DOI 10.17977/UM

Article Type (Review article)

Mapping the Intellectual Structure of Digital Banking and Financial Inclusion: A Bibliometric Review with a Focus on BRI Innovations

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Abstract: This study aims to visualize the evolving knowledge landscape of digital banking and financial inclusion through a bibliometric analysis, with a particular focus on innovation strategies implemented by Bank Rakyat Indonesia (BRI). Using the Scopus database, a total of 48,446 documents were retrieved and filtered through the PRISMA framework. Bibliometric tools such as VOSviewer and Publish or Perish were employed to conduct co-occurrence, citation, and keyword analysis. The research identifies publication trends, thematic clusters, and key contributors to the field between 2000 and 2024. The analysis reveals that *financial inclusion* remains the core theme, strongly associated with digital transformation, blockchain, and mobile technologies. Recent trends indicate a shift towards topics such as decentralized finance (DeFi), cybersecurity, and green finance. In the Indonesian context, BRI's digital innovation strategies align with global efforts to enhance inclusive financial ecosystems. The study is limited to Scopus-indexed articles and does not capture grey literature or policy documents that may provide additional local insights.

Keywords: Digital banking, Financial inclusion, Bibliometric analysis, Fintech, BRI, Innovation, PRISMA, VOSviewer

INTRODUCTION

The evolution of financial technology (Fintech) has become a driving force in the digital transformation of the banking sector, especially to increase financial inclusion in developing countries. Fintech enables the delivery of more efficient and affordable financial services, addressing the challenges faced by communities underserved by traditional banks(Purnomo et al., 2020)Through innovations such as digital payments and app-based financial services, access to financial tools has become easier for previously unaffected or neglected groups, especially in rural areas (Agarwal & Zhang, 2020). Research shows that the adoption of mobile banking technology in developing countries has proven effective in increasing access to financial services (Siano, 2020).

Research also emphasizes that the adoption of this technology not only democratizes access to finance but also drives economic growth by enabling small entrepreneurs to obtain financing and expand their businesses (Thathsarani, 2021). The integration of Fintech in the banking sector is also closely related to the increasing awareness of the need for digital literacy among consumers (Ediagbonya & Tioluwani, 2022). Increasing financial literacy in the digital era is very important, especially to ensure that the benefits of Fintech are felt by all levels of society (Panos & Wilson, 2020). In developing countries, the importance of financial literacy can help vulnerable groups understand and

Received: XX January 2024; Revised: XX February 2024; Accepted: XX March 2024
E-ISSN XXX-XXXX/

utilize available financial services, thereby contributing to wider financial inclusion (Kumari & Devi, 2022).

One of the main challenges is the low level of information technology infrastructure in many areas in Indonesia. Most of the underserved communities are in rural areas, where access to internet networks and technological devices is limited. Research shows that the availability of reliable internet networks and accessibility of digital devices are key factors in increasing financial inclusion (Morgan, 2022). Without adequate infrastructure, efforts to introduce digital innovations such as mobile banking or other financial applications will be ineffective (Kalogiannidis, 2020). In addition, low digital literacy is a significant barrier to the adoption of digital financial services. Many of the underserved communities lack the basic skills to use technology, requiring appropriate education and training (Rethlefsen et al., 2021). Strict regulations are also a challenge often faced by financial institutions, including BRI. Inflexible policies can hinder innovation and the ability of institutions to quickly adapt to changing market needs(Musa et al., 2023). In this context, it is important for financial institutions to collaborate with regulators in creating a framework that supports innovation without sacrificing the security and stability of the financial system.

Bibliometric evaluation can provide a clear picture of the emerging research trends in this domain. A review of the number of publications, citations, and collaborations between researchers can help in the roadmap of technological innovations that can be adopted by BRI. For example, an analysis of publication trends in FinTech shows a shift in a number of related topics such as the digitization of banking services and financial inclusion, reflecting the global interest in this field (Gupta et al., 2020). By utilizing visualization tools, such as co-citation and co-authorship analysis, one can better understand how key concepts are interconnected and determine its strategic direction (Page et al., 2021). Research shows that while FinTech can improve the accessibility of financial services, there are still challenges in terms of regulation, technology adoption, and user trust that must be considered (Ullah et al., 2025). By understanding these dynamics, BRI can develop a more robust and relevant innovation strategy.

