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Current Trends and Future Directions of AI-Driven Management Accounting in Indonesian MSMEs. Insights from Systematic literature Review

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ABSTRAK

Perkembangan pesat Kecerdasan Buatan (AI) saat ini memicu pergeseran paradigma yang mendalam dalam praktik akuntansi manajemen di skala global; namun, adopsi dan integrasi aktual teknologi canggih ini di dalam Usaha Mikro, Kecil, dan Menengah (UMKM) Indonesia masih sangat terbatas oleh tantangan kontekstual yang berbeda. Studi ini melakukan tinjauan literatur sistematis (SLR) komprehensif untuk mensintesis penelitian akademis terkini mengenai penerapan fungsi AI dalam kerangka akuntansi manajemen usaha kecil di Indonesia. Secara khusus, tinjauan ini mengevaluasi transformasi struktural, keunggulan operasional, hambatan implementasi, dan arah penelitian yang muncul dalam lanskap domestik. Dengan menggunakan metodologi yang ketat, pencarian sistematis dilakukan di berbagai basis data ilmiah utama, termasuk Scopus, Web of Science, dan Google Scholar, yang berhasil mengidentifikasi 38 studi empiris dan konseptual yang sangat relevan yang diterbitkan antara tahun 2015 dan 2025. Temuan yang disintesis menunjukkan bahwa modalitas AI tertentu, terutama algoritma Machine Learning (ML), Robotic Process Automation (RPA), Predictive Analytics Software (PAS), dan model Natural Language Processing (NLP) secara substansial mengoptimalkan operasi akuntansi penting seperti pelaporan keuangan, penganggaran perusahaan, manajemen biaya strategis, dan sistem pendukung keputusan eksekutif. Lebih lanjut, analisis mengungkapkan bahwa UMKM yang memanfaatkan alat-alat ini mengamankan pencapaian operasional penting, termasuk peningkatan efisiensi alur kerja, akurasi data yang unggul, wawasan strategis yang mendalam, pengurangan biaya operasional, dan posisi pasar yang lebih kuat. Sebaliknya, adopsi luas teknologi ini sangat terhambat oleh matriks kompleks kekurangan teknis, kendala keuangan, inersia organisasi, kualitas data yang buruk, dan kerangka kepatuhan peraturan yang ambigu. Pada akhirnya, tinjauan ini menyoroti kesenjangan kritis dalam literatur yang ada, khususnya mencatat defisit dalam studi lapangan empiris yang kuat yang terlokalisasi pada perusahaan-perusahaan di Indonesia, eksplorasi yang tidak memadai tentang dinamika kolaborasi manusia-AI, dan kurangnya fokus pada aplikasi AI yang menargetkan kerangka akuntansi berkelanjutan. Oleh karena itu, makalah ini membangun kerangka kerja konseptual yang dimaksudkan untuk membimbing praktisi industri, pembuat kebijakan pemerintah, dan peneliti akademis dalam mendorong adopsi AI yang lancar, sehingga mempercepat kematangan digital dan ketahanan ekonomi jangka panjang dalam ekosistem UMKM Indonesia.

Kata kunci: kecerdasan buatan, akuntansi manajemen, UMKM, transformasi digital, tinjauan literatur sistematis.

ABSTRACT

The rapid evolution of Artificial Intelligence (AI) is currently initiating a profound paradigm shift in management accounting practices on a global scale; however, the actual adoption and integration of these advanced technologies within Indonesian Micro, Small, and Medium Enterprises (MSMEs) remain significantly restricted by distinct contextual challenges. This study conducts a comprehensive systematic literature review (SLR) to synthesize current academic research regarding the deployment of AI functionalities within the management accounting frameworks of Indonesian small businesses. Specifically, this review evaluates the structural transformations, operational advantages, implementation barriers, and emerging research avenues within the domestic landscape. Utilizing a rigorous methodology, a systematic search was executed across major scholarly databases, including Scopus, Web of Science, and Google Scholar, which successfully identified 38 highly relevant empirical and conceptual studies published between the years 2015 and 2025. The synthesized findings demonstrate that specific AI modalities, most notably Machine Learning algorithms (ML), Robotic Process Automation (RPA), Predictive Analytics Software (PAS), and Natural Language Processing (NLP) models that substantially optimize critical accounting operations such as financial reporting, corporate budgeting, strategic cost management, and executive decision support systems. Furthermore, the analysis reveals that MSMEs leveraging these tools secure critical operational milestones, including enhanced workflow efficiency, superior data accuracy, profound strategic insights, diminished operational overheads, and a strengthened market position. Conversely, the widespread adoption of these technologies is heavily impeded by a complex matrix of technical deficiencies, financial constraints, organizational inertia, poor underlying data quality, and ambiguous

regulatory compliance frameworks. Ultimately, this review highlights critical gaps in the existing body of literature, particularly noting a deficit in robust empirical field studies localized to Indonesian enterprises, insufficient exploration of human-AI collaboration dynamics, and a lack of focus on AI applications targeting sustainable accounting frameworks. Consequently, this paper constructs a conceptual framework intended to guide industry practitioners, government policymakers, and academic researchers toward fostering seamless AI adoption, thereby accelerating digital maturity and long-term economic resilience within the Indonesian MSME ecosystem.

Keywords: artificial intelligence, management accounting, MSMEs, digital transformation, systematic literature review.

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INTRODUCTION

Micro, Small, and Medium-Sized Enterprises (MSMEs) are widely recognized as the backbone of Indonesia's economy due to their substantial contribution to employment generation, innovation, and economic sustainability. According to the Indonesian Ministry of Cooperatives and MSMEs (2023), MSMEs account for more than 99% of all business entities and absorb approximately 97% of the national workforce (Hamid & Artha, 2025). Despite their strategic economic role, many MSMEs continue to experience persistent challenges related to financial management, accounting practices, and strategic decision-making. These limitations are commonly associated with inadequate technological infrastructure, restricted financial resources, and limited managerial capabilities (Maharani et al., 2024). Such conditions reduce operational efficiency and hinder long-term business competitiveness in an increasingly digitalized economic environment.

