



DETERMINANT OF DIGITAL FINANCIAL INCLUSION ADOPTION IN SUB SAHARAN AFRICA

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Abstract

Financial exclusion remains a major global challenges, particularly in developing economies, where a large proportion of the population still lacks access to digital financial services due to limited internet penetration and infrastructure deficits. This situation is further exacerbated by technological constraints, low digital literacy, socio-demographic barrier, and weak regulatory frameworks that hinder the effective adoption and usage of digital financial system. This study investigates the determinants of digital financial inclusion in selected Sub-Saharan African countries using secondary data obtained from internationally recognized sources, including the World Development Indicators (WDI) and the International Monetary Fund (IMF). The study adopt an ex post facto research design using panel data from 22 sub-Saharan countries selected through purposive sampling. A Digital Financial Inclusion Index (DFII) is constructed using Principal Component Analysis (using panel regression techniques. The results reveal that internet penetration ($\beta = 0.0289$, $p < 0.05$) has a positive and statistically significant effect on digital financial inclusion, highlighting the importance of digital infrastructure in facilitating access to digital financial service. In contrast, mobile phone subscriptions ($\beta = 0.000592$, $p < 0.00601$) do not significantly influence digital financial inclusion, suggesting that device ownership alone does not guarantee effective usage. Literacy and educational attainment ($\beta = 0.0204$, $p < 0.01$) positively affect DFI, while regulatory quality ($\beta = 0.0652$, $p < 0.471$) shows limited significance, indicating that institutional frameworks must be complemented by investments in infrastructure and human capital, moreso, GDP growth ($\beta = 0.0268$, $p < 0.0114$) has a positive and statistically significant effect on DFI. The study concludes that digital financial inclusion in Sub-Saharan Africa extends beyond technological availability and depends on reliable internet access, improved digital skills, and supportive macroeconomic conditions. The study recommends that policymakers prioritise expanding reliable internet access and strengthening digital literacy initiatives, particularly in underserved areas, to enhance the adoption and effective use of digital financial services.

Keywords: digital financial inclusion; digital infrastructure; financial inclusion; Sub-Saharan Africa

JEL Codes: G21, O33, O16, E44

1. Introduction

Financial inclusion goes beyond merely making financial services available and affordable; it ensures that such services effectively reach vulnerable and underserved populations (De Koker & Jentzsch, 2012). The rapid global expansion of digitalization has brought profound economic and social transformations, reshaping value creation across sectors. The financial services industry, in particular, has experienced significant change, as digital technologies such as artificial intelligence, smart automation, and digital platforms drive the development of new financial products, digital identities, diversified payment systems, and robust financial

infrastructure (Thatsarani& Jianguo, 2022). These innovations are central to the digital transformation of the financial sector, enabling wider and more efficient access to financial services.

In the African context, where a substantial portion of the population remains excluded from formal financial systems, financial inclusion initiatives focus on extending access to low-income and underserved groups. These efforts aim to provide access to credit, savings, and insurance products that are affordable, financially sustainable for providers, and cost-efficient in delivery (World Bank Group, 2014; Nandru et al., 2021). The adoption of digital banking solutions including internet banking, mobile banking, branchless banking, and mobile wallets has accelerated, often supported by artificial intelligence applications that improve service delivery (Babarinde et al., 2020). Digital platforms have enhanced participation by enabling access through mobile devices and widely adopted technologies, promoting broader financial inclusion (Güz& Poyraz, 2024).

Despite these advances, financial exclusion remains pervasive, both nationally and internationally. The United Nations Sustainable Development Goals (SDGs) indicate that over four billion people, mostly in developing countries, still lack internet access, limiting participation in the digital economy and access to digital financial services (Nandru et al., 2021). In Sub-Saharan Africa, while digital financial services especially mobile money platforms have improved efficiency and reduced transaction costs, more than half of the population remains excluded from formal financial systems due to structural barriers, poverty, and income inequality (Asongu et al., 2021; Evans, 2018). The effectiveness of digital financial inclusion in the region is constrained by a combination of technological, sociodemographic, and regulatory challenges. Inadequate digital infrastructure, limited internet penetration, and high technology costs restrict access, while low literacy, limited digital skills, and demographic characteristics such as age, gender, and education affect effective usage. Weak regulatory frameworks, inconsistent policy implementation, and insufficient consumer protection further impede the widespread adoption of digital financial services (Cassimon, et al., 2022). Nonetheless, opportunities exist: approximately two-thirds of unbanked adults worldwide own at least one mobile phone, highlighting the potential for mobile-based financial services to expand access and inclusion (Demirgüç-Kunt et al., 2018). Increasing banking penetration through digital platforms, mobile banking, and other financial technologies supported by adequate infrastructure remains essential for improving financial inclusion outcomes in Sub-Saharan Africa (Ghosh & Chaudhury, 2020).

