

Artificial Intelligence and Digital Entrepreneurship in Indonesia: Opportunities and Challenges for MSME Development

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ABSTRACT

Artificial Intelligence (AI) has become increasingly relevant to digital entrepreneurship and the development of Micro, Small, and Medium Enterprises (MSMEs). This study aims to examine the opportunities and challenges of AI in supporting digital entrepreneurship and MSME development in Indonesia. This study uses a literature review approach by analyzing relevant scientific publications concerning AI adoption, organizational readiness, digital marketing, digital branding, innovation, business value, firm performance, and implementation challenges. The findings indicate that AI provides opportunities for MSMEs to improve marketing, digital branding, operational efficiency, innovation, competitiveness, and business growth. However, AI adoption is influenced by organizational readiness, financial resources, digital literacy, technical skills, training, and external support. Ethical considerations and responsible AI use are also important in the implementation of AI in business activities. The study concludes that maximizing the contribution of AI to MSME development requires the integration of technological adoption with organizational capabilities, human resources, external support, and responsible implementation.

Keywords: Artificial Intelligence, Digital Entrepreneurship, Innovation, MSMEs, Organizational Readiness.

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1. | INTRODUCTION

Artificial Intelligence (AI) has become an important technology in the development of digital business because it can support data processing, decision-making, automation, and various business activities. The increasing use of AI has created opportunities for organizations to improve efficiency and generate business value through new forms of technology-based activities (Dwivedi et al., 2021; Enholm et al., 2022). AI capability can also contribute to organizational creativity and firm performance, particularly when organizations are able to integrate AI with their existing resources and business processes (Mikalef & Gupta, 2021). In the context of entrepreneurship, these developments provide opportunities for businesses to use digital technologies to improve their activities, respond to market changes, and strengthen competitiveness.

Micro, small, and medium enterprises (MSMEs) are also increasingly exposed to the development of AI and digital technologies. AI can support MSMEs in marketing, customer analysis, digital branding, and other business activities. Santosa and Surgawati (2024) show that AI adoption among Indonesian MSMEs can be related to marketing activities, while Sari (2024) highlights the potential of AI-based digital literacy to improve the digital branding capabilities of MSMEs. AI can therefore provide opportunities not only for operational activities but also for the development of digital entrepreneurship. The use of AI may further create business value through efficiency, innovation, and improved competitiveness (Enholm et al., 2022; Haefner et al., 2021).

However, the adoption of AI among MSMEs cannot be separated from various organizational and technological challenges. The intention of SMEs to adopt AI may be influenced by AI awareness, perceived benefits, technological features, social values, and support from government and external organizations (Hardinata et al., 2024). Organizational readiness is also important because businesses need adequate internal capabilities before AI can be effectively implemented (Maharani, 2023). Similarly, the AIRI framework highlights the importance of assessing MSME readiness before implementing AI-based solutions (Budiraharjo et al., 2024). Financial limitations, digital literacy, and training are also identified as important barriers to AI adoption among Indonesian MSMEs (Prasetyo & Andrilla, 2025).

Previous studies have examined AI adoption, marketing, organizational readiness, innovation, and business performance from different perspectives. Nevertheless, these discussions remain distributed across different research focuses. Some studies emphasize factors influencing adoption, while others focus on AI capability, digital marketing, innovation, or implementation challenges (Purnomo et al., 2021; Oldemeyer et al., 2024). Recent research also shows that AI adoption should be considered in relation to the development of MSMEs and startups in Indonesia (Lupiyoadi et al., 2025). Therefore, a broader literature-based discussion is needed to connect the opportunities and challenges of AI with digital entrepreneurship and MSME development.

Based on this background, this study aims to examine the opportunities and challenges of Artificial Intelligence in supporting digital entrepreneurship and MSME development in Indonesia. This study focuses on the potential contribution of AI to marketing, efficiency, innovation, competitiveness, and business growth, while also considering adoption barriers, organizational readiness, skills, training, and responsible use of AI. By synthesizing the existing literature, this study is expected to provide a clear understanding of how AI can support MSME development and what factors need to be considered in its adoption.

2. | LITERATURE REVIEW

Artificial Intelligence and Digital Entrepreneurship

Artificial Intelligence (AI) has become an important technology in digital business and entrepreneurship because it can support business processes, decision-making, innovation, and the creation of business value. AI capability refers to the ability of an organization to develop and use AI resources to support its activities and performance. Mikalef and Gupta (2021) explain that AI capability can contribute to organizational creativity and firm performance. In addition, AI can create business value through improvements in efficiency, innovation, and competitive advantage (Enholm et al., 2022). The use of AI is also closely related to innovation management because AI can provide new opportunities for developing products, processes, and business activities (Haefner et al., 2021). In digital entrepreneurship, these capabilities allow businesses to use technology to respond to changing market conditions and develop more efficient business practices. Therefore, AI can be viewed not only as a technological tool but also as a resource that supports digital entrepreneurship and business development (Dwivedi et al., 2021).