1.1 Objective

To synthesize existing research from Scopus database, identify gaps, uncover emerging trends, and provide a strong foundation for further research.
To conduct a systematic literature review to comprehensively understand the landscape of embroidery craft revival for its sustainability, the primary method used is keyword synthesis.
Q1. What is the current state of studies in terms of digital banking in financial inclusion?
Q2. What are the methods that we can use for the sustainability of digital banking in various challenges especially in BRI bank?

LITERATURE REVIEW

2.1 Digital Banking

Digital banking refers to the digitization of traditional banking services, allowing customers to perform transactions and access financial products through online platforms and mobile applications. This transformation has played a significant role in advancing

financial inclusion, particularly for underrepresented groups. Financial inclusion encompasses the accessibility of essential financial services to various demographic segments, including low-income individuals and those in remote areas. The implementation of digital banking has led to a paradigm shift in customer-bank interactions, enhancing access to financial services. Digital channels, such as mobile banking applications, enable users to conduct transactions more conveniently and at potentially lower costs, ultimately increasing the reach of banking services to underserved populations (Son et al., 2019). Such technological advancements have particularly benefited areas where traditional banking infrastructure is lacking, allowing financial institutions to extend their services effectively (Shaikh, 2023).

Moreover, mobile banking's growth is critically linked to financial inclusion, especially in developing regions. A study highlights how mobile fintech solutions can help bridge the gap for unbanked populations by providing straightforward access to financial products that were previously out of reach (Siano, 2020). The digitization of financial services can empower marginalized communities, offering them a means to save, invest, and navigate economic challenges more independently (Ediagbonya & Tioluwani, 2022). This, in turn, fosters economic growth and has the potential to reduce poverty levels (Tay, 2022).Notably, financial literacy plays a crucial role in this dynamic, as individuals need to understand digital banking tools to utilize them effectively. Research indicates that improving digital financial literacy among underrepresented groups can enhance their engagement with digital banking and financial services, thereby promoting broader financial inclusion (Hasan et al., 2022). Addressing issues such as digital literacy and privacy concerns associated with digital banking services remains essential for building trust and ensuring user satisfaction (Lappeman et al., 2022).

2.2 Financial Inclusion

Financial inclusion, particularly within the context of digital banking, refers to strategies and technologies that enhance access to financial services for underserved or unbanked populations. This concept has gained momentum with the rise of financial technology (FinTech), which employs innovative solutions to provide financial services, aiming to democratize access to banking. The role of FinTech in promoting financial inclusion is crucial. By reducing barriers such as high service fees and the need for traditional banking infrastructure inTech solutions allow marginalized groups to access essential financial services, including savings, loans, and insurance. Research indicates that digital financial services (DFS) have increased access for low-income households, enabling them to participate in savings and insurance practices that were previously inaccessible(Morgan, 2022). This is especially significant in regions like Southeast Asia and Africa, where many individuals remain unbanked due to geographical and systemic challenges.

Moreover, digital financial inclusion is associated with reductions in poverty and economic disparity. Evidence suggests that inclusive financial systems significantly contribute to economic growth by providing individuals and small businesses with the financial resources required for investment and consumption (Khera et al., 2022). Regions exhibiting higher levels of digital financial inclusion have been linked to improved living standards and decreased income inequality, as financial services become accessible to a wider portion of the population (Omar & Inaba, 2020). Blockchain technology and its transparency features can further enhance financial inclusion by

fostering trust among borrowers and financial institutions. This is particularly pertinent for underserved small and medium-sized enterprises (SMEs) that often face significant challenges in securing funding from traditional financial sources(Pal et al., 2021). Innovations such as decentralized finance (DeFi) and mobile money services are well-positioned to meet the specific financial needs of historically marginalized populations (Banna, 2021).

