

Digital Transformation Sustainability in Indonesia's Banking Sector: A Systematic Review

Tiara Aprilia Kardiman¹, Rizki Yoga M¹, Farida Indriani¹

¹ Universitas Diponegoro, Semarang, Indonesia
apriatiara051@email.com

Abstract

This systematic review explores how digital transformation in the Indonesian banking sector contributes to sustainable growth through innovation, strategic adaptation, and policy alignment. Drawing on nine peer-reviewed articles published between 2020 and 2025, the study synthesizes evidence from databases such as Scopus, Web of Science, and Google Scholar, using Publish or Perish to support data collection. An initial 500 articles were identified, and after rigorous screening and quality assessment, nine peer-reviewed articles were selected based on thematic relevance and methodological robustness. The findings reveal that digital tools – including mobile banking, AI, blockchain, and digital infrastructure – improve operational efficiency, financial inclusion, and resilience in banking institutions. The review identifies five thematic research clusters: digital innovation strategies, economic and environmental sustainability, empirical performance evaluation, systemic challenges, and local implementation. These themes collectively demonstrate how digital transformation acts as a strategic enabler for inclusive economic development in Indonesia. The study highlights the importance of policy innovation, SME integration, and digital literacy programs while noting the limited number of Indonesia-specific empirical studies as a major limitation. Future research should use a longitudinal and mixed-method approach to better capture the evolving digital trends in the Southeast Asian financial sector.

Keywords

Digital Transformation, Sustainable Growth, Banking, Financial Inclusion

1. Introduction

The rapid advancement of digital technologies has brought significant transformations across various sectors globally, and the banking industry is no exception. In Indonesia, the banking sector has undergone substantial digitalization, leveraging innovations such as mobile banking, blockchain, and artificial intelligence (Nelson, 2016; Page et al., 2021; Chowdhury et al., 2024). This transformation is pivotal for improving operational efficiency and promoting financial inclusion, which is a crucial factor in fostering sustainable economic growth (Cipek & Ljutić, 2021; Shu et al., 2023). Despite the growing adoption of digital tools in banking, the full potential of these technologies to drive long-term sustainability remains largely untapped, particularly in the context of emerging economies like Indonesia.

Addressing this issue is important because of the banking sector's critical role in shaping economic development (Acosta-Prado et al., 2024; Del Sarto & Ozili, 2025). With the increasing reliance on digital tools, understanding the relationship between digital transformation and economic sustainability is essential. Scholars have responded to this challenge by examining the benefits and limitations of digitalization in the banking sector. Some studies argue that digital transformation contributes significantly to improving service delivery and financial access (Natsir, et al., 2023; Wijaya et al., 2024). While others highlight the barriers such as regulatory challenges, cybersecurity risks, and the digital divide that hinder the widespread success of these technologies (Widyandri & Laila, 2022; Oyewole et al., 2024).

This article seeks to contribute to this body of knowledge by systematically reviewing the literature surrounding digital transformation in Indonesia's banking sector. The review synthesizes studies published between 2020 and 2025, utilizing multiple reputable academic databases, including Scopus, Web of Science, and Google Scholar. The study's main objective is to explore how digital innovations have impacted sustainable growth within the Indonesian banking industry. This review aims to identify key themes and challenges that have emerged in the existing literature while contributing new insights into the ongoing discourse (Dianti, 2023; Ikhsan et al., 2025).

The review follows a rigorous methodology to achieve this, focusing on peer-reviewed articles with thematic relevance and methodological soundness. It involves a comprehensive data collection and screening process to ensure that only high-quality studies are included. By synthesizing the findings from these studies, the article highlights both the opportunities and the barriers to achieving sustainable growth through digital transformation in Indonesia's banking sector. Ultimately, this research provides actionable recommendations for policymakers, financial institutions, and researchers to leverage digital transformation for long-term economic resilience better (Cheng et al., 2021; Skare & Porada-Rochon, 2022; Anindya et al., 2024).

In conclusion, this article provides a thorough understanding of the role of digital transformation in Indonesia's banking sector and its potential to foster

sustainable growth. The research findings will be instrumental in guiding future strategies and initiatives to overcome existing challenges and maximize the benefits of digitalization in the financial services industry (Ijomah et al., 2024; Saura et al., 2020; Yang & Zhang, 2020).

2. Methods

This study employs a Systematic Literature Review (SLR) approach to examine how innovation, strategy, and implementation contribute to sustainable economic growth in a globalized world. The methodology follows the PRISMA 2020 guidelines to ensure a transparent, replicable, and rigorous analysis process. The SLR approach enables a systematic evaluation and synthesis of existing studies, minimizing selection bias and providing a comprehensive overview of current knowledge in this field.

Data were collected from several academic databases, including Scopus, Web of Science, and Google Scholar. The Publish or Perish software was used to search for relevant publications, supported by automation tools to identify articles that met the inclusion criteria. Keywords such as “digital transformation in Indonesia,” “Indonesia banking sector,” “banking sector,” and “sustainable growth” were used in combination with Boolean operators like AND and OR to narrow the search scope. A total of 500 records were initially identified. After removing duplicates (500 articles), additional exclusions were made due to duplication ($n = 2$), books ($n = 11$), ineligible records flagged by automation (16 articles), and other reasons (83 articles), leaving 406 articles for screening based on titles and abstracts.

The screening process involved reviewing the titles and abstracts of the identified articles. At this stage, 217 articles were excluded due to irrelevance to the research topic, being written in a language other than English, or lacking a focus on innovation and policy. This resulted in 189 articles for further review. However, 143 articles could not be retrieved in full, leaving 46 for eligibility assessment. Of these, 37 were excluded due to reasons such as lack of empirical data, inappropriate methodology, or no substantial contribution to the field. Ultimately, nine articles were included in the final synthesis.