AI Adoption and Readiness among Indonesian MSMEs

AI adoption among MSMEs is influenced by several factors related to awareness, perceived benefits, organizational conditions, and technological readiness. Purnomo et al. (2021) use the Technology Acceptance Model to explain the adoption of AI technology in digital startups, showing the relevance of technology acceptance in understanding AI adoption. In Indonesian SMEs, AI adoption intention can be influenced by AI awareness, perceived benefits, government support, social values, and AI features (Hardinata et al., 2024). Organizational readiness is also important because SMEs need sufficient internal resources and capabilities to implement AI effectively (Maharani, 2023). Budiraharjo et al. (2024) further emphasize the importance of assessing MSME readiness before implementing AI. Recent evidence also indicates that financial limitations, digital literacy, and training can become barriers to AI adoption among Indonesian MSMEs (Prasetyo & Andrilla, 2025). Thus, successful AI adoption requires not only access to technology but also adequate organizational and human capabilities.

AI, Innovation, Marketing, and MSME Performance

AI can support MSME development through marketing, digital branding, innovation, efficiency, and business performance. Santosa and Surgawati (2024) identify AI adoption as a useful tool for marketing activities among Indonesian MSMEs, while Sari (2024) highlights the role of AI-based digital literacy in strengthening MSME digital branding. Beyond marketing, AI capabilities can support organizational creativity and firm performance (Mikalef & Gupta, 2021). AI competencies can also contribute to firm performance through innovation activities. Furthermore, AI can support innovation management and create opportunities for businesses to develop new products and processes (Haefner et al., 2021). Research on SMEs also indicates that integrating AI into organizational knowledge bases can support firm growth and productivity (Kopka & Fornahl, 2024). Therefore, the use of AI can provide MSMEs with opportunities to strengthen marketing activities, innovation, competitiveness, and overall business development.

3. | RESEARCH METHOD

This study uses a literature review approach to examine the opportunities and challenges of Artificial Intelligence (AI) in supporting digital entrepreneurship and MSME development in Indonesia. A literature review was selected because the study focuses on understanding and synthesizing findings from previous studies rather than collecting primary data from respondents. The study does not use questionnaires, interviews, or statistical analysis. Instead, the analysis is based on relevant scientific publications that discuss AI adoption, AI readiness, digital entrepreneurship, digital marketing, innovation, business value, firm performance, and the challenges of implementing AI in small and medium-sized enterprises. This approach is considered appropriate because the available literature provides findings from different perspectives that can be compared and synthesized to obtain a broader understanding of AI adoption among MSMEs.

The literature used in this study consists of scientific publications that are relevant to the research topic and are included in the reference collection for this study. The sources cover both Indonesian MSMEs and the broader international discussion of AI in SMEs and business organizations. Several studies specifically examine AI adoption in Indonesian MSMEs and SMEs. For example, Purnomo et al. (2021) discuss AI technology adoption in digital startups using the Technology Acceptance Model, while Hardinata et al. (2024) examine factors influencing AI adoption intention among Indonesian SMEs. Other studies discuss organizational readiness, including Maharani (2023), who examines organizational readiness for AI adoption in Indonesian manufacturing SMEs, and Budiraharjo et al. (2024), who assess MSME AI readiness using the AIRI framework. Recent research by Prasetyo and Andrilla (2025) also provides evidence concerning AI adoption among MSMEs and identifies financial limitations, digital literacy, and training as important challenges.

The literature selection was based on its relevance to the main focus of the study. Publications were considered relevant when they discussed at least one of the following themes: AI adoption, AI capability, AI readiness, digital entrepreneurship, digital marketing, digital branding, innovation, business value, firm performance, business growth, implementation challenges, or responsible AI use. The literature was then reviewed to identify recurring findings and relationships among these themes. Studies that discuss AI marketing among Indonesian MSMEs, such as Santosa and Surgawati (2024), and AI-based digital branding, such as Sari (2024), were used to understand the role of AI in supporting digital business activities. Studies by Mikalef and Gupta (2021), and Enholm et al. (2022), were considered in examining the relationship between AI capabilities, business value, innovation, and firm performance.