2.3 Bibliometric Analysis

Bibliometrics, as a quantitative and systematic analysis of scientific literature, serves several crucial functions in research. Broadly, it aids in mapping scientific knowledge, evaluating research performance, and identifying emerging trends and gaps in various fields. By utilizing bibliometric techniques, researchers can make evidence-based assessments about the intellectual landscape of their respective areas, thereby guiding future inquiry and fostering collaboration. One of the primary functions of bibliometrics is to provide a detailed overview of the publication landscape within a specific field. This includes the identification of prolific authors, influential journals, and major research themes, which can reveal the structure of knowledge in a domain. For instance, bibliometric analyses highlight significant shifts in research focus over time, as demonstrated by comprehensive studies on cancer research (Rethlefsen et al., 2021), artificial intelligence (Guo et al., 2020), and the impact of the COVID-19 pandemic on various sectors (Verma & Gustafsson, 2020). Such insights are valuable for understanding how disciplines evolve and where significant research output originates, allowing scholars to align their work with trending topics.

Moreover, bibliometrics facilitates performance evaluations for individuals, institutions, and countries. By employing quantitative measures such as citation counts and impact factors, stakeholders can assess the academic output and impact of researchers or research institutions. This is particularly useful for funding agencies and academic institutions when determining funding allocations, resource distributions, and strategic planning (Pranckutė, 2021). Furthermore, bibliometric indicators serve as benchmarks for researchers aiming to enhance their visibility and credibility within their fields (Li et al., 2022). Additionally, bibliometrics can elucidate collaboration patterns and networks among researchers. Understanding the extent and nature of co-authorship can identify collaborative trends that enhance knowledge sharing and resource utilization across disciplines (Khanra et al., 2020). Advanced bibliometric tools, such as VOSviewer or CiteSpace, can visually represent these networks, allowing for a more intuitive grasp of research interconnectivity (Tseng et al., 2021).

METHOD

The study used data from the Scopus database from 2000 to December 2024, as it is more common among researchers. With more than 48,446 journals, Scopus is one of the most comprehensive abstract and citation indexes of peer-reviewed literature. It provides affiliations, number of publications and bibliographic information about them, and the number of citations the authors have. The search for relevant articles was based on titles containing the keywords “Fintech” or “Digital Banking” or “Financial Inclusion”. We paid attention to the title because it summarizes the research area and objectives. We

retrieved 48,446 documents for bibliometric analysis, excluding four documents that were pulled from the dataset.

This study conducted bibliometric analysis using productive object analysis and social network analysis. Bibliometric analysis provides three indicators: structural, quality, and quantity. Structural indicators show how publications are related to each other, which can help identify research clusters. Quantity indicators measure research productivity, namely the number of publications. Meanwhile, quality indicators reflect researchers' performance based on citations and reputable publications, such as the number of citations, h-index, g-index, and citation score. The analysis of productive objects yields the highest productivity characterized by country/region, organization, journal, and author. Social network analysis provides structural and quality indicators. Social networks consist of nodes connecting keyword or author networks. We used three analysis tools: Microsoft Excel, VOSviewer (www.vosviewer.com) and Harzing's Publish and Perish software. These tools were used to (1) calculate the frequency of published materials and create corresponding charts and graphs, (2) create and visualize bibliometric networks, and (3) calculate citation and other frequency metrics. Figure 1 shows a search diagram using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)

RESULTS

3.1 PRISMA (Preferred Reporting Items for Systematic Review and Meta Analysis)

The process of identifying and screening literature in this study was carried out systematically through the Scopus database, resulting in 48,446 initial documents. A total of 36,255 documents were directly eliminated because the full manuscript was inaccessible, leaving 12,191 documents for further screening. After excluding 13 non-English documents and 2,614 documents that were not successfully retrieved, a total of 9,564 documents were then evaluated based on the publication period, topic relevance, and subject suitability. As a result, 3,113 documents were eliminated because they were outside the time range, 3,313 were not relevant to the main keywords (Fintech, Digital Banking, and Financial Inclusion), and 3,091 others did not match the focus of the Digital Banking subject, so that only 47 studies were finally included in the analysis.

