The role of Financial Technology by Indonesian Digital Banks

Maya Macia Sari[1*], Noni Ardian[2]
[1,2]*Department of Management, Faculty of Social Sciences, Universitas Pembangunan Panca Budi; Medan, Indonesia*

*Corresponding Author E-Mail: mayamacia@dosen.pancabudi.ac.id

ABSTRACT

One of the key pillars supporting the operations of digital banks is cloud computing technology, which enables flexible management of data and applications through the internet. Cloud computing has become an ideal solution for digital banks because it offers efficiency in managing information technology infrastructure. This study aims to examine the use of cloud computing technology by digital banks in Indonesia. A qualitative approach with a case study method was employed to analyze how cloud computing is utilized by Indonesian digital banks. The findings of this study indicate that cloud computing technology has a significantly positive impact on the operations of digital banks in Indonesia. A total of 75% of digital banks reported a reduction in operational costs of up to 30% after adopting cloud computing, while 60% noted improvements in data access speed due to the flexibility of the infrastructure. Service scalability is also a major advantage, with 55% of banks able to increase capacity without making substantial investments in additional infrastructure. Furthermore, the integration of cloud technology with big data and artificial intelligence allows 70% of banks to enhance service personalization, such as more accurate product recommendations and improved fraud detection. However, this study also identifies several key challenges, including data security concerns experienced by 40% of digital banks, as well as compliance with local regulations, which remains an obstacle for 50% of banks.

Keywords*: Banks, Cloud Computing, Digital Finance, Financial Technology, Indonesia.*

Submitted:
December 8, 2025

Revised:
February 2, 2026

Accepted:
March 28, 2026

Published Online:
March 31, 2026

INTRODUCTION

In today's digital era, the development of information and communication technology has significantly transformed various sectors, including banking. Digital banks have emerged to meet society's need for fast, efficient, and easily accessible services anytime and anywhere (Sudirdja, 2021). A key enabler of their operations is cloud computing, which allows flexible management of data and applications via the internet. Cloud services help reduce hardware costs, increase storage capacity, and accelerate service innovation (Nutalapati, 2024). This is particularly important in Indonesia, where competition among digital banks continues to grow alongside rising demand for technology-based banking solutions (Vera & Rayyan, 2024).

The use of cloud computing is also in line with the digital transformation initiatives promoted by the Indonesian government. Through various programs, such as the National Non-Cash Movement (*Gerakan Nasional Non-Tunai*/GNNT) and efforts to accelerate financial inclusion, the government encourages the adoption of technology in the banking sector to reach unbanked and underbanked populations. Cloud technology enables digital banks to offer innovative solutions that can be widely accessed, including in remote areas (Megawati et al., 2023).

On the other hand, the adoption of cloud computing by digital banks also presents certain challenges, particularly related to data security and regulatory compliance. Customer data managed by banks is highly sensitive and therefore requires strong security measures. The Financial Services Authority (*Otoritas Jasa Keuangan*/OJK), as the

JIMKES

Jurnal Ilmiah Manajemen Kesatuan
Vol. 14 No. 2, 2026
pp. 2275-2284
IBI Kesatuan
ISSN 2337 – 7860
E-ISSN 2721 – 169X
DOI: 10.37641/jimkes.v14i2.4728

regulatory body, imposes strict rules on banking data storage, including restrictions on storing data abroad. This creates a need for cloud service providers to meet security standards that comply with local regulations. In addition, the use of cloud computing opens opportunities for digital banks to develop services based on big data and Artificial Intelligence (AI) (Alqahtani et al., 2024). These technologies enable banks to conduct real-time customer data analysis to create more personalized and efficient user experiences. By leveraging the cloud, digital banks can integrate various systems to deliver services such as product recommendations, credit risk analysis, and automated fraud prevention (Togatorop et al., 2024).

Nevertheless, the adoption rate of cloud computing technology in Indonesia still faces several obstacles. Some digital banks, especially those still in the development stage, are constrained by the high costs associated with migrating systems to cloud platforms. Moreover, the lack of experts in cloud computing within Indonesia remains a significant barrier to its optimal utilization (Linggadjaya et al., 2022). Another challenge is public trust in the security of cloud-based services. Despite major cloud service providers adopting advanced security protocols, public concerns regarding potential data breaches persist. This issue must be addressed by digital banks to ensure their services gain widespread acceptance.

In the context of global competition, the adoption of cloud computing also provides opportunities for Indonesian digital banks to enhance their competitiveness. By utilizing robust infrastructure, digital banks can expand their market reach, including attracting customers from the millennial and Generation Z segments who tend to prefer technology-based services. Beyond technical benefits, cloud computing adoption also positively contributes to the operational sustainability of digital banks. By using cloud-based services, banks can reduce energy consumption and carbon emissions generated by traditional data centers, aligning with global trends that encourage the banking sector to support sustainability initiatives (Alfarizi et al., 2023).

