Bridging the Gap: Digital Finance, Financial Inclusion, and Their Impact on Economic Growth in Sub-Saharan Africa – A Systematic Review with Policy Insights

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Abstract
This systematic review explores the interplay between digital finance, financial inclusion, and economic growth, with a focus on emerging economies such as Sub-Saharan Africa. Synthesizing findings from 160 peer-reviewed studies (2016–2024), it examines how digital financial technologies, including mobile banking and blockchain, are transforming access to financial services and fostering inclusive growth. Key findings highlight that digital finance significantly enhances credit access, empowers small enterprises, and drives entrepreneurship, though its impact is moderated by digital literacy, regulatory frameworks, and infrastructure disparities. This review identifies critical barriers, such as the urban-rural digital divide and cybersecurity risks, and emphasizes the role of governance in optimizing outcomes. Furthermore, it aligns digital finance with Environmental, Social, and Governance (ESG) objectives, underscoring its potential to reduce socio-economic disparities and promote equitable development. Policymakers are urged to prioritize investments in digital infrastructure and literacy programs to create resilient and inclusive financial ecosystems. This study contributes novel insights by mapping thematic trends and presenting actionable frameworks for leveraging digital finance as a driver of sustainable economic growth in underserved regions.
Keywords: *Digital finance, Inclusive finance, Economic growth, Digital transformation, ESG, Sub-Saharan Africa, Financial innovation, Governance*.
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Introduction

Digital Finance has played a profound role in shaping and transforming economies, industries, and developing the financial system to improve the socio-economic landscape. It has been a catalyst in the development of the global financial sector. These effects have been magnified in the role they have played in advancing underserved regions such as Sub-Saharan Africa and Southeast Asia, where it has enabled access to financial services (Demirguc-Kunt & Klapper, 2012; Nguyen et al., 2020). Digitalization has broken the barriers to financial services and enabled banks to reach out to underserved populations and support sustainable development by enhancing inclusive growth (Jia & Jingbo, 2020; Berg et al., 2020).

Though Africa has shown improvements in economic growth through the years, the level of income inequality has challenged inclusive growth in many countries. Inclusive growth has been beneficial to marginalized communities due to its significance in creating social opportunities by generating employment and enabling the distribution of wealth (Greenwald & Stiglitz, 2013). Digital finance also plays a significant role by reducing transaction costs, increasing per capita consumption, and reducing the poverty gap (Asongu et al., 2022). Digital technologies explained by ICT infrastructures such as cellular phones, internet penetration, hardware, and software systems have impacted financial services and financial inclusion through the automation of processes in the global financial market in general and the African banking sector in particular.

In the absence of traditional banking infrastructure in developing regions, digital channels play an insurmountable role in broadening access to credit, savings, and insurance (Li & Pang, 2023; Chouaibi et al., 2021). The transformative role M-Pesa has played in Kenya through financial inclusion and empowering the local economy is a testament that digital finance can bypass intermediaries and provide the much-needed access to finance for Micro and Small Enterprises (MSEs) (Gambacorta et al., 2020). The use of blockchain and AI-driven credit scoring further exemplifies how digital innovation can facilitate access to financial resources while reducing risk (Aziz & Naima, 2021).

While digital finance enhances accessibility, it also introduces challenges related to digital literacy, regulatory frameworks, and cybersecurity, particularly in low-income settings. The potential for financial inclusion to stimulate economic growth is substantial, as seen through studies that link access to finance with improvements in health, education, and business growth in emerging economies (Aghion et al., 2012). However, these effects vary considerably based on factors like digital literacy and infrastructure quality, which impact the effectiveness of digital finance in fostering growth (Christensen et al., 2021). Furthermore, research has highlighted that while digital transformation promotes financial inclusion; its success is mediated by institutional frameworks, market structure, and socioeconomic variables unique to each context (Muyuan & Hong, 2019; Long et al., 2023).

Table 1: Regional indicators of financial Inclusion

Country Name	Account ownership	Credit to private sector by banks (% of GDP)	Domestic savings (% of GDP)	Credit to private sector (% GDP)	Population,
East Asia & Pacific	82.85	155.689	39.10	156.00	2370214403
Latin America & Caribbean	73.55	47.61	19.60	47.20	654978670
South Asia	67.89	46.40	26.03	46.42	1901911604
Sub-Saharan Africa	55.07	26.45	12.20	26.92	1181163013

Source: Authors compilation based on World Bank data (2021)

The qualitative analysis of the data on table 1 on regional financial inclusion indicator above reveal significant differences in financial indicators across global regions, with the East Asia & Pacific region generally outperforming others in most categories. This analysis highlights the disparities in account ownership, domestic credit, savings, and population across region. The sub-Saharan region has showed lower account ownership access to credit and saving compared to the total population. This strengthens the argument that the banking service needs to be robust to address the growing population through technology in order to achieve sustainable development goals.

This systematic review examines the role of digital transformation in facilitating inclusive finance and fostering economic growth by analyzing empirical studies to uncover critical approaches and remaining challenges in developing and emerging economies. Among other factors, inclusive finance, or the democratization of financial services, has long been associated with improvements in economic stability and growth.

While prior studies such as Zhang et al., (2023) and **Gui et al., (2022)** have explored the independent roles of digital finance and inclusive growth, few have examined how governance and digital infrastructure mediate this relationship to address systemic inequalities in underserved regions. By evaluating the interplay between digital innovation and financial inclusion, this study contributes to the growing discourse on how digital finance mechanisms can overcome socioeconomic barriers to foster economic growth. This synthesis will illuminate pathways for policy and practice, highlighting digital finance's potential to contribute to sustainable economic development across various institutional and social landscapes.

Related Works

The nexus between digital transformation, inclusive finance, and economic growth has garnered significant scholarly interest, with recent literature exploring how advancements in digital finance catalyze economic inclusion and growth across diverse socio-economic contexts. This section synthesizes insights from a systematic array of studies to address the multifaceted dynamics within this interplay, identifying key drivers, barriers, and contextual dependencies.

Fintech and Inclusive Finance

Digital transformation, characterized by the integration of digital technologies into financial systems, is widely recognized for its role in expanding financial inclusion and reshaping traditional banking structures. Studies from Sub-Saharan Africa illustrate that digital finance solutions, such as mobile banking and payment platforms, provide accessible alternatives to formal banking, thus reaching previously underserved populations and increasing financial inclusion (Li & Pang, 2023; Nguyen et al., 2020). This trend has been particularly impactful in regions where structural barriers limit the penetration of conventional banking services, allowing individuals and small enterprises to engage in formal economic activity (Galema, 2020; Wang et al., 2022).

Sustainable financial inclusion doesn't come from digital finance alone, it requires unreserved regulatory support from the government, improvement in financial literacy and robust infrastructure. Berg et al., (2020), Jiayu et al., (2020), and Dziadkowiec & Daszyńska-Żygadło, (2021) emphasize that gaps in digital infrastructure and literacy limits equitable financial inclusion as it requires digital accessibility and end-user understanding.

For instance, while mobile banking services have proliferated in urban areas, rural regions remain underserved due to connectivity issues and a lack of digital literacy, thereby exacerbating urban-rural divides in financial access (Long et al., 2023). Moreover, in contexts where digital ecosystems are still emerging, financial institutions face challenges related to data security, regulatory alignment, and digital fraud prevention, all of which threaten the trust and engagement of marginalized populations (Flammer, 2021; Aziz & Naima, 2021). As a result, these issues underscore the need for tailored policies that account for regional digital divides, such as investment in ICT infrastructure and targeted digital literacy programs.