In recent years, the rapid advancement of digital technologies has significantly transformed the field of management accounting. Traditionally focused on planning, controlling, and supporting managerial decisions, management accounting is now evolving toward a more technology-driven and data-oriented discipline (Anriva & Hamidah, 2024). Among emerging technologies, Artificial Intelligence (AI) has become one of the most disruptive innovations, fundamentally reshaping the architecture of accounting systems and financial governance worldwide (Salsabillah et al., 2025). AI-powered technologies, including machine learning, robotic process automation (RPA), predictive analytics, and natural language processing, enable organizations to automate repetitive accounting tasks, process large volumes of financial data, improve forecasting accuracy, and generate real-time strategic insights (S & Pratama, 2024). Consequently, the role of accountants is gradually shifting from manual transaction recording toward strategic business analysis and decision support (Wang & He, 2024).

For MSMEs, the integration of AI into management accounting presents substantial opportunities to overcome existing operational and financial constraints. AI-based systems provide scalable and cost-efficient solutions that were previously accessible only to large corporations, enabling small businesses

to enhance accounting accuracy, operational efficiency, and strategic planning capabilities (Husain et al., 2024). In Indonesia, the adoption of cloud-based accounting software and AI-driven financial management tools has gradually increased among MSMEs (Septiawan et al., 2025). Nevertheless, the implementation process remains uneven and relatively slow due to several structural barriers, including low digital literacy, high implementation costs, inadequate technological readiness, and concerns regarding cybersecurity and data privacy (Tanhardrjo & Kornelius, 2025). These challenges are particularly significant in emerging economies, where technological infrastructure and institutional support systems are still developing.

Although global literature has extensively documented the benefits of AI implementation in accounting and financial management, most existing studies predominantly focus on large multinational corporations and advanced economies (Wang & He, 2024). Academic discussions concerning MSMEs in developing countries, particularly within the Indonesian context, remain limited and fragmented. Existing Indonesian studies tend to emphasize digital marketing adoption and e-commerce transformation rather than examining how AI technologies influence internal accounting functions, budgeting systems, costing mechanisms, and performance management structures (Salsabillah et al., 2025). Furthermore, there is still a lack of comprehensive academic synthesis that systematically maps AI applications, evaluates their organizational impacts, and identifies critical adoption barriers specific to Indonesian MSMEs (Darmayadi et al., 2025). Current literature also fails to provide a cohesive understanding of the opportunities, challenges, and future research directions associated with AI-driven management accounting in developing-market environments (Syahrudin & Suryani, 2025).

To address these gaps, this study employs a Systematic Literature Review (SLR) approach to examine the development and implementation of AI in management accounting within Indonesian MSMEs. The SLR method provides a structured, transparent, and replicable framework for identifying, evaluating, and synthesizing existing scholarly evidence. Specifically, this review aims to identify AI applications relevant to management accounting practices among Indonesian MSMEs, evaluate the transformative impact of AI on operational efficiency, financial accuracy, and strategic decision-making, and explore opportunities for MSMEs to strengthen competitiveness and scalability through digital transformation. In addition, this study seeks to identify technological, organizational, and policy-related barriers affecting AI adoption while highlighting important research gaps that require further empirical and theoretical investigation.

Ultimately, this paper contributes both theoretically and practically to the growing discourse on digital transformation and management accounting innovation. The findings are expected to provide valuable insights for researchers, policymakers, and MSME practitioners regarding the strategic implications of AI implementation in Indonesia's MSME sector. Furthermore, this study aims to support the formulation

of policies and strategic initiatives that can accelerate AI adoption, strengthen economic resilience, and promote sustainable business development in Indonesia's rapidly evolving digital economy.

RESEARCH METHODS

Research Design

This research utilizes a Systematic Literature Review (SLR) technique in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. SLR guarantees a clear, organized, and repeatable method for gathering, screening, and combining current research on Artificial Intelligence (AI) in management accounting for Indonesia's MSMEs.
The SLR method has a number of benefits: it avoids bias by applying set criteria for inclusion and exclusion, it gives a full picture of what is already known and what is happening, and it finds gaps in research and chances for more study. This methodology guarantees that the results are grounded in evidence and academically sound, making them appropriate for informing both theory and practice.

Data Sources

A comprehensive search was conducted across multiple academic databases to capture a wide range of studies:

1. Scopus – for peer-reviewed journal articles in business, accounting, and technology domains.
2. Web of Science – to capture high-quality interdisciplinary research.
3. Google Scholar – to include grey literature, conference proceedings, and open-access studies relevant to MSMEs and AI adoption.

Additional sources included:

- Indonesian government reports on MSME performance and technology adoption.
- Reports from accounting and fintech organizations discussing AI applications in small business contexts.

Search Strategy

The search strategy combined relevant keywords and Boolean operators to ensure coverage of the topic. The main search strings included:

1. "Artificial Intelligence" AND "Management Accounting" AND "MSME" AND "Indonesia"
2. "AI adoption" AND "SME accounting" AND "financial management"
3. "Digital transformation" AND "MSME accounting"
4. "Machine learning" AND "financial reporting" AND "small business"

The search included studies published between 2015 and 2025, capturing the recent trends and emerging applications of AI in accounting.

Inclusion and Exclusion Criteria

Inclusion Criteria:

1. Studies focused on AI applications in management accounting.
2. Research involving MSMEs, especially in Indonesia.
3. Articles published in English, including peer-reviewed journals, conference proceedings, and book chapters.
4. Studies that report on benefits, challenges, or adoption factors of AI.