However, implementing cloud computing requires a paradigm shift in bank operational management. The use of this technology is not only related to technical aspects but also involves organizational strategies, human resource training, and proper risk management. Therefore, digital banks need to adopt a holistic approach to ensure that cloud technology can deliver optimal benefits (Aulianisa, 2020; Sudarwanto & Kharisma, 2022).

In recent years, several digital banks in Indonesia have begun utilizing cloud computing as part of their digital transformation strategies. Nonetheless, further research is needed to understand how this technology can be applied optimally, especially in addressing challenges related to regulation, security, and resource management. Therefore, this study aims to examine the use of cloud computing technology by digital banks in Indonesia. The primary focus of this research is to analyze the benefits, challenges, and strategies that can be implemented to support the effective adoption of cloud computing in the digital banking industry. It is expected that this study will provide relevant recommendations for digital banks and related stakeholders to optimize the use of cloud technology.

LITERATURE REVIEW

Cloud Computing, Digital Banking Operations, and Technology in Financial Services

Cloud computing refers to the delivery of computing resources, including storage, processing power, and software, through the internet on a pay-as-you-go basis. In the financial sector, cloud technology is used to support core banking functions, digital transactions, data processing, and real-time analytics. The theoretical foundation for cloud adoption in financial institutions is rooted in the concept of IT resource virtualization, which enables organizations to increase flexibility while reducing dependency on physical infrastructure. Previous research by Marston et al. (2011) highlights that cloud computing provides competitive advantages through operational efficiency and service scalability. In the context of digital banking, cloud computing

facilitates fast deployment of digital services, high system availability, and continuous innovation.

Digital banking relies on technology-driven operations that emphasize automation, real-time service delivery, and data-centric decision-making. The adoption of new technologies, such as cloud computing, can be explained through the Technology–Organization–Environment (TOE) Framework, which emphasizes that technological readiness, organizational capabilities, and external pressures influence adoption decisions. Financial institutions are more likely to adopt technological innovations when the benefits outweigh organizational risks and when there is strong environmental support, including regulatory guidance (Zahra et al., 2023; Santorry, 2024; Riandi et al., 2024). In Indonesia, digital banks increasingly adopt cloud computing due to the rising demand for online services and the need for operational agility.

Scalable and Efficient IT Security Infrastructure

A key theoretical advantage of cloud computing is its ability to provide efficient and scalable IT infrastructure. Efficiency is achieved through optimized resource allocation and reduced maintenance costs, while scalability allows institutions to increase capacity according to demand without large capital expenditures. According to Armbrust et al. (2010), scalability is considered one of the most critical benefits, especially for businesses that experience fluctuating service loads, such as digital banks. Previous studies, such as Hussin et al. (2019) on cloud adoption in Asian financial institutions, show that banks adopting cloud solutions report significant improvements in system performance, faster deployment cycles, and reduced operational bottlenecks.

Despite its benefits, cloud computing presents security risks involving data breaches, cyber-attacks, and compliance with data protection regulations. The Information Security Theory highlights three key dimensions, namely Confidentiality, Integrity, and Availability (CIA Triad), as core parameters for evaluating security performance in digital systems. Studies by Subashini and Kavitha (2011) emphasize that security concerns remain the primary barrier to cloud adoption in sectors handling sensitive data, such as banking. Research in Indonesia by Suhardi et al. (2025) similarly reveals that digital banks face regulatory challenges related to data localization and compliance with the OJK, which influences how cloud services are implemented and monitored.

Big Data, AI Integration, and Regulatory Compliance

The development of big data has significantly transformed financial services, particularly in the banking industry, by enabling institutions to analyze large volumes of data to better understand customer behavior, market dynamics, and potential risks. Big Data Analytics (BDA) is widely recognized as a strategic tool for extracting valuable insights from complex datasets, allowing organizations to identify new market opportunities while improving customer retention (Zakir et al., 2015). In the banking sector, the use of big data has also been shown to enhance organizational performance, particularly in supporting more effective decision-making and risk management processes (Srivastava & Gopalkrishnan, 2015; Choi & Lambert, 2017). The implementation of big data analytics is further supported by cloud computing, which enables large-scale data storage and high-speed processing. From the Resource-Based View (RBV) perspective, digital data and analytical capabilities represent strategic resources that can create competitive advantage. Empirical research indicates that integrating cloud infrastructure with artificial intelligence can enhance financial service innovation and operational resilience (Gai et al., 2018).

