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Blockchain for Secure and Transparent SAP Transactions in Financial Institutions in Indonesia

Loso Judijanto[1], Christine Riani Elisabeth[2]
[1]IPOSS Jakarta
[2]Universitas Logistik dan Bisnis Internasional

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ABSTRACT

The integration of blockchain technology into SAP transactions holds significant potential to enhance security and transparency within financial institutions in Indonesia. This study employs a qualitative approach, using interviews with six key informants, to explore the challenges, benefits, and practical implications of this technological innovation. Findings reveal that blockchain's decentralized, immutable, and encrypted architecture addresses critical security concerns, while its transparent ledger fosters accountability and trust among stakeholders. However, challenges such as high implementation costs, technological complexity, and regulatory uncertainty pose significant barriers to adoption. Practical recommendations include phased deployment, collaborative partnerships, and proactive regulatory engagement. This research underscores blockchain's transformative potential for Indonesia's financial sector, offering a pathway to robust, secure, and transparent financial operations.

Corresponding Author:

Name: Loso Judijanto
Institution: IPOSS Jakarta
Email: losojudijantobumn@gmail.com

1. INTRODUCTION

The rapid advancement of digital technologies, particularly integrated ERP systems like SAP, has significantly transformed the operational frameworks of financial institutions in emerging economies such as Indonesia. These systems enhance efficiency in managing financial transactions by integrating advanced tools like AI and machine learning, which improve forecasting accuracy and risk assessment capabilities [1]. SAP Analytics Cloud (SAC) planning has revolutionized financial services by improving risk management, financial forecasting, and regulatory compliance, while AI and machine learning integration in SAC systems further enhance operational efficiency and customer satisfaction [1]. Digital innovations, including AI and blockchain, streamline compliance processes and enable proactive risk management [2]. However, cybersecurity threats and regulatory compliance issues pose significant challenges in the digital transformation of financial institutions [3]. Additionally, high costs, limited infrastructure, and resistance to change hinder the implementation of digital tools in emerging markets [2], while data standardization and technical investment remain critical challenges in the intelligent

transformation of enterprise financial management [4]. In addressing these challenges, emerging technologies play a crucial role; blockchain technology offers secure and transparent financial transactions, fostering trust and reducing costs [3], while fintech innovations, such as mobile payments and peer-to-peer lending, empower SMEs and enhance financial inclusion in emerging markets [5]. Furthermore, AI tools like predictive analytics and chatbots contribute to improved operational efficiency and customer experience [5].

Blockchain technology offers a promising solution to enhance the security, efficiency, and transparency of SAP transactions within Indonesian financial institutions. Its decentralized and immutable nature can address operational inefficiencies, fraud risks, and regulatory challenges, which are prevalent in the financial sector. By leveraging blockchain, Indonesian financial institutions can improve transaction integrity and stakeholder trust, thereby strengthening the sector's resilience. Blockchain's decentralized ledger ensures that transaction records are immutable and transparent, significantly reducing the risk of fraud and data manipulation [6], [7]. The use of strong cryptographic techniques in blockchain makes it difficult for cybercriminals to alter transaction data, thereby enhancing the overall security of financial operations [6]. Additionally, blockchain can streamline financial operations by eliminating intermediaries, thus reducing transaction times and costs. This is particularly beneficial for cross-border payments, where blockchain can cut down processing times from days to minutes [8]. Smart contracts automate transaction processes, reducing the need for manual intervention and minimizing operational inefficiencies [7], [8]. Furthermore, blockchain enhances compliance with regulations such as Know Your Customer (KYC) and Anti-Money Laundering (AML) by providing real-time monitoring and immutable records [9]. It also mitigates risks associated with central system failures, offering a more resilient financial infrastructure [9].

This study aims to investigate the potential application of blockchain technology in securing and enhancing transparency in SAP-based financial transactions in Indonesian financial institutions. Utilizing a qualitative approach, the research seeks to capture the perspectives of industry professionals on the benefits, challenges, and practical implications of integrating blockchain into existing SAP systems.

