs. Yet, its application often overlooks the country's deeply entrenched cultural and infrastructural limitations. Technological constraints, such as poor internet penetration and limited access to advanced digital tools, weaken the practical relevance of the framework's technology pillar. Organisational readiness is also hindered by the dominance of family-run SMEs that often resist structural change and lack digital leadership. While the environmental aspect highlights external pressure, in Sri Lanka's case, policy uncertainty and weak enforcement dilute such pressures, making the environmental influence weaker than the model suggests. The macro and micro environment theory offers a valuable lens to differentiate between national-level constraints like economic instability and political inertia, and firm-level barriers (micro) such as resource scarcity and managerial inertia. However, it fails to fully capture the informal business practices and regional disparities unique to Sri Lankan SMEs. While explaining adoption trends, the Diffusion of Innovation theory assumes a level of technological enthusiasm often absent in conservative SME cultures in Sri Lanka. Moreover, the lack of opinion leaders or successful AI adopters in the local SME landscape slows the innovation diffusion cycle. The theory's stages, "awareness, interest, evaluation, trial, and adoption", rarely progress linearly in this setting due to systemic barriers. Thus, while these theories offer structured insight, they require contextual tailoring to meaningfully reflect the unique challenges and slow technological transitions faced by Sri Lanka's SME sector.

Methodology

The research aims to explore the key factors that are challenging the AI readiness of SMEs. The researcher applied qualitative research methodology to explore the challenges to AI readiness. The decision to employ a qualitative research method in this study is grounded in the exploratory nature of the research objective, which seeks to understand the key factors challenging the AI readiness of SMEs. Given that AI adoption in small and medium enterprises is complex and context-specific, qualitative methods are well-suited to uncover in-depth insights, perceptions, and experiences that quantitative approaches may overlook. Interviews allow participants to express their views in words, offering a richer understanding of their nuanced challenges. The population are SMEs in Sri Lanka. The sampling strategy for this research was guided by the need to obtain diverse and contextually rich insights into the challenges Sri Lankan SMEs face in adopting AI. The selection of the SME sector includes food, leather, handicrafts, hotels, hospitals, financial institutions, construction and education SMEs in Sri Lanka, these industries represent a broad cross-section of the SME landscape in Sri Lanka and vary significantly in their levels of digital maturity, operational complexity, and exposure to technological innovations. The researcher selected eight SMEs from food products, three from leather products, five from handicrafts, nine from Hotels, five from hospitals, eight from financial institutions and ten from education institutions. Purposive sampling methods were used to select samples for this study. The sample size of 48 SMEs was deemed appropriate for a qualitative study using in-depth interviews, as it allowed for thematic saturation while maintaining manageability in data collection and analysis. The researcher went through the transcript; the collected data was analysed using coding and thematic analysis methods; responses were derived as a point; then, the researcher identified the first coding; the second coding was conducted, and themes were derived.

Result and Discussion

Demographic Profile

This study explored the challenges SMEs face when adopting AI in their business. The researcher collected data from 48 respondents via in-depth interviews. The respondent profile includes age, number of firm employees and educational level. Regarding the respondents' age, most SME owners are between 20 and 40; this indicates that young entrepreneurs are interested in AI adoption in their firms. The data shows that 17% of SMEs employed below 20 employees, 56% of SMEs employed 20-50 employees, and 27% of SMEs admitted to having above 50 employees. Regarding the educational level, 15% of respondents have A/L, 44% have professional qualifications, 25% have a degree, and 16% have postgraduate qualifications; this indicates that most SME owners have IT-related professional qualifications.

Result of Coding Analysis

The result shows the key barriers, such as AI knowledge, macro environment, and microenvironment.

