EFFECTIVENESS OF ARTIFICIAL INTELLIGENCE AND BLOCKCHAIN INTEGRATION FOR FRAUD PREVENTION IN ACCOUNTING INFORMATION SYSTEMS: A SYSTEMATIC REVIEW OF EMPIRICAL EVIDENCE

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Abstract

Digital transformation of Accounting Information Systems (AIS) increases operational efficiency while amplifying the risk of accounting fraud. Conventional internal controls are often insufficient to address complex and systematic fraud, driving the adoption of advanced technologies such as Artificial Intelligence (AI) and blockchain. AI supports active fraud detection through anomaly identification and data analytics, whereas blockchain ensures data integrity through transparency and immutability. However, empirical evidence on the effectiveness of their integration in AIS remains limited and fragmented. This study applies a Systematic Literature Review (SLR) to synthesize empirical findings on the effectiveness of AI and blockchain integration for fraud prevention in AIS. Ten empirical journal articles published between 2020 and 2025 were selected from Google Scholar, SINTA, Scopus, and Web of Science. A narrative synthesis was employed to identify patterns, technological roles, integration mechanisms, and implementation factors. The results indicate that AI–blockchain integration provides superior fraud prevention compared to standalone applications. AI primarily enables real-time anomaly detection and fraud analytics, while blockchain functions as a preventive mechanism by ensuring data immutability and reliable audit trails. Key integration mechanisms include anomaly detection, blockchain-based audit trails, smart contracts, and continuous auditing. Implementation effectiveness is strongly influenced by organizational readiness, data quality, human resource competence, IT infrastructure, and regulatory support. This study contributes an empirical synthesis and emphasizes the importance of a socio-technical approach to sustainable fraud prevention in AIS.

Keywords: Artificial Intelligence, Blockchain, Accounting Information Systems, Fraud Prevention, Systematic Literature Review

1. INTRODUCTION

The rapid development of digital technologies has brought significant transformations to Accounting Information Systems (AIS) practices. AIS no longer functions merely as a tool for recording financial transactions but plays a strategic role in providing accurate, relevant, and timely information to support managerial decision-making. However, the digitalization of accounting systems also increases the

complexity of business processes, potentially amplifying the risk of accounting fraud. Increasingly sophisticated and systematic forms of fraud are often difficult to detect through traditional internal control mechanisms (Lui, 2023; Supriadi, 2024).

Accounting fraud can have significant impacts, such as financial losses, reputational damage, and reduced stakeholder trust. This situation drives the need for a more proactive, adaptive, and technology-based approach to fraud prevention. In this context, Artificial Intelligence (AI) has been widely applied in accounting and auditing systems to detect fraudulent patterns through automated analysis of large datasets and to identify transaction anomalies in real time, achieving higher accuracy compared to conventional methods (Ikhsan et al., 2022; Sujana & Laela, 2025).

On the other hand, blockchain technology offers characteristics such as a transparent, secure, and immutable distributed ledger, which has the potential to preserve the integrity of accounting data and minimize manipulation of financial information (Zulhelmi et al., 2023). The application of blockchain in AIS is believed to enhance the reliability and transparency of financial reporting, thereby contributing to preventive fraud measures.

In recent years, studies have shown a tendency to integrate AI and blockchain as a more comprehensive solution for fraud prevention. This integration aims to combine AI's capability in detecting transaction patterns and anomalies with blockchain's strength in maintaining data security and integrity continuously (Lui, 2023; Tampubolon et al., 2025). However, systematic reviews evaluating the effectiveness of this technological integration in the context of fraud prevention within AIS based on empirical evidence remain limited.

Beyond technological aspects, previous research has also emphasized that the success of AI and blockchain implementation in AIS environments is influenced by organizational factors, such as IT infrastructure readiness, human resource competencies, and top management support (Sidabutar et al., 2025; Sujana & Laela, 2025). The limited research that systematically synthesizes the individual roles of AI and blockchain, their integration mechanisms, and the key factors influencing successful implementation indicates an important research gap that requires further investigation.