2. LITERATURE REVIEW

2.1 Blockchain Technology

Blockchain technology, introduced by Nakamoto in 2008, has expanded beyond Bitcoin to revolutionize various industries, particularly finance. Its principles of distributed consensus, cryptographic security, and smart contracts enhance transaction security and transparency. Blockchain’s decentralized nature minimizes fraud, unauthorized access, and data breaches, fostering trust in financial systems [10]. By eliminating intermediaries, it reduces costs and accelerates transactions, especially in cross-border payments and asset management [10], [11]. Smart contracts automate processes, improving efficiency [12]. Additionally, blockchain aids regulatory compliance through real-time data analysis and predictive modeling, supporting identity verification and fraud prevention [13]. However, challenges like scalability, data privacy, and energy consumption remain [10]. Collaboration among financial institutions, regulators, and blockchain innovators is crucial for overcoming these obstacles and ensuring a sustainable digital financial ecosystem [10].

2.2 SAP Systems in Financial Institutions

The integration of blockchain technology with SAP systems offers a promising solution to enhance security and mitigate risks such as fraud, unauthorized access, and data corruption in financial institutions. Blockchain's decentralized and immutable nature provides a robust

framework for securing financial data, ensuring transparency, and enhancing trust in financial transactions. This integration can be further optimized by leveraging AI and machine learning technologies, which already enhance SAP-driven financial operations through real-time fraud detection and risk management [14], [15]. Blockchain's decentralized ledger ensures that all transactions are transparently recorded and cannot be altered, reducing the risk of data corruption and fraud, while smart contracts automate and enforce compliance with financial regulations, minimizing unauthorized access and ensuring data integrity [16]. AI and ML integration with SAP systems further enhances fraud detection and risk management by analyzing patterns and anomalies in financial data [14], [15]. These technologies also automate routine tasks and provide predictive analytics, improving decision-making and operational efficiency within SAP environments [17], [18]. However, implementing blockchain with SAP requires addressing challenges such as data quality assurance, model interpretability, and regulatory compliance [15]. A robust IT infrastructure and interdisciplinary collaboration are essential for successful integration and seamless operation [15].

2.3 Conceptual Framework

The study borrows from the theoretical foundations of blockchain technology and SAP systems, examining their integration to address security and transparency challenges in financial transactions. The conceptual framework is interested in the relationship between blockchain features (e.g., decentralization, immutability) and SAP features (e.g., data integration, financial reporting) to enhance operational efficiency and stakeholder trust.

3. METHODS

3.1 Research Design

This study adopts a qualitative study design in examining the opinions of industry experts on using blockchain for secure and transparent SAP transactions. Qualitative approaches are most appropriate for understanding complex phenomena and acquiring in-depth details about the challenges and opportunities surrounding the adoption of blockchain.

3.2 Selection of Informants

Six major informants with experience and expertise in blockchain technology, SAP systems, and financial transactions were chosen via purposive sampling. The informants were chosen on three main criteria: profession, as they were either IT professionals, blockchain developers, financial analysts, or financial institution managers; experience, as they had a minimum of three years of experience working in their particular fields; and relevance, that is, taking part directly in blockchain and SAP implementation-related operations or projects. To ensure diversity and balance of opinion, the selected informants were drawn from technology companies, financial institutions, and academic specialists.

3.3 Data Collection Methods

Data were collected through semi-structured interviews conducted face-to-face and remotely, and covering key areas such as knowledge of blockchain and SAP systems, self-reported benefits of using blockchain, challenges and obstacles to integration, and pragmatic considerations and recommendations for adoption. Every interview took around 45–60 minutes and was audio-recorded after obtaining informants' consent. Other data were collected from related documents, reports, and policy guidelines to give contextual backup.

3.4 Data Analysis

Data gathered were analyzed with the help of NVIVO software, which is a tool for qualitative data analysis that supports thematic coding and categorization. Analysis was done through transcription, where audio recordings of the interviews were transcribed verbatim to ensure accuracy; coding, where important themes and patterns were created through open coding and grouped into categories such as security, transparency, challenges, and implementation strategies; thematic analysis, where themes were narrowed down to explain relationships,

insights, and implications; and triangulation, where interview, document, and report data were cross-checked to ensure validity and reliability.

4. RESULTS AND DISCUSSION

4.1 Enhanced Security in SAP Transactions

All the informants emphasized that blockchain technology significantly enhances the security of SAP transactions and cited a number of indispensable benefits. Decentralized storage avoids a single point of failure and provides it with extra difficulty to be hacked by cybercriminals and steal data. Immutability of blockchain avoids any tampering with transactions and maintains data integrity. Additionally, high-level encryption standards provide for stringent protection against unauthorized users and add to the security of financial transactions.

One informant testified that:

"Blockchain's decentralized structure is such that even if a node is compromised, the system is not compromised, which makes it very suited to monetary transactions."