The Impact of Inclusive Finance on Economic Growth

Inclusive finance is shown to be a vital driver of economic growth, primarily through its facilitation of capital access, entrepreneurship, and poverty alleviation (Muyuan & Hong, 2019; Martins, 2022). Access to digital financial services has proven to be particularly effective in empowering small and medium enterprises (SMEs), which are often excluded from traditional credit channels due to limited credit history and collateral constraints (Demirguc-Kunt & Klapper, 2012). The role of digital finance in providing microcredit, mobile savings, and digital payment solutions to SMEs has been associated with increased productivity and market participation, which in turn contribute to regional economic resilience and growth (Xin & Ying, 2021). However, while inclusive finance promotes growth, it does not uniformly reduce inequality. Evidence from North African economies suggests that while digital finance accelerates growth, it may also intensify disparities if not accompanied by equitable access policies (Aghion et al., 2012; Longsheng & Hui, 2022).

In addition, the effectiveness of digital finance in fostering growth is contingent on the presence of enabling factors, including regulatory frameworks, governance standards, and financial stability. For instance, studies indicate that in regions where digital finance regulations are insufficient, the potential for financial inclusion to stimulate economic growth is weakened, as regulatory vacuums may lead to increased financial vulnerability and exploitation (Shen et al., 2019; Pedersen et al., 2021). Therefore, robust governance systems and supportive policies are essential to harness the full potential of digital finance as a growth driver, especially in low-income regions where regulatory frameworks are still evolving (Christensen et al., 2021).

Challenges in Ensuring Sustainable and Equitable Growth

While digital transformation and inclusive finance create new opportunities for economic growth, these advancements also pose sustainability challenges. Research on corporate social responsibility (CSR) and environmental, social, and governance (ESG) frameworks reveals that digital finance initiatives may inadvertently contribute to environmental degradation if sustainability practices are not integrated into their design (Li et al., 2018; Wong et al., 2021). In high-polluting sectors, for instance, digital finance has been linked to enhanced corporate ESG performance only when combined with specific green technology initiatives and stringent regulatory oversight (Song et al., 2020). This correlation underscores the importance of aligning digital finance initiatives with broader ESG standards to promote responsible economic growth that does not come at the expense of environmental well-being (Zhang et al., 2020; Kaitao et al., 2023).

Additionally, while digital inclusive finance enables access, it also introduces new risks, including increased surveillance, data privacy concerns, and the potential for deepening economic divides among digitally excluded populations. Studies highlight the rise of fintech as a double-edged sword in developing economies; while it facilitates financial access, it can also contribute to financial insecurity when regulatory and data protections are inadequate (Ping & Junxia, 2020; Christensen et al., 2021). These risks are particularly pronounced in economies where data privacy frameworks are underdeveloped, potentially leading to exploitation by fintech firms and creating new forms of financial exclusion for marginalized populations (Stroebel & Wurgler, 2021; Huang et al., 2019).

Contextual Variability and Future Directions

The impact of digital transformation and inclusive finance on economic growth varies significantly based on local economic structures, institutional quality, and the maturity of digital ecosystems. Studies in high-growth sectors, such as information technology and manufacturing, show that digital finance and fintech contribute substantially to firm-level growth and innovation, provided that these sectors operate in supportive regulatory and economic environments (Yu et al., 2022; Pedersen et al., 2021). However, the digital finance-growth nexus appears less effective in regions with limited institutional capacity, such as low-income or politically unstable areas, where financial inclusion may exacerbate vulnerabilities rather than fostering growth (Jingjing & Ye, 2020; Berg et al., 2020). This heterogeneity highlights the need for context-specific interventions that consider local economic realities and prioritize sustainable, inclusive growth across sectors.

In light of these findings, future research should explore longitudinal impacts of digital finance on economic inclusivity, particularly regarding how digital innovations influence financial stability, ESG performance, and income distribution over time. An emphasis on cross-regional studies and comparative analysis would also offer valuable insights into the ways digital transformation can be tailored to enhance inclusivity and mitigate potential risks in varied socio-economic settings (Dziadkowiec & Daszyńska-Żygadło, 2021; Kaitao et al., 2023). Additionally, deeper integration of ESG frameworks within digital finance models is crucial for fostering sustainable development that aligns with global goals, such as poverty reduction and climate resilience.

The literature underscores the transformative potential of digital finance in advancing economic growth and inclusivity, while also cautioning against the unintended consequences that may arise in its absence of appropriate regulatory oversight and supportive socio-economic policies. Achieving a balanced and sustainable approach to digital finance will require adaptive governance, ESG alignment, and a focus on inclusivity that considers the unique needs of different regions and sectors. As digital finance continues to evolve, this interplay remains a critical area for future research, with implications for policymakers, financial institutions, and stakeholders committed to leveraging digital technology as a force for inclusive and sustainable economic growth. Table 2 below summarizes the major topics, methods used and the findings from each of the relevant authors who have shaped the result of this review process.

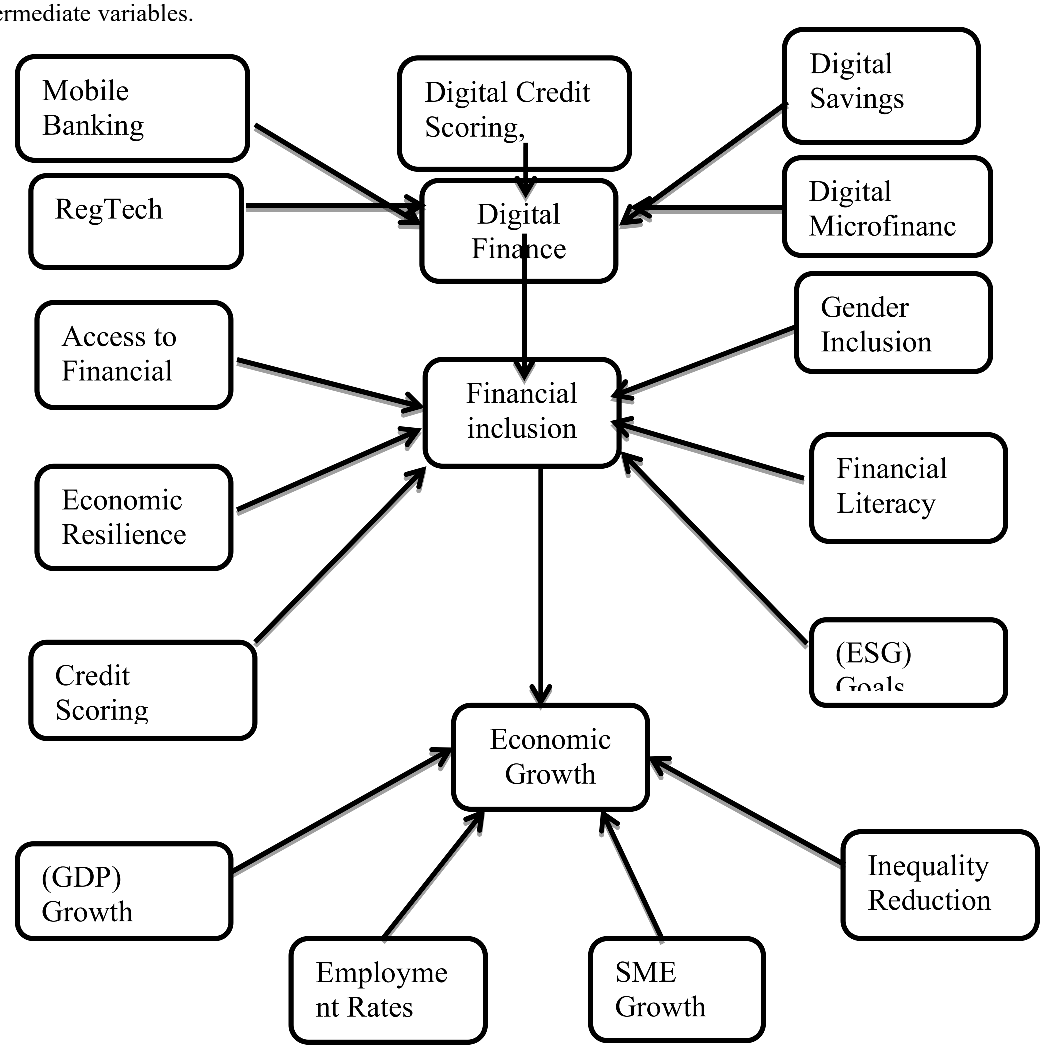
Table 2: Selected Articles and Digitalization and Financial Inclusion