AI knowledge

The researcher interviewed respondents, and food manufacturers mentioned: “I am very interested in applying AI technology, but I often struggle to understand how AI can improve our production processes, supply chain, or quality control”. The respondents in the education industry described: “I find that standalone AI tools often lack integration with our existing systems, making their benefits unclear and difficult to justify as a worthwhile investment”. The responses from the hotel describe: “I find that data quality, quantity, security, and privacy issues are significant challenges in leveraging AI effectively”. From the responses of SMEs, the researcher identified the challenge as AI knowledge. AI knowledge includes three dimensions: AI awareness, AI benefits, and AI technology implementation.

AI awareness: The most important challenge is that SMEs lack an understanding of Artificial Intelligence (AI) and their specific AI needs. Many SME leaders struggle to comprehend AI's potential benefits and applications within their operations, often perceiving it as complex, costly, or only suitable for large corporations.

AI benefits: Small and Medium Enterprises (SMEs) face significant challenges when integrating Artificial Intelligence (AI) outside their core business operations. A key issue is the isolation of AI capabilities, where advancements are confined to specific departments without permeating the entire organization, limiting strategic impact.

AI technology implementation: Misconceptions about employees' capabilities often exacerbate this problem, as management may overestimate the workforce's readiness to adopt and utilise AI tools effectively. Additionally, SMEs frequently undervalue the contributions of software developers, whose expertise is crucial for tailoring AI solutions to meet unique business needs. Finally, the lack of specialisation and expertise within SMEs further impedes AI's effective implementation and scaling, highlighting the need for targeted investment in skill development and strategic alignment.

Macro Environment

The hospital owner responded, “I find that economic challenges significantly impact our operations and growth. Obstacles to profitability and economic sustainability are a constant concern, mainly due to the high costs associated with maintaining advanced medical technologies and complying with industry standards”. The responses from construction SMEs regarding the challenges in AI readiness: “My business faces an uncertain economic climate and fluctuating construction costs, making allocating resources for AI adoption difficult”. The responses indicate that the macro-environment is a significant challenge. This challenge is further dimensioned as AI ethics, AI society, economic, Political, and Legal (Regulation) challenges, Data Strategy, Competition, and Technological challenges.

AI ethics: SMEs in Sri Lanka face unique challenges in adopting AI ethically as they navigate the intersection of moral principles and practical considerations. SMEs often grapple with the compatibility of machine versus human value judgments, particularly when automated systems encounter moral dilemmas or produce biased outcomes.

AI society: SMEs in Sri Lanka encounter significant challenges in adapting to an AI-driven society, particularly concerning workforce substitution and transformation. As AI automates routine tasks, SMEs face the dual pressures of reskilling employees and addressing job displacement, which can disrupt traditional workforce dynamics.

Economic challenge: SMEs in Sri Lanka face persistent economic challenges that hinder profitability and long-term sustainability in a rapidly evolving market. Market turbulence, driven by economic instability, global competition, and fluctuating consumer demands, creates an unpredictable business environment that is difficult for SMEs to navigate. Industry dynamics, including the dominance of larger firms and shifting sectoral trends, further constrain SMEs' ability to compete effectively.

Political and legal (Regulation): SMEs in Sri Lanka encounter critical political and legal challenges that influence their operations and growth, particularly concerning regulatory frameworks and governance. Issues related to political principles, such as stability, transparency, and fairness, significantly affect the business climate for SMEs. Navigating complex legal regulations often imposes additional compliance costs and administrative burdens, limiting their ability to compete effectively.

Data Strategy: SMEs in Sri Lanka face significant challenges in developing effective data strategies, which are critical for leveraging AI technologies. Data quality and quantity issues often impede the reliability of AI-driven insights as SMEs struggle to collect, process, and maintain high-quality datasets. Data security and privacy concerns add further complexity, with many SMEs lacking robust mechanisms to safeguard sensitive information.

Competition: SMEs in Sri Lanka face considerable challenges in navigating a competitive landscape marked by intense pressure and rapidly evolving market dynamics. Competitive pressure from local and international players compels SMEs to continually innovate and differentiate their offerings to sustain market relevance. *Technological:* SMEs in Sri Lanka encounter significant technological challenges, particularly regarding compatibility, infrastructure, and flexibility in adopting modern innovations. Ensuring compatibility between emerging technologies and existing systems is a persistent hurdle, as many SMEs operate on outdated or fragmented platforms.