4.2 Greater Transparency and Accountability

Transparency was a top benefit. Informants noted that blockchain's ledger system provides access to all stakeholders in real-time information regarding transactions. Transparency reduces the likelihood of fraud and increases the level of trust between stakeholders.

One financial analyst added:

"SAP integration with blockchain creates a culture of accountability. Every transaction can be traced and verified, critical for compliance and trust."

4.3 Blockchain Integration Challenges

As much as it has advantages, there are several challenges in implementing blockchain on SAP systems, such as expensive implementation, where the initial investment is high; technological complexity, since the integration involves merging two sophisticated systems, which requires specialized skills and equipment; and regulatory uncertainty, where Indonesia's regulatory framework for blockchain is still emerging and presents challenges to financial institutions in obtaining compliance and sustainability.

According to one IT specialist:

"The technology is promising, but financial institutions need clarity on regulations and access to skilled personnel to manage the integration process effectively."

4.4 Practical Implications for Financial Institutions

Informants cited real-world application of blockchain in SAP transactions such as incremental rollout by starting with pilot programs to test feasibility and shake out processes, collaboration with blockchain technology vendors to address knowledge and resource shortages, and regulation compliance by collaborating with regulators to ensure blockchain implementations align with legal specifications.

DISCUSSION

The findings confirm the literature on how blockchain reduces security risks [9], [19]. Indonesian financial institutions can neutralize threats such as data breaches and fraud through the integration of blockchain and SAP. Blockchain's decentralized and encrypted properties address these issues head-on, increasing financial transaction reliability.

Transparency is rooted in blockchain technology, as articulated by [20], [21] This study justifies these facts, illustrating blockchain's immutable bookkeeping to augment transparency and responsibility in SAP dealings. In Indonesia's financial entities, where the importance of conformity and trust pervades, similar transparency can become a driving factor for stakeholder trust and adherence to regulation.

Although the potential benefits are enormous, the challenges raised mirror wider concerns in blockchain uptake [19], [22]. High costs of implementation and technical complexity necessitate strategic planning. Financial institutions will need to pursue phased implementations, using partnerships and pilot testing to reduce risks. Regulatory uncertainty, too, must be addressed by proactive engagement with policymakers.

Implications for Indonesia's Financial Sector

Blockchain integration into SAP systems has the revolutionary power to change Indonesian financial institutions. Blockchain can make the sector more resilient and competitive through improved security and transparency in an accelerating digitizing economy. Achievement, however, depends on resolving integration challenges and creating an innovation-supporting ecosystem.

5. CONCLUSION

This study provides a comprehensive breakdown of blockchain integration with SAP transactions in Indonesian financial institutions. Blockchain is identified in the study as having the capability to address some of the most critical issues in financial transactions, including enhancing security using decentralized and encrypted systems and transparency using immutable ledgers. These advantages align with the needs of the industry for increased accountability, compliance, and stakeholder trust.

However, the study also identifies significant barriers such as cost, advanced technological requirements, and a dynamic regulatory landscape. These challenges require careful phased deployment, supported by technology vendor arrangements and consensus with policymakers to align innovations with legal and commercial imperatives.

Finally, blockchain technology represents a viable alternative to safe and transparent SAP transactions, but there is potential for successful use only if certain challenges are overcome. This research offers insightful contributions to guide the use of blockchain by financial institutions for operational agility and resilience in Indonesia's vibrant financial environment.

REFERENCES

[1] T. R. Pambala, "The role of SAC planning in financial services: Risk management and strategic financial planning," *Int. J. Sci. Res. Arch.*, vol. 14, no. 1, pp. 961–966, 2025.

[2] A. A. Alex-Omiogbemi, A. K. Sule, B. M. Omowole, and S. J. Owoade, "Conceptual framework for advancing regulatory compliance and risk management in emerging markets through digital innovation," 2024.

[3] M. S. K. Munira, "Digital Transformation in Banking: A Systematic Review Of Trends, Technologies, And Challenges," *Technol. CHALLENGES (January 27, 2025)*, 2025.

[4] M. Atiquzzaman, N. Yen, and Z. Xu, *2021 International Conference on Big Data Analytics for Cyber-Physical System in Smart City: Volume 2*, vol. 103. Springer Nature, 2022.

[5] H. E. Omokhoa, C. S. Odionu, C. Azubuike, and A. K. Sule, "Digital transformation in financial services: Integrating AI, fintech, and innovative solutions for SME growth and financial inclusion," *Gulf J. Adv. Bus. Res.*, vol. 2, no. 6, pp. 423–434, 2024.