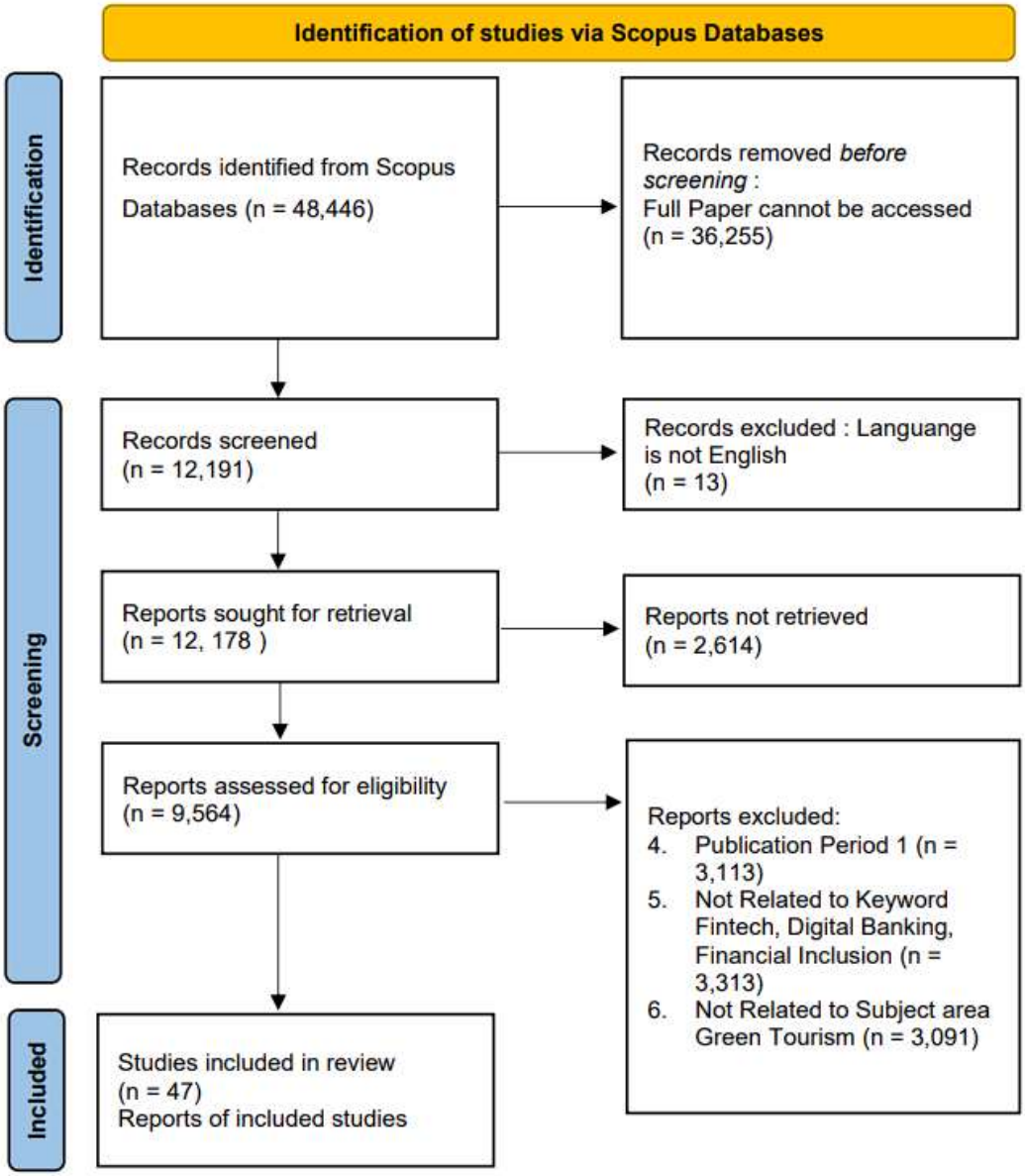

Figure 1. PRISMA

3.2 Q1 = What is the current state of knowledge regarding digital banking in financial inclusion?

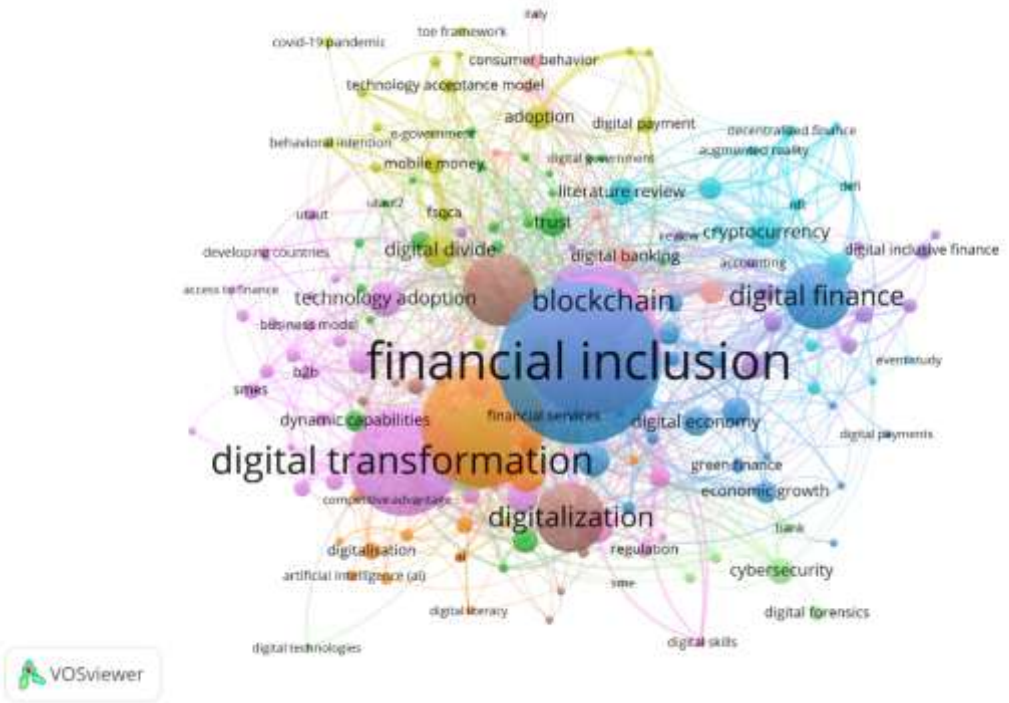

Figure 2. Preferred Reporting Items for Systematic Reviews and Meta-Analyses

This visualization shows that “financial inclusion” is the main focus in the literature, as indicated by the largest node size (circle) and central position. This means that the topic of financial inclusion often appears and has a strong relationship with various other concepts in digital finance research. Other big keywords that are directly adjacent are “digital transformation”, “blockchain”, “digital finance”, and “digitalization”, which illustrates that aspects of digital transformation and new technologies such as blockchain are closely related to efforts to increase financial inclusion. In addition, topics such as “technology adoption”, “trust”, and “mobile money” also play an important role, indicating that technology adoption and user trust are the main factors that are often studied in the context of financial inclusion and digital banking. The green cluster, for example, reflects aspects of user behavior such as the technology acceptance model (TAM), UTAUT, and behavioral intention, which are widely used in financial technology adoption studies. On the right side of the map, the interconnectedness of “digital finance”, “cryptocurrency”, “decentralized finance (DeFi)”, and “digital payment” is evident, indicating that this new digital financial ecosystem is a hot topic in the latest developments in fintech research. Meanwhile, the topics of “cybersecurity”, “digital forensics”, and “regulation” appear in more dispersed but connected areas, indicating that security and regulation are important concerns but are not yet dominant topics.

The presence of nodes such as “green finance” and “economic growth” indicates the integration of sustainability issues in fintech research, although it is still not as large as other central themes. On the other hand, “digital divide” and “developing countries” indicate an awareness of the challenges of the digital divide that can hinder financial inclusion, especially in developing countries. This map reflects that the scientific literature on digital banking and financial inclusion is highly concentrated on the

integration of digital transformation, blockchain technology, user adoption, and a focus on efforts to promote wider financial access through technological innovation. This visualization is very useful for identifying dominant themes, research trend directions, and potential gaps that have not been widely explored, such as the relationship between green finance and cybersecurity in the context of digital inclusion.