The banking sector operates under strict regulations related to risk management, consumer protection, and data governance. Cloud adoption must align with national and international regulatory frameworks, including data sovereignty laws and cybersecurity regulations. The institutional theory argues that regulatory pressures shape organizational technology decisions (Currie, 2011). In Indonesia, compliance with OJK Regulation Number 38/POJK.03/2016 and data protection requirements influences how digital

banks structure their cloud infrastructure. Financial institutions adopting cloud services indicate that regulatory clarity and collaboration between banks and regulatory bodies are crucial factors for successful cloud adoption.

RESEARCH METHODS

This study employs a qualitative research design with a case study approach to examine the implementation of cloud computing technology in digital banks in Indonesia. The case study method enables in-depth exploration of how banks adopt, manage, and benefit from cloud computing, while addressing associated challenges, providing rich insights into practical applications in the banking sector. The focus is on several leading digital banks that have integrated cloud computing with advanced technologies such as artificial intelligence and big data analytics to improve operational efficiency, service personalization, and sustainability.

Data collection was conducted using multiple techniques to ensure the credibility and triangulation of findings. First, direct observations were carried out to examine the implementation of cloud computing, including infrastructure deployment, integration with AI systems, and operational workflows. Second, semi-structured interviews were conducted with key personnel involved in cloud management, IT operations, and compliance functions to gather insights on the benefits, challenges, and decision-making processes associated with cloud adoption. Third, document analysis was performed on internal bank reports, regulatory guidelines, and policies issued by the Financial Services Authority to understand compliance requirements, security standards, and strategic considerations in adopting cloud solutions. This multi-source data collection enabled a comprehensive understanding of both technical and managerial aspects of cloud computing adoption.

Data analysis was performed using thematic analysis, in which the collected information was systematically coded and categorized into relevant themes, including operational benefits, cost efficiency, service scalability, data security, regulatory compliance, customer trust, and sustainability outcomes. The analysis focused on identifying patterns and relationships between cloud computing adoption and its impact on service personalization, storage capacity, and carbon emission reductions, as reflected in the results. By combining observation, interviews, and document review, this study provides a holistic view of how cloud computing supports the digital transformation of Indonesian banks and offers practical recommendations for overcoming implementation challenges and optimizing technological benefits (Sugiyono, 2018).

RESULTS

Benefits and Challenges of Cloud Computing Implementation

The study found that the majority of digital banks in Indonesia have adopted cloud computing technology, with most banks reporting cost savings and improved operational efficiency. However, the biggest challenges faced have to do with data security issues, regulatory compliance, and system migration costs.

Table 1. Benefits and Challenges Faced by Digital Banks after Adopting Cloud Computing

Aspects	Percentage of Banks Experiencing	Description
Reduced Operating Costs	75%	The bank experienced savings of up to 30% in IT infrastructure management.
Data Security	40%	Data security is a major challenge, with the risk of leaks or cyberattacks.
Regulatory Compliance	50%	Challenges related to regulatory uncertainty that need to be adjusted to OJK policies.
Service Scalability	60%	Cloud computing allows banks to quickly expand capacity without large investments.
Customer Trust	45%	Some banks have recorded customer concerns about data storage in the cloud.

Table 1 above shows that the majority of digital banks experience significant benefits from the use of cloud computing, especially in terms of reduced operational costs. As many as 75% of banks report that they can save up to 30% on managing their IT infrastructure, which is one of the main advantages of cloud computing. However, considerable challenges were also found, especially related to data security issues. As many as 40% of digital banks report that data security is one of the main challenges, as highly sensitive customer data needs to be protected from potential leaks or cyberattacks. In addition, 50% of digital banks identify regulatory compliance as an important issue, as they must ensure that their systems comply with the policies set by the OJK. Service scalability is one of the advantages of cloud computing, with 60% of banks reporting that they can quickly scale up service capacity without the need to make large investments in additional infrastructure. Nonetheless, there are also concerns regarding customer trust, with 45% of banks recording this issue. Some customers are worried about storing their data in the cloud, which is a sensitive issue in the adoption of this technology in the digital banking sector. While cloud computing offers a wide range of benefits for digital banks, security and regulatory challenges still need to be addressed in order for these technologies to be optimally deployed (Marston et al., 2011).

Table 2. Benefits of Scalability and Data Storage in Digital Banks Using Cloud Computing

Aspects	Percentage of Banks Experiencing	Description
Increased Storage Capacity	65%	The ability to store more data without high investment costs.
Increased Data Access Speed	60%	Faster data access thanks to flexible cloud infrastructure.
Service Scalability	55%	Ease of increasing service capacity as needed.
Storage Cost Efficiency	70%	Cost savings related to managing physical servers and data centers.