The inclusion criteria focused on articles that directly addressed themes of sustainable economic growth, the banking sector, and digital transformation in Indonesia, published between 2020 and 2025 in reputable journals indexed by Scopus or Web of Science. Only empirical studies, literature reviews, and systematic reviews available in full text and written in English were included. Exclusion criteria involved removing articles that did not specifically address innovation and strategy in the context of sustainable growth, lacked empirical data or in-depth analysis, or were not available in full text.

Theoretically, this study is grounded in two main frameworks: Innovation Systems Theory and Strategic Management Theory. Innovation Systems Theory emphasizes how technological and non-technological innovations drive economic sustainability through new approaches to production, governance, and

consumption. Strategic Management Theory is used to understand how governments and organizations formulate and implement long-term strategies to achieve sustainable growth across various economic contexts.

3. Results

This study employs a Systematic Literature Review (SLR) approach to examine how innovation, strategy, and implementation contribute to sustainable economic growth in a globalized world. The methodology follows the PRISMA 2020 guidelines to ensure a transparent, replicable, and rigorous analysis process. The SLR approach enables a systematic evaluation and synthesis of existing studies, minimizing selection bias and providing a comprehensive overview of current knowledge in this field.

Data were collected from several academic databases, including Scopus, Web of Science, and Google Scholar. The Publish or Perish software was used to search for relevant publications, supported by automation tools to identify articles that met the inclusion criteria. Keywords such as “digital transformation in Indonesia,” “Indonesia banking sector,” “banking sector,” and “sustainable growth” were used in combination with Boolean operators like AND and OR to narrow the search scope. A total of 500 records were initially identified. After removing duplicates (500 articles), additional exclusions were made due to duplication ($n = 2$), books ($n = 11$), ineligible records flagged by automation (16 articles), and other reasons (83 articles), leaving 406 articles for screening based on titles and abstracts.

The screening process involved reviewing the titles and abstracts of the identified articles. At this stage, 217 articles were excluded due to irrelevance to the research topic, being written in a language other than English, or lacking a focus on innovation and policy. This resulted in 189 articles for further review. However, 143 articles could not be retrieved in full, leaving 46 for eligibility assessment. Of these, 37 were excluded due to reasons such as lack of empirical data, inappropriate methodology, or no substantial contribution to the field. Ultimately, nine articles were included in the final synthesis.

The inclusion criteria focused on articles that directly addressed themes of sustainable economic growth, the banking sector, and digital transformation in Indonesia, published between 2020 and 2025 in reputable journals indexed by Scopus or Web of Science. Only empirical studies, literature reviews, and systematic reviews available in full text and written in English were included. Exclusion criteria involved removing articles that did not specifically address innovation and strategy in the context of sustainable growth, lacked empirical data or in-depth analysis, or were not available in full text.

Theoretically, this study is grounded in two main frameworks: Innovation Systems Theory and Strategic Management Theory. Innovation Systems Theory emphasizes how technological and non-technological innovations drive economic sustainability through new approaches to production, governance, and

The data analysis process was conducted in multiple stages. First, relevant articles were categorized according to their core themes, such as the role of technological innovation in economic growth, the integration of sustainability into policy frameworks, and challenges in implementing sustainability strategies. Then, the articles were grouped into categories like innovation-driven economic growth and the impact of policy on sustainable development. Information from these articles was synthesized to identify emerging trends, research gaps, and opportunities for future exploration.

The research findings will be reported through a combination of tables, diagrams, and narrative descriptions that highlight key trends, patterns, and insights. A PRISMA flowchart will illustrate the article selection process from initial identification to final inclusion, ensuring transparency, improving analytical reliability, and allowing for replication by future researchers. The VOSviewer visualization presents a co-occurrence network of author keywords extracted from the selected articles in this systematic review. This mapping reveals the thematic structure and interrelationships among core concepts discussed in the literature on digital transformation and sustainable growth in the Indonesian banking sector.

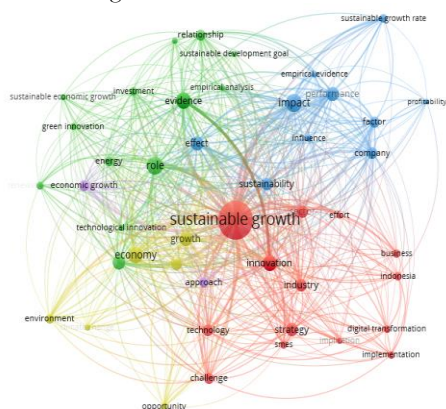


Figure 1. VOS Viewer Network Visualization

Based Figure 1, the keyword co-occurrence visualization provides a precise thematic mapping of research related to digital transformation in Indonesia's banking sector and its connection to sustainable growth. Sustainable growth emerges as the most prominent node at the network's core, reflecting its central role across the literature. The surrounding clusters of keywords form distinct thematic groupings that represent the primary directions of scholarly inquiry.

The first and most prominent cluster is associated with digital transformation and innovation strategies, including strategy, SMEs, implementation, and industry. This cluster highlights the strategic efforts in leveraging digital tools to enhance operational efficiency, customer experience, and the competitiveness of financial institutions. In Indonesia, these efforts are closely tied to expanding digital banking services and empowering small and medium enterprises, both of which are crucial for inclusive and sustainable economic development.

A second cluster emphasizes economic and environmental concerns. Keywords such as green innovation, technological innovation, energy, and economic growth indicate a strong interest in the intersection of digital transformation and environmentally sustainable practices. This body of research underscores the potential of digital technologies to support a transition toward low-carbon economic systems while maintaining growth and innovation in the financial sector.

