Applied Data Science and Analysis
Vol.2025, **pp**. 112–117
DOI: https://doi.org/10.58496/ADSA/2025/007; ISSN: 3005-317X
https://mesopotamian.press/journals/index.php/ADSA

Research Article

# The Role of Artificial Intelligence (AI) in Transforming Small and Medium Enterprises (SMEs): A Narrative Review

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**ARTICLE INFO**

Article History
Received 25 Jan 2025
Revised: 26 Feb 2025
Accepted 24 Mar 2025
Published 13 Apr 2025

Keywords
Artificial Intelligence
SMEs
Deep learning
Application
Challenges

**ABSTRACT**

AI is of great interest to researchers and practitioners as a means of achieving the necessary progress in the business industry. However, the role of AI in transforming SMEs is not well documented. The study assessed the role of AI in transforming SMEs globally. The study investigated the current state of AI in SMEs, challenges, and opportunities. This study reviewed a total of 1,021 published articles, mainly from 1992-2024. The review was performed using scientifically cited and indexed databases, namely Dimensions, Web Science, Elsevier Scopus, and Google Scholar. The study demonstrates how AI enables SMEs to improve competitiveness, streamline operations, and conform to sustainability objectives by tackling particular issues such as scarce resources, operational inefficiencies, and cyber threats. The study closes knowledge gaps in how SMEs, particularly those with limited resources, might benefit from affordable AI tools and platforms. Also, it was found that building workforce capacity through collaborations and customized training programs can help close the skills gap, while improving cybersecurity and implementing efficient data management frameworks can help with privacy issues. However, despite the growing frame of literature on AI packages, studies specializing in AI embracing on the organizational level stay restrained. The study findings emphasized regional integration within the EAC through technology transfer and the development of SME capability. The current study aligns with Uganda's NDPIII (2020/21–2024/25), under the innovation and technology application pillar, accelerating industrial growth.

## 1. INTRODUCTION

Globally, numerous new industrial artificial intelligence (AI) applications have been made possible by significant advancements in deep learning techniques, making AI applicable to any business looking to stay competitive such as predictive preservation, robotics automation, supply chain optimization, first-class control via photograph popularity, and customized patron experiences the usage of recommendation systems [1]. These technologies empower groups to enhance efficiency, reduce charges, and benefit aggressive blessings. SMEs are an increasing number of leveraging AI for obligations like demand forecasting, fraud detection, and dynamic pricing [2], however challenges like constrained resources and information hinder AI usage in business. As a result, AI now affects small and medium-sized businesses (SMEs) as well as multinational tech companies. This is due to the fact that few SMEs are interested in creating their own applications because doing so is costly, time-consuming, and frequently fraught with failure risk [3]. Instead, SMEs favour cloud-based solutions and depend more and more on AI-as-a-service [4]. Businesses hesitate for a variety of reasons. The current implementation level of SMEs determines perceived hurdles, which also reveal data-related misunderstandings and a lack of expertise. This is consistent with the findings of Borah et al. [5], who claimed that the development of deep learning techniques has led to a number of new applications for AI, making AI crucial for any business looking to remain competitive. SMEs still rely on AI for growth and cloud-based solutions, despite the fact that some are worried about developing their applications due to the expense and duration of integrating AI, which increases the chance of failure.

AI is becoming more widely acknowledged in Uganda as a driver of SME transformation leading to success innovations [6]. AI is being used by local SMEs for tailored marketing, fraud detection, and inventory management. AI is being used by innovations like Uganda's e-commerce platforms to increase market reach and optimize operations. Furthermore, by incorporating AI into vital industries like healthcare and education, programs like the AI4Development project seek to increase SME capacity [7]. Notwithstanding these developments, there is still a lack of access to AI infrastructure and expertise, highlighting the necessity of funding training and reasonably priced technology to guarantee AI's fair adoption across Uganda's SMEs [8]. Also, in terms of SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation,

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and Infrastructure) through AI-driven technological advancements, and SDG 1 (No Poverty) through the creation of economic opportunities. The study supports the economic component of the UN Global Agenda 2030 by boosting the competitiveness of SMEs and promoting sustainable development. By encouraging the use of AI for economic transformation, it is consistent with Uganda Vision 2040, especially the pillars of innovation and industrialization. The study findings may place a strong emphasis on regional integration within the East African Community (EAC) through technology transfer and the development of SME capability. It advances the objective of a knowledge-driven economy for Africa's Agenda 2063. Additionally, it aligns with Uganda's NDPIII (2020/21–2024/25), under the innovation and technology application pillar, accelerating industrial growth.