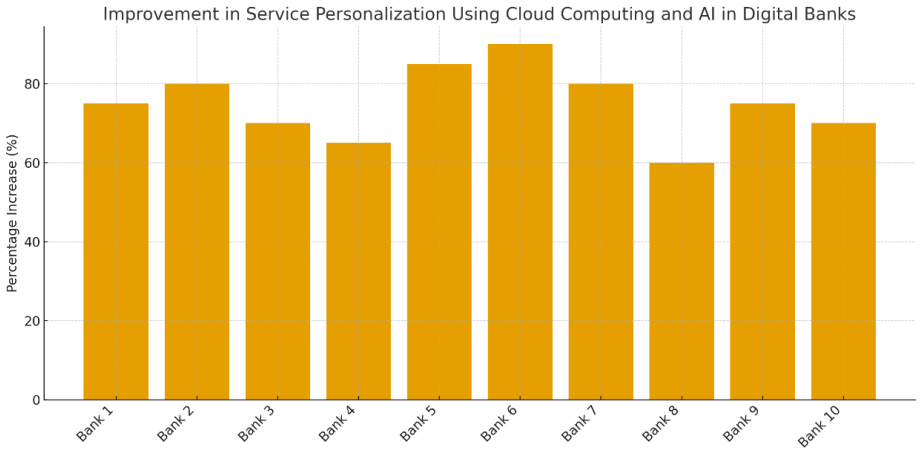
Source: Results of Research Analysis on Digital Banks in Indonesia, 2025.

Table 2 above illustrates how the use of cloud computing increases storage capacity and operational efficiency in digital banks. As many as 65% of digital banks report that they are able to store more data without the need to invest heavily in physical infrastructure. In addition, 60% of banks revealed that the speed of data access increased thanks to the use of the cloud, which allowed them to respond more quickly to customer needs. Service scalability is also an advantage, with 55% of banks admitting that the cloud provides the flexibility to add service capacity to the demand of a dynamic market. The cost savings in managing data storage are also felt by 70% of banks that switch to the cloud. It should be noted that the use of cloud computing technology integrated with Artificial Intelligence (AI) has a significant impact on the personalization of services in digital banks (Gai et al., 2018). With the ability of the cloud to process customer data in real-time, digital banks can offer products and services that better suit individual needs and preferences.

The Impact of Implementing Cloud Computing

The adoption of cloud computing in digital banking has emerged as a key driver for both operational efficiency and customer-centric service innovation. By integrating cloud platforms with advanced technologies such as artificial intelligence and big data analytics, digital banks are able to process large volumes of information in real time, enabling more personalized services, accurate risk assessments, and targeted product recommendations. This technological shift not only enhances customer experience and satisfaction but also supports strategic decisions related to regulatory compliance and data management (Famoti et al., 2025). Moreover, cloud computing contributes to sustainability by reducing energy consumption and carbon emissions, demonstrating its dual impact on efficiency and environmental responsibility. The following figures and tables illustrate

how cloud computing adoption influences service personalization, provider selection, and carbon emission reduction in Indonesian digital banks.



Source: Results of Research Analysis on Digital Banks in Indonesia, 2025.
Figure 1. Improved Service Personalization Using Cloud Computing and AI in Digital Banks

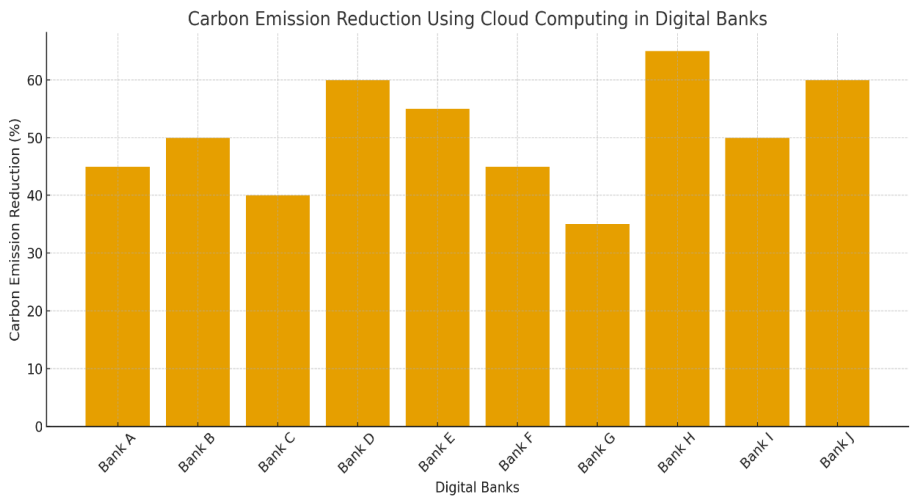
The graph in Figure 1 shows that the use of cloud computing integrated with AI and big data technology has a positive impact on the personalization of digital bank services. As many as 70% of digital banks that use a combination of cloud computing and AI report improvements in personalization of services, such as more relevant product recommendations and more accurate credit risk analysis. This indicates that the cloud's ability to process data in real-time allows banks to provide experiences that are more tailored to customer needs and preferences, increasing customer loyalty and satisfaction (Togatorop et al., 2024). The selection of cloud service providers is also based on location and regulations, as shown in Table 3.