Another cluster focuses on performance evaluation and empirical analysis, comprising keywords like impact, effect, empirical evidence, performance, and factor. These studies assess the tangible outcomes of digital transformation initiatives and offer data-driven insights into their effectiveness. This research informs evidence-based policy and investment decisions by quantifying impacts on profitability, operational efficiency, and stakeholder value. Additionally, a cluster addresses environmental challenges and strategic opportunities, represented by terms such as environment, challenge, opportunity, and technology. These keywords reflect the broader socio-technical landscape in which digital transformation unfolds. They highlight the barriers, risks, and contextual factors that shape the successful adoption of digital tools, particularly in emerging economies.

The keyword Indonesia is directly associated with business and digital transformation, indicating a growing body of localized research. This connection illustrates how scholars have contextualized global trends in digitalization within Indonesia's specific institutional and economic frameworks. Such localization is essential for crafting relevant strategies that align with national development goals and financial inclusion agendas. Overall, the topic mapping illustrates that research on digital transformation in Indonesia's banking sector is multidimensional and increasingly linked with broader sustainability objectives. Scholars are exploring the technological aspects and engaging with economic, environmental, and institutional perspectives. These collective efforts underline digital transformation as a vital enabler of sustainable growth in developing country contexts.

In addition to the network visualization, the overlay visualization provides temporal insights by displaying the average publication year associated with each keyword. This visual mapping uses a color gradient from purple (older) to yellow (newer) to indicate the chronological appearance of keywords within the reviewed literature. The overlay reveals that foundational concepts such as sustainable growth, impact, economic growth, and innovation appeared predominantly in earlier studies (around 2021–2022), as indicated by their bluish-purple hues. Meanwhile, more recent research (2022 onwards), shown in green to yellow, has increasingly focused on specific terms like digital transformation, Indonesia, business, and implementation. This suggests a growing scholarly interest in the practical application and regional context of digitalization efforts in the banking sector.

The emergence of these keywords in more recent publications highlights a shifting focus from theoretical exploration to applied strategies and localized implementation, particularly in Indonesia. Digital transformation now co-occurs more frequently with terms like strategy, SMEs, and business, indicating a trend toward exploring how these technological shifts translate into institutional and economic changes. Additionally, terms such as environment and opportunity, while present, appear less frequently and with lighter node sizes, suggesting underexplored areas that could benefit from further research.

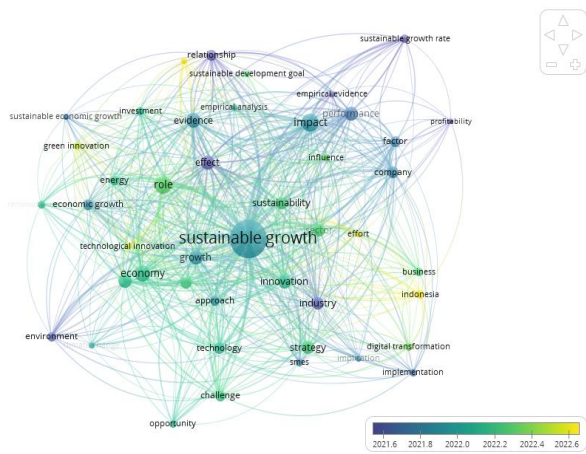


Figure 2. VOS Viewer Overlay Visualization

Based Figure 2, visualization supports the review's findings that scholarly attention is evolving from broad sustainability themes toward actionable, context-specific studies investigating how digital innovations are embedded into Indonesia's banking sector as a pathway to sustainable economic development.

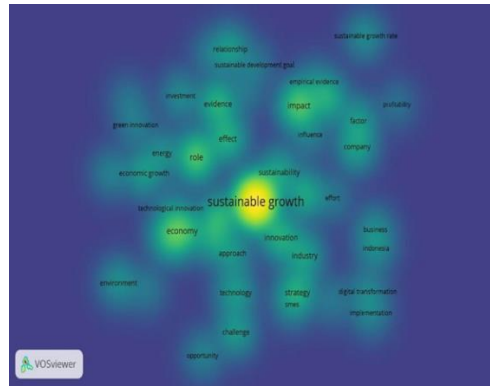


Figure 3. VOS Viewer Density Visualization

Figure 3 provides a heatmap-style representation of keyword prominence and concentration based on their frequency and co-occurrence strength in the analyzed literature. In this map, keywords with higher frequency and stronger link strength are displayed in bright yellow, indicating areas of dense academic activity. In contrast, less frequent or peripheral keywords are shown in green to blue, signifying a lower research focus.

Sustainable growth appears at the map's core as the most dominant and densely linked keyword, signifying its central role and frequent appearance in the literature across all selected studies. This aligns with the overarching theme of the review and validates the keyword's significance in guiding academic inquiry within the banking and digital transformation context.

Surrounding sustainable growth, other keywords such as innovation, economy, industry, impact, and sustainability show moderate to high density, reflecting recurring discussions on how technological innovation and digital implementation contribute to sustainable economic outcomes. These keywords are located within warm-colored zones, indicating consistent co-occurrence patterns with the core theme. On the map's periphery, keywords like opportunity, environment, SMEs, and implementation appear in cooler tones, such as green or blue. This suggests that while these topics are present in the discussion, they are less emphasized or explored, representing potential gaps or future research opportunities in digital transformation and sustainable finance. Overall, the density visualization reinforces the conceptual core of this systematic review and visually affirms the thematic significance of digital and sustainability-oriented terms in the evolving discourse around Indonesia's banking sector. It also highlights underexplored areas that can be targeted for further empirical exploration.

