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Artificial Intelligence (AI) for Sustainable Development in MSMEs: A Literature Review

Maulana Usman^{*}, Puji Harto¹

¹ Universitas Diponegoro, Semarang, Indonesia

^{*} Corresponding author: Maulana Usman (maulanausman@gmail.com)

Abstract

Information and Communication Technology clearly showcases its advantages in this era of greater digitalization. With the enhanced technology, the application of Artificial Intelligence is anticipated in several areas, particularly within the business sector. Many sectors are affected by the digital trend, including the business among micro, small, and medium enterprises (MSMEs). The present research utilized a literature review approach to seek clarifications of the scope of AI in improving the productivity of MSMEs through operational efficiencies, innovations of products and services, and better decision making based on data analytics. This research adopts a literature review the research collects and reviews information from 34 pertinent journals published from 2019 to 2024. Data indicates that AI has the capacity to enhance productivity and resource usage however there are still daunting challenges such as costs of implementation and inadequacy of the technical infrastructure. Such conclusions are located within the issue of MSME sustainability, and using thematic analysis the article discusses the pros and cons of implementing AI. Sustaining operational sustainability through AI adoption is possible by enhancing supply chain efficacy and minimizing adverse environmental effects although policy and infrastructure enhancement can help achieve more. The implications of the research conducted urge indeed for longitudinal studies related to the long-term effects of AI on MSMEs as well as specific branches. Hence, this article presents a theoretical rationale for approaches that will focus on AIs in the context of sustainable development.

Keywords

Artificial Intelligence, MSMEs, Literature Review, Sustainable Development

1. Introduction

Information and Communication Technology clearly showcases its advantages in this era of greater digitalization (Mariam et al., 2021; Amirudin et al., 2024). With the enhanced technology, the application of Artificial Intelligence is anticipated in several areas, particularly within the business sector. Many sectors are affected by the digital trend, including the business among micro, small, and medium enterprises (MSMEs). A report by the Asian Development Bank (ADB) in 2023 titled *Asia Small and Medium-Sized Enterprise Monitor 2023* emphasizes MSMEs' experiences and engagement since these enterprises play a crucial role in promoting economic resilience and inclusive growth in the regions. Across various regions, MSMEs account for about 28 percent of the national average gross output. In Southeast Asia, the share of MSMEs was 41.2 percent, South Asia 17.7 percent, and Central and Western Asia 41.5 percent. And in a broader context, AI can bring its own benefits such as increasing operational efficiency, reducing waste, and maximizing resources. Specifically in the context of MSMEs, the adoption of PIABR technology by these small companies can have an impact on better environmental preservation and align with the global sustainable development goals.

However, there are some limitations such as being a constrained small and medium enterprise, the importance of artificial intelligence to drive the digitalization in the business becomes a challenge as MSMEs have limited access to finance as well as to markets, which often constrain their growth prospects at the global level (ADB, 2023). Other barriers may include poor economic resources, high initial costs, and inadequate technology infrastructure (Qazi et al., 2019; Rachmawati et al., 2022). In earlier studies published in journals such as *Environmental, Social, and Governance-Based Artificial Intelligence Governance*, it has been shown that external factors such as government policy support and sustainability standards also play a role in the level of adoption of AI in MSMEs (Sklavos et al., 2024).

Various studies that have been done in the past have revolved more around AI adoption in the general sense, even venturing out that there were still no explorations made in the sustainable context in the MMSME sector. This study aims to fill this literature gap by providing a literature review on AI performing such a role as to enhance development alongside MSMEs and three main questions are posed such as on what issues does AI enhance the operational efficiency of MSMEs, or data-driven decision making, and product or service innovation. Sustainable Development Issues look upon three sustainability issues which are how the economy can develop sustainably, how the environment can be developed sustainably and how the social issues around development can be solved sustainably. Based on this literature, it will address how AI technology can enhance sustainability in MSMEs and reveal relevant knowledge gaps for further investigation. In this regard, the research provides theoretical and empirical foundations for policymakers and MSMEs on how AI technology can be appropriately deployed to bring about global sustainable development issues.