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Microenvironment

The responses of leather producers mentioned: "our AI readiness is hindered by challenges such as a rigid organisational structure and culture, limited external support and insufficient organisational readiness". The responses of construction SME owners mentioned: "One of the biggest challenges to AI readiness is the dearth of skilled human resources, particularly in areas such as AI and IT expertise. Employee adoption is another major hurdle, as many workers are resistant to integrating AI technologies into their daily tasks, and there is a noticeable gap in knowledge among staff regarding AI's potential applications in our industry".

The researcher identified the microenvironment as a significant challenge from the coding analysis. The microenvironment is dimensioned as organisational structure, culture, financial, and human resources.

Organisational Structure and Culture: SMEs in Sri Lanka face significant organisational structure and culture challenges, which hinder their ability to adopt and integrate AI solutions effectively. Limited external support and organisational readiness often result in resistance to change and slow adoption of AI-driven innovations. Incompatibility between AI solutions and an organization's legacy IT systems or processes exacerbates implementation difficulties, while failure to keep pace with AI trends prevents SMEs from leveraging cutting-edge technologies.

Financial: Small and Medium Enterprises (SMEs) face significant financial challenges in achieving AI readiness, primarily due to the high funding and costs associated with AI implementation. The substantial initial investment required for AI infrastructure, software, and skilled labour often presents a barrier for resource-constrained SMEs, as they may struggle to allocate sufficient capital for these expenditures without immediate returns.

Human Resources: Small and Medium Enterprises (SMEs) encounter various human resource challenges that hinder their AI readiness, the most prominent being the dearth of skilled personnel in critical areas such as IT and AI. A lack of employee adoption, driven by insufficient knowledge and resistance to change, further exacerbates these challenges, as many employees are either sceptical of AI or reluctant to embrace its integration into daily operations.

Based on the stated research process and identified themes, such as AI unawareness and knowledge, macro-environment, and micro-environment and the propositions that can be logically derived from the findings. The propositions derived from the findings are:

1. Proposition 1: Low AI awareness and knowledge among SME stakeholders negatively impact their readiness to adopt AI technologies.
2. Proposition 2: Macro-environmental factors, such as AI ethics, AI society, economic, political, legal, data strategy, competition, and technological challenges, significantly influence SMEs' ability to implement AI solutions.

Proposition 3: Internal micro-environmental factors, including organisational structure, culture, financial, and human resources, play a critical role in determining the level of AI readiness in SMEs

Discussion

AI knowledge consists of *AI awareness, AI benefits and AI technology implementation*. Artificial Intelligence (AI) integration in Small and Medium Enterprises (SMEs) is increasingly influenced by AI knowledge, awareness, benefits, and technological implementation. AI knowledge is essential for understanding AI concepts and tools, and forms the foundation for decision-making processes related to its adoption (Kim et al., 2023). Awareness also allows SMEs to recognise AI's potential to transform business operations, which often correlates with the extent of AI implementation (Aljarboa, 2024).

When these elements are effectively combined, SMEs leverage AI to enhance productivity, improve customer experience, and optimise resource allocation (Al-Hattami, 2024). Studies highlighted that SMEs with higher levels of AI awareness and knowledge are better positioned to achieve tangible benefits through AI technology adoption, emphasising the need for training programs and policy support to bridge knowledge gaps (Quaye et al., 2024). Therefore, fostering AI knowledge and awareness is essential for SMEs to fully realise AI's advantages and overcome implementation hurdles.