Exclusion Criteria:

1. Studies not related to accounting or AI.
2. Research focused exclusively on large enterprises.
3. Articles without full-text availability.
4. Publications prior to 2015.

Screening Process

The screening process followed PRISMA guidelines and included three stages:

1. Identification:

- A total of 1,260 articles were retrieved from all databases.
- After removing duplicates 1,112 articles remained.

2. Screening:

- Titles and abstracts were screened for relevance to AI in management accounting and MSMEs.
- 90 articles were selected for full-text review.

3. Eligibility:

- Full-text articles were assessed against inclusion and exclusion criteria.
- A total of 38 studies met all criteria and were included in the final synthesis.

A PRISMA flow diagram can be included in the publication to visually summarize the identification, screening, and eligibility process.

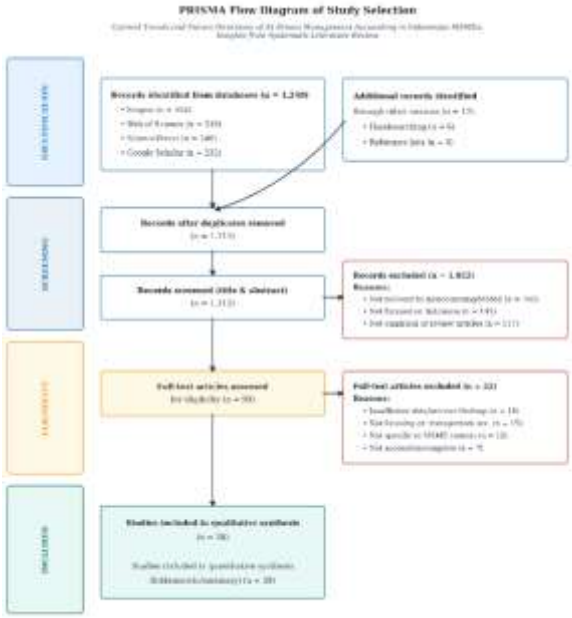


Figure 1: PRISMA Flow Diagram

Data Extraction and Synthesis

Data extraction followed a structured framework to ensure consistency and comprehensiveness. Key information extracted from each study included:

Table 1: Data Extraction and Synthesis Process

Data Extraction Category	Description
Author(s) & Year	Identifies the study and publication date
Study Type	Empirical, Conceptual, Review, or Case Study
AI Technology Used	Machine Learning algorithms (ML), Robotic Process Automation (RPA), Predictive Analytics Software (PAS), and Natural Language Processing (NLP)
Accounting Function Impacted	Financial Reporting, Budgeting, Cost Management, Auditing, Decision Support
MSME Context	Indonesian MSMEs or comparable small enterprises
Benefits Reported	Efficiency, Accuracy, Predictive Insights, Strategic Support
Challenges & Barriers	Cost, Literacy, Data Security, Infrastructure, Regulatory Issues
Key Findings	Main insights and conclusions
Recommendations	Suggestions for practice and further research

After extraction, data were synthesized thematically:

1. AI applications in management accounting functions.
2. Benefits and transformative impacts.
3. Barriers and challenges for adoption.
4. Emerging research trends and knowledge gaps.

Quality Assessment

Each study was assessed for methodological quality based on:

- Clarity of objectives and research questions.
- Adequacy of research design and data collection methods.
- Relevance to AI adoption in MSMEs.
- Transparency in reporting findings and conclusions.

High-quality studies were prioritized in the synthesis to ensure reliable conclusions.

RESULTS AND DISCUSSION

The systematic and comprehensive evaluation of existing literature concerning the implementation of Artificial Intelligence (AI) in management accounting within Indonesia's Micro, Small, and Medium Enterprises (MSMEs) generated substantial insights into the current state of adoption, practical applications, benefits, challenges, and emerging scholarly directions. A total of 38 selected studies fulfilled the established inclusion criteria, consisting of empirical research, conceptual discussions, and review-based articles published between 2015 and 2026. Collectively, these studies demonstrate the growing academic and practical interest in how AI technologies are transforming accounting functions and managerial decision-making processes within MSMEs operating in developing economies such as Indonesia.

The findings of the review were systematically categorized into several major thematic areas to provide a structured understanding of the phenomenon:

AI Applications in Management Accounting for MSMEs

Artificial Intelligence (AI) is increasingly being integrated into management accounting practices to automate routine activities, improve accuracy, and strengthen strategic decision-making processes. Although the adoption of AI among Indonesian MSMEs remains at an early stage, existing studies indicate that these technologies possess considerable potential to enhance accounting functions despite the sector's limited financial and technological resources. Several major AI applications identified in the literature include automated financial reporting, predictive analytics, cost management, fraud detection, and decision support systems (Fitriyani, 2024). Through these applications, MSMEs are able to process large volumes of financial information more efficiently, reduce the likelihood of human error, and generate valuable insights that support both operational and strategic business decisions (Anwar, 2025).

To provide a more systematic understanding, the reviewed studies were comparatively analyzed based on the type of AI technology utilized, the accounting functions influenced, the benefits achieved, and the challenges encountered during implementation. A comprehensive summary of this synthesis is presented in Table 2.