Table 3. Selection of Cloud Service Providers by Location and Regulation

Cloud Service Providers	Percentage of Banks that Choose	Description
Global Cloud Providers	50%	Use a global provider despite regulatory risks.
On-premises Cloud Providers	30%	Prefer local providers to meet regulations and security.
Hybrid Cloud Providers	20%	Using a combination of local and global cloud providers.

Source: Results of Research Analysis on Digital Banks in Indonesia, 2025.

Table 3 above illustrates digital banks' preferences in choosing cloud service providers based on location and regulatory compliance. As many as 50% of banks choose global cloud providers despite regulatory challenges, especially related to the OJK policy that requires banking data to be stored domestically. On the other hand, 30% of banks choose local cloud providers that are considered more secure and more adaptable to Indonesian regulations. Meanwhile, 20% of digital banks choose hybrid cloud providers that combine the advantages of global and local providers, providing flexibility in managing data and services. The use of cloud computing is not only beneficial in terms of operational efficiency but also has a positive impact on sustainability (Al-Sharafi et al., 2023). One of the important benefits of cloud computing is the reduction in energy consumption and carbon emissions, which contributes to the efforts to reduce the carbon footprint of digital banks. The following graph illustrates the carbon emission reductions achieved by various digital banks adopting cloud computing.



Source: Results of Research Analysis on Digital Banks in Indonesia

Figure 2. Carbon Emission Reduction by Using Cloud Computing in Digital Banks

The graph in Figure 2 shows that the use of cloud computing has a positive impact on the sustainability of digital bank operations. As many as 45% of digital banks that use cloud services reveal that they have managed to reduce their carbon emissions, thanks to the reduction in energy consumption from physical data centers. This reflects a global trend that is increasingly pushing the industry to support sustainability initiatives and reduce environmental impact, in line with the adoption of more efficient and environmentally friendly technologies. The results show that the use of cloud computing provides significant benefits for digital banks in Indonesia, both in terms of cost efficiency, scalability, and service innovation (Al Farishi & Tjun, 2025). However, the biggest challenges faced are related to data security and regulatory compliance, which are still the main obstacles to the optimal application of this technology. Digital banks need to develop stricter policies related to security and involve cloud providers that are able to meet Indonesian regulatory standards to ensure the successful implementation of cloud computing.

DISCUSSION

Cloud computing has become a key driver in the operational transformation of digital banks in Indonesia, enabling them to meet customer demands for fast, efficient, and accessible services without large capital investments in traditional IT infrastructure (Sari et al., 2020). Its flexibility allows banks to manage and access data online, supporting responsive, technology-based services (Bejju, 2014). Adoption of cloud computing reduces operational costs by eliminating the need for physical data centers, with some banks reporting savings of up to 30%, and allows funds to be redirected toward innovative services (Gupta et al., 2013). Moreover, cloud technology provides scalability that traditional infrastructure cannot, enabling banks to adjust capacity in real time to meet growing demand and expand into underserved areas across Indonesia (Fadhilah et al., 2021; Irsyad et al., 2024).

Despite its benefits, cloud computing adoption in digital banks faces significant challenges, particularly regarding customer data security (Hasan et al., 2023; Khalfan & Alshawaf, 2024). Banking data is highly sensitive, and risks of leakage and cyberattacks remain major concerns (Bandara et al., 2021). Public trust is also limited, requiring education and transparency even though global providers use advanced security protocols (Rijal & Saranani, 2023; Billytona et al., 2024). Regulatory constraints from the OJK, such as restrictions on storing data abroad, complicate the use of global cloud services, forcing many banks to adopt local or hybrid solutions, which still face capacity limitations (Permana & Puspitaningsih, 2021).