The analysis was conducted descriptively and thematically. First, the relevant literature was identified and grouped according to its main topic. Second, the findings from each group were compared to identify common opportunities and challenges associated with AI adoption. Third, the findings were synthesized to explain how AI can support digital entrepreneurship and MSME development. The analysis focused on several recurring themes, including AI adoption and readiness, marketing and digital branding, operational efficiency, innovation, competitiveness, business performance, implementation barriers, and ethical considerations. Literature concerning AI and innovation management, such as Haefner et al. (2021), Grashof and Kopka (2023), and Kopka and Fornahl (2024), was used to strengthen the discussion of innovation and business growth. Oldemeyer et al. (2024) was also used to provide a broader perspective on AI implementation challenges in SMEs.

Finally, the findings from the selected literature were interpreted in relation to the conditions and needs of MSMEs. The analysis did not attempt to produce statistical generalizations but instead sought to provide a structured understanding of the opportunities and challenges reported in previous studies. The results were subsequently organized into a discussion of AI adoption, opportunities for digital entrepreneurship, challenges of implementation, responsible AI use, and implications for MSME development. Through this process, the study provides a concise literature-based perspective on how AI can contribute to MSME development while recognizing the organizational, technological, financial, and human factors that may influence successful adoption.

4. | RESULTS

The literature reviewed in this study indicates that Artificial Intelligence (AI) has become increasingly relevant to the development of digital entrepreneurship and MSMEs. The findings show that AI adoption among MSMEs is influenced by technological, organizational, and environmental factors. Several studies demonstrate that awareness of AI benefits, technological characteristics, and external support play important roles in encouraging adoption. Hardinata et al. (2024) identify AI awareness, perceived benefits, government support, social values, and AI features as factors

influencing AI adoption intentions among SMEs. Similarly, Purnomo et al. (2021) emphasize the importance of technology acceptance in explaining the adoption of AI technologies within digital business environments. These findings indicate that the decision to adopt AI is not solely determined by the availability of technology but also by users' perceptions and organizational conditions.

The reviewed literature also highlights the importance of organizational readiness in supporting AI implementation. Maharani (2023) reports that organizational readiness is a key factor affecting AI adoption among Indonesian manufacturing SMEs. This finding is consistent with Budiraharjo et al. (2024), who demonstrate that MSME readiness needs to be evaluated before AI implementation can be carried out effectively. Furthermore, Lupiyoadi et al. (2025) show that AI adoption among MSMEs and startups is influenced by both technological and behavioral factors, indicating that readiness extends beyond infrastructure and includes user perceptions regarding AI capabilities.

Another important finding concerns the role of AI in supporting marketing and digital business activities. Santosa and Surgawati (2024) show that AI can be used as a marketing tool among Indonesian MSMEs, helping businesses improve marketing effectiveness and customer engagement. Sari (2024) further reports that AI-based digital literacy contributes to stronger digital branding capabilities among MSMEs. These findings suggest that AI can support digital entrepreneurship through more efficient marketing activities and improved communication with customers. The literature also indicates that the use of AI in digital marketing enables businesses to process information more effectively and respond to market demands more quickly.

The findings additionally reveal that AI contributes to innovation and business performance. Mikalef and Gupta (2021) report that AI capability is associated with organizational creativity and firm performance. Enholm et al. (2022) similarly explain that AI creates business value through improvements in efficiency, innovation, and competitive advantage. These studies collectively indicate that AI has the potential to support not only operational improvements but also broader organizational development through enhanced innovation capacity.

The reviewed studies further show that AI can support innovation management and business growth. Haefner et al. (2021) identify AI as an important enabler of innovation management, allowing organizations to improve their ability to develop products, services, and processes. Grashof and Kopka (2023) report that AI can support radical innovation by creating new opportunities for business development. Likewise, Kopka and Fornahl (2024) explain that integrating AI into organizational knowledge bases can contribute to productivity improvements and firm growth, particularly among SMEs. These findings indicate that AI may serve as a strategic resource for organizations seeking long-term competitiveness and growth.

Despite these opportunities, the literature consistently identifies several challenges associated with AI adoption. Prasetyo and Andrilla (2025) report that financial

limitations, digital literacy constraints, and insufficient training remain major barriers to AI adoption among Indonesian MSMEs. Similar concerns are highlighted by Maharani (2023), who notes that organizational readiness remains uneven across SMEs. Oldemeyer et al. (2024), through a systematic review of AI implementation in SMEs, also identify resource limitations, technological complexity, and implementation difficulties as common barriers. These findings suggest that many MSMEs face challenges in acquiring the resources and capabilities necessary to fully utilize AI technologies.