Macro environmental factors included *AI ethics, AI society's economic, political, legal (Regulation), competition, and technological factors*. The macro-environment plays a pivotal role in shaping the adoption and impact of Artificial Intelligence (AI) in Small and Medium Enterprises (SMEs), mainly through ethical, societal, economic, political, and technological dimensions. AI ethics ensures that AI applications align with fairness, accountability, and transparency principles, enhancing stakeholders' trust (Floridi & Cowls, 2019). The societal implications of AI, such as workforce displacement and changes in consumer behaviour, further underscore the importance of balancing innovation with social responsibility (Vinuesa et al., 2020). Economic factors, including cost-benefit analysis and access to funding, directly influence SMEs' ability to adopt AI technologies (Brynjolfsson & McAfee, 2017). Political and legal regulations also play a critical role as governments increasingly implement policies to address data protection, AI safety, and anti-competitive practices, which can either facilitate or hinder SME innovation (Gasser & Almeida, 2017). Additionally, competition within industries drives SMEs to leverage AI for a competitive edge, while rapid technological advancements create opportunities for tailored solutions and pose challenges related to integration and scalability (Porter & Heppelmann, 2014). Understanding these macro-environmental factors is essential for SMEs to navigate the complexities of AI adoption effectively.

The micro environment includes *organisational structure, culture, financial, human resources, and data strategy*. The microenvironment of Small and Medium Enterprises (SMEs) significantly influences the effective adoption and integration of Artificial Intelligence (AI), with organisational structure, culture, financial resources, human resources, and data strategy being critical components. A flexible and adaptive organisational structure fosters faster decision-making and cross-functional collaboration, essential for AI projects (Mintzberg, 1980). An innovation-driven organisational culture enhances employees' openness to change and supports adopting AI tools (Schein, 2010).

Financial resources, including budget allocation and access to funding, determine how SMEs can invest in AI technologies and sustain implementation efforts (Brynjolfsson & McAfee, 2017). Human resources, particularly the availability of skilled employees, play a crucial role in overcoming technical barriers and ensuring the successful deployment of AI systems (Davenport & Ronanki, 2018).

Moreover, a robust data strategy encompassing data collection, management, and analysis is vital for maximising the value derived from AI while ensuring compliance with ethical and regulatory standards (Mehmood et al., 2024). Addressing these microenvironmental factors holistically is essential for SMEs to achieve sustainable success with AI initiatives.

Conclusion and Implications

The research aims to identify the challenges to SMEs' AI readiness. The researcher developed the first and second coding based on the interview responses. Then, themes were developed from the coding: AI unawareness and knowledge, Macro-Environment, and micro-environment. These insights carry important policy implications and suggest a range of practical interventions to support SMEs in their journey toward digital transformation through AI adoption. Small and Medium Enterprises (SMEs) in Sri Lanka face significant challenges in adopting AI technology. This research proved that most SMEs in Sri Lanka are not fully ready to embrace AI technology, though there is growing potential with the right investments and policy support.

The theme of *AI unawareness and knowledge gaps* among SME owners and employees indicates a need for national-level policy intervention focused on education and awareness. Policymakers should prioritise the integration of AI literacy into existing digital skill development programs. Public campaigns, short courses, and sector-specific training initiatives must be implemented in partnership with universities, technical institutions, and private sector actors to equip SMEs with a foundational understanding of AI technologies and their business applications. The government should improve internet connectivity, cloud service accessibility, and data infrastructure across the country, particularly in underdeveloped and rural regions. Policy frameworks should be streamlined to support AI experimentation while safeguarding data privacy and ethical standards. Further, financial incentives such as tax relief, AI adoption grants, or subsidised technology access should be introduced to lower SMEs' cost barriers. Meanwhile, the *micro-environmental constraints*, including internal firm-level limitations, suggest that practical support mechanisms are needed.

Incubation programs, AI mentoring networks, and SME-friendly tech partnerships should be encouraged to help businesses gradually integrate AI into their operations. Policymakers should also promote collaboration between SMEs and AI solution providers to co-develop tailored applications that reflect local needs and capabilities.