Another benefit of cloud computing is the increased ability to analyze customer data in real-time. By using big data technology and Artificial Intelligence (AI) integrated on cloud platforms, digital banks can create a more personalized customer experience (El-Gohary et al., 2021; Bhattacharya & Sinha, 2022; Shafi et al., 2023). Rapid data analysis allows banks to offer more relevant products, improve credit risk management efficiency, and optimize fraud detection (Delgosha et al., 2019). This service personality is one of the competitive advantages that can increase customer loyalty, especially among millennials and Generation Z (Luthfia et al., 2022). However, another obstacle faced in the implementation of cloud computing in Indonesia is the cost of system migration. Digital banks, especially those that are still growing, often struggle to allocate the budget to move their systems to cloud platforms. The complex migration process requires skilled human resources, which are unfortunately still limited in Indonesia. The limited number of experts in the field of cloud computing hinders banks' ability to make the most of this technology. Therefore, collaboration is needed between cloud service providers, educational institutions, and governments to address these shortcomings through training and skill development.

Sustainability is a key reason digital banks adopt cloud computing, as it reduces energy use and carbon emissions compared to traditional data centers, supporting both operational efficiency and environmental initiatives (Aldossary & Alharbi, 2022). However, successful implementation requires organizational shifts, including operational restructuring, staff training, and risk management (Salam & Putri, 2024). Managing relationships with cloud providers is also crucial, as customer trust in data security determines adoption success (AlHogail, 2018; Zhang et al., 2022; Ulfha, 2025). Even with advanced security protocols, public concerns about data leaks persist, making transparency, audits, and customer education essential to build trust and enable broader cloud adoption (Citra et al., 2024).

CONCLUSION

This study shows that cloud computing significantly benefits digital bank operations in Indonesia, with 75% of banks reporting a 30% reduction in operational costs, 60% faster data access, and 55% improved service scalability. Integration with AI and big data also enhances service personalization for 70% of banks. Key challenges include data security concerns and regulatory compliance obstacles. To maximize benefits, collaboration among cloud providers, governments, and educational institutions is essential, alongside efforts to build customer trust. With proper strategy and policy support, cloud computing can drive digital transformation, boosting competitiveness, financial inclusion, operational efficiency, and sustainability in Indonesia's banking sector.

Based on the study's findings and methodology, several limitations can be identified. First, the research employs a qualitative case study approach with a limited number of digital banks, which may restrict the generalizability of the results to the broader Indonesian banking sector. Second, data collection relied on interviews and internal documents, which could be influenced by respondent bias or incomplete access to information. Third, the focus on integrating cloud computing with AI and big data limits the exploration of other potentially relevant technologies, such as blockchain or the Internet of Things (IoT). For future research, a quantitative approach with a larger sample could be employed to validate and generalize the findings while measuring the impact of cloud computing more objectively. Future studies could investigate strategies for mitigating data security risks, ensuring regulatory compliance, and exploring the integration of emerging technologies in digital banking, as well as examining long-term effects on financial inclusion and operational sustainability.

FUNDING STATEMENT: This research did not receive any specific grant from funding agencies in the public, commercial, or not - for - profit sectors.

CONFLICTS OF INTEREST: The author declares no conflict of interest.

DECLARATION OF GENERATIVE AI STATEMENT: During the preparation of this work, the author(s) used ChatGPT, Grammarly, and Turnitin in order to assist with language refinement, grammar checking, and originality verification. After using this tool/service, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the publication.

REFERENCES

[1] Al Farishi, R. R., & Tjun, L. T. (2025). Factors affecting cloud-based accounting adoption in the Indonesian banking sector. *Jurnal Akuntansi, 29*(1), 25-47.

[2] Aldossary, M., & Alharbi, H. A. (2022). An eco-friendly approach for reducing carbon emissions in cloud data centers. *Computers, Materials & Continua, 72*(2), 45-57.

[3] Alfarizi, M., Kamila, H. R., Andriana, F. A., & Wusqo, U. (2023). Digital banking in accelerating the economic empowerment of Indonesian womenpreneurs: Socio-economic exploration and the role of PLS-SEM-based LPS. *Journal of Master of Sharia Economics, 2*(2), 1–32.

[4] AlHogail, A. (2018). Improving IoT technology adoption through improving consumer trust. *Technologies*, *6*(3), 64-76.

[5] Alqahtani, M. M. M., Singh, H., Haddadi, E. A. A., Al-Shibli, F. S. R., & Al-balushi, H. A. A. (2024). Impact of internet of things, cloud computing, artificial intelligence, digital capabilities, digital innovation, IT flexibility on firm performance in Saudi Arabia Islamic bank. *Advances in Social Sciences Research Journal*, *11*(7), 71-91.

[6] Al-Sharafi, M. A., Iranmanesh, M., Al-Emran, M., Alzahrani, A. I., Herzallah, F., & Jamil, N. (2023). Determinants of cloud computing integration and its impact on sustainable performance in SMEs: An empirical investigation using the SEM-ANN approach. *Heliyon*, *9*(5), 134-147.