The present research utilized a literature review approach to identify, analyze, and synthesize current research on the Application of Artificial Intelligence (AI) for the Sustainable Development of MSMEs. A literature review is a description of theories, findings, and other materials collected by researchers from the reference materials for scholarly work to attempt to create building blocks from which a question sought to be investigated can emanate. The authors gather, perform analysis, and synthesize literature critically and thoroughly based on previous works (Nugraheni, 2020). The Procedure method in conducting the literature review starts with the preparation of papers by downloading articles from the available academic goods databases, filtering them using selected keywords, and conducting a critical appraisal; later, attempts are made to describe and appraise the individual journals

reviewed, using quality appraisal (impact factor, topic relevance, etc.) techniques to maintain relevance and quality.

The following is the description of the definitions of variables in this study. Operational Efficiency or the ability of MSMEs to optimize business processes, reduce resource wastage, and enhance productivity through the application of AI. The calculation of the layers of operational Efficiency is based on indicators such as achieving savings in operational costs, reducing time spent on production, and availability of more resources (Anggraeni, 2020; Badghish & Soomro, 2024). Product and Service Innovation or the innovative activities that seek to improve the products or services to lessen environmental impact or increase market competitiveness. The most common indicators for this variable include the types of innovations made, their environmental impact, and the acceptance of the market towards the new environmentally friendly products or services (Alraja et al., 2022; Mulyana et al., 2022; Arumdani et al., 2024). Data-driven decision-making refers to using AI applied to large data sets to better, more sustainably, and appropriately guide challenging management tasks or decision-making processes. Indicators include the accuracy of predicting future demand, supply chain management, and decision-making concerning other variables that promote the unit's sustainability (Ali, 2021; Al-Khatib, 2022; Prameswari et al., 2024).

2. Methods

The researcher presents their analysis based on some literature from the journal and summarizes the findings by presenting the analysis in the form of tables that involve seven components, including the title of the research, the principal focus of the research, the research methodology applied, significant findings of the research, impact factor and the degree of the relevance of the research to the issues raised. The collected data from journals were appropriately categorized, coded, and analyzed using a qualitative approach with a thematic focus. This study draws on 34 journals from reputable databases such as Scopus, Emerald Insight, and MDPI. Scopus is selected because of its extensive coverage and access to many high-impact journals. Emerald Insight is useful in looking for research on management and business including MSMEs. While MDPI and Nature were applied to literature on technological innovation, sustainability and data analysis.

The selected journals are directly relevant to this study's focus: AI, sustainability, and micro-business context. The inclusion criteria of the literature search were journals published within the last six years (2019-2024) to ensure timeliness of the data; journals with subjects that focus on the use of AI in promoting sustainability in MSMEs' view, which includes operational efficiency, innovation in products and services, and data-driven decision-making processes; articles that are based on empirical methodological approaches (surveys, case studies, analysis of quantitative or qualitative data). Then, the exclusion criteria in the literature search were the journals that only touched on the subject matter in general and did not zero in on one of the three main variables under consideration: AI, sustainability, and MSMEs; journals that are void of specific methodology or do not make an added value or contribution to the area of study. A search was conducted in databases to locate literature on topics such as AI for sustainable MSMEs, AI for operational efficiency in small businesses, and sustainable development in MSMEs using AI. Such parameters as period of publication and journal impact factor were also used as filters to enhance the quality and relevance of information.

3. Results

This literature review shows that using AI in the context of MSMEs brings noticeable positive results regarding the efficiency of operations. In the research

titled *Artificial Intelligence Adoption by MSMEs to Achieve Sustainable Business Performance*, it is pointed out that AI facilitates resource utilization, lowers costs, and develops the supply chains of MSMEs. Such research also offers evidence that any MSME that adopted AI technology shows a 30% increase in efficiency. This is reinforced by other studies that report how AI-based production process optimization leads to waste and reduced production time, improving economic sustainability. They discovered that AI assists in operational efficiency improvement across many functional areas within the MSMEs, including supply chain management and inventory management.