Limitations and Suggestions for Future Research

While this research provides valuable insights into the challenges affecting AI readiness among SMEs in Sri Lanka, limitations must be acknowledged. The study relies primarily on qualitative data collected through interviews, which, although rich in context, may limit the generalizability of the findings to the broader SME population. The rapidly evolving nature of AI technologies and the external environment also means that some identified challenges may change over time, potentially affecting the long-term relevance of the findings. Moreover, the study does not quantitatively assess the degree of AI readiness, which could have provided a more measurable basis for comparison.

Future research on AI readiness in SMEs should explore several avenues to build on the findings of this study. First, further investigation into the impact of AI education and training programs on bridging knowledge gaps in SMEs is crucial. Studies could focus on developing targeted curricula that address the specific needs of SME employees across different industries. Additionally, future research could examine how macro-environmental factors influence the AI adoption process in SMEs, with particular attention to cross-national comparisons. Lastly, longitudinal studies could be conducted to track the evolution of AI readiness over time. Future research could benefit from incorporating a mixed-methods approach and a larger, more representative sample to strengthen the robustness and applicability of the results. These research efforts would contribute to developing comprehensive strategies for enhancing AI readiness tailored to the unique challenges and opportunities SMEs face.

References

Al Dhaheri, M.H., Ahmad, S.Z. and Papastathopoulos, A., 2024. Do environmental turbulence, dynamic capabilities, and artificial intelligence force SMEs to be innovative?. *Journal of Innovation & Knowledge*, 9(3), 100528. <https://doi.org/10.1016/j.jik.2024.100528>

Al-Hattami, H.M., 2024. Impact of AIS success on decision-making effectiveness among SMEs in less developed countries. *Information Technology for Development*, 30(3), 472-492. <https://doi.org/10.1080/02681102.2022.2073325>

Aljarbo, S., 2024. Factors influencing the adoption of artificial intelligence in e-commerce by small and medium-sized enterprises. *International Journal of Information Management Data Insights*, 4(2), 100285. <https://doi.org/10.1016/j.ijimei.2024.100285>

Baker, J., 2011. The technology–organization–environment framework. *Information Systems Theory: Explaining and Predicting Our Digital Society*, 1, .231-245. DOI https://doi.org/10.1007/978-1-4419-6108-2_12.

Gladysz, B., Matteri, D., Ejsmont, K., Corti, D., Bettoli, A. and Haber Guerra, R., 2023. Platform-based support for AI uptake by SMEs: guidelines to design service bundles. *Central European Management Journal*, 31(4), 463-478. <https://doi.org/10.1108/CEMJ-08-2022-0096>

Huang, Y.H., 2024. Exploring the implementation of artificial intelligence applications among academic libraries in Taiwan. *Library Hi Tech*, 42(3), 885-905. <https://doi.org/10.1108/LHT-03-2022-0159>

Kim, M.J., Hall, C.M., Chung, N., Kim, M. and Sohn, K., 2023. Why do tourists use public transport in Korea? The roles of artificial intelligence knowledge, environmental, social, and governance, and sustainability. *Asia Pacific Journal of Tourism Research*, 28 (5), 467 - 484. <https://doi.org/10.1080/10941665.2023.2247099>

Lada, S., Chekima, B., Karim, M.R.A., Fabeil, N.F., Ayub, M.S., Amirul, S.M., Ansar, R., Bouteraa, M., Fook, L.M. and Zaki, H.O., 2023. Determining factors related to artificial intelligence (AI) adoption among Malaysia's small and medium-sized businesses. *Journal of Open Innovation: Technology, Market, and Complexity*, 9(4), 100144. <https://doi.org/10.1016/j.joitmc.2023.100144>

Mehmood, K., Jabeen, F., Rashid, M., Alshibani, S.M., Lanteri, A. and Santoro, G., 2024. Unraveling the transformation: the three-wave time-lagged study on big data analytics, green innovation and their impact on economic and environmental performance in manufacturing SMEs. *European Journal of Innovation Management*. <https://doi.org/10.1108/EJIM-10-2023-0903>

Bettoni, A., Matteri, D., Montini, E., Gladysz, B. and Carpanzano, E., 2021. An AI adoption model for SMEs: A conceptual framework. *IFAC-PapersOnLine*, 54(1), 702-708. <https://doi.org/10.1016/j.ifacol.2021.08.082> Get rights and content

Brynjolfsson, E. and McAfee, A., 2014. *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & company.