Empirical evidence shows that digital financial inclusion is influenced by sociodemographic, technological, and regulatory factors. Güz and Poyraz (2024) and Hernández-Mejía et al. (2024) demonstrate that access to digital financial services, regulatory frameworks, and infrastructure significantly affect inclusion, with disparities such as urban-rural differences influencing adoption patterns. Shabeena, Ashiq, and Rehman (2024) emphasize that regulatory support and technological accessibility enhance the uptake of digital financial services by micro-enterprises. Similarly, Mose and Thomi (2021) highlight the role of demographic characteristics, including age, education, and gender, alongside access to technology, in determining financial inclusion. While these studies provide valuable insights, they often examine these factors in isolation, leaving limited understanding of how technological readiness, sociodemographic characteristics, and regulatory environments jointly influence digital financial inclusion, particularly in Sub-Saharan Africa.

This gap constrains policymakers' ability to design evidence-based interventions that leverage digital finance for inclusive development. A clearer understanding of these determinants, and how they interact, is essential to narrow the digital divide, expand financial access, and promote sustainable economic growth. Accordingly, this study aims to investigate the determinants of digital financial inclusion adoption in Sub-Saharan Africa, focusing on the combined influence of sociodemographic, technological, and regulatory factors. By addressing this gap, the study seeks to inform policymakers, financial institutions, and development practitioners on effective strategies to enhance digital financial inclusion in the region.

Research Hypothesis

H₀: Technological, socio-demographic, institutional, and macroeconomic factors have no significant effect on digital financial inclusion in selected Sub-Saharan African countries.

H₁: Technological, socio-demographic, institutional, and macroeconomic factors significantly influence digital financial inclusion in selected Sub-Saharan African countries

2. Literature Review

This segment discusses the literature review of the study precisely: this deals with conceptual review, theoretical review, empirical review and research gap identified in the study

Digital financial inclusion

Digital financial inclusion refers to the provision of affordable digital access to financial services aimed at reaching underserved populations and businesses (World Bank, 2022). It involves the use of platforms such as mobile banking, internet banking, and digital wallets to facilitate transactions and access to services including credit, savings, and insurance. Adoption reflects the extent to which individuals and firms actively utilize these services in their financial activities. Singh et al. (2014) emphasize that digital financial inclusion is an effective mechanism for overcoming barriers to formal financial access among marginalized groups, while also enhancing capital flow, supporting entrepreneurship, and easing financing constraints, particularly for SMEs.

Limited access to finance remains a major constraint to economic opportunities in developing regions, especially Sub-Saharan Africa. Empirical studies identify information and communication technology (ICT), particularly mobile phones and internet connectivity, as key drivers of digital financial service adoption (Suryono et al., 2020; Pradhan et al., 2017). Diniz et al. (2012) note that ICT enables financial institutions to expand outreach and reduce transaction costs, while Chavan (2013) highlights its transformative impact on financial service delivery. Technological innovations such as ATMs, mobile banking, mobile money, POS systems, and e-wallets have further improved convenience, speed, and reliability, thereby accelerating adoption (Gupta & Arya, 2019; Sarkar, 2016).

These developments underpin Digital Financial Inclusion (DFI), which integrates digital technology with inclusive finance to provide affordable and accessible services to financially excluded populations (World Bank Group, 2014; Nandru et al., 2021). In Sub-Saharan Africa, mobile-based solutions and digital payment platforms have proven particularly effective in expanding financial access (David-West et al., 2018). Kenya's experience illustrates this success, where the introduction of Safaricom's M-Pesa in 2007 significantly increased access to formal

financial services among low-income populations due to its affordability, ease of use, and extensive agent network (Oji, 2015).