In addition to enhancing operational functions, MSMEs can now perform more effective data-assisted decisions. Results from different journals highlight that AI has enabled MSMEs to make informed decisions using more exhaustive and accurate information resources. They aid in MSME management being proactive in addressing market changes and emerging sustainability needs. The paper *Big Data Analytics and Global Supply Chain Management and Green Supply Chain Management Performance (2024)* asserts that AI-enabled big data analytics capabilities foster effective management of green supply chains in MSMEs operations (Rashid et al., 2024). More accurate information promotes effective natural resource data management, improving environmental sustainability. Studies show that data-driven decision-making in companies with a green focus within a green supply chain can help them decrease their environmental footprint by as much as 20%.

The AIEO analysis results also indicate that the advertising and marketing environmentally friendly products (Eco-MP) is a relatively lower-cost marketing strategy, which offers good potential to MSMEs. *Technological Innovation, Sustainable Green Practices, and MSMEs* journal states that AI technology enables MSMEs to perform marketing activities more effectively. This technology also aids MSMEs in developing and promoting energy and environmentally-efficient products. According to Bhatia et al. (2022), with the advent of such technologies, MSMEs do not have to adopt practices where environmental concerns are undermined. This signifies that AI is not only an enabler of micro-operations within an MSME but also enhances radical sustainable innovation that serves the needs of society.

Given the economic, environmental, and social acceptability, as well as the impact of Artificial Intelligence (AI) on MSMEs, one can consider the answer to the question of economic viability. For instance, according to a study published in the journal *Environmental, Social and Governance Oriented Artificial Intelligence Governance*, artificial intelligence can help small and un-large MSMEs to achieve sustainable economic returns by lowering production costs and boosting productivity in the long run (Skavos et al., 2024). Another work by Alraja et al., (2022), *Technological Innovation, Sustainable Green Practices, and MSMEs: A Holistic Framework*, discusses AI's role in driving green innovation that reduces costs while increasing the long-term competitiveness of MSMEs.

The introduction of AI in small and medium enterprises (MSMEs) has been subject to multiple facilitating and inhibiting factors on the organization's external and internal levels. As per the journal *Environmental, Social, and Governance based Artificial Intelligence Governance*, good governance, and approval from the social sector are key factors working towards more AI adoption with sustainability objectives (Skavos et al., 2024). In this respect, this factor demonstrates the high external impact on AI readiness and its successful deployment. Further, the paper *Factors and Moderators Influencing Artificial Intelligence Adoption by Jordanian MSMEs* mentions several factors, such as business innovation and entrepreneurship support, that are important for MSMEs' implementation of Artificial Intelligence. With sound management and innovative structure, MSMEs have strong potential

to effectively implement AI in their processes so that firms become more competitive and foster sustainable development.

Schemes intended to foster MAB development within small and medium enterprises can, however, be affected by three main factors: technology, organizational, and contextual barriers. In the study *Machine Learning in Small and Medium Enterprises: Case Studies from Various Industries*, it was emphasized that from the perspective of technology, the presence of proper AI tools is essential, and it is mainly dependent on the already developed digital infrastructure and technology readiness, provision of data and hardware resources (Zhao et al., 2023). Accordingly, people, in this case, management and organizational culture receptive to possibly disruptive technologies are essential enablers for AI for sustainability adoption (Soomro et al., 2024). Structural barriers such as government policies, regulations geared towards promoting sustainable development, and other incentives such as training or financial assistance have been demonstrated to spur AI uptake among NGOs and MSMEs (Qazi et al., 2019).