[6] M. R. Maulana, "Bitcoin dan Konsep Uang Digital: Tinjauan Historis dan Teoritis," *Waralaba J. Econ. Bus.*, vol. 1, no. 2, 2024.

[7] N. Aisah, S. Z. J. Putri, and M. R. Hafizi, "Blockchain Technology Innovation As An Optimization Of Transaction Security In Islamic Financial Institutions," *J. Cent. Bank. Law Institutions*, vol. 4, no. 1, pp. 23–48, 2025.

[8] A. K. Sule, N. L. Eyo-Udo, E. C. Onukwulu, M. O. Agho, and C. Azubuike, "Implementing blockchain for secure and efficient cross-border payment systems," *Int. J. Res. Innov. Appl. Sci.*, vol. 9, no. 12, pp. 508–535, 2024.

[9] G. YOGANANDHAM, "REVOLUTIONIZING BANKING WITH REFERENCE TO EMBRACING DIGITAL INNOVATION, ARTIFICIAL INTELLIGENCE, BLOCKCHAIN, AND SUSTAINABILITY-A COMPREHENSIVE THEORETICAL ASSESSMENT," 2024.

[10] P. Bani, "Blockchain dan Asuransi Mikro: Kajian Literatur tentang Peluang dan Tantangan Inovasi," *Prem. Insur. Bus. J.*, vol. 11, no. 2, pp. 1–12, 2024.

[11] S. R. Chittoju and S. F. Ansari, "Blockchain's Evolution in Financial Services: Enhancing Security, Transparency, and Operational Efficiency," *Int. J. Adv. Res. Comput. Commun. Eng.*, vol. 13, no. 12, pp. 1–5, 2024.

[12] N. Kaur and N. Kshetri, "Blockchain Technology: Aiding Transformation in the Healthcare and Medical Industry," in *Blockchain Technology for Cyber Defense, Cybersecurity, and Countermeasures*, CRC Press, 2025, pp. 34–54.

[13] T. K. Vashishth, V. Sharma, V. Kaushik, and K. K. Sharma, "Blockchain-Driven Innovations in the Banking and Financial Sectors: Harnessing the Power of Automated Machine Learning," in *Utilizing AI and Machine Learning in Financial Analysis*, IGI Global Scientific Publishing, 2025, pp. 555–578.

[14] R. BHATIA, "Exploring the Fusion of SAP S/4HANA and Machine Learning for Intelligent Financial Operations," *J. Next-Generation Res. 5.0*, 2025.

[15] S. S. Parimi, "Automated Risk Assessment in SAP Financial Modules through Machine Learning," *Available SSRN 4934897*, 2019.

[16] L. E. L. Barna and B. Ștefan Ionescu, "ERP Systems: A Solution for Sustainable Business Development," in *BASIQ*

International Conference, 2021, pp. 618–624.

[17] A. Vaid and C. Sharma, "Leveraging SAP and artificial intelligence for optimized enterprise resource planning: Enhancing efficiency, automation, and decision-making," *DOI https//doi. org/10.30574/wjarr*, vol. 3, 2022.

[18] C. Sharma and A. Vaid, "Converging SAP, AI, and data analytic for transformative business management," *World J. Adv. Res. Rev*, vol. 14, no. 3, pp. 736–761, 2022.

[19] D. Gupta, L. Elluri, A. Jain, S. S. Moni, and O. Aslan, "Blockchain-Enhanced Framework for Secure Third-Party Vendor Risk Management and Vigilant Security Controls," in *2024 IEEE International Conference on Big Data (BigData)*, IEEE, 2024, pp. 5577–5584.

[20] J. P. NUGRAHA, "PROSPEK PEMANFAATAN TEKNOLOGI BLOCKCHAIN UNTUK MENGOPTIMALKAN KEAMANAN DOKUMEN PERTANAHAN ELEKTRONIK." Sekolah Tinggi Pertanahan NAsional, 2024.

[21] N. Linawati and S. Aisjah, "The Role of Peer to Peer Lending in Increasing Funding for MSMEs." Petra Christian University, 2019.

[22] A. S. Kriswandaru, B. Pratiwi, J. Laksito, W. Ariani, and S. Sholikatun, "Analisis Yuridis terhadap Penggunaan Teknologi Blockchain dalam Pengamanan Data Pribadi: Studi Kasus di Indonesia," *Perkara J. Ilmu Huk. dan Polit.*, vol. 2, no. 4, pp. 531–540, 2024.