Based on the above discussion, this study aims to provide a systematic review of empirical findings regarding the effectiveness of AI and blockchain integration in fraud prevention within Accounting Information Systems. Specifically, this study formulates the following research questions: (1) How effective is the integration of AI and blockchain in fraud prevention within AIS based on empirical literature? (2) What are the individual roles of AI and blockchain in supporting fraud prevention? (3) What mechanisms are employed in the integration of these technologies, such as anomaly detection, data immutability, and smart contracts? (4) What factors influence the successful implementation of AI and blockchain integration in fraud prevention within

Accounting Information Systems?

2. METHODOLOGY

This study employs a Systematic Literature Review (SLR) approach to identify and synthesize empirical findings related to the effectiveness of Artificial Intelligence (AI) and blockchain integration in fraud prevention within Accounting Information Systems (AIS). This approach is adopted to provide a comprehensive and structured overview of the existing literature, as well as to identify prevailing research patterns and gaps based on rigorous scientific evidence.

The literature search was conducted systematically using reputable academic databases, namely Google Scholar, SINTA, Scopus, and Web of Science. The search strategy applied a combination of keywords including *"Artificial Intelligence"*, *"Blockchain"*, *"Accounting Information System"*, *"Fraud Prevention"*, and *"Fraud Detection"*, along with their equivalents in the Indonesian language. Boolean operators AND and OR were used to enhance the relevance and precision of the search results.

The retrieved articles were screened based on predefined inclusion and exclusion criteria. The inclusion criteria consisted of empirical journal articles employing quantitative, qualitative, or mixed-method approaches that examine the application of AI and/or blockchain in the context of AIS, auditing, or fraud prevention; published between 2020 and 2025; available in English or Indonesian; and indexed in the selected databases. Conversely, the exclusion criteria included non-empirical studies, conceptual papers, literature reviews, non-journal publications, articles without full-text access, and duplicate records.

The article selection process was conducted in several stages, beginning with the identification of records obtained from the initial search, followed by title and abstract screening, and subsequently full-text assessment to ensure topical relevance and methodological rigor. Articles that met all eligibility criteria were then analyzed using a narrative synthesis approach to identify patterns of findings, the individual roles of AI and blockchain, the fraud prevention mechanisms employed, and the factors influencing the successful implementation of these technologies.

3. FINDINGS AND DISCUSSION

Table 1. Article data extraction table

No	Author(s) & Year	Research Focus	Research Method	Research Findings / Conclusions
1	Saeed & Cek (2024)	Impact of AI and Blockchain on audit quality	Empirical survey, PLS-SEM	The integration of AI and Blockchain significantly improves audit quality through

				faster fraud detection, enhanced data accuracy, and increased transparency in financial systems.
2	Kumar & Yamuna (2025)	Blockchain- and AI-based fraud detection and prevention system	System development and simulation	The integration of AI and Blockchain is effective in detecting anomalous transactions in real time, reducing data manipulation risks, and enhancing AIS security.
3	Arham (2025)	Role of AI and Blockchain in accounting fraud detection	Quantitative empirical study	AI and Blockchain significantly enhances fraud detection effectiveness through machine learning techniques and complex transaction pattern analysis.
4	Taher & Ahmed (2024)	Blockchain, AI, and financial reporting reliability	Survey and SEM	Blockchain improves data integrity and immutability, while AI strengthens error and fraud detection in accounting systems.
5	Kermani et al., n.d. (2025)	Blockchain and internal control	Empirical study	Blockchain implementation strengthens internal controls and prevents fraud through transparency and immutable audit trails.
6	Suyono et al. (2025)	AI in Accounting Information Systems	Quantitative study	AI enhances fraud detection capabilities and accounting data processing efficiency; however, its effectiveness depends on data quality and human resource competence.
7	Mahmoud & Nour, n.d. (2024)	AI in AIS for fraud detection	Conceptual study and case study	AI plays a crucial role in anomaly detection and fraud prediction but is not optimal without integration with data security technologies such as Blockchain.
8	Ketha (2024)	AI and Blockchain integration in fraud prevention	Empirical study Quantitative-Qualitative	The integration of AI and Blockchain provides the highest effectiveness in fraud prevention compared to the use of individual technologies.