Table 2: AI Applications in Management Accounting for Indonesian MSMEs

AI Technology	Accounting Function	Key Applications	Benefits	Challenges / Barriers	Representative Studies
Machine Learning (ML)	Predictive analytics, budgeting, forecasting	Cash flow prediction, sales forecasting, budget optimization	Improved decision-making, trend analysis, proactive planning	Requires historical data, technical knowledge	(Anwar, 2025; T. Ermawati et al., 2025)
Robotic Process Automation (RPA)	Bookkeeping, transaction recording	Automating repetitive tasks, generating real-time reports	Increased efficiency, reduced errors, timesaving	High setup cost, integration with existing systems	(Ratmono et al., 2023; Suhut et al., 2025)
Natural Language Processing (NLP)	Financial reporting, compliance	Processing invoices, categorizing expenses, regulatory compliance	Faster processing, consistent reporting	Limited NLP tools in Bahasa Indonesia, requires clean data	(Alfarizi et al., 2024; Pandey, 2025; Thuc et al., 2025)
AI-Powered Dashboards	Decision support, management reporting	Real-time visualization, KPI monitoring	Enhanced insights, strategic decision support	Requires digital infrastructure, training needed	(Candra & Sutopo, 2025; Febriyani et al., 2024; Perkasa & Widianto, 2025)
Predictive Analytics Algorithms	Cost management, pricing strategy	Dynamic pricing, cost optimization, scenario analysis	Optimized resource allocation, competitive pricing	Data availability, accuracy dependent on input quality	(Judijanto et al., 2025; Patricia et al., 2022; Tambunan, 2025)

Table 2 illustrates the major AI technologies currently utilized in management accounting practices among MSMEs. Machine Learning (ML) and Predictive Analytics play an important role in supporting MSMEs in improving financial decision-making and optimizing resource allocation. Meanwhile, Robotic Process Automation (RPA) is primarily used to automate repetitive accounting activities, such as bookkeeping and transaction recording, thereby reducing manual workload and increasing operational efficiency. Natural Language Processing (NLP) contributes to invoice processing and compliance reporting activities, while AI-powered dashboards provide visual analytical tools that support managerial decision-making processes. Each AI technology demonstrates a specific relationship with particular accounting functions (Tambunan, 2025). For example, ML is widely applied in budgeting and financial forecasting, whereas RPA is more commonly associated with transaction processing and financial reporting tasks. This classification demonstrates the suitability of different AI technologies for distinct accounting activities.

The table also highlights several practical AI applications, including cash flow forecasting, automated financial reporting, cost optimization, and Key Performance Indicator (KPI) visualization. These applications demonstrate how MSMEs can leverage AI technologies to improve both operational efficiency and long-term strategic planning (Patricia et al., 2022). Furthermore, AI implementation consistently provides multiple benefits, including greater accuracy, improved efficiency, enhanced predictive capabilities, and stronger support for strategic decision-making. Even relatively simple AI solutions can assist MSMEs in reducing operational costs, forecasting sales trends, and ensuring timely financial reporting (Tambunan, 2025).

However, despite these advantages, several barriers continue to hinder AI adoption among MSMEs. One of the primary challenges involves technical limitations, particularly inadequate knowledge regarding AI implementation and low levels of digital literacy. Financial constraints also remain a significant obstacle, as the initial investment required for software, infrastructure, and system integration is often costly for small businesses. In addition, data-related issues, including limited access to high-quality datasets, inconsistent financial records, and language-related barriers such as NLP adaptation for Bahasa Indonesia, further complicate implementation processes. Finally, successful AI integration requires appropriate employee training and sufficient digital infrastructure to ensure compatibility between existing business systems and AI-based solutions.

1. Benefits of AI Adoption

The adoption of Artificial Intelligence (AI) in management accounting offers substantial advantages for MSMEs in Indonesia, particularly in improving operational efficiency, accounting accuracy, and strategic decision-making capabilities (Adelin et al., 2025). Beyond enhancing routine business operations, AI also contributes to greater organizational competitiveness, scalability, and financial accessibility in an increasingly digital business environment. This section discusses the practical and strategic benefits of AI implementation, as well as the opportunities available for MSMEs to utilize AI technologies in strengthening financial management, supporting business expansion, and accelerating digital transformation initiatives.

As discussed in Section 1 regarding AI applications (Indrayani et al., 2024), the benefits of AI adoption can generally be categorized into six major areas: Efficiency and Productivity, Accuracy and Reliability, Strategic Decision-Making, Cost Optimization, Competitive Advantage, and Financial Inclusion & Scalability. Within these areas, AI enables MSMEs to transform traditional business processes into more data-driven, automated, and responsive operational systems. To provide a clearer understanding of these benefits and opportunities, table 3 presents a synthesis of findings derived from the 38 reviewed studies.

Table 3: Benefits and Opportunities of AI Adoption in MSME Management Accounting

Benefit Dimension	Description / Opportunity	Practical Examples in MSMEs	Representative Studies
Efficiency & Productivity	AI automates repetitive tasks, reduces manual intervention, and accelerates processes	Automated bookkeeping with RPA, real-time report generation, invoice processing	(Adepoju et al., 2025; Siswanto & Aqdam, 2024)
Accuracy & Reliability	AI reduces errors in data entry and reporting, ensures consistent results	Predictive analytics for cash flow forecasting, NLP for expense categorization	(Fajri et al., 2024; Triyana et al., 2025)
Strategic Decision-Making	AI enables data-driven insights, trend analysis, and scenario planning	Dynamic pricing, cost optimization, KPI monitoring dashboards	(Aliah & Faridani, 2025)
Cost Optimization	AI helps MSMEs allocate resources effectively and minimize unnecessary costs	Reducing manual labor costs, optimizing operational expenses	(Patricia et al., 2022; Tambunan, 2025)
Competitive Advantage	AI supports informed and timely decisions, enabling MSMEs to respond to market changes	Early identification of sales trends, risk detection in financial operations	(Adiningsih & Pratama, 2024; Y. Ermawati et al., 2024)
Financial Inclusion & Scalability	Cloud-based AI platforms allow smaller enterprises to access sophisticated financial tools	Cloud accounting software with AI modules for SMEs, mobile AI applications	(Alfarizi et al., 2024; Perkasa & Widianto, 2025)

MSMEs can utilize AI technologies to automate routine accounting activities such as bookkeeping, invoice processing, and financial report generation, as illustrated in Table 3. The automation of these repetitive tasks significantly reduces manual workload and enables organizations to allocate more time and resources toward strategic business activities. In particular, Robotic Process Automation (RPA) and AI-powered accounting systems are highly beneficial for MSMEs that operate with limited accounting personnel and constrained organizational resources (Alfarizi et al., 2024).