Access to finance

Access to finance refers to the ability of individuals and firms to obtain and effectively use financial services such as payments, savings, credit, and insurance at affordable cost and with ease (Mose & Thomi, 2021). In recent years, this concept has expanded beyond traditional banking to include digital financial services, reflecting the growing role of technology in financial inclusion. In the context of developing economies, access to finance is shaped not only by the physical availability of financial institutions but also by digital infrastructure, affordability, literacy, and institutional quality. According to the World Bank (2021), improving access to finance is essential for reducing poverty and promoting inclusive economic growth, particularly through digital channels that lower transaction costs and expand outreach to underserved populations. Relating this to the present study, access to finance is conceptualized as the foundation of digital financial inclusion (DFI). In this framework, individuals gain access to financial services through digital platforms such as mobile banking, internet-based transactions, and fintech applications. However, this access is determined by several interrelated factors, including internet penetration, mobile phone usage, literacy levels, regulatory quality, and macroeconomic stability (Abdulmumin, 2018). Thus, digital financial inclusion in Sub-Saharan Africa is viewed not merely as the presence of financial services, but as the effective ability of individuals to access and use these services meaningfully through digital channels.

Demographic Determinants

Socio-demographic characteristics are widely recognized as key determinants of digital financial inclusion, influencing individuals' ability and willingness to adopt digital financial services, particularly in Sub-Saharan Africa where inequalities are pronounced. Access to information and communication technologies is central to this process, as internet connectivity and digital devices enable engagement with financial services. Corrado and Corrado (2015) show that household internet access increases the likelihood of banking inclusion and credit access, while Yuneline and Rosanti (2023) highlight the role of new technologies in fostering financial innovation and inclusion.

Income, wealth, and asset ownership also significantly shape adoption, as financially stronger households are better positioned to utilize digital services. Yang et al. (2023) find that higher income and wealth increase the likelihood of digital finance usage, a pattern particularly relevant in Sub-Saharan Africa where poverty limits adoption. Broader socio-economic conditions, including inequality and perceived corruption, further influence access to digital finance (Kálmán et al., 2024c). Age, education, and financial literacy are equally important. Younger and more educated individuals are more likely to adopt digital financial services (Zainudin et al., 2019), with Cassimon et al. (2022) confirming higher usage among educated, urban, and middle- to high-income groups. Financial literacy enhances users' ability to understand and utilize digital financial products effectively (Ahmad et al., 2022; Isaia and Oggero, 2022), increasing adoption probabilities, including for more complex services (Yang et al., 2023; Gunawan et al., 2023). Overall, socio-demographic factors, including income, education, age, ICT access, and financial literacy, significantly influence digital financial inclusion. In Sub-Saharan Africa, these factors interact with structural constraints such as poverty and digital divides, reinforcing unequal access to digital financial services and justifying their inclusion in empirical analyses.

Technological Factors

Digitalization has transformed financial systems globally, shifting Sub-Saharan Africa from traditional banking models to digitally driven service delivery, particularly through mobile banking and mobile money. These innovations have significantly improved financial access for rural and underserved populations, despite the region's relatively underdeveloped financial systems compared to other developing regions (Allen, 2014). Digital technologies have expanded access to financial services for individuals previously excluded due to cost or geographic barriers (Anarfo et al., 2018). These technologies, including mobile phones, internet connectivity, and digital networks, enhance financial service delivery through improved information processing, reduced transaction costs, and greater efficiency. In Sub-Saharan Africa, ICT growth has strengthened financial systems and facilitated broader financial integration and globalization (Anarfo et al., 2018; Friedline, 2017). However, financial inclusion remains low, with over half of the population still excluded, largely due to poverty, inequality, and infrastructural deficits. Nonetheless, mobile money platforms have achieved notable success by enabling low-cost transactions and improving access to basic financial services (Asongu et al., 2021; Evans, 2018). Despite these gains, the full potential of digitalization is constrained by illiteracy, limited internet access, and high infrastructure costs. Many individuals lack the skills required to effectively use digital financial services. Even so, digital finance has contributed to poverty reduction and improved welfare by providing affordable and timely financial access (Evans, 2018; Mushtaq, 2019). Mobile phone penetration has particularly benefited rural populations, enhancing financial inclusion and supporting social and economic development (Warren, 2007).