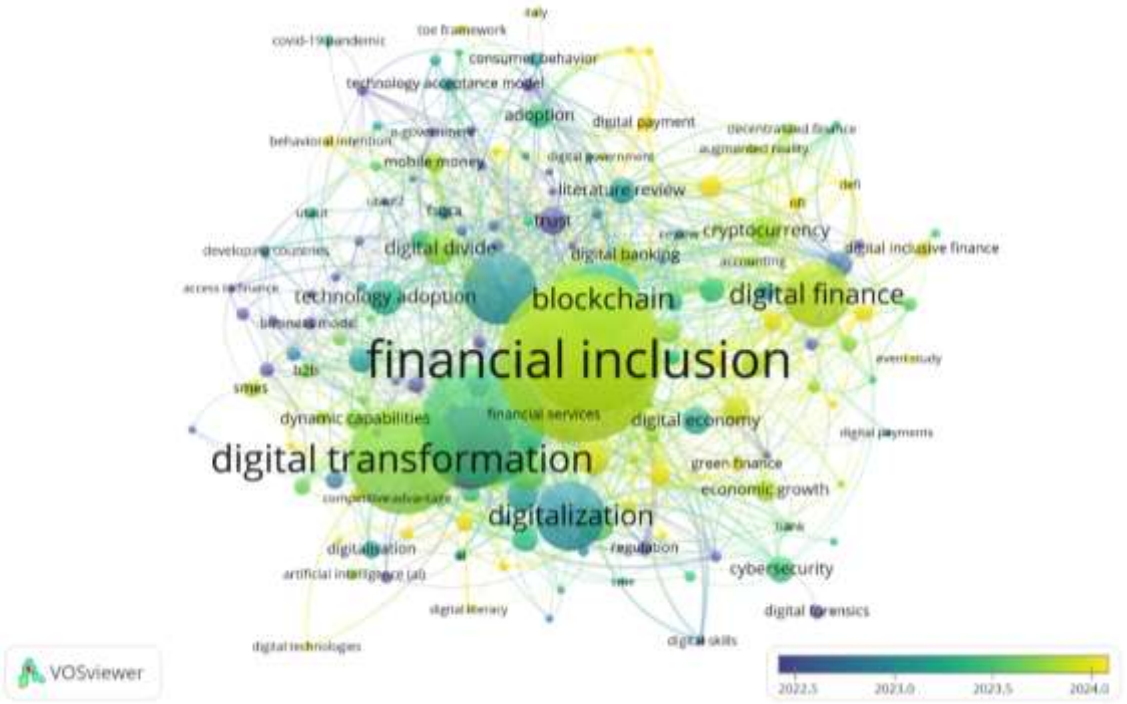

Figure 3. Overlay visualisation map of author keywords co-occurrence (2004–2024)

Other terms such as “digital transformation”, “digitalization”, and “blockchain” also have significant weight and are colored yellowish green, indicating that the focus on digital transformation and blockchain technology remains relevant and growing until 2024. This reflects the trend that financial inclusion is highly dependent on the use of these technologies. Meanwhile, topics such as “cryptocurrency”, “digital payment”, “digital finance”, and “decentralized finance (DeFi)” are shown in bright yellow. This shows that these topics are on the rise and are at the center of attention in recent publications, reflecting the latest wave of innovation in the digital and decentralized financial system space. On the other hand, blue nodes such as “mobile money”, “technology adoption”, “trust”, and “digital divide” are topics that have been part of the discussion for a long time but are still relevant. The focus on the digital divide and adoption shows that the long-standing challenges of technology access and acceptance gaps have not been fully resolved, especially in developing countries. The appearance of terms such as “green finance,” “economic growth,” and “digital forensics” in green indicates that sustainability and digital security issues have begun to gain more attention in recent years. While still not as dominant as other topics, their presence in this visualization indicates an expansion of the literature’s focus towards ESG and risk mitigation.

Figure 4. Density visualisation map of citations (2005-2024)

Other keywords that also show high density and are in the bright yellow-green zone are "digital transformation", "digitalization", "blockchain", "digital finance", and "technology adoption". The presence of these words in dense areas indicates that they are highly influential concepts and are often associated with relevant research. This means that digital transformation and new technologies are the main pillars in efforts to promote financial inclusion widely. On the edge of the map, terms such as "cybersecurity", "green finance", "digital forensics", and "augmented reality" appear, which are displayed in a blue or bluish green background. This shows that these topics are still relatively new or not as intensive as the main density centers, although they show potential as new directions in the development of literature. For example, "green finance" is starting to be raised in the context of digital financial sustainability, while "cybersecurity" is a concern related to risk and trust in digital banking. Topics such as "mobile money", "trust", and "digital divide" are also present in the green zone, indicating that although not as popular as the central topics, they remain relevant especially in the context of financial technology adoption in developing countries. "Trust" and "technology acceptance models" even become important bridges in the study of user behavior towards digital banking adoption.