In addition, technologies such as machine learning, predictive analytics, and natural language processing contribute to improving the accuracy, consistency, and reliability of financial reporting processes. AI systems are capable of detecting irregularities in transaction records, automatically classifying expenses, and minimizing the likelihood of human error in accounting operations. These capabilities are especially valuable for MSMEs that may lack professionally trained accounting staff or advanced financial expertise (Perkasa & Widianto, 2025).

AI also plays an important role in strengthening strategic decision-making by providing data-driven insights and real-time analytical information. AI-powered dashboards and Key Performance Indicator (KPI) monitoring systems enable business managers to evaluate organizational performance, develop dynamic pricing strategies, and formulate more accurate budget planning based on predictive patterns and market trends. As a result, management accounting evolves beyond its traditional administrative role

and becomes a strategic instrument for business planning and competitive decision-making (Febriyani et al., 2024).

Furthermore, AI implementation assists MSMEs in optimizing resource allocation and reducing operational costs. Automated accounting processes decrease dependence on manual labor, while predictive models support more effective forecasting related to inventory management, resource utilization, and financial planning. AI technologies also enhance business adaptability by providing real-time information and predictive capabilities that allow MSMEs to respond more rapidly to market fluctuations and changing business conditions (Suhut et al., 2025). For example, predictive analysis of cash flow and sales trends enables businesses to take proactive measures to maximize profitability while minimizing financial risks.

Moreover, the emergence of cloud-based AI accounting solutions has expanded access to sophisticated financial management tools that were previously available primarily to large corporations. Mobile-based AI accounting applications further increase financial accessibility for MSMEs operating in remote or underserved regions by enabling efficient financial management, reporting, and monitoring regardless of geographical limitations.

2. Barriers and Challenges

Even though Artificial Intelligence (AI) has the power to change things, many Indonesian MSMEs are having trouble using it. These problems are related to technology, organization, money, and rules. However, it is important to know these barriers in order to understand how AI is being adopted and to come up with good plans for how to use it. There are five key areas of difficulty: Technical Limitations, Financial Constraints, Data Quality & Privacy, Organizational Readiness, and Regulatory & Policy Barriers. Table 4 shows a summary of these problems based on the 38 research that were looked at.

Table 4: Challenges and Barriers of AI Adoption in MSME Management Accounting

Challenge Dimension	Description	Impact on MSMEs	Representative Studies
Technical Limitations	Low digital literacy, insufficient AI expertise, lack of IT infrastructure	Limit's ability to implement AI tools, increases dependency on external consultants	(Asmar et al., 2025; Maharani et al., 2024)
Financial Constraints	High cost of AI software, hardware, and implementation	Prevents small businesses from adopting advanced AI solutions	(Husain et al., 2024; Septiawan et al., 2025)
Data Quality & Privacy	Incomplete, inconsistent, or unstructured data; concerns about cybersecurity and confidentiality	Reduces AI accuracy, risks financial and reputational damage	(Darmayadi et al., 2025; Tanhardrjo & Kornelius, 2025)

Organizational Readiness	Resistance to change, lack of training, limited management support	Slows adoption, reduces effectiveness of AI systems	(Hamid & Artha, 2025; Syahrudin & Suryani, 2025)
Regulatory & Policy Barriers	Limited guidelines, unclear compliance standards for AI usage in accounting	Increases legal uncertainty, discourages investment in AI	(Hamid & Artha, 2025; Syahrudin & Suryani, 2025)

Many MSMEs in Indonesia continue to face significant obstacles in adopting AI-based accounting systems due to limited digital literacy and inadequate technological knowledge. The absence of reliable IT infrastructure and a shortage of skilled personnel often force businesses to depend on external technical support, which increases operational costs and slows the overall adoption process (Laksmono et al., 2025).

In addition, the substantial initial investment required for AI implementation remains one of the primary barriers for MSMEs. Costs associated with software licensing, hardware procurement, system integration, and implementation services are often considered too expensive for small businesses operating with limited financial resources. As a result, many MSMEs prioritize essential operational expenditures over long-term technological investments, thereby delaying AI integration into their accounting practices (Thuc et al., 2025).

Another major challenge relates to data quality and availability. Effective AI systems require structured, accurate, and high-quality datasets to generate reliable outputs. However, many MSMEs still struggle with incomplete, inconsistent, or poorly maintained financial records, limiting the effectiveness of AI-driven accounting applications (Anggraini, 2026). Furthermore, concerns regarding data privacy and cybersecurity, particularly in relation to customer information and financial transaction data, contribute to organizational hesitation toward AI adoption. Many small businesses lack adequate cybersecurity systems and data protection mechanisms, increasing vulnerability to digital security risks (Alfarizi et al., 2024).

Organizational and human resource factors also significantly influence the implementation of AI technologies. Successful AI adoption requires effective change management, including employee training, managerial support, and organizational readiness to adapt to new digital workflows (Supriyati et al., 2025). Resistance to change, fear of job displacement, and limited understanding of the practical benefits of AI often hinder organizational acceptance and slow the implementation process.

Moreover, regulatory and compliance-related uncertainties create additional barriers to AI adoption within the accounting sector. The absence of clear legal frameworks, accounting standards, and regulatory guidelines regarding AI implementation may discourage MSMEs from investing in AI technologies, particularly in areas involving taxation, financial reporting, and data protection compliance (Perkasa & Widianto, 2025).