The literature also points to the importance of support systems in facilitating AI adoption. Kasih et al. (2024) emphasize the role of Digital Innovation Hubs in supporting MSME digital innovation through training, technical assistance, and innovation facilities. The findings indicate that external support can help reduce barriers related to technological knowledge and implementation capacity. This suggests that successful AI adoption may depend not only on internal organizational readiness but also on broader ecosystem support.

Another finding emerging from the reviewed literature relates to ethical and responsible AI use. Dwivedi et al. (2021) note that AI adoption brings not only opportunities but also challenges associated with governance, ethics, and policy. Hamid and Artha (2025) highlight ethical considerations in AI adoption among MSMEs, including the need for responsible technology use. In addition, Dwivedi et al. (2023) discuss the opportunities and implications of generative AI technologies such as ChatGPT, while also emphasizing potential risks related to reliability, governance, and responsible implementation. These findings indicate that ethical considerations are increasingly important as AI technologies become more integrated into business activities.

The reviewed literature demonstrates that AI offers significant opportunities for MSME development through improved marketing, digital branding, efficiency, innovation, competitiveness, and business growth. At the same time, the findings consistently show that challenges related to organizational readiness, financial resources, digital literacy, technical skills, training, and ethical implementation remain important considerations for successful AI adoption. The evidence suggests that both internal capabilities and external support mechanisms are necessary to maximize the benefits of AI for digital entrepreneurship and MSME development.

5. | DISCUSSION

The findings of this literature review indicate that Artificial Intelligence (AI) has an important role in supporting digital entrepreneurship and MSME development in Indonesia. The reviewed literature shows that the contribution of AI is not limited to the use of technology for operational activities, but also extends to marketing, digital branding, innovation, efficiency, competitiveness, and business growth. However, the benefits of AI adoption depend on the readiness of MSMEs to integrate AI into their existing business processes and resources. This finding is consistent with Mikalef and

Gupta (2021), who explain that AI capability can support organizational creativity and firm performance when organizations are able to develop and use AI resources effectively. Therefore, AI should be considered as a business resource that can support broader organizational development rather than only as a technological tool.

AI adoption among MSMEs is influenced by several technological, organizational, and environmental factors. The findings show that awareness of AI benefits, perceived benefits, technological characteristics, government support, social values, and AI features can influence the intention of SMEs to adopt AI. Hardinata et al. (2024) demonstrate that these factors are relevant in explaining AI adoption intention among Indonesian SMEs. This finding is also related to Purnomo et al. (2021), who use the Technology Acceptance Model to explain AI technology adoption in digital startups. The results suggest that the decision to adopt AI is influenced not only by the availability of technology but also by how business users perceive its usefulness and how the technology fits with their business activities. Thus, increasing awareness and understanding of AI benefits can become an important step in encouraging MSMEs to consider AI adoption.

Organizational readiness is another important issue in the implementation of AI among MSMEs. The literature indicates that access to AI technology alone is not sufficient to ensure effective implementation. MSMEs need adequate internal resources, capabilities, knowledge, and skills to integrate AI into their business activities. Maharani (2023) identifies organizational readiness as an important factor affecting AI adoption among Indonesian manufacturing SMEs, while Budiraharjo et al. (2024) emphasize the need to assess MSME readiness before implementing AI-based solutions. These findings indicate that MSMEs should consider their existing organizational conditions before adopting AI. A gradual implementation approach may therefore be more appropriate for businesses that have limited technological capabilities or resources.

The reviewed literature also demonstrates that AI provides opportunities to strengthen marketing and digital branding activities. Santosa and Surgawati (2024) show that AI can be used as a marketing tool among Indonesian MSMEs, while Sari (2024) highlights the contribution of AI-based digital literacy to MSME digital branding capabilities. These findings indicate that AI can help MSMEs improve marketing effectiveness, customer engagement, and communication with customers. For MSMEs operating in digital business environments, the ability to process information and respond to market demands is increasingly important. AI can support these activities by helping businesses use digital information more effectively and develop marketing activities that are more responsive to customer needs.

In addition to marketing, AI has the potential to support innovation and firm performance. Mikalef and Gupta (2023) explain that AI competencies can contribute to firm performance through innovation-related activities. This finding is consistent with Enholm et al. (2022), who identify efficiency, innovation, and competitive advantage

as important sources of business value from AI. Haefner et al. (2021) further show that AI can support innovation management by creating opportunities for organizations to develop products, services, and processes. These findings suggest that the contribution of AI to MSMEs can extend beyond short-term operational efficiency. When AI capabilities are integrated with organizational resources and innovation activities, AI may support the development of new business practices and strengthen long-term competitiveness.