The study answered the following research questions:

1. What are the applications of AI in SMEs?
2. What are the challenges facing the application of AI in SMEs?
3. Are there solutions to the challenges facing the application of AI in SMEs?

## 2. METHODOLOGY

### 2.1. Identification of studies

This study used a literature search and synthesis of pertinent peer-reviewed papers and associated material as its methodological technique. Literature search from 1992-2024 was performed using scientifically cited and indexed databases, namely Dimensions, Web Science, Elsevier Scopus, and Google Scholar. On the inclusion and exclusion criteria peer-reviewed papers, institutional publications, were used in this study in line with the study under investigation while unpublished sources and other work that was out of the study scope were excluded from the study. As a result, over 1021 publications, government reports, AI reports, and conference proceedings were examined. E-books from the World Bank, policy papers from the World Bank, and published student essays were all retrieved, with 44 of them being evaluated and used in this work.

### 2.2. Searching Strategy

In addition, the searching strategy used included Boolean combinations like AI AND SMEs, SMEs AND challenges, challenges AND opportunities, and AI OR machine learning AND SMEs to capture variations. Phrases such as "AI adoption in SMEs", "AI-driven innovation in SMEs", and "AI for SME growth" target specific aspects. Truncation strategies like AI AND SME* help find related terms like SMEs' development. Broader queries include AI AND entrepreneurship, AI AND business innovation, and digital transformation AND SMEs. Specific topics like AI AND customer experience in SMEs, AI AND supply chain management in SMEs, and AI AND marketing strategies for SMEs are explored.

## 3. RESULTS FROM LITERATURE REVIEW

### 3.1. The application of AI in SMEs

- **Customer Support Automation**

AI-powered chatbots and digital assistants revolutionize customer support through offering 24/7 providers, coping with multiple queries simultaneously, and presenting immediate responses. SMEs can use equipment like ChatGPT or Zendesk AI to beautify consumer engagement without hiring great support body of workers [9]. These structures improve consumer satisfaction through resolving common problems and enhancing complicated queries to human sellers. For instance, 85% of patron interactions are now managed via AI in a few SMEs, saving expenses and lowering response instances [10]. This fosters emblem loyalty and allows SMEs to compete with larger establishments with restrained sources. Predictive analytics, powered by means of AI, allows SMEs to forecast market developments, customer behaviour, and inventory needs. By analysing historic records and real-time inputs, SMEs can make statistics-pushed decisions that lessen risks and optimize operations.

### 3.2. The challenges facing the application of AI in SMEs

Despite the growing frame of literature on AI packages, studies specializing in AI embracing on the organizational level stay restrained. Chen et al. [11] spotlights the shortage of studies investigating organizational-stage AI adoption, mainly in SMEs. Similarly, Cubric [12] systematic evaluation recognized only 30 studies related to AI adoption within the business and control area, indicating a sizeable research hole.