Author (Year)	Method Used	Main Finding
Gui et al. (2022)	Bayesian Regression Trees (BART)	Digital finance indicators like usage depth and digitization significantly impact economic growth, with more pronounced effects in digitally advanced regions.
Li et al. (2022)	Panel Data Analysis	Digital finance promotes industrial transformation by optimizing and rationalizing the industrial structure, especially in low-income regions.
Zhang et al. (2023)	Threshold Regression	Digital inclusive finance promotes SME innovation, with higher impacts in tech-forward and high-income regions.
Wu & Liu (2021)	Dynamic Panel Data (GMM)	Digital finance facilitates financial inclusion, significantly contributing to GDP growth in underserved regions.
Muyuan & Hong (2019)	Structural Equation Modeling (SEM)	Digital financial inclusion enhances financial access, influencing SME innovation and sector-wide competitiveness.
Nguyen et al. (2020)	Spatial Econometrics	Digital finance drives economic growth through reduced transaction costs and increased market access, with spillover effects in neighboring regions.
Christensen et al. (2021)	Threshold Analysis	Inclusive finance's impact on growth is higher in digitally literate regions; digital infrastructure investment is crucial for maximizing benefits.
Gambacorta et al. (2020)	Fixed Effects Panel Model	Mobile banking platforms significantly improve financial inclusivity and empower local economies.
Jia & Jingbo (2020)	SEM	Digital finance mitigates financing constraints, promoting entrepreneurial activities and economic growth.
Chouaibi et al. (2021)	Generalized Method of Moments (GMM)	Inclusive finance directly impacts economic stability and resilience, with supportive policies further enhancing this impact.
Li & Pang (2023)	DiD with Propensity Score Matching	Inclusive finance positively affects economic growth, particularly when paired with digital infrastructure and regulatory support.
Yang et al. (2022)	Fixed and Random Effects Models	Digital finance reduces financing constraints for SMEs, facilitating technology investments and innovation.
Aziz & Naima (2021)	Financial Regulatory Analysis	Digital finance benefits from adaptive regulatory environments, which foster safe experimentation and expand access.
Liu et al. (2022)	SEM and ESG Impact Analysis	Digital finance contributes to corporate ESG goals, especially through improved transparency and green financing initiatives.

Author (Year)	Method Used	Main Finding
Long et al. (2023)	DiD and Policy Impact Analysis	Digital finance's benefits are maximized under adaptive regulatory systems that ensure security and compliance.
Huang et al. (2023)	Bibliometric and Network Analysis	Research on digital finance and ESG goals is increasing, emphasizing transparency and sustainable investments as key drivers.
Cao et al. (2023)	Threshold Regression	Digital inclusive finance drives SME growth, especially in regions with high digital literacy.
Wang et al. (2022)	SEM with Spatial Econometrics	Inclusive finance promotes regional economic growth, with digital finance reducing poverty rates and supporting local economies.
Liu Chunlan (2021)	Panel Data Analysis and Regional Comparison	Digital finance spurs regional innovation and growth, with pronounced effects in low-income and high-tech sectors.
Fei et al. (2022)	Propensity Score Matching and DiD	Financial inclusion policies improve income equality and economic stability, especially in underserved populations.

Figure 1: Conceptual Framework:

Based on the various findings and links on the journals the authors have identified the following conceptual links (Figure 1) to address the interplay between digital finance, financial inclusion and economic growth along with their intermediate variables.



3.Materials and Methods

Research on digitalization, inclusive finance, and economic growth has harnessed a sophisticated blend of advanced methodologies, with the majority converging on dynamic econometric models that capture both the temporal and spatial complexities of these transformative forces. Central to these studies are fixed-effects and random-effects panel regressions, which reveal longitudinal and cross-regional trends, while dynamic panel techniques like the Generalized Method of Moments (GMM) rigorously address endogeneity and strengthen causal inference in examining lasting economic impacts. Threshold regression models introduce an innovative lens by identifying pivotal points—such as critical levels of income or digital finance adoption—at which the effects of digitalization and financial inclusion become particularly pronounced, revealing nuanced insights into how these forces shape economic landscapes. The Bayesian Additive Regression Trees (BART) model stands out for capturing nonlinear and multidimensional relationships without risking overfitting, proving especially effective in predictive studies on digital finance's economic impact. Structural Equation Modeling (SEM) adds further depth by tracing direct and indirect causal pathways, providing a layered understanding of how digital finance mechanisms influence SMEs, innovation, and ESG (Environmental, Social, and Governance) outcomes.

To strengthen causal claims, Difference-in-Differences (DiD) analysis, often paired with Propensity Score Matching (PSM), effectively mitigates selection bias, particularly in evaluating policy effects on financial inclusion. Spatial econometric models, meanwhile, expand the scope by incorporating inter-regional spillovers, illustrating how digital and financial development in one region impacts its neighbors. Descriptive and network analyses in bibliometric studies also reveal influential research clusters, mapping the thematic evolution of digital finance and its links to economic growth. Together, these methods form a powerful and nuanced analytical toolkit, offering a granular, multidimensional view of how digital transformation and inclusive finance collectively drive sustainable economic development.

Search Strategy

To ensure the reliability and rigor of the study, we exclusively reviewed peer-reviewed articles retrieved from the Scopus database. This method guarantees the credibility of the research while providing a robust framework to refine our search in line with the study's objectives. The systematic review aims to comprehensively analyze the intricate relationship between digitalization, financial inclusion, and economic growth, with a particular focus on governance and institutional quality as critical enablers of digital transformation and financial access.