AI integration into organizational knowledge and innovation activities is also relevant to MSME growth. Kopka and Fornahl (2024) indicate that integrating AI into organizational knowledge bases can contribute to productivity and firm growth, particularly among SMEs. Grashof and Kopka (2023) similarly highlight the potential of AI to support radical innovation and create new opportunities for business development. These findings strengthen the argument that AI can become a strategic resource for MSMEs when it is integrated with knowledge, innovation, and business processes. Therefore, MSMEs need to move beyond simply using individual AI applications and develop the organizational capability to use AI as part of their broader business strategy.

Despite these opportunities, AI adoption among MSMEs continues to face significant challenges. Financial limitations, digital literacy, and insufficient training are identified as important barriers among Indonesian MSMEs (Prasetyo & Andrilla, 2025). Oldemeyer et al. (2024) also identify resource limitations, technological complexity, and implementation difficulties as common challenges in AI implementation among SMEs. These findings indicate that the digital transformation of MSMEs through AI cannot be separated from the availability of financial and human resources. MSMEs with limited resources may experience difficulties in selecting appropriate AI technologies, developing internal capabilities, and maintaining their implementation. Therefore, AI adoption should be accompanied by training and capacity development that are consistent with the needs and conditions of MSMEs.

External support is also important in addressing these implementation barriers. Kasih et al. (2024) emphasize the role of Digital Innovation Hubs in supporting MSME digital innovation through training, technical assistance, and innovation facilities. This finding indicates that the development of AI adoption should not rely entirely on the internal capabilities of individual MSMEs. Government institutions and external organizations can contribute by providing access to training, technical assistance, and innovation facilities. Such support can reduce barriers related to technological knowledge and implementation capacity and can help MSMEs develop the capabilities required to use AI effectively.

Finally, the adoption of AI needs to consider ethical and responsible use. Dwivedi et al. (2021) highlight that AI adoption involves governance, ethics, and policy challenges, while Hamid and Artha (2025) emphasize ethical considerations in AI adoption among MSMEs. The increasing use of generative AI also creates new

opportunities and implications for business activities, including potential concerns regarding reliability, governance, and responsible implementation (Dwivedi et al., 2023). Therefore, the development of AI-based digital entrepreneurship should not focus only on efficiency and business performance. Responsible use of AI is also necessary to ensure that technological adoption is aligned with appropriate business practices and organizational responsibilities.

The literature indicates that AI can provide significant opportunities for MSME development, particularly through marketing, digital branding, efficiency, innovation, competitiveness, and business growth. Nevertheless, these opportunities can only be maximized when MSMEs have adequate organizational readiness, financial resources, digital literacy, technical skills, and training. The findings also show that external support and responsible AI use are important components of successful implementation. Thus, AI adoption among Indonesian MSMEs should be understood as a process that involves technology, organizational capability, human resources, and the broader digital entrepreneurship ecosystem. This perspective provides a more comprehensive understanding of how AI can contribute to MSME development while recognizing the challenges that may influence successful adoption.

6. | CONCLUSION

This study concludes that Artificial Intelligence (AI) provides important opportunities for supporting digital entrepreneurship and MSME development in Indonesia. Based on the reviewed literature, AI can contribute to marketing, digital branding, operational efficiency, innovation, competitiveness, business performance, and business growth. The use of AI enables MSMEs to improve business activities, respond to market demands, process information more effectively, and develop new products, services, and processes. Therefore, AI has the potential to become an important resource for MSMEs in strengthening their digital business activities and long-term competitiveness. However, the adoption of AI among MSMEs is not determined by technology availability alone. Successful implementation requires adequate organizational readiness, financial resources, digital literacy, technical skills, training, and an understanding of the benefits and characteristics of AI.

Limited resources, technological complexity, and insufficient capabilities may prevent MSMEs from fully utilizing AI technologies. External support through training, technical assistance, and innovation facilities is therefore important to strengthen MSME capabilities and reduce implementation barriers. The study also concludes that AI adoption should be implemented responsibly. Ethical considerations, governance, reliability, and responsible use need to be considered as AI becomes increasingly integrated into business activities. Overall, maximizing the contribution of AI to MSME development requires an approach that connects technology adoption with organizational capabilities, human resources, external support, innovation, and responsible implementation.

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Conflict of Interest Statement

The authors declare that there is no conflict of interest.

Ethical Approval and Originality Statement

Ethical approval was obtained for this study. The manuscript represents original work and has not been previously published, nor is it under consideration by another journal.

Data Disclosure Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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