9	Supriadi (2024)	Digital auditing and fraud analytics	Auditor survey	The use of AI enhances fraud analytics, while Blockchain strengthens the reliability of audit evidence through immutable data.
10	Natali et al. (2025)	IT governance and fraud prevention	Empirical study	The success of AI and Blockchain integration is influenced by management support, IT infrastructure readiness, and supportive regulatory frameworks.

3.1 Effectiveness of Artificial Intelligence and Blockchain Integration in Fraud Prevention within Accounting Information Systems

Based on the synthesis of ten empirical studies, a relatively consistent pattern of findings indicates that the integration of Artificial Intelligence (AI) and Blockchain provides a higher level of effectiveness in fraud prevention compared to the isolated application of each technology. Studies that explicitly examine the integration of both technologies (Ketha, 2024; Kumar & Yamuna, 2025; Saeed & Cek, 2024) report significant improvements in fraud detection accuracy, accelerated identification of anomalous transactions, and strengthened integrity of accounting data.

Comparative analysis of research findings demonstrates that AI–Blockchain integration produces a fraud prevention system that is both detective and preventive in nature. AI enables dynamic identification of abnormal transaction patterns, while Blockchain ensures that recorded transaction data remain immutable and transparent. In contrast, studies focusing solely on AI (Arham, 2025; Suyono et al., 2025) or Blockchain (Kermani et al., n.d.) reveal partial effectiveness limited to the specific functions of each technology.

From a methodological perspective, research on AI–Blockchain integration is predominantly based on quantitative approaches, particularly empirical surveys employing Structural Equation Modeling (SEM/PLS-SEM) and simulation-based system testing. Although these studies report generally positive outcomes, most adopt cross-sectional designs, leaving the long-term effectiveness of integrated technologies in real-world Accounting Information System environments largely underexplored. This limitation constrains the generalizability of existing empirical findings.

3.2 Individual Roles of Artificial Intelligence and Blockchain in Fraud Prevention within Accounting Information Systems

The literature synthesis reveals a clear functional distinction between Artificial Intelligence and Blockchain in fraud prevention within Accounting Information Systems. Artificial Intelligence is consistently positioned as an active fraud detection tool, primarily through transaction pattern analysis, anomaly detection, and machine learning–based fraud analytics (Arham, 2025; Supriadi, 2024; Suyono et al., 2025).

However, comparative findings also reveal variations and inconsistencies in AI effectiveness across studies. While several studies report high detection accuracy, others emphasize that AI performance is highly dependent on data quality, algorithmic complexity, and the competence of human resources managing the system. This condition highlights AI's vulnerability to input data manipulation when not supported by robust data security mechanisms.

Conversely, Blockchain functions as a structural fraud prevention mechanism by enhancing data integrity, transaction transparency, and immutable audit trails (Kermani et al., n.d.; Taher & Ahmed, 2024). Empirical evidence indicates that Blockchain effectively strengthens internal controls and financial reporting reliability but is not inherently designed to actively detect fraud. Consequently, Blockchain's preventive capability becomes more effective when combined with analytical technologies such as Artificial Intelligence.

3.3 Fraud Prevention Mechanisms in the Integration of Artificial Intelligence and Blockchain

From a technical perspective, the synthesis of empirical findings identifies three dominant fraud prevention mechanisms employed within Accounting Information Systems. First, AI-based anomaly detection mechanisms utilize machine learning and fraud analytics to identify irregular transactions in real time (Arham, 2025; Kumar & Yamuna, 2025).