As summarized in Table 4, although AI offers numerous advantages for MSMEs, as discussed in Section 2, Indonesian MSMEs continue to encounter multiple challenges in implementing these technologies effectively. Addressing these barriers requires collaborative efforts involving regulatory support, financial incentives, digital infrastructure development, and targeted training programs. By understanding these challenges, policymakers, researchers, and MSME practitioners can formulate more effective strategies to facilitate AI integration and bridge the gap between the potential benefits of AI and its practical implementation within Indonesia's MSME sector.

3. Research Trends and Gaps

The review identifies several important research gaps and potential directions for future investigation:

First, a considerable number of previous studies have been conducted within global settings or concentrated primarily on large-scale organizations, resulting in limited empirical evidence that specifically reflects the conditions of developing countries such as Indonesia. This issue is further intensified by the absence of AI implementation frameworks specifically designed for MSMEs, despite the fact that these enterprises operate under unique structural limitations, financial constraints, and technological challenges that differ substantially from those of large corporations (Nagara et al., 2026).

Second, existing literature provides insufficient attention to behavioral and organizational dimensions related to AI adoption. Factors such as managerial perceptions, employee preparedness, organizational culture, and resistance to technological change remain underexplored, even though prior findings suggest that human and organizational elements play a crucial role in determining the success or failure of AI implementation within businesses (Al Dhaheri et al., 2024).

Third, the current studies have not comprehensively examined the balance between human judgment and AI capabilities in managerial decision-making processes. Recent scholarly discussions increasingly emphasize the importance of integrating automated analytical systems with human oversight to ensure that decisions remain effective, ethical, and contextually appropriate. However, empirical investigations into how this collaboration can be optimally achieved remain relatively limited (Wang et al., 2025).

Fourth, the significant gap concerns the role of AI in supporting Environmental, Social, and Governance (ESG) reporting among MSMEs. Although AI technologies demonstrate considerable potential in improving ESG-related data collection, monitoring, analysis, and reporting quality, research examining the practical implementation and effectiveness of AI-driven ESG reporting systems within small and medium-sized enterprises is still scarce and insufficiently developed (Riti et al., 2025).

Fifth, the limited scholarly attention has been directed toward evaluating the effectiveness of government policies, regulatory systems, and institutional support mechanisms in encouraging AI

adoption among MSMEs. External pressures, including government regulations, industry standards, and policy incentives, are recognized as important determinants influencing technological adoption decisions. Nevertheless, empirical studies assessing how these external institutional factors shape AI implementation within MSMEs remain inadequate (Rahmani et al., 2024).

Finally, the literature demonstrates a lack of longitudinal research examining the long-term effects of AI adoption on MSME performance, innovation capacity, and business competitiveness. Most existing studies rely predominantly on cross-sectional analyses or case-study approaches, which limit the ability to observe sustainable impacts and organizational changes over extended periods. This limitation highlights the need for more comprehensive longitudinal investigations capable of capturing the evolving influence of AI technologies on MSME growth and resilience over time (Al Dhaheri et al., 2024).

The comprehensive analysis of AI applications, benefits, and challenges demonstrates that although AI adoption among Indonesia's MSMEs is still in its early stages, it holds substantial transformative potential for management accounting practices. The findings presented in this Results section provide a foundational understanding of how AI can reshape management accounting functions, identify the opportunities available for MSMEs, and highlight the major barriers and research gaps that require further scholarly attention.

The results of this systematic literature review further indicate that Artificial Intelligence (AI) is gradually transforming management accounting practices within Indonesian MSMEs. Through the analysis of 38 selected studies, several significant patterns emerged regarding AI applications, implementation benefits, adoption challenges, and existing gaps within the current body of research.

Discussion:

Transformation of Management Accounting in Indonesian MSMEs

The findings of this systematic literature review demonstrate that Artificial Intelligence (AI) is progressively transforming management accounting practices within Indonesian MSMEs from traditional transaction-oriented processes into more strategic, data-driven, and technology-enabled systems. Historically, management accounting in MSMEs relied heavily on manual bookkeeping, spreadsheet-based reporting, and retrospective financial analysis, which often limited the speed, accuracy, and strategic value of managerial decision-making. However, the integration of AI technologies such as Machine Learning (ML), Robotic Process Automation (RPA), Natural Language Processing (NLP), predictive analytics, and AI-powered dashboards has significantly changed the operational role of management accounting within small business environments.

The review indicates that AI technologies are increasingly utilized to automate repetitive accounting activities, including bookkeeping, transaction recording, invoice processing, budgeting, and financial reporting. In particular, RPA enables MSMEs to reduce administrative workload and minimize manual

processing errors, while machine learning and predictive analytics support forecasting, scenario planning, and strategic resource allocation (Ratmono et al., 2023; Tambunan, 2025). These technologies allow MSMEs to generate faster, more accurate, and more proactive financial insights, thereby improving organizational responsiveness in highly competitive and rapidly changing business environments.

Furthermore, AI-powered dashboards and real-time monitoring systems strengthen managerial control by enabling MSME owners and managers to monitor Key Performance Indicators (KPIs), evaluate operational performance, identify financial irregularities, and make evidence-based strategic decisions without excessive dependence on external accounting consultants. This transformation reflects a broader shift in management accounting from a purely administrative and compliance-oriented function toward a strategic business support system that facilitates organizational planning, forecasting, and decision-making (Judijanto et al., 2025; Patricia et al., 2022). These findings are consistent with previous international studies highlighting the strategic role of AI in digital accounting transformation while also contextualizing the phenomenon within the structural realities of Indonesian MSMEs (Adiningsih & Pratama, 2024; Febriyani et al., 2024).