Five hundred records were initially identified through electronic database searches using Publish or Perish, with sources including Scopus, Web of Science, and Google Scholar. After removing duplicate records ($n = 2$), book ($n = 11$), ineligible records flagged by automation tools (16 articles), and for other reasons (83 articles), 406 unique records remained for screening. Based on carefully evaluating titles and

abstracts, 189 articles were excluded due to irrelevance, lack of focus on Indonesia's banking sector, or poor methodological quality. Full-text assessments were then conducted on 46 articles, excluding 37 studies based on predefined eligibility criteria such as insufficient discussion on sustainable growth or digital transformation context. As a result, nine peer-reviewed articles were included in the final synthesis. This screening process is visually documented in the PRISMA 2020 flowchart (Figure 1), illustrating the rigorous and transparent methodology employed throughout the selection phase.

The selected literature spans from 2020 to 2025 and represents diverse study designs, including empirical research, conceptual analyses, policy reviews, and case studies. This research shows interest in digital transformation in Indonesia's banking sector and its contribution to sustainable growth, which has attracted the interest of researchers to support this vital industry, such as several studies (Banna & Alam, 2020; Cosma et al., 2020; Dikau & Volz, 2021; Hakimi et al., 2024; Ijomah et al., 2024; Karim et al., 2023; Liu et al., 2024; Rahmayati, 2021). For example, the highly cited study by Ijomah et al. (2024) examines the role of digital marketing strategies in advancing SMEs' sustainable growth, while Banna and Alam (2020) evaluate Islamic banking efficiency and its correlation with inclusive development outcomes. Another key contribution, Saftiana and Jie (2023), explores the sustainable growth rate in ASEAN's banking industry under risk contexts, reflecting regionally comparative perspectives.

Moreover, articles such as Liu et al. (2024) and Dikau and Volz (2021) broaden the scope by connecting financial sustainability with green finance, institutional governance, and central banking mandates. Collectively, these studies emphasize the multifaceted nature of digital transformation and its critical influence on financial system modernization and sustainable economic development, particularly within Indonesia and comparable economies.

Table 1: Summary of Studies and Key Findings

Study / Methodology	Main Topic	Main Findings
Ijomah et al. (2024) / Conceptual-empirical	Digital marketing strategies for SMEs	SEO and social media enhance competitive advantage and sustainable growth
Banna & Alam (2020) / Quantitative (DEA)	Islamic banking efficiency and financial inclusion	Islamic banks improve inclusive and sustainable growth in 32 countries
Saftiana & Jie (2023) / Empirical-quantitative	Sustainable growth rate in ASEAN banking industry	Asset utilization positively affects actual and sustainable growth

Study / Methodology	Main Topic	Main Findings
Karim et al. (2023) / Quantitative-survey	Consumer loyalty in Indonesian banking	Emotional bonding influences consumer awareness and loyalty
Liu et al. (2024) / Quantitative- comparative	Fintech, green finance, and institutional performance	Fintech and green finance support environmental sustainability
Cosma et al. (2020) / Qualitative content analysis	Non-financial disclosure in European banks	European banks engage in sustainability through enhanced disclosures
Hakimi et al. (2024) / Case study	Digital transformation in Afghanistan's banking	E-banking fosters targeted interventions for sustainable growth
Dikau & Volz (2021) / Policy analysis	Central bank mandates and green finance	Sustainability objectives can be integrated into central bank mandates
Rahmayati (2021) / Empirical review	Competition strategy in Islamic banking	Marketing strategy enhances performance and long-term sustainable growth

Table 1 summarizes the nine studies selected for this systematic review. Each entry includes information on the research methods used, the primary focus of discussion in each study, and key findings relevant to digital transformation and sustainable growth in the finance and banking sector. The studies reflect a diversity of methodologies, ranging from quantitative approaches such as Data Envelopment Analysis (DEA) and empirical surveys to qualitative approaches such as policy studies and content analysis. Key topics include digital marketing strategies, Islamic banking efficiency, financial inclusion, digital transformation, and central bank policies on green finance.

Key findings show that digital innovations such as social media and financial technology (fintech) are important in driving competitive advantage, operational efficiency, and financial sector sustainability. In addition, there is particular attention to regional aspects, such as the Indonesian and ASEAN contexts, which demonstrate the importance of locally-based approaches in implementing digital transformation to support sustainable development. Table 1 serves as the basis for further thematic analysis in the discussion section and provides an overview of current research directions in the reviewed areas.



Figure 4. The results of mapping research topics in digital transformation on Indonesia's banking sector and its contribution to sustainable growth

Based Figure 4, the digital transformation of Indonesia's banking sector involves technological, operational, and strategic shifts. At its core, this transformation encompasses adopting new technologies, digital service delivery, and developing digital infrastructure. New technologies such as artificial intelligence (AI), machine learning, blockchain, and big data analytics are integrated into banking operations to enhance decision-making and automate routine functions. These tools provide more personalized services and real-time insights that improve customer satisfaction and operational control.

In parallel, digital service delivery has rapidly expanded, primarily through platforms like mobile banking, internet banking, and AI-powered chatbots. These innovations have transformed how customers interact with banks, making transactions faster, more convenient, and accessible across diverse geographical locations. Supporting these services is a backbone of digital infrastructure, including cloud computing and cybersecurity frameworks, which ensure data availability, scalability, and protection against increasing cyber threats.

The impacts on banking from this digital shift are substantial. Operational efficiency has improved through automation and streamlined processes. Service accessibility has broadened, especially for populations in rural or underserved regions, contributing to greater financial inclusion. Additionally, the customer experience has evolved with responsive, 24/7 digital interfaces, while innovation in

financial products has enabled banks to offer more customized and dynamic financial solutions.