Second, Blockchain-based immutability and audit trail mechanisms ensure that transaction data cannot be altered after recording, thereby significantly reducing the risk of post-recording data manipulation (Kermani et al., n.d.; Taher & Ahmed, 2024). Third, the implementation of smart contracts and continuous auditing enables automation of internal controls and ongoing transaction monitoring, particularly in digital accounting environments (Ketha, 2024; Kumar & Yamuna, 2025).

Comparative analysis indicates that the integrated application of these mechanisms yields higher fraud prevention effectiveness than their isolated implementation. Nevertheless, the existing literature remains limited in evaluating these mechanisms from organizational governance, regulatory compliance, and auditing practice perspectives, thereby presenting opportunities for further research.

3.4 Factors Influencing the Success of Artificial Intelligence and Blockchain Integration

Cross-study synthesis indicates that the success of integrating Artificial Intelligence and Blockchain in fraud prevention is not solely determined by technological sophistication but is also shaped by organizational and contextual factors. The most frequently identified determinants include data quality and availability, the competence of accounting professionals and auditors, the readiness of information technology infrastructure, and management support alongside regulatory frameworks (Natali et al., 2025; Suyono et al., 2025).

Comparative findings reveal variations across organizational contexts, suggesting that the effectiveness of technological integration is highly contingent upon institutional readiness. Methodologically, studies within this theme predominantly employ empirical surveys and organizational-level analyses, with a notable limitation being the scarcity of longitudinal research examining the sustainability of fraud prevention systems beyond initial implementation stages.

Overall, the literature synthesis demonstrates that while the integration of Artificial Intelligence and Blockchain holds substantial potential for fraud prevention within Accounting Information Systems, empirical studies that simultaneously examine integration effects using longitudinal and context-specific designs in real organizational environments remain limited. These findings underscore the need to develop socio-technical fraud prevention frameworks that explicitly consider the interaction between technology, human actors, and governance structures as key determinants of system effectiveness. Accordingly, future research is encouraged to adopt longitudinal designs and cross-sectoral, cross-geographical empirical studies to achieve a more comprehensive understanding of the sustainability and practical implementation of AI–Blockchain integration in Accounting Information Systems.

4.   CONCLUSION

A systematic review of ten empirical studies shows that the integration of Artificial Intelligence (AI) and blockchain consistently provides higher effectiveness in fraud prevention within Accounting Information Systems than the implementation of each technology separately. AI plays a dominant role in the active detection of fraud through transaction pattern analysis, anomaly identification, and machine learning–based fraud analytics, while blockchain functions as a structural preventive mechanism that ensures the integrity, transparency, and immutability of accounting data. The combination of these two technologies results in a fraud prevention system that is both detective and preventive in nature, supported by key mechanisms such as anomaly detection, blockchain-based audit trails, and the implementation of smart contracts and continuous auditing.

The SLR findings also emphasize that the success of AI and blockchain integration is not determined solely by technological capabilities, but is strongly influenced by organizational and contextual factors, including data quality and availability, human resource competencies, information technology infrastructure readiness, management support, and supportive regulatory frameworks. Methodological limitations in most studies, which predominantly adopt cross-sectional designs, indicate that empirical evidence regarding the long-term sustainability of the effectiveness of this technological integration remains relatively limited.

Conceptually, this SLR contributes to the development of knowledge by presenting a structured synthesis of the individual roles of AI and blockchain, the mechanisms of their integration, and the key factors determining successful

implementation in the context of fraud prevention in Accounting Information Systems. These findings strengthen the understanding that effective fraud prevention requires the integration of analytical technologies and data security within a socio-technical framework that considers the interaction between technology, people, and governance. Accordingly, this study provides a theoretical and empirical foundation for the development of AI–blockchain integrated fraud prevention models and opens avenues for future research that is longitudinal and contextually oriented across sectors and geographical settings

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