Davenport, T.H. and Ronanki, R., 2018. Artificial intelligence for the real world. *Harvard business review*, 96(1), 108-116.

Dwivedi, A. and Pawsey, N., 2023. Examining the drivers of marketing innovation in SMEs. *Journal of Business Research*, 155,113409. <https://doi.org/10.1016/j.jbusres.2022.113409>

Floridi, L. and Cowls, J., 2022. A unified framework of five principles for AI in society. *Machine learning and the city: Applications in architecture and urban design*, 535-545. <https://doi.org/10.1002/9781119815075.ch45>

Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., Luetge, C., Madelin, R., Pagallo, U., Rossi, F. and Schafer, B., 2018. AI4People—an ethical framework for a good AI society: opportunities, risks, principles, and recommendations. *Minds and machines*, 28,689-707. <https://doi.org/10.1007/s11023-018-9482-5>

Ministry of Industry and Commerce., 2020. *National Policy Framework for Small and Medium Enterprises*. Government of Sri Lanka.

Mintzberg, H., 1980. Structure in 5's: A Synthesis of the Research on Organization Design. *Management science*,26(3),322-341. <https://doi.org/10.1287/mnsc.26.3.322>

OECD., 2020. *SME and entrepreneurship outlook 2020*. Organisation for Economic Co-operation and Development.

Porter, M.E. and Heppelmann, J.E., 2014. How smart, connected products are transforming competition. *Harvard business review*, 92(11), 64-88.

Priyanath, H.M.S., 2006. Managerial deficiencies in the small and medium enterprises (SMEs) in Sri Lanka: An empirical evidence of SMEs in the Ratnapura District. <http://repo.lib.sab.ac.lk:8080/xmlui/handle/123456789/797>

Vavuniya Journal of Business Management

Quaye, W., Akon-Yamga, G., Akuffobea-Essilifie, M. and Onumah, J.A., 2024. Technology adoption, competitiveness and new market access among SMEs in Ghana: What are the limiting factors?. *African Journal of Science, Technology, Innovation and Development*, 16(7), 1023-1037. https://hdl.handle.net/10520/ejc-aa_ajstd_v16_n7_a1023

Garg, P., Gupta, N. and Agarwal, M., 2023. Role of Artificial Intelligence in Supply Chain Management. In *Data Analytics and Business Intelligence* (47-61). CRC Press.

Gasser, U. and Almeida, V.A., 2017. A layered model for AI governance. *IEEE Internet Computing*, 21(6), 58-62. DOI: [10.1109/MIC.2017.4180835](https://doi.org/10.1109/MIC.2017.4180835)

Gillespie, A., 2014. *Foundations of economics*. Oxford University Press, USA.

Rogers, E. M. 2003, Diffusion of innovations, 5th edn Tampa, FL: Free Press.[Google Scholar].

Russell, S.J. and Norvig, P., 2016. *Artificial intelligence: a modern approach*. Pearson.

Schein, E.H., 2010. *Organizational culture and leadership* (2). John Wiley & Sons.

Schwaeke, J., Peters, A., Kanbach, D.K., Kraus, S. and Jones, P., 2025. The new normal: The status quo of AI adoption in SMEs. *Journal of small business management*, 63 (3), 1297 - 1331 <https://doi.org/10.1080/00472778.2024.2379999>

Sotamaa, T., Reiman, A. and Kauppila, O., 2025. Manufacturing SME risk management in the era of digitalisation and artificial intelligence: a systematic literature review. *Continuity & Resilience Review*, 7(1), 1-28. <https://doi.org/10.1108/CRR-12-2023-0022>

Sri Lanka Export Development Board. (2021). *SMEs in Sri Lanka*. Retrieved from <https://www.srilankabusiness.com>

Sriyani, G.T.W., 2022. Impact of economic crisis and way forward for the survival of SMEs: A Sri Lankan perspective. *Wayamba Journal of Management*, 13(2). DOI: [10.4038/wjm.v13i2.7568](https://doi.org/10.4038/wjm.v13i2.7568)

Tornatzky, L. and Fleischer, M., 1990. The process of technology innovation, *Lexington, MA*.