Despite these advancements, several challenges persist. The readiness of human resources to adapt to digital tools remains uneven, necessitating upskilling and cultural change within institutions. Regulatory compliance also presents difficulties, particularly as digital innovations often outpace existing legal frameworks. Moreover, ongoing digital infrastructure and technology investment remains critical, especially for mid-sized or regional banks.

Crucially, the digital transformation of banking is a technical evolution and a key contributor to sustainable growth. It enables broader financial inclusion, allowing previously unbanked individuals and microenterprises to access formal financial services. The digitization of banking services also reduces emissions by minimizing physical infrastructure needs and encouraging paperless processes. Furthermore, it promotes inclusive economic growth by supporting small and medium-sized enterprises (SMEs) and fostering entrepreneurship. Ultimately, digital transformation contributes to long-term financial stability by improving financial system resilience and transparency. In summary, the transformation of Indonesia's banking sector is a strategic lever for sustainable economic development. Its successful implementation hinges not only on technology but also on regulatory foresight, inclusive design, and institutional adaptability.

4. Discussion

The banking sector in Indonesia is undergoing significant transformation accelerated by the COVID-19 pandemic, which has necessitated a reevaluation of traditional business models as organizations pivot towards digital solutions. This transition aligns with the dynamic capabilities framework in strategic management, where financial institutions are increasingly integrating emerging technologies such as Artificial Intelligence (AI) and blockchain into their operations to enhance operational efficiency and customer engagement (Natsir, et al., 2023; Yudaruddin, 2023). The emergence of FinTech firms has particularly blurred the lines between traditional banks and startups, compelling banks to adopt collaborative approaches as both funders and partners in innovation, thereby fostering a more agile organizational structure aimed at creating new value propositions (Corbet et al., 2024; Sabina & Handajani, 2024).

A comprehensive understanding of this transformation requires focusing on technological advancements, customer experience, and service quality. Studies emphasize that digital banking channels positively impact customer satisfaction and loyalty, improving financial performance (Arinta & Widyastuti, 2024; Sugihyanto & Arsjah, 2022). As banks strive to enhance their digital offerings, ethical considerations and consumer protection issues become paramount. Institutions are urged to adopt responsible governance principles in their AI integration to ensure

that advancements do not compromise ethical standards or widen the digital divide in access to financial services (Sasea & Sakmaf, 2023).

Policy frameworks are crucial in facilitating advancements in digital banking, thus ensuring they contribute meaningfully to sustainable growth in Indonesia. One notable regulatory support is Bank Indonesia's implementation of the Quick Response Code Indonesian Standard (QRIS), which has been pivotal in enhancing the usability of digital payments across various financial institutions, including banks and e-wallets (Erlando et al., 2020; Sugihyanto & Arsjah, 2022). This standardization fosters interoperability, a vital component for the widespread adoption of digital financial services (Widarwati et al., 2022; Subkhan, & Hutajulu, 2023). The Financial Services Authority has also begun addressing the rise of Artificial Intelligence (AI) and big data within the financial sector by issuing guidelines to create minimum standards for emerging technologies. This initiative is essential for ensuring innovation balances consumer protection and data privacy requirements (Bongomin et al., 2020). The urgency for such a balance is highlighted in current literature, which underlines the necessity for regulators to maintain a conducive environment for innovation while safeguarding against the increased risks associated with digitization, such as data breaches and cybersecurity threats (Enebeli-Uzor & Adam, 2024; Zeynalova, 2024).

Digital and financial literacy are essential for fostering a conducive environment for adopting digital finance, particularly in Indonesia, where many individuals remain unfamiliar with digital financial services. Research indicates that approximately 38% of Indonesians possess adequate financial literacy, which poses a barrier to effective engagement with digital finance platforms (Hermawan et al., 2022). The World Bank and Indonesian authorities have recognized this challenge, launching educational initiatives to enhance digital financial literacy among Small and Medium Enterprises (SMEs) and individuals (Herlinawati et al., 2023). These initiatives highlight the need for a structured educational system encompassing digital finance literacy in the school curricula.

Policy makers are encouraged to build upon existing educational campaigns by integrating digital finance within school curriculums and supporting community-based workshops (Purnama et al., 2021). This approach aligns with evidence indicating that enhancing financial literacy significantly increases the likelihood of individuals adopting digital finance services. Studies suggest that financial literacy empowers individuals with the skills needed to navigate the financial landscape, thereby augmenting digital finance engagement among users (Daud et al., 2022; Hermawan et al., 2022; Yuneline & Rosanti, 2023). Moreover, collaborations with telecommunications companies and fintech organizations can facilitate user training, instill confidence in digital financial services, and protect individuals from potential fraud (Hermawan et al., 2022).

In recent years, financial inclusion and support for micro, small, and medium enterprises (MSMEs) have been central to Indonesia's economic policy, particularly

with the ambitious goal of achieving 90% financial inclusion by 2024. This target underscores the importance of integrating MSMEs into the broader financial ecosystem, given their substantial contributions to regional and national economies (Angreyani et al., 2023; Ariningrum et al., 2024). Research shows that financial literacy is crucial in promoting financial inclusion in Indonesia, enabling unbanked individuals to access financial products (Ali et al., 2021). To further this agenda, regulatory frameworks are essential for incentivizing banks to lend to MSMEs, with strategies that may include expanding agent networks in rural areas. For instance, the Financial Services Authority (*Otoritas Jasa Keuangan/OJK*) has initiatives to transform traditional rural banks into digital banking entities to enhance service accessibility for local communities (Lestari et al., 2024). Fiscal support, including guarantee schemes for banks issuing MSME loans through digital channels, can accelerate this process, fostering a supportive environment for small enterprises (Adzimatunur & Manalu, 2021; Setiawan et al., 2021). Evidence suggests that interventions to bolster MSME access to finance can significantly improve their revenue and sustainability (Fitra & Sinatra, 2020; Purwiyanta et al., 2022).