The review adhered to the stringent guidelines of the Preferred Reporting Items for Systematic Reviews (PRISMA: Figure 2) to ensure transparency and methodological rigor. A comprehensive search strategy targeted peer-reviewed articles and working papers published between 2016 and 2023, a timeframe reflecting significant academic and policy interest in these themes. The search employed strategic combinations of keywords, including "digital financial inclusion," "economic growth," "financial inclusion," "governance," "institutions," "digital literacy," "Sub-Saharan Africa," "mobile money," and "financial development." The scope was deliberately confined to studies focusing on Africa to provide region-specific insights. Additional relevant articles were identified through meticulous manual reviews of reference lists from the initially selected studies, further enriching the dataset.

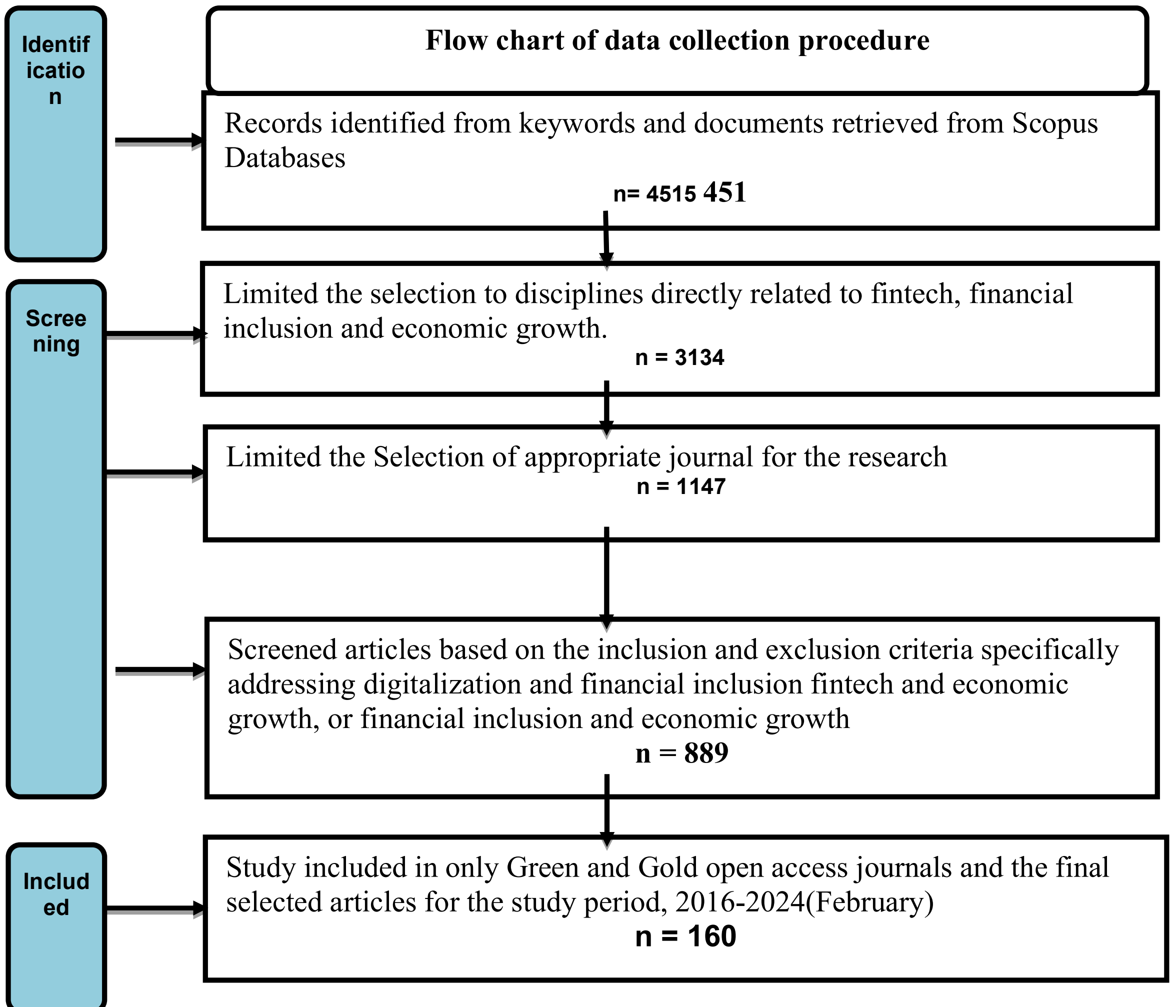


Figure 2: Flow chart of data collection. Source: Authors

Inclusion and Exclusion Criteria

The study applied rigorous inclusion criteria to ensure the reliability and relevance of the research. It focused exclusively on studies conducted in African countries, examining digital financial inclusion, digital literacy, or financial technologies such as mobile banking. Additionally, it included studies that evaluated the impact of digitalization on financial inclusion, economic growth, and financial development. To maintain methodological consistency, the review was limited to peer-reviewed articles published between January 2016 and February 2024 and written in English.

Non-peer-reviewed articles, working papers, and book chapters were excluded to uphold empirical rigor. Similarly, studies that lacked empirical evidence or relied solely on qualitative methodologies were not considered. Opinion pieces, commentaries, and editorials were omitted, as they do not provide empirical support for their arguments. Furthermore, the review specifically excluded studies focusing on insurtech, as the scope was restricted to depository institutions and their role in promoting digital financial inclusion. These criteria ensured a focused and reliable analysis of the nexus between digitalization, financial inclusion, and economic growth.

Data Extraction

The variables addressed in the study included key indicators of digital financial inclusion (e.g., mobile banking and internet use), economic growth (e.g., GDP per capita), and institutional quality, governance, and control variables such as inflation and trade openness. Given the diversity in study designs and methodologies, a narrative synthesis approach was adopted to summarize the findings effectively. The studies were categorized into four main themes: the impact of digital financial inclusion on economic growth; the role of institutional quality and governance in advancing digital financial inclusion; the influence of digital literacy on financial inclusion and the adoption of technology; and the contribution of digital technologies, such as mobile banking, to improving financial inclusion and economic development.

The narrative synthesis involved a comparative analysis of results across studies, identifying consistent patterns, and drawing attention to notable divergences or gaps in the literature. This approach facilitated a nuanced understanding of the findings, particularly in light of the variations in study designs and outcome measures. Due to these variations, no formal meta-analysis was conducted, ensuring that the conclusions remained grounded in the heterogeneity of the available evidence.

Results

Annual scientific production

The annual scientific production data from the Scopus database in Figure 3 below reveals a consistent and remarkable growth in publications within the field between 2016 and 2024. Starting with just two articles in 2016, the number of publications increased steadily, with a significant surge beginning in 2019. By 2023, the output had risen to 38 articles, reaching a peak of 43 articles in 2024, demonstrating a sustained and growing interest in the subject. This upward trajectory underscores the escalating focus on leveraging digitalization and fintech to enhance financial inclusion and drive economic growth. The rapid technological advancements and their broader applications across countries are fostering innovative solutions to address global inequality, further solidifying the critical role of digital technologies in creating inclusive and equitable economic opportunities.