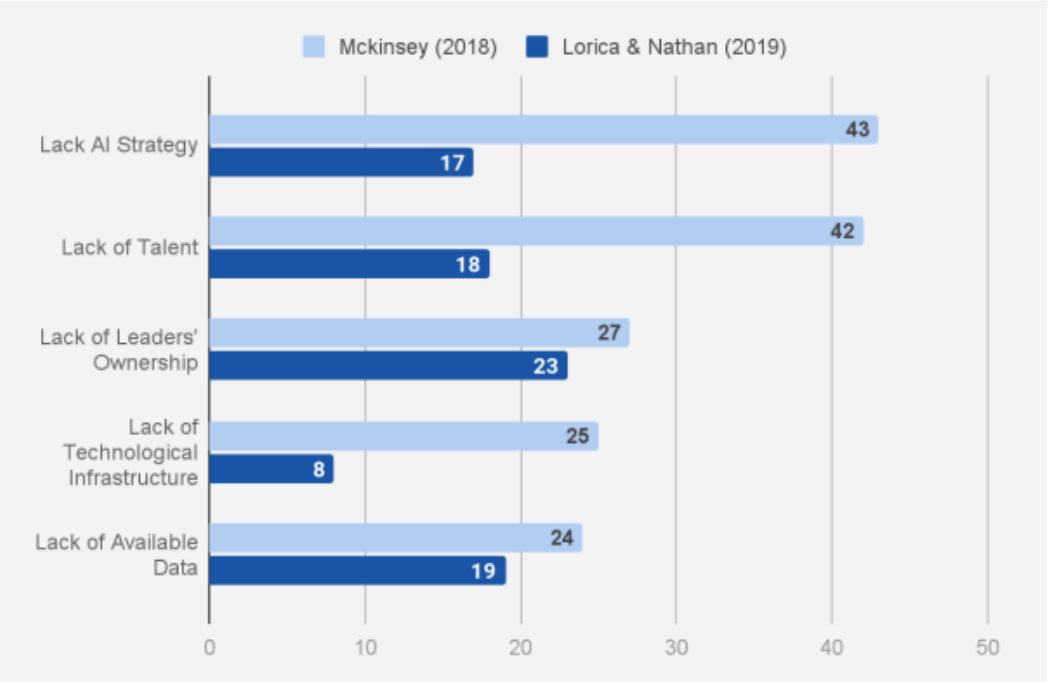


Fig. 1. Surveys on AI Adoption Challenges [21]

### 3.3. High Implementation Costs and Resource Constraints

SMEs often face massive monetary and resource barriers, which prevent the application of AI like high prematurely costs for AI gear, infrastructure, and skilled employees which pressure SMEs' budgets. Many SMEs lack the financial capacity to put money into superior technologies or get admission to credit centers to fund AI usage. Umeorah et al. [13] highlights that monetary barriers are a critical impediment to AI adoption in small agencies, especially in developing economies. This issue also extends to the cost of training groups of workers to apply AI gear successfully, leading to underutilization of to be had technologies. These constraints emphasize the need for price-powerful AI solutions tailored to the operational capacities of SMEs, underscoring a place that calls for similar research and coverage intervention to cope with affordability and accessibility gaps.

- **Lack of Skilled Workforce**

SMEs regularly function with restricted technical know-how, which hampers their potential to completely integrate and leverage AI technology. According to Kumar et al. [14] SMEs face difficulties in attracting and keeping expertise professional in facts science, machine getting to know, and AI machine control. Additionally, small businesses regularly cannot compete with large corporations in offering aggressive salaries for such roles.

- **Cultural and Organizational Barriers**

The increasing reliance on AI for competitive gain makes it imperative to understand the unique challenges SMEs face in adopting AI [15]. While large organizations have an advantage from economies of scale and access to resources, SMEs function beneath restricted environments, necessitating context-precise research [16]. Most existing research, inclusive of that by using [17], makes a specialist of boundaries widely, however, no longer delve into region-precise demanding situations or the unique contexts of SMEs in developing economies. Empirical gaps exist in expertise how those challenges range across industries and regions, in addition to the lengthy-time period influences of AI adoption on SME overall performance [18]. Addressing these gaps can help manual policymakers and era companies in growing tailored answers, growing permitting surroundings for AI adoption [19], and in the end enhancing the competitiveness of SMEs globally [20].

### 3.4. The possible solutions to the challenges facing the application of AI in SMEs

- **Promoting Affordable AI Solutions and Supportive Policies**

To address the excessive implementation charges, SMEs require get right of entry to less expensive AI equipment and supportive financial regulations. Governments and generation vendors can collaborate to subsidize AI technology tailored

to SMEs or provide bendy price plans to reduce economic burdens [18]. Open-source AI platforms and cloud-based totally answers provide fee-powerful alternatives, allowing SMEs to leverage AI without extensive initial investments in infrastructure [9]. Additionally, governments can establish grant packages and tax incentives to encourage AI adoption. Developing partnerships among SMEs and large agencies or research institutions can also facilitate technology switch and shared assets. Studies, which include [19], emphasize that imparting inexpensive, scalable AI equipment designed for SME operations is important for growing adoption charges. These measures can democratize get right of entry to AI technology, permitting SMEs to compete successfully in their industries whilst fostering innovation and monetary increase.