In pursuing financial inclusion, innovative banking models are increasingly being employed to reach unbanked populations in Indonesia, particularly through the efforts of banks and fintech companies. Notably, Bank Rakyat Indonesia (BRI) has pioneered an agent-based model known as BRILink, which operates through a network of over 500,000 trained agents across thousands of villages. This approach enables basic transaction services via mobile devices and card readers, facilitating financial services to remote and underserved communities. Completing millions of transactions through this network illustrates a significant leap forward in using digital channels to bridge the service gap left by traditional banking branches.

The successful deployment of agent networks to enhance financial access aligns with findings from research discussing the vital need for reducing transaction costs and embedding banking services seamlessly into the daily lives of individuals at the “bottom of the pyramid”. By leveraging mobile technology and local agents, BRI exemplifies how financial institutions can effectively lower barriers to access for populations traditionally regarded as unbankable. This strategy benefits financial service providers, allowing them to capture previously untapped markets. However, it is also essential for uplifting individuals and communities that gain access to these critical financial resources, promoting economic resilience and empowerment.

Practical strategies to advance digital transformation in Indonesia’s banking sector can be grouped into several key areas. One effective approach is the development of branchless and agency banking by building and scaling networks of trusted local agents or kiosks equipped with digital terminals to deliver financial services in rural and underserved areas. This model has proven successful in reaching micro-entrepreneurs, such as street vendors and farmers, who often lack access to traditional banking infrastructure. In parallel, digital advisory and trust-building initiatives are essential. Banks can train staff or mobilize loan officers to act as digital

advisors who educate customers on the safe use of mobile banking. These programs help mitigate risks such as fraud and theft, boost user confidence, and address the digital literacy gap frequently highlighted in literature.

Another critical strategy involves SME training and ecosystem development. Banks can collaborate with industry stakeholders or development partners to offer SMEs training in digital finance, as seen in the modules provided by Bank Indonesia and the Financial Services Authority. Additionally, establishing integrated digital business ecosystems—connecting finance with supply chains and e-commerce—can help incorporate SMEs into broader value chains. Evidence from BRI suggests that building such ecosystems can uplift more than 30 million customers from poverty. Infrastructure investment also plays a vital role. Banks must support the expansion of national digital infrastructure, including robust data centers and cloud services, which are considered the foundational pillars of digital transformation. Ensuring secure and reliable delivery service depends on these elements. Moreover, expanding broadband and mobile internet access, particularly in off-grid regions, is essential to enable widespread use of digital services. Public-private partnerships or government incentives can encourage telecommunications and technology companies to develop this critical infrastructure.

Importantly, all strategies should be implemented with a strong emphasis on sustainability. For example, investing in energy-efficient data centers and promoting paperless banking not only reduces operational costs but also minimizes environmental impact. These efforts align with banks' responsibilities to manage and mitigate their perceived environmental and social impacts while pursuing growth. These practical and evidence-based strategies provide a clear roadmap for how Indonesian banks can harness digital transformation to promote inclusive and sustainable economic development.

5. Conclusion

This study provides a comprehensive synthesis of the literature on digital transformation in Indonesia's banking sector and its implications for sustainable growth. The findings underscore the multidimensional role of digital innovation, not only as a tool for improving operational efficiency and customer engagement but also as a strategic enabler of broader socio-economic objectives, including financial inclusion, green finance, and institutional modernization. Indonesian banks are navigating a path toward resilience and long-term development by integrating emerging technologies – such as AI, blockchain, and mobile platforms. However, several limitations should be acknowledged. First, while the review employed rigorous screening criteria, the small number of final articles (n=9) may limit the generalizability of the conclusions. This may be due to the narrow focus on Indonesia-specific banking studies that explicitly link digital transformation to sustainable development. Additionally, the exclusion of non-English language publications could have resulted in the omission of relevant local insights. Another

limitation stems from the heavy reliance on secondary data, which may not capture real-time industry changes or the nuanced effects of regulatory shifts.

These limitations raise valid concerns about how fully the selected studies represent the state of digital transformation across Indonesia's banking landscape. Emerging innovations, especially from smaller financial institutions or fintech startups, were underrepresented due to a lack of peer-reviewed coverage. Furthermore, the diversity of methodologies across the reviewed studies – ranging from policy analyses to empirical evaluations – poses challenges for comparability, though it also enriches the scope of understanding.

Future research should address these gaps through mixed-method studies that combine qualitative and quantitative data, allowing for a deeper exploration of behavioral, technological, and institutional factors. Longitudinal research is primarily needed to capture how digital transformation evolves and how it responds to regulatory, environmental, and market dynamics. Furthermore, comparative studies across Southeast Asia would provide regional benchmarks and help identify best practices for sustainable digital banking development.

Ultimately, while this review affirms that digital transformation holds significant promise for advancing sustainable growth in Indonesia's banking sector, it also highlights the necessity for ongoing policy support, infrastructural investment, and human capital development. These efforts must be inclusive, forward-looking, and grounded in strong governance to ensure that digital finance contributes meaningfully to Indonesia's economic resilience and social equity.

References

- Acosta-Prado, J. C., Rojas Rincón, J. S., Mejía Martínez, A. M., & Riveros Tarazona, A. R. (2024). Trends in the Literature About the Adoption of Digital Banking in Emerging Economies: A Bibliometric Analysis. *Journal of Risk and Financial Management*, 17(12), 1276–1285.
- Adzimatunur, F., & Manalu, V. G. (2021). The effect of islamic financial inclusion on economic growth: a case study of islamic banking in indonesia. budapest international research and critics institute (birci-journal): *Humanities and Social Sciences*, 4(1), 976–985.
- Ali, M. M., Abrista Devi, Bustomi, H., Muhammad Rizky Prima Sakti, & Hafas Furqani. (2021). Factors influencing islamic financial inclusion in indonesia: a structural equation modelling approach. *ICR Journal*, 12(2), 249–274.
- Angreyani, A., Akbar, A., Haeruddin, M. I. M., Mustafa, M. Y., & Mustafa, F. (2023). The phantom menace: a moderation analysis of gender on msme's financial literacy and financial performance. *Asian Research Journal of Arts & Social Sciences*, 21(1), 48–55.