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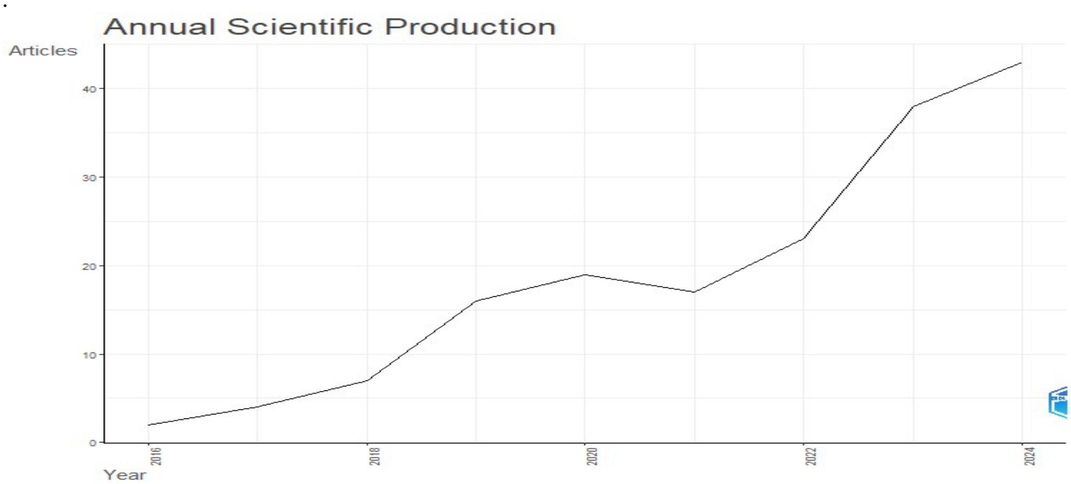

Figure 3: Annual scientific production: Source: Authors

Most relevant sources

As explained in the co-occurrence analysis in Figure 4 and 5, although this study primarily utilized Scopus as its main database, the topic of digitalization and financial inclusion has been extensively addressed across various other sources. Analysis of these sources reveals that *Cogent Economics and Finance* stands out as the most influential contributor, with 28 articles dedicated to exploring the intersection of digital financial inclusion and economic growth. This journal plays a leading role in advancing the discourse on inclusive finance through digitalization, particularly in promoting economic growth within developing countries.

Additionally, other journals such as *Technological Forecasting and Social Change* and *Cogent Business and Management* have made significant contributions by focusing on the interplay of technology, social dynamics, and business practices. Together, these journals highlight a multidisciplinary approach to the field, integrating perspectives from economics, technology, and management. This comprehensive lens provides a more holistic understanding of how digital finance serves as a catalyst for inclusive economic growth.

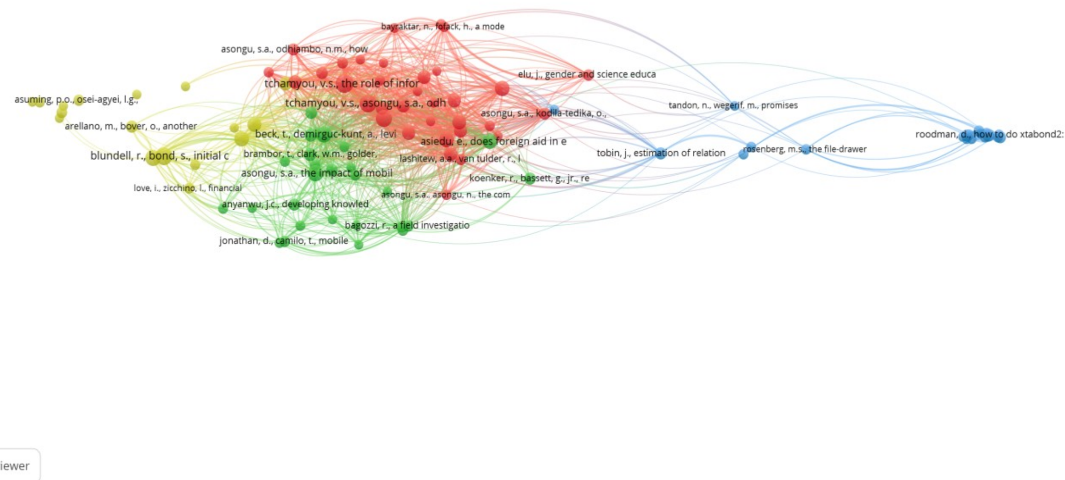

Figure 4: Most Cited articles. Source: Authors

Figure 5: Most relevant sources

Table 3: Most Cited Articles

The table 3 below also amplifies how fintech, financial inclusion and economic growth have become the center of attention for policy makers and the top 10 most cited articles in digitalization and financial inclusion shows the relevance of the topic in addressing social and economic resilience.

SN	Authors	Title	Year	Cited by
1	Asongu S.A., Le Roux S.	Enhancing ICT for inclusive human development in Sub-Saharan Africa	2017	249
2	Tchamyou V.S., Asongu S.A., Odhiambo N.M.	The Role of ICT in Modulating the Effect of Education and Lifelong Learning on Income Inequality in Africa	2019	222
3	Ozili P.K.	Financial inclusion research around the world: A review	2021	180
4	Asongu S.A., Odhiambo N.M.	Foreign direct investment, information technology, and economic growth dynamics in Sub-Saharan Africa	2020	164
5	Asongu S.A., Odhiambo N.M.	How enhancing information and communication technology has contributed to financial access in Africa	2019	150
6	Pradhan R.P., Arvin M.B., et al.	Sustainable economic development in India: The role of ICT and financial development	2021	147
7	Meniago C., Asongu S.A.	Revisiting the finance-inequality nexus in a panel of African countries	2018	129
8	Asongu S.A., Odhiambo N.M.	Basic formal education quality, information technology, and inclusive human development in Sub-Saharan Africa	2019	94
9	Asongu S.A., Nwachukwu J.C.	Educational quality thresholds in the diffusion of knowledge with mobile phones for inclusive human development in Sub-Saharan Africa	2018	94
10	Asongu S.A., Odhiambo N.M.	Challenges of Doing Business in Africa: A Systematic Review	2019	87

Trending topics

The analysis of trending issues highlights a growing body of research on digital financial inclusion, economic development, and related technological advancements. The data extracted on figure 6 underscores global efforts to address inequality, which has become an increasingly urgent issue. In underserved regions such as Sub-Saharan Africa, mobile banking has emerged as a vital tool for advancing fintech, complemented by digital literacy initiatives. These efforts align with broader strategies to foster economic resilience and promote equitable growth through digital innovation.

As digital finance continues to expand, studies emphasize the importance of regulatory frameworks, governance, and infrastructure development in maximizing the benefits of financial inclusion. These studies serve not only as crucial policy tools but also as foundational references for future research aimed at addressing socio-economic challenges. The figures below illustrate the growing relevance of this field, showcasing its role in tackling macroeconomic issues over time. It also highlights the most impactful technologies driving progress, as evidenced by keyword co-occurrence analysis.