[7] Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., ... & Zaharia, M. (2010). A view of cloud computing. *Communications of the ACM*, *53*(4), 50-58.

[8] Aulianisa, S. S. (2020). The concept and comparison of buy now, pay later with banking credit in Indonesia: A necessity in the digital and technology era. *Journal of Rechts Vinding: National Legal Development Media, 9*(2), 183-195.

[9] Bandara, R., Fernando, M., & Akter, S. (2021). Managing consumer privacy concerns and defensive behaviours in the digital marketplace. *European Journal of Marketing*, *55*(1), 219-246.

[10] Bejju, A. (2014). Cloud computing for banking and investment services. *Advances in Economics and Business Management*, *1*(2), 34-40.

[11] Bhattacharya, C., & Sinha, M. (2022). The role of artificial intelligence in banking for leveraging customer experience. *Australasian Accounting, Business and Finance Journal, 16*(5), 78-91.

[12] Billytona, C., Rizal, M., Khoiriyah, M., Kurnia, D., & Oktavia, R. (2024). The utilization of technology in the development of Islamic banking operations. *Economic and Business Management International Journal, 6*(2), 113–119.

[13] Choi, T. M., & Lambert, J. H. (2017). Advances in risk analysis with big data. *Risk Analysis*, *37*(8), 1435-1442.

[14] Citra, D., Putri, P., & Lutfianti, A. (2024). The role of FinTech financial technology in transforming traditional banking services. *Indonesian Legal Media, 2*(4), 194–201.

[15] Currie, W. L. (2011). *Institutional theory of information technology* (pp. 137-173). Oxford: Oxford University Press.

[16] Delgosha, S. M., Hajiheydari, N., & Fahimi, S. M. (2021). Elucidation of big data analytics in banking: a four-stage Delphi study. *Journal of Enterprise Information Management*, *34*(6), 1577-1596.

[17] El-Gohary, H., Thayaseelan, A., Babatunde, S., & El-Gohary, S. (2021). An exploratory study on the effect of artificial intelligence-enabled technology on customer experiences in the banking sector. *Journal of Technological Advancements (JTA)*, *1*(1), 1-17.

[18] Fadhilah, J., Layyinna, C. A. A., Khatami, R., & Fitroh, F. (2021). The utilization of digital wallet technology as an alternative solution to modern payments: Literature review. *Journal of Computer Science and Engineering (JCSE), 2*(2), 89–97.

[19] Famoti, O., Ewim, C. P. M., Eloho, O., Muyiwa-Ajayi, T. P., Ezechi, O. N., & Omokhoa, H. E. (2025). Revolutionizing customer experience management through data-driven strategies in financial services. *International Journal of Advanced Multidisciplinary Research and Studies*, *5*(1), 948-957.

[20] Gupta, P., Seetharaman, A., & Raj, J. R. (2013). The usage and adoption of cloud computing by small and medium businesses. *International Journal of Information Management*, *33*(5), 861-874.

[21] Hasan, M., Hoque, A., & Le, T. (2023). Big data-driven banking operations: Opportunities, challenges, and data security perspectives. *FinTech*, *2*(3), 484-509.

[22] Hussin, H., Salleh, N. A., Suhaimi, M. A., & Ali, A. M. (2019). Cloud computing practices and perceived benefits by SMEs in Malaysia: some empirical evidence. *Journal of Information Systems and Digital Technologies*, *1*(2), 1-15.

[23] Irsyad, F. R., Siregar, F. A., Marbun, J., & Hasyim, H. (2024). Facing a new era: banking strategies in facing market and technological changes in Indonesia. *Journal of Economics and Business Management*, *3*(1), 13-25.

[24] Khalfan, A. M., & Alshawaf, A. (2004). Adoption and implementation problems of e-banking: A study of the managerial perspective of the banking industry in Oman. *Journal of Global Information Technology Management*, *7*(1), 47-64.

[25] Linggadjaya, R. I. T., Sitio, B., & Situmorang, P. (2022). Digital transformation of PT Bank Jago Tbk from a conventional bank to a digital bank. *International Journal of Digital Entrepreneurship and Business, 3*(1), 9–22.

[26] Luthfia, F., Mulyana, R., & Ramadani, L. (2022). Studi kasus pengaruh tata kelola ti terhadap transformasi digital dan kinerja bank B. *ZONAsi: Jurnal Sistem Informasi*, *4*(2), 100-116.

[27] Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud computing: The business perspective. *Decision Support Systems*, *51*(1), 176-189.

[28] Megawati, L., Wiharma, C., & Hasanudin, A. (2023). Peran teknologi blockchain dalam meningkatkan keamanan dan kepastian hukum dalam transaksi kontrak di Indonesia. *Jurnal Hukum Mimbar Justitia*, *9*(2), 410-435.