- Anindya, D. A., Aisyah, S., Anggriani, D. P., Fadillah, T. D., Habibie, M., Risal, T., & Nurhusna, S. (2024). Evaluation of revenue accounting system at pos indonesia pulo brayan branch using framework matrix approach. *Economic and Business Horizon*, 3(2), 25-34.
- Ariningrum, H., Nuryana, I., & Saputri, D. E. (2024). Determinant factors affecting compliance msme taxpayers (case study of cipadang village community). *ECo-Buss*, 6(3), 1638-1647.
- Arinta, Y. N., & Widyastuti, E. (2024). Accelerating digital banking transformation through user acceptance: a study on the millennial cultural. *Maksimum*, 14(1), 74-82.
- Aslamzai, S., Adhi, N., & Hakimi, S. (2024). Digital transformation of Afghanistan banking: Exploring e-banking trends and impacts. *Keunis*, 12(1), 90-99.
- Banna, H., & Alam, M. R. (2020). Islamic banking efficiency and inclusive sustainable growth: The role of financial inclusion. *Journal of Islamic Monetary Economics and Finance*, 6(1), 213-242.
- Bongomin, G. O. C., Ntayi, J. M., & Akol, C. M. (2020). Analyzing the relationship between financial literacy and financial inclusion by microfinance banks in developing countries: social network theoretical approach. *International Journal of Sociology and Social Policy*, 40(11), 1257-1277.
- Cheng, Y., Awan, U., Ahmad, S., & Tan, Z. (2021). How do technological innovation and fiscal decentralization affect the environment? A story of the fourth industrial revolution and sustainable growth. *Technological Forecasting and Social Change*, 162(1), 120398.
- Cipek, K., & Ljutić, I. (2021). The influence of digitalization on tax audit. *Oditor*, 7(1), 37-69.
- Corbet, S., Hou, Y. (Greg), Hu, Y., Oxley, L., & Tang, M. (2024). Do financial innovations influence bank performance? Evidence from China. *Studies in Economics and Finance*, 41(2), 241-267.
- Cosma, S., Venturelli, A., Schwizer, P., & Boscia, V. (2020). Sustainable development and European banks: A non-financial disclosure analysis. *Sustainability*, 12(15), 6146-6154.
- Daud, I., Nurjannah, D., Mohyi, A., Ambarwati, T., Cahyono, Y., Haryoko, A. D. E., Handoko, A. L., Putra, R. S., Wijoyo, H., Ari-Yanto, A., & Jihadi, M. (2022). The effect of digital marketing, digital finance and digital payment on finance performance of indonesian smes. *International Journal of Data and Network Science*, 6(1), 37-44.
- Del Sarto, N., & Ozili, P. K. (2025). FinTech and financial inclusion in emerging markets: a bibliometric analysis and future research agenda. *International Journal of Emerging Markets*, 20(13), 270-290.
- Dianti, A. R. (2023). Enhancing financial risk management in the digital age: a systematic review. *Arthatama: Journal of Business Management and Accounting*, 7(2), 79-91.

- Dikau, S., & Volz, U. (2021). Central bank mandates, sustainability objectives and the promotion of green finance. *Ecological economics*, 184, 107022.
- Enebeli-Uzor, S., & Adam, M. (2024). Monetary policy, digitalisation and banking industry performance in nigeria. *Journal of Scientific Research and Reports*, 30, 459-468.
- Erlando, A., Riyanto, F. D., & Masakazu, S. (2020). Financial inclusion, economic growth, and poverty alleviation: evidence from eastern Indonesia. *Heliyon*, 6(10), e05235.
- Fitra, H. A., & Sinatra, F. (2020). The effect of industry 4.0 on the development of micro, small and medium enterprises (msmes) banana chips in bandar lampung. *Jurnal Wilayah Dan Lingkungan*, 8(2), 177-186.
- Herlinawati, E., Aulia Hilmiawan, G., Pratiwi, N., Subroto, M. R. S., Handayani, A. P., & Thoyyiba, M. R. (2023). Improving understanding of digital financial literacy for pondok pesantren anwar futuhiyyah students. *Proceeding International Conference of Community Service*, 1(1), 91-96
- Hermawan, A., Gunardi, A., & Sari, L. M. (2022). Intention to use digital finance msme: the impact of financial literacy and financial inclusion. *Jurnal Ilmiah Akuntansi Dan Bisnis*, 17(1), 191-196.
- Ijomah, T. I., Idemudia, C., Eyo-Udo, N. L., & Anjorin, K. F. (2024). Innovative digital marketing strategies for SMEs: Driving competitive advantage and sustainable growth. *International Journal of Management & Entrepreneurship Research*, 6(7), 2173-2188.
- Ikhsan, R. B., Fernando, Y., Prabowo, H., Yuniarty, Gui, A., & Kuncoro, E. A. (2025). An empirical study on the use of artificial intelligence in the banking sector of Indonesia by extending the TAM model and the moderating effect of perceived trust. *Digital Business*, 5(1), 100103.
- Karim, K., Ilyas, G. B., Umar, Z. A., Tajibu, M. J., & Junaidi, J. (2023). Consumers' awareness and loyalty in Indonesia banking sector: does emotional bonding effect matters?. *Journal of Islamic Marketing*, 14(10), 2668-2686.
- Koly, K. N., Saba, J., Billah, M. A., McGirr, A., Sarker, T., Haque, M., ... & Begum, F. (2023). Depressive symptoms and anxiety among women with a history of abortion living in urban slums of Bangladesh. *BMC psychology*, 11(1), 197.
- Lestari, P. I., Wardi, T. B., Rahman, A., & Dikrurahman, D. (2024). Legal protection for small and medium enterprises (smes) in facing unfair business competition. *Journal Research of Social Science, Economics, and Management*, 4(1), 77-84.
- Liu, L., Chen, Z., Al-Hiyari, A., & Nassani, A. (2024). Sustainable growth in mineral rich BRI countries: Linking institutional performance, Fintech, and green finance to environmental impact. *Resources Policy*, 96(2), 105159.
- Natsir, K., Arifin, A. Z., & Ronald, R. (2023). Financial inclusion in the use of digital banking services in jakarta. *International Journal of Application on Economics and Business*, 1(4), 2477-2493.