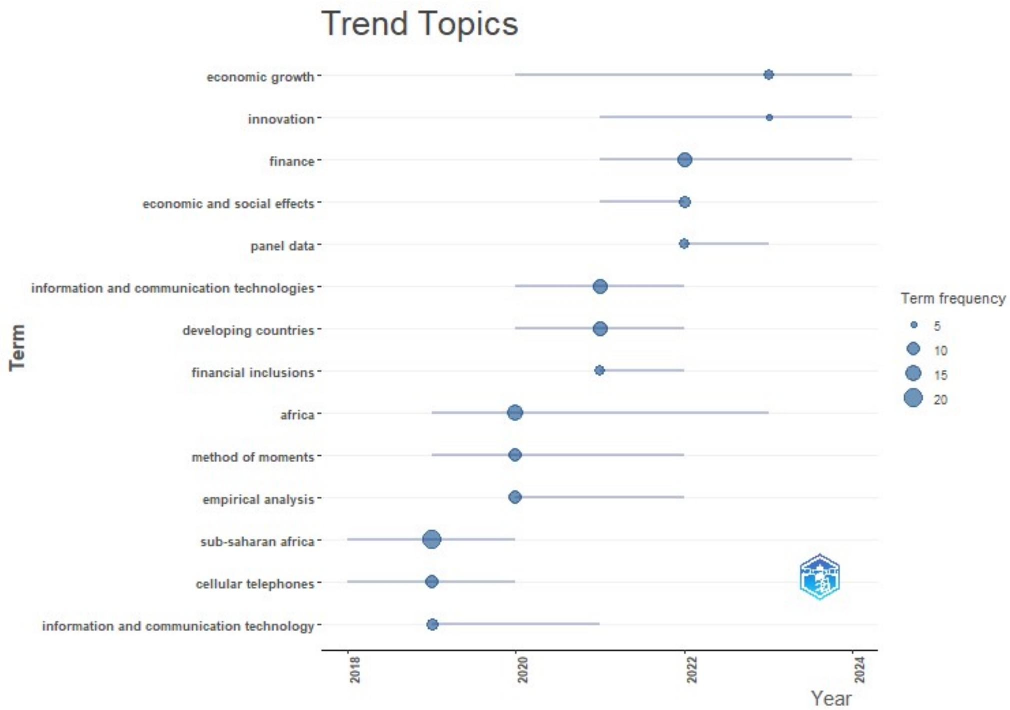

Figure 6: Trending Topics. Source: Authors

Keyword Co-Occurrence

The co-occurrence analysis depicted in Figures 7 and Figure 8 provides critical insights into the thematic interconnections of digital finance, inclusive finance, and economic growth. The analysis of the general keywords and authors key words showed how inclusive finance has dominated studies and how digital finance such as mobile banking and other digital technologies have been used to address financial inclusion and economic resilience. Figure 6 presents a co-occurrence network that underscores the centrality of concepts such as "financial inclusion," "governance," and "digital transformation," while also identifying emerging sub-themes like "blockchain" and "ESG goals." These figures collectively emphasize the multidimensional impact of digital finance, showcasing its ability to foster sustainable economic growth while addressing socio-economic disparities. The analysis also points to areas that warrant further investigation, including urban-rural digital divides and the role of adaptive regulatory frameworks in enhancing financial inclusion.

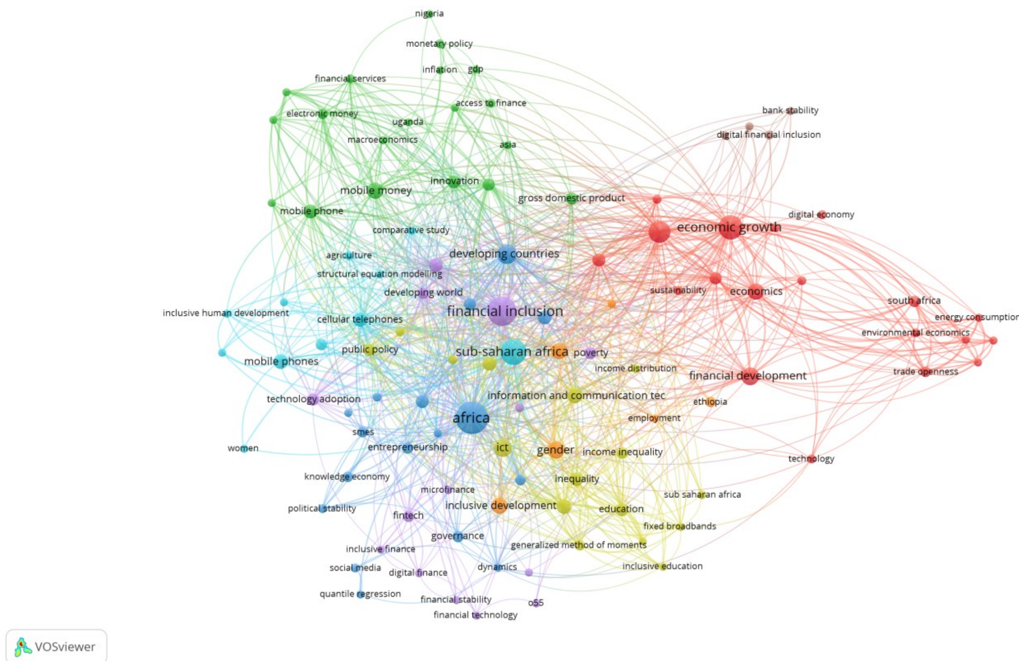

Figure 7: General keyword Co-occurrence Network. Source: Authors

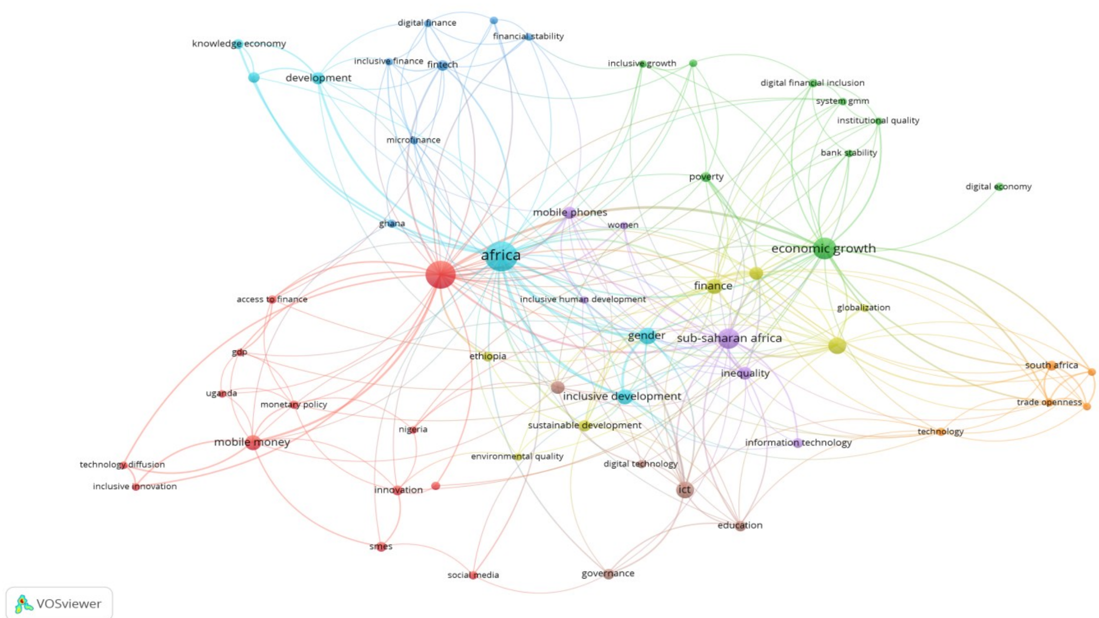

Figure 8: Co-Occurrence Network: Authors Keywords. Source: Authors

Discussion

Digitalization and Inclusive Finance

Digitalization has fundamentally transformed inclusive finance, enabling broader financial accessibility and offering tools that bypass the barriers of traditional banking systems. The rise of digital financial platforms—like mobile payments, online credit systems, and blockchain-based lending—has created financial access points for underserved communities and small-to-medium enterprises (SMEs), particularly in low-income and remote regions (Gui et al., 2022; Li et al., 2022). Digital finance channels allow users to conduct transactions, secure loans, and save without the need for physical bank branches, significantly lowering transaction costs and expanding access to financial services (Christensen et al., 2021; Gambacorta et al., 2020). Structural Equation Modeling (SEM) and panel regression models across various studies demonstrate that digital finance tools bridge existing financial gaps by leveraging data for alternative credit scoring, risk assessments, and personalized financial services (Muyuan & Hong, 2019). This shift not only promotes access but also enables financial literacy through digital platforms, fostering financial independence (Wu & Liu, 2021).