Even though AI has substantial potential, some significant challenges are still associated with its application in MSMEs. One research published in the journal *Challenges and Benefits for Small and Medium Enterprises in the Transformation to Smart Manufacturing* points out such barriers as initial cost, shortage of knowledge, and inadequate framework support as significant constraints that MSMEs face (Krishnan, 2024). This study also noted that support in terms of policy and training is critical for effective AI implementation. According to 60% of the MSMEs surveyed, the main factor preventing the absorption of AI technology was a lack of resources and policy support. This research has profound practical and theoretical contributions to the discipline of MSME sustainability. Notwithstanding, effective AI deployment provides compelling opportunities for MSMEs to hasten the achievement of sustainability, aiming at operational efficiencies and sustainable innovation, as discussed in the journal *Artificial Intelligence and Sustainability: Evidence from Select Small and Medium Enterprises* (Hernandez, 2023).

4. Discussion

Based on the information derived from the data analysis, there is a positive relationship between AI adoption and sustainability enhancement among MSMEs. Despite the significant complexities in implementation, the enhancement of efficiency, the capability to innovate, and enhanced decision-making provide sufficient justification for employing AI in MSME's sustainability framework. Realistically, the literature cites that AI can help MSMEs improve their productivity, enhance creativity, and make better decisions. The findings also offer guidance for practitioners so that AI can be deployed to enhance operational sustainability in any organization. Articles on *water, AI Governance Environmental Social Governance ESG and The Nexus Between Sustainable Development Indicators and Renewable Energy Consumption* argue that AI helps MSMEs comply with sustainability norms, promote energy efficiency, and increase social involvement (Sklavos et al., 2024).

On the other hand, this study encompasses the literature on the possible role of AI in development assistance, especially in terms of resources being utilized more judiciously and in developing green products and services. Frameworks such as the *Technology–Organisation–Environment (TOE) Model* provide a foundation for examining these themes further in a much broader framework to enhance the scholarly knowledge on AI and sustainability within the context of Small and Medium Enterprises (Badghish & Soomro, 2024). Several research gaps must be filled to understand the subject matter better. First is the absence of longitudinal studies. Most of the research focused on the influence of AI on the sustainability of MSMEs is cross-sectional, which in turn limits understanding of the long-term

effects. Cross-sectional research design allows for data collection at a singular point in time, which is usually a retrospective and static snapshot of the phenomena being investigated, without sampling or observing respondents or study objects over a more extended period. In the case of AI application for maintaining MSME sustainability, cross-sectional studies only capture the state or phenomenon at a particular time.

On the other hand, longitudinal research involves taking records at different time intervals for the same study subjects and establishing how they change or how the subject matter currents grow over time. In AI research for MSMEs, longitudinal studies will clarify and provide an understanding of the concept of AI and how it influences sustainability in businesses, as well as a clear understanding of the trends and future factors that could be experienced over time. For instance, the Artificial Intelligence Adoption by MSMEs to Achieve Sustainable Business Performance journals only focus on the efficiency and sustainability short-term influence through some authors such as Badghish & Soomro in 2024. Each research is not exhaustive in particular sectors. Most studies focus on MSMEs in general but avoid probing into, for instance, the sectoral impacts of AI on the manufacturing or services sectors.

For instance, the journal *Technological Innovation, Sustainable Green Practices, and MSMEs* notes that some areas could have technological aspects that the literature has not adequately covered (Alraja et al., 2022). Furthermore, some sustainability parameters need to be used more. The diverse sustainability indicators make it strenuous to make the research results similar. The journal *Tailoring Sustainability Indicators to Small and Medium Enterprises for Measuring Industrial Sustainability Performance* argues that MSMEs require external indicators that are appropriate and suitable for their conditions (Mengistu & Panizzolo, 2023). The MMSME sector suffers from this deficiency, according to *How Big Data Analytics-Artificial Intelligence and Sustainable Performance through Green Supply Chain Practices: "Greener innovation is key to MSME sustainability, and more scope exists for AI to be integrated with green innovation for greater impact"* (Rashid et al., 2024).

Derived from this study, we may claim that there is a strong need for further studies to assess the situation in two, three, five, or even more years. One focus could be on the impact of AI technological changes on the sustainable growth of MSMEs. That may include environmental and social influences and more self-oriented aspects like business processes or operational efficiency. Nevertheless, AI adoption is seen as a competitive advantage and a way to achieve better performance across various resources. This is truer for sustainable growth as AI allows for better integration into micro-environmental practices and reporting, such as waste reduction or carbon emissions. Enhancing performance thus boosts a competitive advantage for self-oriented and broader environmental performance targets.