Opportunities for MSMEs Through AI Adoption

The adoption of AI in management accounting creates several strategic opportunities for Indonesian MSMEs. One of the most significant opportunities relates to operational efficiency and productivity enhancement. Automation technologies reduce repetitive manual tasks, minimize human error, accelerate accounting processes, and allow managers to allocate greater attention toward strategic business activities. This is particularly important for MSMEs that often operate with limited human resources and constrained financial capacity (Adepoju et al., 2025; Siswanto & Aqdam, 2024).

In addition, AI adoption substantially improves strategic decision-making capabilities. Predictive analytics and AI-based forecasting tools enable MSMEs to analyze market trends, forecast sales and cash flow, optimize costs, and improve resource allocation strategies. Real-time access to financial information also strengthens managerial agility and enables faster responses to changes in market conditions (Aliah & Faridani, 2025). Consequently, management accounting evolves into a strategic mechanism that supports business sustainability and competitive positioning rather than merely serving reporting and compliance functions.

Another important opportunity identified in the literature concerns financial inclusion and business scalability. Cloud-based AI accounting platforms and mobile financial applications allow smaller enterprises to access sophisticated accounting technologies that were previously affordable only for large corporations (Septiawan et al., 2025). This democratization of digital accounting technologies enables MSMEs operating in remote or underserved regions to improve financial management practices, strengthen transparency, and participate more effectively in the digital economy.

Moreover, AI adoption provides MSMEs with competitive advantages by enabling data-driven and timely decision-making. AI-supported monitoring systems can identify financial risks, sales patterns, and operational inefficiencies at earlier stages, allowing businesses to respond proactively to market fluctuations and customer demands (Adiningsih & Pratama, 2024; Tambunan, 2025). Therefore, the findings suggest that AI adoption should not be viewed solely as a technological improvement but rather as a strategic enabler capable of strengthening organizational resilience, adaptability, and long-term business growth.

Barriers and Constraints to AI Adoption

Despite its transformative potential, the widespread adoption of AI in Indonesian MSMEs continues to face substantial barriers and structural constraints. One of the most significant challenges identified in the literature is limited digital literacy and insufficient technological expertise among MSME owners and employees. Many small businesses lack the technical knowledge necessary to implement, operate, and maintain AI-based accounting systems effectively, resulting in strong dependence on external consultants and technology providers (Asmar et al., 2025; Maharani et al., 2024).

Financial limitations also represent a major obstacle to AI implementation. The high costs associated with software acquisition, hardware infrastructure, system integration, maintenance, and employee training often discourage MSMEs from investing in AI technologies. Given their limited budgets, many MSMEs prioritize short-term operational survival over long-term digital transformation investments (Husain et al., 2024; Septiawan et al., 2025).

In addition, poor data quality and cybersecurity concerns significantly reduce the effectiveness and reliability of AI systems. Effective AI implementation requires structured, accurate, and high-quality financial data; however, many MSMEs continue to maintain incomplete, inconsistent, or poorly organized accounting records. Concerns regarding data privacy, cyber threats, and financial confidentiality further increase organizational resistance toward AI adoption (Darmayadi et al., 2025; Tanhardrjo & Kornelius, 2025). Language-related limitations, particularly the limited development of NLP technologies in Bahasa Indonesia, also create technical barriers for localized AI applications.

Organizational readiness and institutional support remain additional critical factors affecting adoption success. Resistance to technological change, fear of job displacement, limited managerial commitment, and inadequate employee training frequently hinder organizational acceptance of AI systems (Hamid & Artha, 2025; Syahrudin & Suryani, 2025). Furthermore, unclear regulatory frameworks and the absence of standardized guidelines regarding AI implementation in accounting practices create legal uncertainty for MSMEs, particularly in areas related to taxation, compliance, financial reporting, and data protection.

Addressing these barriers requires coordinated collaboration among policymakers, educational institutions, financial organizations, and technology providers. Government support through digital literacy programs, financial incentives, AI training initiatives, infrastructure development, and regulatory standardization is essential to accelerate AI adoption within the MSME sector. Without adequate institutional and policy support, the gap between the potential benefits of AI and its actual implementation among Indonesian MSMEs may continue to widen.

Overall, the discussion demonstrates that AI possesses substantial potential to transform management accounting practices and improve the competitiveness of Indonesian MSMEs. However, successful adoption depends not only on technological availability but also on organizational preparedness, financial accessibility, human resource capabilities, and supportive institutional ecosystems.

Theoretical and Practical Implications

This study provides important theoretical and practical implications for understanding AI-driven management accounting within Indonesian MSMEs. From a theoretical perspective, this systematic literature review contributes to the development of management accounting, digital transformation, and technology adoption literature by contextualizing AI implementation within MSMEs operating in a developing economy. Previous studies have predominantly focused on large corporations and developed countries, while limited scholarly attention has been directed toward MSMEs in emerging markets such as Indonesia (Wang & He, 2024; Salsabillah et al., 2025). By synthesizing 38 selected studies, this review demonstrates how AI technologies including Machine Learning (ML), Robotic Process Automation (RPA), Natural Language Processing (NLP), predictive analytics, and AI-powered dashboards are transforming management accounting functions such as budgeting, financial reporting, cost management, and strategic decision support within resource-constrained business environments (Tambunan, 2025; Ratmono et al., 2023; Judijanto et al., 2025).

Furthermore, this study extends existing theoretical discussions by emphasizing that AI adoption in management accounting is influenced not only by technological capabilities but also by organizational readiness, managerial support, employee competencies, digital literacy, regulatory frameworks, and institutional conditions (Hamid & Artha, 2025; Syahrudin & Suryani, 2025). The findings therefore contribute to the broader discourse on digital transformation by integrating technological, organizational, and environmental perspectives within the context of MSMEs. In addition, the review identifies important research gaps related to human-AI collaboration, ESG reporting, behavioral dimensions, and long-term organizational impacts, thereby providing a conceptual foundation for future empirical and theoretical studies (Al Dhaheri et al., 2024; Wang et al., 2025; Riti et al., 2025).