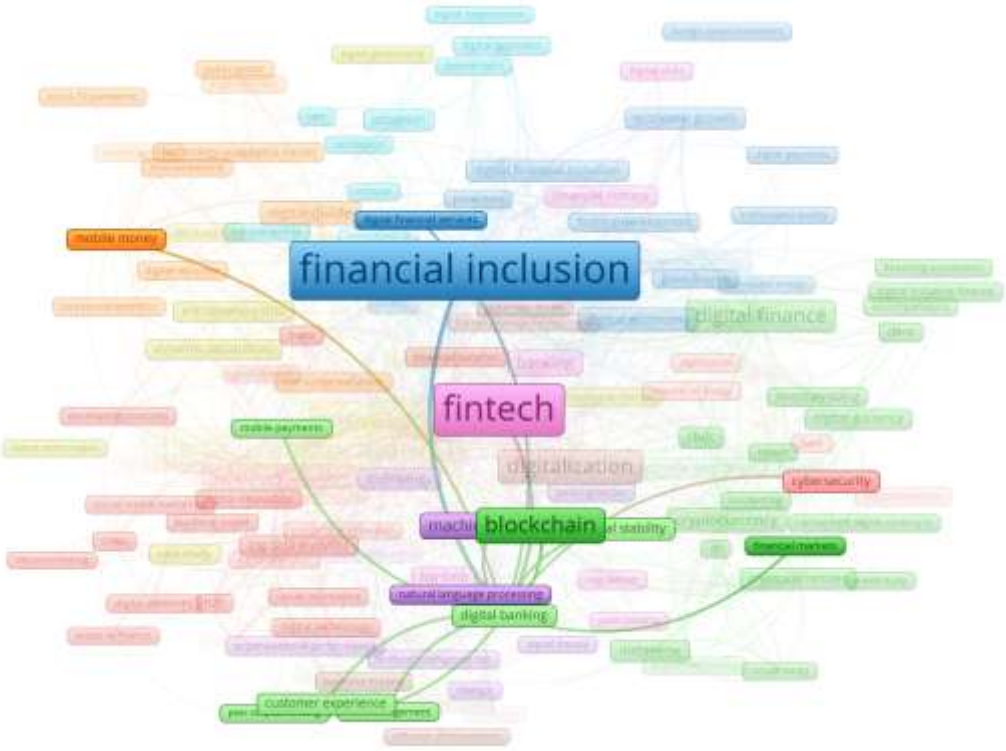

Figure 5. Digital Banking in Financial Inclusion

In this bibliometric visualization, the keyword digital banking occupies a strategic position in the literature landscape that examines the relationship between financial technology, financial inclusion, and digital transformation. Although not as large as financial inclusion or blockchain, the presence of digital banking amidst various important terms shows that this topic functions as a link between technological innovation and modern financial services. This is reflected in its close relationship with various cutting-edge concepts such as cryptocurrency, digital currency, and central bank digital currency (CBDC) which describe a comprehensive transformation in the monetary system and broader digital financial services.

In addition, digital banking also shows a strong closeness to issues such as cybersecurity and digital forensics, indicating that the security aspect is a primary concern in the development of a digital banking system. In this context, user trust and personal data protection are important elements that help determine the level of adoption and sustainability of digital banking services. Its relationship with regulation and digital literacy adds a critical dimension to consumer readiness and the responsibility of authorities in creating a safe, inclusive, and orderly digital financial ecosystem.

Interestingly, digital banking has also begun to explore new, more experimental areas such as open banking, metaverse, and augmented reality. This reflects the future direction of banking services that are no longer focused solely on conventional transactions via the internet, but rather developing into a more interactive, open, and integrated financial experience with various new technology platforms. Therefore, in this conceptual map, digital banking appears not only as a technical topic, but also as an interdisciplinary field

of study that combines innovation, security, regulation, and inclusion in one large framework. With this position, digital banking plays an important role in driving the digital transformation of the financial sector while expanding public financial access and participation, especially through the use of adaptive and inclusive digital technology. This visualization indirectly shows that digital banking is not only a bridge for financial innovation, but also one of the main pillars in the development of a sustainable global digital financial ecosystem.