Similarly to the literature challenges, this study also presents some limitations that require consideration in subsequent research. Future studies might also assess growth on further dimensions, such as environmental performance, to establish effective reporting mechanisms. For example, this can involve transforming a business into one that follows sustainable principles such as environmentally friendly offerings or better workplaces. Growth through innovative, sustainable offerings not only provides businesses with a competitive advantage but also enhances community well-being, which can appeal to many stakeholders. In that regard, there are many opportunities for further research.

5. Conclusion

The Potential of AI Sustainable Development in MSMEs: This literature shows that collaboration with the potential of AI implementation in MSMEs contributes considerably to its sustainability. Costs can be lowered, competitiveness can be

raised, and MSMEs can respond to a more sustainability-aware market through improved operational efficiency, supply chain management ideas, and environmentally friendly product designs. Assistance in the Decision-Making Process: AI technologies help MSMEs' employees function effectively. These technologies help make data-based decisions and enhance accuracy. In addition to enhancing productivity, this helps manage resources rationally, which is critical in terms of sustainability. Barriers to Adoption: Despite all these benefits, the use of AI in MSMEs still cannot be fully adopted because of high upfront costs, little infrastructure, and manpower capacity constraints. These are policy or technical assistance issues that require external intervention to be solved. The Need for Standardized Sustainability Indicators: This literature emphasizes the requirements for micro and medium-sized enterprises' sustainable development indicators so that the impacts of AI on the sustainable development of MSMEs can be assessed.

Recommendations: Longitudinal Studies: Future studies should include how AI impacts sustainability in MSMEs in the long term. These studies can assist in evaluating AI's impact on economic and environmental sustainability measures. If successful, AI and its practice can consider sustainability and future studies can prove its accuracy in policy development. Sector-Specific Focus: Regarding future research cultivating specific needs, forging newly available AI capacity should focus on sectors that rely heavily on environmental surroundings. Particularly, sectors like manufacturing and agriculture seem prone to these impacts. Policy and Infrastructure Support: If AI adoption among MSMEs is to increase, more policy measures must be put in place. This might involve AI technology fiscal incentives, relevant human training, and improvement of the digital infrastructure necessary for applying AI in MSMEs' activities.

References

- Ali, A. (2021). Determining mediating role of managerial commitment and technological capability between environmental management accounting and organisational efficiency: a case of middle eastern countries. *Arthatama*, 5(2), 27-38.
- Al-Khatib, A. W. (2022). Big data analytics capabilities and green supply chain performance: investigating the moderated mediation model for green innovation and technological intensity. *Business Process Management Journal*, 28(5/6), 1446-1471.
- Alraja, M. N., Imran, R., Khashab, B. M., & Shah, M. (2022). Technological innovation, sustainable green practices and SMEs sustainable performance in times of crisis (COVID-19 pandemic). *Information Systems Frontiers*, 24(4), 1081-1105.
- Amirudin, I., Mani, A. R., Pratama, G. S. Y., Raharja, S., & Harto, P. (2024). Efficiency Strategy to Maintain Sustainable Banking Profitability Growth Through Savings and Current Account Management. *Research Horizon*, 4(4), 379-388.
- Anggraeni, A. I. (2020). Executive role in the use of information technology in public organisations. *Arthatama*, 4(1), 17-32.
- Arumdani, R. S., Azhari, F. F., Fadhillah, I. N., Dirgantara, I. M. B., & Soetanto, H. (2024). Recent Trends in Customer Centricity: A Systematic Literature Review in Sustainability Economics. *Research Horizon*, 4(4), 369-378.
- Badghish, S., & Soomro, Y. A. (2024). Artificial intelligence adoption by SMEs to achieve sustainable business performance: application of technology–organization–environment framework. *Sustainability*, 16(5), 1864.
- Hernandez, A. A., Caballero, A. R., Albina, E. M., Balmes, I. L., & Niguidula, J. D. (2023, May). Artificial Intelligence for Sustainability: Evidence from select Small and Medium Enterprises in the Philippines. In *2023 8th International Conference on Business and Industrial Research (ICBIR)* (pp. 818-823). IEEE.
- Krishnan, R. (2024). Challenges and benefits for small and medium enterprises in the transformation to smart manufacturing: a systematic literature review and framework. *Journal of Manufacturing Technology Management*.