- **Building Workforce Capacity through Training and Collaboration**

Targeted actions are needed to increase workforce capacity in AI in order to close the skills gap. Training classes, workshops, and certification programs designed specifically for SME employees can give them the tools they need to operate and deploy AI systems. Cooperation among technical training organizations, academic institutions, and SMEs can improve skill development and create talent pipelines [20]. Initiatives to develop accessible, reasonably priced training programs for AI-related skills can be funded by government sectors. To close the technical gap, SMEs might also investigate contracting with specialized companies to create and maintain AI. A consistent supply of talent can be ensured by promoting internships and apprenticeships in AI-related disciplines, which can give students and young professionals practical experience [21]. SMEs can benefit from learning from larger firms with proven AI strategies by establishing mentorship opportunities and knowledge-sharing networks within industries [22].

- **Ethical AI Practices, Engaging Management, and Measuring Success**

Creating an easy charter on moral AI usage and elevating team recognition about data protection builds a responsible lifestyle [23]. Regularly auditing compliance reinforces ethical practices and safeguards touchy information. Convincing manipulation of AI’s rate requires smooth communique and demonstrable proof. Organizing shows that spotlight AI's stressful conditions and blessings and offering region-specific achievement memories can guide their self-guarantee within the environment and the society at large [24]. Actively concerning management in assignment selection promotes alignment among organizational dreams and AI tasks [9][27-29]. Measuring AI blessings calls for outlining clear, measurable objectives. By monitoring financial earnings, method enhancements, and other metrics, SMEs can investigate the effect of AI and make necessary changes to their strategies for better effects.

## 4. CONCLUSIONS AND RECOMMENDATIONS

### 4.1. Conclusions

The study illustrates how AI enables SMEs to improve competitiveness, streamline operations, and conform to sustainability objectives by tackling particular issues such as scarce resources, operational inefficiencies, and cyber threats. The study closes knowledge gaps in how SMEs, particularly those with limited resources, might benefit from affordable AI tools and platforms. The long-term effects of AI on SME profitability, sector-specific AI implementation techniques, and the function of government incentives in hastening AI adoption are, nevertheless, issues that require more research. Future studies should also look at how AI is integrated into SMEs in developing countries like Uganda and how adoption rates are impacted by cultural hurdles. On the challenges, the effective use of AI in SMEs depends on resolving important issues with focused, workable solutions. Financial barriers can be reduced and technology access democratized through cooperative initiatives, supporting regulations, and reasonably priced AI tools [25]. Building workforce capacity through collaborations and customized training programs can help close the skills gap, while improving cybersecurity and implementing efficient data management frameworks can help with privacy issues. In order to build trust and match AI adoption with business objectives, ethical AI methods, transparent management involvement, and quantifiable success monitoring are essential [26]. By putting these tactics into practice, SMEs may use AI to boost competitiveness, increase productivity, and spur innovation all of which will support long-term economic growth. To fully realize this promise, governments, IT companies, and industry players must work together.

### 4.2. Policy Recommendations

- **Establish AI Training Programs**: Develop and fund accessible training programs for AI-related skills in collaboration with technical training institutions, academic bodies, and industry players.
- **Enhance Data Governance**: Introduce secure data-sharing frameworks and promote the adoption of technologies like blockchain to address data management and privacy challenges.
- **Promote Ethical AI Practices**: Mandate the creation of ethical charters for AI use within SMEs and support regular audits to ensure compliance with data protection laws.

- **Foster Industry Collaboration**: Encourage partnerships between SMEs, large organizations, and research institutions to facilitate resource sharing, knowledge transfer, and mentorship for sustainable AI integration.

## Funding

The authors had no institutional or sponsor backing.

## Conflicts Of Interest

The author's disclosure statement confirms the absence of any conflicts of interest.

## Acknowledgment

The authors extend appreciation to the institution for their unwavering support and encouragement during the course of this research.

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