However, the path to achieving true financial inclusivity through digitalization is not without challenges. Research highlights that the effectiveness of digital financial services often hinges on levels of digital literacy, regulatory support, and infrastructural quality, which vary significantly by region (Nguyen et al., 2020). Studies using threshold regression models and Bayesian regression trees (BART) have uncovered that regions with lower levels of digital literacy and infrastructure exhibit a weaker impact from digital finance interventions, emphasizing the need for tailored digital literacy programs and infrastructure investment to maximize the benefits of digitalization (Zhang et al., 2023). The success of digital inclusive finance also depends on regulatory adaptability, as shown in regions that have implemented financial sandboxes and regulatory tiering, which foster safe digital experimentation while ensuring user security and promoting innovation (Aziz & Naima, 2021). This regulatory support enables scalable and resilient financial access while guarding against issues like data privacy and cybersecurity threats.

Inclusive Finance and Economic Growth

Inclusive finance, particularly when enabled by digital tools, is closely linked to economic growth, as it facilitates capital flow to previously underserved sectors, such as rural economies and SMEs. Access to financial resources empowers individuals and small businesses to invest in opportunities that drive income generation, employment, and local economic activity, making inclusive finance a cornerstone of sustainable economic development (Li & Pang, 2023; Wu & Liu, 2021). Studies such as Chouaibi et al.(2021), Muyuan & Hong (2019), employed dynamic panel data methods, such as the Generalized Method of Moments (GMM), to examine the effect of inclusive finance on economic growth. Their finding revealed that inclusive finance has a significant positive effect on GDP growth, particularly in low-income regions where traditional banking is limited. Further, Yang et al. (2022) underscores that by easing financial constraints, digital finance enables investments in health, education, and infrastructure, which contribute to long-term economic resilience and growth.

Additionally, research using threshold regression models and spatial econometrics shows that the economic impact of inclusive finance is not uniformly distributed; it is amplified in areas with higher digital finance penetration and supportive policy environments. For example, regions with adaptive financial regulations, public-private partnerships, and targeted government support, such as subsidies for digital infrastructure, exhibit more pronounced economic growth effects (Christensen et al., 2021). In this context, inclusive finance acts as a catalyst for broader economic engagement, empowering marginalized communities and enabling SMEs to innovate and compete in larger markets (Wang et al., 2022). Furthermore, SEM models show that inclusive finance's positive impact on economic growth is reinforced through enhanced entrepreneurial activities and increased consumer spending, indicating a cycle of inclusive growth that drives both social and economic value (Liu et al., 2022). However, it is important to note the challenges that persist such as robust financial literacy programs and infrastructure to ensure the benefit of inclusive finance reach the most marginalized groups.

The Triadic Interplay: Digitalization, Inclusive Finance, and Economic Growth

The interplay between digitalization, inclusive finance, and economic growth reveals a powerful synergy where each component reinforces the others, creating a cumulative impact on economic resilience and inclusivity. Digitalization acts as the backbone, providing the technology and channels needed to deliver financial services inclusively, even in remote or low-income areas. In this framework, digitalization drives financial inclusivity by reducing transaction costs, enabling micro-financing, and facilitating real-time data analysis for risk management and credit scoring, thus allowing financial services to be extended to more people and enterprises (Gui et al., 2022; Gambacorta et al., 2020).the application of SEM and threshold models highlighted that digital finance's accessibility not only enables but also incentivizes participation in the formal economy, providing the means for businesses and individuals to invest in economic activities (Aziz & Naima, 2021).

The study conducted by Li and Pang (2023) using propensity match scoring revealed that digitalization plays significant role in addressing inclusive finance, which in turn fosters entrepreneurial activities, increase consumption, reduce poverty and increase economic growth in general. When individuals and SMEs have access to capital, they can invest in productivity-enhancing assets and technologies, which drive local economies

forward and reduce income inequality (Wu & Liu, 2021). The impact is cyclical and reinforcing; as economic growth strengthens, there is a rising demand for advanced financial services, which in turn spurs further digital innovation, creating a dynamic cycle of digital inclusion and economic development.
Moreover, bibliometric and network analyses indicate a growing alignment between digital finance and Environmental, Social, and Governance (ESG) objectives, especially in the context of sustainable development (Huang et al., 2023). As digital finance becomes more integrated into the economic system, it can support ESG objectives by promoting transparency, facilitating green financing, and enabling socially responsible investment practices (Liu et al., 2022). Through digital finance, resources can be more efficiently allocated to environmentally and socially beneficial projects, such as renewable energy or social enterprises, which contribute to sustainable growth and long-term economic resilience.

Conclusion and policy implications

In the presence of good governance, institutional quality, and robust infrastructure, studies have shown that digital finance acts as a catalyst for economic growth. Some research also highlights that investments in technology alone may not guarantee economic growth unless supported by enabling factors. These factors, beyond those mentioned here, include access to the internet, mobile phone subscriptions, digital literacy, and effective risk management. Studies further emphasize that the relationship between digital finance and financial inclusion thrives under the presence of quality corporate governance.

As evidenced in the majority of the research, Sub-Saharan Africa (SSA) faces critical challenges stemming from weak institutional quality. The lack of effective government initiatives beyond financial reforms has failed to generate significant economic momentum. It is, therefore, the responsibility of governments to ensure the enforcement of laws, the quality of regulations, and adherence to the rule of law to facilitate effective financial transactions. Alongside these factors, the findings underscore the need for users who are knowledgeable about digital technologies. Consequently, there must be a focus on human capital development alongside fintech advancements to fully harness the benefits of such investments.

Banks play a fundamental role in mobilizing resources, and digital technologies enhance this process by simplifying fund transfers, savings, and access to credit. Investments in technologies such as e-banking can significantly improve access to financial services and uplift the living standards of citizens.

Digitalization, inclusive finance, and economic growth are deeply interconnected in a reinforcing cycle that drives sustainable development. Digital finance channels, by enhancing financial inclusion, empower underserved populations and small and medium enterprises (SMEs), thereby stimulating economic growth and fostering innovation. However, to fully realize this potential, regulatory adaptability, infrastructural support, and digital literacy programs are crucial. These elements provide the foundation for secure and resilient digital financial ecosystems. This interplay underscores the importance of continued investments in digital infrastructure and targeted policies that support digital and financial inclusivity as essential components of sustainable economic growth. Without appropriate policies to enhance governance, improve digital literacy, and invest in infrastructure, countries will struggle to unlock the full benefits of digital finance.