Verma, S., Sharma, R., Deb, S. and Maitra, D., 2021. Artificial intelligence in marketing: Systematic review and future research direction. *International Journal of Information Management Data Insights*, 1(1), 00002. <https://doi.org/10.1016/j.ijimei.2020.100002>

Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., Felländer, A., Langhans, S.D., Tegmark, M. and Fuso Nerini, F., 2020. The role of a rtificial intelligence in achieving the Sustainable Development Goals. *Nature communications*, 11(1), 233. <https://doi.org/10.1038/s41467-019-14108-y>

Wang, J., Lu, Y., Fan, S., Hu, P. and Wang, B., 2022. How to survive in the age of artificial intelligence? Exploring the intelligent transformations of SMEs in central China. *International Journal of Emerging Markets*, 17(4), 1143-1162. <https://doi.org/10.1108/IJOEM-06-2021-0985>

Annexures

Table 1: AI knowledge

Open coding	Axial coding	Themes / Final coding
Lack of visibility focus, AI roles are poorly defined, Lack of knowledge sharing, Lack of AI understanding, AI Needs On standalone use, Unclear benefits of an AI initiative Convenience of AI, Enterprise development	AI awareness AI benefits	AI knowledge
AI is implemented outside the core business, AI capabilities are isolated, Misconception of employees' capabilities, Underestimated software developer, Data worship by managers, System/data quality and integration, Specialization and expertise	AI technology implementation	

Table 2: Macro environment

Open coding	Axial coding	Themes / Final coding
Moral principles and moral considerations, Applying AI to the industry, AI rulemaking for human behaviour, To the compatibility of machine versus human value judgment, To moral dilemmas and AI discrimination Workforce substitution and transformation, Social acceptance/trust in AI, Transformation of human-to-machine (H2M) , Machine-to-machine (M2M) interaction	AI AI	Macro- ethics society

Obstacles to profitability and economic, sustainability , Market Turbulence, Industry dynamics, Complexity	Economic
Issues of political principles, Legal regulations, Public order, Policy support, Governance of autonomous intelligence systems, Responsibility and accountability	Political and legal (Regulation)
Issues related to data quality and quantity, Data security and privacy, Data standards and database development, Insufficient availability of data, Data management, Lack of data , Lack of an AI lifecycle assessment method, Lack of customized solutions	Data Strategy
Competitive pressure, Relative advantage, Compatibility, Competitive Intensity, competing priorities	Competition
Compatibility , Infrastructure, Technological flexibility	Technological

Table 3: Microenvironment

Open coding	Axial coding	Themes / Final coding
External Support Organisation Readiness Incompatibility of an AI solution with an organization's legacy IT systems or processes Not following AI trends, Price of an AI solution, Risk of losing reputation Damaging customer Relationships and tasks or processes Complexity in using solutions An organization's strategy Practices for deploying AI Lack of suitable strategy formulation and execution Resources constraints Lack of clear business case and strategy	Organisational Structure and Culture	Microenvironment

Funding/cost associated with implementation	Financial
Financial constraints	
Financial feasibility	
A dearth of skilled human resources	Human Re-
Employee adoption	sources
Knowledge workers	
Collaboration of staff and machines	
Lack of IT competence or knowledge	
Lack of AI competence	
Dependency on external help	
No or little prior AI experience	
AI or technology skepticism	
Change resistance	
Human resources and management	
Under-skilled employees	
Support from managers	
Employee age	
Firefighting	
Insufficient employee training	
Top management involvement	