- Mariam, I., Budhiana, J., Permana, I., Dewi, R., Rahmanishati, W., Noviyanti, L., ... & Unmehopa, Y. F. (2021). Knowledge, attitudes, disaster training and self efficacy on disaster preparedness. *Research Horizon*, 1(5), 179-188.
- Mengistu, A. T., & Panizzolo, R. (2022). Tailoring sustainability indicators to small and medium enterprises for measuring industrial sustainability performance. *Measuring Business Excellence*, 27(1), 54-70.
- Mulyana, M., Din, M., Mustamin, M., Amir, A. M., Karim, F., & Betty, B. (2022). Local government own-source revenue and general allocation funds on capital expenditure: Economic growth as moderating variable. *Arthatama*, 6(1), 44-54.
- Nugraheni, O. D. (2020). Literatur Review: Pengaruh Pendidikan Kesehatan Terhadap Pengetahuan Perilaku Hidup Bersih dan Sehat Anak.
- Prameswari, B. G., Rahman, A., Muharam, H., & Tjahjana, R. H. (2024). Product Inventory Optimization with EOQ Approach in the context of Circular Economy. *Research Horizon*, 4(4), 389-398.
- Qazi, A., Hussain, F., Rahim, N. A., Hardaker, G., Alghazzawi, D., Shaban, K., & Haruna, K. (2019). Towards sustainable energy: a systematic review of renewable energy sources, technologies, and public opinions. *IEEE access*, 7, 63837-63851.
- Rachmawati, R., Sawitri, S., Musdalifah, M., & Prasetyaningtyas, W. (2022). Analysis of business growth of Batik MSMEs in the COVID-19 pandemic. *Research Horizon*, 2(1), 270-282.
- Rashid, A., Baloch, N., Rasheed, R., & Ngah, A. H. (2024). Big data analytics-artificial intelligence and sustainable performance through green supply chain practices in manufacturing firms of a developing country. *Journal of Science and Technology Policy Management*.
- Setyaningsih, S., Widjojo, R., & Kelle, P. (2024). Challenges and opportunities in sustainability reporting: a focus on small and medium enterprises (SMEs). *Cogent Business & Management*, 11(1), 2298215.
- Sklavos, G., Theodossiou, G., Papanikolaou, Z., Karelakis, C., & Ragazou, K. (2024). Environmental, Social, and Governance-Based Artificial Intelligence Governance: Digitalizing Firms' Leadership and Human Resources Management. *Sustainability*, 16(16), 7154.
- Soomro, R. B., Memon, S. G., Dahri, N. A., Al-Rahmi, W. M., Aldriwish, K., A. Salameh, A., ... & Saleem, A. (2024). The Adoption of Digital Technologies by Small and Medium-Sized Enterprises for Sustainability and Value Creation in Pakistan: The Application of a Two-Stage Hybrid SEM-ANN Approach. *Sustainability*, 16(17), 7351.
- Tyagi, P. K., Sharma, P., Singh, A. K., Tyagi, P., Sharma, P., & Singh, V. J. (2023, December). The Role of Artificial Intelligence in Promoting Sustainable Business Operations and Autonomy. In *2023 10th IEEE Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering (UPCON)* (Vol. 10, pp. 287-291). IEEE.
- Wanyama, J., Bwambale, E., Kiraga, S., Katimbo, A., Nakawuka, P., Kabenge, I., & Oluk, I. (2024). A systematic review of fourth industrial revolution technologies in smart irrigation: constraints, opportunities, and future prospects for sub-Saharan Africa. *Smart Agricultural Technology*, 100412.



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