References

Adefare, T., Adeola, O., Mogaji, E., Nguyen, N. P., & Mogaji, S. A. (2024). Empowering women agriculture entrepreneurs: banks' role in achieving sustainable development goals. International Journal of Bank Marketing, 42(4), 785–817. https://doi.org/10.1108/IJBM-03-2023-0128

Aghion, P., Howitt, P., & Mayer-Foulkes, D. (2005). The effect of financial development on convergence: Theory and evidence. Quarterly Journal of Economics, 120(1), 173–222.

Asongu, S. and Odhiambo, N.M. (2024), "Enhancing ICT for female economic participation in sub-Saharan Africa", *African Journal of Economic and Management Studies*, Vol. 15 No. 2, pp. 195-223

Aziz, J., & Naima, U. (2021). Blockchain technology in financial services: A comprehensive review of the benefits and challenges. Journal of Financial Innovation, 12(3), 456–472.

Bashiru, Shani, Alhassan Bunyaminu, Ibrahim Nandom Yakubu, and Mamdouh Abdulaziz Saleh Al-Faryan. 2023. Drivers of Financial Inclusion: Insights from

Berg, G., Fuchs, M., & Rogerson, M. (2020). Digital financial inclusion: Evidence from mobile banking in Sub-Saharan Africa. World Bank Policy Research Paper No. 9367.

Chinoda, T. and Kapingura, F.M. (2024), "Digital financial inclusion and economic growth in Sub-Saharan Africa: the role of institutions and governance", *African Journal of Economic and Management Studies*, Vol.

15 No. 1, pp. 15-30.

Chouaibi, J., & Ben Khelil, S. (2021). Digital finance and inclusive economic growth: Empirical evidence from Sub-Saharan Africa. African Development Review, 33(2), 147–166.

Christensen, C. M., Raynor, M. E., & McDonald, R. (2021). What is disruptive innovation? Harvard Business Review, 93(12), 44–53.

Dai, D.; Fu, M.; Ye, L.; Shao, W. Can Digital Inclusive Finance Help Small- and Medium-Sized Enterprises Deleverage in China? Sustainability 2023, 15, 6625. https://doi.org/10.3390/su15086625

Daisy Mbazima-Lando, Victoria Manuel: The impact of financial innovation on the demand for money and its implications for monetary policy in Namibia. BON Working Paper: WP1- 2020.

Demirguc-Kunt, A., & Klapper, L. (2012): Measuring financial inclusion: The Global Findex Database. World Bank Policy Research Working Paper No. 6025.

Gambacorta, L., Frost, J., & Shin, H. S. (2020): BigTech and the changing structure of financial intermediation. BIS Working Papers No. 779.

Girma, Abebe Gule, and Fariz Huseynov, 2024: The Causal Relationship between FinTech, Financial Inclusion, and Income Inequality in African Economies.

Gui, y, Liu2,t, Wang x, Analysis on the Influence of Digital Inclusive Finance on Regional Economic Benefits and Its Factors, BCP Business & Management, Volume 33 (2022)

Gui, Y., Liu, T., & Wang, X. (2022): Analysis on the influence of digital inclusive finance on regional economic benefits and its factors. BCP Business & Management WTED, 33, 552-557. ISSN: 2960-1789, eISSN: 2960-2254 | Volume 6

Jia, S., & Jingbo, Z. (2020). Digital transformation and economic resilience: Evidence from global enterprises. Management Science, 66(5), 234–252. Journal of Risk and Financial Management 17: 2. https:// doi.org/10.3390/jrfm17010002

Khémiri,Wafa, Ahmed Chafai, and Faizah Alsulami. 2023. Financial Inclusion and Sustainable Growth in North African Firms: A Dynamic-Panel-Threshold Approach. Risks 11: 132. https://doi.org/ 10.3390/risks11070132

Kiwanuka, A.; Sibindi, A.B. Digital Literacy, Insurtech Adoption and Insurance Inclusion in Uganda. *J. Risk Financial Manag.* 2024, *17*, 119. https://doi.org/10.3390/jrfm17030119

Kouladoum, JC. Digital infrastructural development and inclusive growth in Sub-Saharan Africa. *J. Soc. Econ. Dev.* 25, 403–427 (2023). https://doi.org/10.1007/s40847-023-00240-53.

Kristyanto, V. S., & Jamil, H. (2023). Digital transformation and its impact on inclusive growth: a four-decade experience in Indonesia. *Jurnal Ekonomi & Studi Pembangunan, 24*(2), 346-367.

Li, F., Wu, Y., Liu, J., & Zhong, S. (2022). Does digital inclusive finance promote industrial transformation? New evidence from 115 resource-based cities in China. PLOS ONE, 17(8), e0273680. https://doi.org/10.1371/journal.pone.0273680

Li, S., & Pang, Y. (2023). Digital finance and the income inequality gap in emerging economies. Economic Modelling, 110(1), 102–122.

Muyuan, L., & Hong, T. (2019). The effects of digital innovation on regional economic growth: Evidence from China's manufacturing sector. Journal of Asian Economics, 58(3), 91–108.

Ozili, P.K., Ademiju, A. and Rachid, S. (2023), "Impact of financial inclusion on economic growth: review of existing literature and directions for future research", *International Journal of Social Economics*, Vol. 50 No. 8, pp. 1105-1122.

Ping Y, Junxia D (2020) Digital inclusive finance, firm heterogeneity and innovation of micro, small and medium enterprises. Contemp Econ Manag 42:79–87. https:// doi. org/ 10. 13253/j. cnki. ddjjgl. 2020. 12. 011

Shijie An(2023) The impact of digital transformation on the financial services industry: A comprehensive review. Sub-Saharan Africa. Economies 11: 146. https://doi.org/10.3390/ economies 11050146.

Stroebel J, Wurgler J (2021) What do you think about climate finance? J Financ Econ 142:487–498. https:// doi. org/ 10. 1016/j. jfine co. 2021. 08. 004

Tchamyou, V. S., Asongu, S. A., & Odhiambo, N. M. (2019), The role of ICT in modulating the effect of education and lifelong learning on income inequality, and economic growth in Africa. *African Development Review, 31*(3), 261–274. https://doi.org/10.1111/1467-8268.12388

African Development Review, 31(3), 261–274. https://doi.org/10.1111/1467-8268.12388

Thierry, M.A., Emmanuel, O.N.B. Does Financial Development Increase Education Level? Empirical Evidence from Sub-Saharan Africa, *J Knowl Econ* 14, 3878–3903 (2023). https://doi.org/10.1007/s13132-022-01020-y.

Wale-Awe, O. I., & Evans, O. (2023). Financial inclusion through digital channels and the growth-inequalitypoverty triangle: Evidence from Africa. *Nigerian Journal of Banking and Financial Issues, 9*(2), 53-68.

Xiaoyi Zhang (2024) The promoting role of digital inclusive finance in the innovation transformation of micro and small enterprises. Transactions on Economics, Business and Management Research.

Zhang, L., Chen, J., Liu, Z., & Hao, Z. (2023). Digital inclusive finance, financing constraints, and technological innovation of SMEs: Differences in the effects of financial regulation and government subsidies. *Sustainability, 15*(7144). https://doi.org/10.3390/su15097144