DISCUSSION

4.1 Q2. What are the methods we can use for digital banking sustainability in various challenges?

The sustainability of digital banking services, especially at Bank Rakyat Indonesia (BRI), requires a comprehensive approach to address the various challenges that exist. Methods that can be applied include strengthening information technology, improving customer experience, creating financial inclusion policies, and improving cybersecurity. First, the adoption of blockchain technology can be a solution to increase transparency and credibility in financial transactions. This technology allows BRI to reach previously marginalized market segments, such as micro and small businesses, by offering financial products that can be accessed at low costs (Ali & Aysan, 2025). The use of blockchain in financial services can reduce the risk of fraud and increase operational efficiency, thereby encouraging customer trust in digital services (Ibnou-Laaroussi et al., 2020). In addition, this technology also allows further integration with fintech startups to create innovative new services (Tsindeliani et al., 2021).

Second, improving customer experience through chatbot-based services is important in the sustainability of digital banking. Research shows that the quality of information provided by chatbots contributes to increased customer satisfaction and trust, which are key to maintaining market share in the digital era (Anh et al., 2023). In addition, banks need to build user-friendly and responsive interfaces, to ensure that customers can access services easily and efficiently (Talwar et al., 2022). This is increasingly important amid changes in customer behavior triggered by the COVID-19 pandemic, which has increased reliance on digital services (Kaur et al., 2021). Third, the implementation of financial inclusion policies that support access to services for all levels of society is also very vital. Through digitalization, BRI can facilitate financial access for previously underserved segments of society, such as farmers and small business actors in remote areas. Conducting financial education campaigns to improve people's digital literacy must also be prioritized, so that they are better able to use the services offered (Sunio et al., 2023). Improving cybersecurity must be a top priority in the development of digital services. To protect customer data and prevent cyber attacks, BRI needs to invest in advanced information system technology and train employees to understand the associated risks (Johri & Kumar, 2023). Research shows that customers are increasingly aware of security and privacy issues, so banks that can demonstrate their commitment to security can build stronger relationships and increase trust (Narsimha et al., 2022).

CONCLUSION

This study makes a significant contribution to understanding the global knowledge landscape on digital banking and financial inclusion through a bibliometric approach based on Scopus data. By utilizing keyword network visualization methods and scientific mapping using VOSviewer and the PRISMA approach, this study not only identifies current research trends but also reveals the relationship between topics such as digital transformation, blockchain, financial literacy, to green finance and cybersecurity that are now starting to emerge in the global literature. The uniqueness (novelty) of this study lies in the combination of international-scale bibliometric synthesis and national application contexts through a spotlight on digital innovation carried out by Bank Rakyat Indonesia (BRI). This study not only describes an academic intellectual map but also provides an evidential basis for BRI in designing a more adaptive and inclusive innovation strategy. The finding that financial inclusion, technology adoption, and digital trust are dominant nodes in the research network shows that BRI needs to continue to strengthen people's digital literacy, build a secure system, and expand the reach of technology-based financial services to reach unbanked and underserved groups.

Furthermore, the results of this study can be utilized by BRI in three strategic aspects: first, as a basis for identifying technology development priorities that are relevant to global trends; second, as a basis for designing academic and technology partnerships that are in line with the world's leading research themes; and third, as a reference for strengthening BRI's position as a national leader in sustainable digital financial inclusion. By understanding the direction of BRI's research and position in the global digital financial ecosystem, it is hoped that this institution will be able to strengthen its role not only as a financial service provider, but also as a pioneer in Indonesia's digital economic transformation.

Implication

These findings strengthen the theoretical understanding of digital financial inclusion and point to new directions in global research such as green finance and cybersecurity. Practically, this study provides a basis for BRI to design adaptive innovation strategies. For policymakers, these results can be a reference in formulating regulations that support inclusive and sustainable digital transformation.

Limitation and Future Direction

The study is limited to Scopus-indexed articles and does not capture grey literature or policy documents that may provide additional local insights. Future research could integrate qualitative content analysis to deepen the socio-political dimensions of digital banking in rural areas.

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