[29] Nutalapati, P. (2024). A review on cloud computing in finance-transforming financial services in the digital age. *International Research Journal of Engineering & Applied Sciences*, *12*(3), 35-45.

[30] Permana, T., & Puspitaningsih, A. (2021). Digital economy studies in Indonesia. *Simki Journal of Economics, 4*(2), 161–170.

[31] Riandi, M. H., Hapsari, R., Hussein, A. S., Parwati, K. Y., & Alam, M. D. (2024). Analysing the effect of social and technological causes on bank 4.0 adoption in Indonesia. *Jurnal Ilmiah Manajemen Kesatuan*, *12*(5), 1969-1976.

[32] Rijal, S., & Saranani, F. (2023). The role of blockchain technology in increasing economic transparency and public trust. *Technology and Society Perspectives (TACIT)*, *1*(2), 56-67.

[33] Salam, A., & Putri, E. E. L. (2024). Implementasi teknologi cloud computing pada bidang perbankan (study literature). *Jurnal Kajian Teknik Elektro, 2*(9), 128–131.

[34] Santorry, S. (2024). Evaluating the impact of technological innovations on operational risk management in financial institutions. *The Journal of Academic Science*, *1*(6), 762-776.

[35] Sari, R. P., Santoso, D. T., & Puspita, D. (2020). Analisis kesiapan UMKM Kabupaten Karawang terhadap adopsi cloud computing dalam konteks industri 4.0. *Jurnal Teknik Industri*, *15*(2), 63-72.

[36] Shafi, S. B., Mahmud, I., Rahul, D. D., Aqif, H., Tariquzzaman, M. D., Osman, F. Y., ... & Sozib, H. M. (2023). Artificial intelligence in banking: Transforming bank management and customer experience. *Cuestiones de Fisioterapia*, *52*(3), 337-348.

[37] Srivastava, U., & Gopalkrishnan, S. (2015). Impact of big data analytics on banking sector: Learning for Indian banks. *Procedia Computer Science*, *50*(1), 643-652.

[38] Subashini, S., & Kavitha, V. (2011). A survey on security issues in service delivery models of cloud computing. *Journal of Network and Computer Applications*, *34*(1), 1-11.

[39] Sudarwanto, A. S., & Kharisma, D. B. B. (2022). Comparative study of personal data protection regulations in Indonesia, Hong Kong and Malaysia. *Journal of Financial Crime*, *29*(4), 1443-1457.

[40] Sudirdja, R. P. (2021). The use of cloud computing technology in bureaucratic reform to realize a professional, communicative and accountable prosecutor's office. *Journal of Law & Development, 50*(4), 828-840.

[41] Sugiyono. (2018). *Metode penelitian kualitatif*. Bandung: Alphabeta

[42] Suhardi, S. (2025). Mapping islamic financial inclusion literature: Trends, key issues, and future research directions. *Indonesia Accounting Research Journal*, *12*(4), 149-163.

[43] Togatorop, A. M. H., Darmawan, D. W., & Hidayati, R. (2024). Transformasi digital dalam mencapai keberlanjutan di bidang ekonomi dan keuangan. In *Prosiding Management Business Innovation Conference (MBIC)* (Vol. 7, No. 1, pp. 16-31). Pontianak: MBIC.

[44] Ulfha, S. M. (2025). Financial digitalization on operational efficiency and corporate value in the era of industry 5.0. *Jurnal Ilmiah Manajemen Kesatuan*, *13*(6), 5783-5794.

[45] Vera, D. A., & Rayyan, F. (2024). Penerapan strategi transformasi digital di lingkungan manufaktur pada sistem informasi manajemen. *Lokawati: Jurnal Penelitian Manajemen dan Inovasi Riset: Asosiasi Riset Ilmu Manajemen dan Bisnis Indonesia*, *2*(4), 140-150.

[46] Zahra, A. F., Kusuma, Z. H., Putra, I. D., Arifin, R. F., Fadhila, Z. N., Amrozi, Y., & Rozzika, C. (2023). Penelitian cloud computing pada industri, pendidikan, kesehatan, transportasi, dan perbankan. *Jurnal Teknologi Informasi*, *9*(2), 163-171.

[47] Zakir, J., Seymour, T., & Berg, K. (2015). Big data analytics. *Issues in Information Systems*, *16*(2), 89-101.

[48] Zhang, W., Siyal, S., Riaz, S., Ahmad, R., Hilmi, M. F., & Li, Z. (2023). Data security, customer trust and intention for adoption of Fintech services: an empirical analysis from commercial bank users in Pakistan. *Sage Open*, *13*(3), 215-227.