- Nelson, N. L. (2016). Kinesio taping for chronic low back pain: A systematic review. *Journal of Bodywork and Movement Therapies*, 20(3), 672–681.
- Oyewole, A. T., Okoye, C. C., Ofodile, O. C., & Ugochukwu, C. E. (2024). Cybersecurity risks in online banking: A detailed review and preventive strategies applicatio. *World Journal of Advanced Research and Reviews*, 21(3), 625–643.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *bmj*, 372.
- Purnama, S., Ulfah, M., Machali, I., Wibowo, A., & Narmaditya, B. S. (2021). Does digital literacy influence students' online risk? *Evidence from Covid-19. Heliyon*, 7(6), e07406.
- Purwiyanta, P., Pujiharjanto, A., Astuti, R. D., & Kijkasiwat, P. (2022). The causality of financial inclusion and economic growth in indonesia. *Jurnal Analisis Bisnis Ekonomi*, 20(1), 18–30.
- Rahmayati, R. (2021). Competition Strategy In The Islamic Banking Industry: An Empirical Review. *International Journal Of Business, Economics, And Social Development*, 2(2), 65-71.
- Sabina, & Handajani, L. (2024). Disclosure of Disruptive Innovation in the Indonesian Banking Sector. *COSTING: Journal of Economic, Business and Accounting*, 7(4), 11041–11061.
- Saftiana, Y., & Jie, F. (2023). Banking industry sustainable growth rate under risk: Empirical study of the banking industry in ASEAN countries. *Sustainability*, 15(1), 564.
- Sasea, E. M., & Sakmaf, M. S. (2023). Digital bank legal challenges: security protection and leakage of customer personal data. *Awang Long Law Review*, 6(1), 245–250.
- Saura, J. R., Palos-Sanchez, P., & Rodríguez Herráez, B. (2020). Digital marketing for sustainable growth: Business models and online campaigns using sustainable strategies. *Sustainability*, 12(3), 1003.
- Setiawan, N., Wakhyuni, E., & Setiawan, A. (2021). Balance scorecard analysis of increasing msme income during the covid 19 pandemic in samosir district. *Ilomata International Journal of Social Science*, 2(4), 233–245.
- Shu, Y., Ma, X., Liu, Z., Li, J., & Zhang, Y. (2023). Potential of the digital information platform applied in promotion of rural landscape in china: *From Preliminary Practices to Framework Conception. Land*, 12(9).
- Skare, M., & Porada-Rochon, M. (2022). The role of innovation in sustainable growth: A dynamic panel study on micro and macro levels 1990–2019. *Technological Forecasting and Social Change*, 175, 121337.
- Subkhan, M. A., & Hutajulu, D. M. (2023). The analysis of the effect of financial deepening on Indonesia's economic growth: *A longitudinal analysis. Research Horizon*, 3(1), 19-35.

- Sugihyanto, T., & Arsjah, R. J. (2022). The effect of digital banking, digital transformation on the efficiency of commercial banks in indonesia. *International Journal of Islamic Education, Research and Multiculturalism (IJIERM)*, 5(2), 387-408.
- Widarwati, E., Solihin, A., & Nurmallasari, N. (2022). Digital finance for improving financial inclusion indonesians' banking. *Signifikan: Jurnal Ilmu Ekonomi*, 11(1), 17-30.
- Widyandri, D. B., & Laila, N. (2022). Analisis pengaruh mobile banking dan keuangan inklusif terhadap kinerja keuangan bank syariah di indonesia periode 2014-2019. *Jurnal Ekonomi Syariah Teori Dan Terapan*, 9(1), 14.
- Wijaya, L., Asfina, V., Tirtasaputra, M., Achmad, S., & Sutoyo, R. (2024). Blockchain effects on cashless payments in indonesia – a systematic literature review. *The 18th IMT-GT International Conference on Mathematics, Statistics and Their Applications*, 7-11.
- Yang, L., & Zhang, Y. (2020). Digital financial inclusion and sustainable growth of small and micro enterprises—evidence based on China's new third board market listed companies. *Sustainability*, 12(9), 3733.
- Yudaruddin, R. (2023). Financial technology and performance in Islamic and conventional banks. *Journal of Islamic Accounting and Business Research*, 14(1), 100-116.
- Yuneline, M. H., & Rosanti, M. F. C. (2023). The role of digital finance, financial literacy, and lifestyle on financial behaviour. *HOLISTICA – Journal of Business and Public Administration*, 14(2), 97-115.
- Zeynalova, A. (2024). From closed banking to open banking: risks and opportunities. *Journal of Applied Business, Taxation and Economics Research*, 3(3), 303-316.