From a practical perspective, the findings offer valuable guidance for MSME owners, accountants, managers, policymakers, and technology providers seeking to accelerate AI adoption in management

accounting practices. For practitioners, the study highlights that MSMEs can improve operational efficiency, financial accuracy, and strategic decision-making through the gradual implementation of AI technologies such as cloud-based accounting systems, RPA-driven bookkeeping automation, predictive analytics, and AI-powered dashboards (Alfarizi et al., 2024; Perkasa & Widianto, 2025). These technologies enable MSMEs to automate repetitive accounting tasks, reduce human error, optimize resource allocation, and generate real-time business insights that support more effective managerial decisions (Febriyani et al., 2024; Patricia et al., 2022).

The findings also suggest that MSMEs should adopt AI incrementally according to their technological readiness and financial capacity. Small businesses may initially prioritize affordable and scalable AI solutions, such as cloud accounting platforms and mobile-based financial applications, before integrating more advanced AI capabilities including machine learning and predictive analytics (Septiawan et al., 2025; Tambunan, 2025). This staged adoption approach can help MSMEs minimize implementation risks while strengthening long-term digital capabilities and competitiveness.

For policymakers and institutional stakeholders, this study highlights the importance of establishing supportive ecosystems that facilitate AI adoption among MSMEs. The review reveals that barriers such as low digital literacy, inadequate infrastructure, limited technical expertise, high implementation costs, cybersecurity concerns, and unclear regulatory frameworks continue to hinder AI integration within Indonesian MSMEs (Laksmono et al., 2025; Tanhardrjo & Kornelius, 2025). Therefore, government agencies and related institutions should develop targeted digital literacy programs, financial incentives, AI training initiatives, cybersecurity guidelines, and clearer accounting regulations related to AI implementation, taxation, financial reporting, and data protection (Rahmani et al., 2024; Perkasa & Widianto, 2025). Strengthening institutional support mechanisms can accelerate digital transformation and improve the accessibility of AI technologies for small enterprises across Indonesia.

For researchers, this study highlights several opportunities for future investigation. Future research should focus on conducting empirical studies specifically centered on Indonesian MSMEs to examine the long-term impact of AI adoption on organizational performance, innovation capability, sustainability, and competitiveness (Al Dhaheri et al., 2024). Additional studies are also needed to explore behavioral and organizational dimensions such as managerial perceptions, employee readiness, resistance to technological change, and human-AI collaboration in managerial decision-making processes (Wang et al., 2025). Moreover, future scholars may investigate the role of AI in supporting ESG and sustainability accounting practices among MSMEs, as current literature addressing this issue remains limited (Riti et al., 2025).

Overall, this study implies that AI should not merely be viewed as a technological accounting tool but rather as a strategic enabler capable of transforming management accounting practices, strengthening

business resilience, and supporting sustainable growth among Indonesian MSMEs. Successful implementation, however, requires collaborative efforts involving researchers, practitioners, policymakers, educational institutions, and technology providers to enhance digital readiness, improve accounting capabilities, and foster inclusive digital transformation within Indonesia's MSME ecosystem.

CONCLUSION

This systematic literature review examined the implementation of Artificial Intelligence (AI) in management accounting practices among Indonesian MSMEs, with particular emphasis on AI applications, benefits, adoption barriers, and future research directions. The findings indicate that AI technologies such as Machine Learning (ML), Robotic Process Automation (RPA), Natural Language Processing (NLP), and predictive analytics are increasingly being utilized to support budgeting, financial reporting, cost management, and managerial decision-making processes. The integration of these technologies contributes to improved operational efficiency, greater accounting accuracy, enhanced strategic planning, reduced operational costs, and strengthened competitive advantage for MSMEs. In addition, AI adoption supports business scalability and promotes broader financial inclusion within the digital economy. Despite these benefits, the review identifies several critical challenges that continue to hinder AI adoption among Indonesian MSMEs. These challenges include limited digital and technical competencies, financial constraints, poor data quality, insufficient organizational readiness, and regulatory uncertainty. Furthermore, the study reveals that empirical research specifically examining AI-driven management accounting practices within the Indonesian MSME context remains limited. Existing literature also provides insufficient exploration of important issues such as human-AI collaboration, sustainability and ESG accounting, organizational adaptation, and the effectiveness of institutional and policy support mechanisms.

The findings suggest that AI should be regarded as a strategic enabler capable of transforming management accounting practices and strengthening the long-term resilience and competitiveness of MSMEs in Indonesia. However, successful implementation requires adequate technological infrastructure, organizational preparedness, financial support, and clear regulatory frameworks. The results of this review provide valuable insights for both practitioners and researchers in supporting AI implementation strategies, improving managerial decision-making, and accelerating the digital transformation of MSMEs. Future studies are encouraged to conduct empirical investigations focusing specifically on Indonesian MSMEs to evaluate the long-term impact of AI adoption on organizational performance, innovation capability, and business sustainability. Further research may also explore the influence of organizational culture and behavioral factors on AI adoption, as well as the role of AI in sustainability reporting and ESG accounting practices among small enterprises. In addition, policymakers

and institutional stakeholders should develop supportive policy frameworks, financial incentives, and digital capacity-building programs to facilitate broader AI adoption across the MSME sector. Overall, AI presents a transformative opportunity for Indonesian MSMEs by enhancing management accounting processes, strengthening operational resilience, and supporting sustainable business growth and competitiveness in the digital era.

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