Regulatory Framework

The regulatory environment is central to the adoption and sustainability of digital financial inclusion. Effective regulations and strong institutions promote innovation, ensure consumer protection, and build trust, thereby encouraging participation in digital financial services (Beck et al., 2015; Ozili, 2018). In Sub-Saharan Africa, where regulatory gaps and weak institutions persist, governance quality significantly shapes digital financial inclusion outcomes (Demirgüç-Kunt et al., 2018). Supportive regulatory frameworks, particularly those allowing non-bank actors such as mobile network operators to provide financial services, have been critical in expanding access (Beck et al., 2015; Sahay et al., 2020). Flexible and innovation-friendly policies have driven the growth of mobile money, while clear licensing, interoperability, and risk-based supervision reduce entry barriers and enhance system stability (Mothobi & Grzybowski, 2017; World Bank Group, 2014). Institutional quality also matters, as strong governance increases confidence and adoption, whereas weak institutions and corruption undermine trust in digital platforms (Allen et al., 2016; Ozili, 2018; Asongu et al., 2018).

Consumer protection is equally important, as inadequate safeguards related to data privacy, cybersecurity, and fraud increase perceived risks and discourage usage. Robust frameworks enhance user confidence and support sustained adoption (World Bank Group, 2022; Demirgüç-Kunt & Singer, 2017). In addition, regulatory conditions influence the cost and accessibility of digital services. Competitive and well-coordinated regulations promote innovation and affordability, while interoperability further enhances inclusion by enabling seamless transactions (Beck et al., 2015; Sahay et al., 2020; World Bank Group, 2014). Government initiatives, including national financial inclusion strategies and digital payment systems, have also expanded access and normalized digital financial usage across populations (Klapper & Singer, 2017; Demirgüç-Kunt et al., 2018). However, challenges such as regulatory uncertainty, weak enforcement, and

limited supervisory capacity continue to constrain progress (Ozili, 2018; World Bank Group, 2022). Overall, the literature confirms that strong regulatory frameworks and institutional quality are critical for fostering trust, innovation, and widespread adoption of digital financial services in Sub-Saharan Africa.

Theoretical Review

This study is anchored on the Technology Acceptance Model (TAM), while also incorporating complementary theories to provide a more comprehensive explanation of digital financial inclusion.

Technology Acceptance Model

The Technology Acceptance Model (TAM) is a widely used framework for analyzing technology adoption, emphasizing individuals' perceptions and behavioral intentions toward new technologies (Molino et al., 2020). Developed by Davis (1989), the model identifies two key determinants: perceived usefulness and perceived ease of use (Matemba & Li, 2018). The theory assumed that Perceived usefulness reflects the extent to which a technology improves performance or quality of life, while perceived ease of use captures how effortless and accessible the technology is (Molino et al., 2020). The model further assumes that individuals act rationally when deciding to adopt technology, that behavioral intention is the strongest predictor of actual usage, and that external variables influence adoption indirectly through user perceptions. TAM is highly relevant to this study because digital financial inclusion depends on whether individuals perceive digital financial services as useful, accessible, and easy to use. In the context of this study, internet penetration enhances accessibility, mobile phone ownership facilitates usage, while literacy and education improve users' ability to understand and interact with digital financial platforms. Trust and perceived usefulness also determine sustained adoption of digital financial services, making TAM suitable for explaining individual-level adoption behavior in Sub-Saharan Africa. However, despite its wide application, TAM has been criticized for several limitations. First, it overemphasizes individual perceptions while ignoring structural and institutional constraints. Second, it does not fully capture macroeconomic and regulatory factors that influence technology adoption in developing economies. Third, it underestimates the role of trust, culture, and social influence in shaping financial behavior. Finally, it assumes rational decision-making, which may not always reflect real-world adoption behavior in low-income contexts (Bagozzi, 2007; Venkatesh et al., 2003).

Empirical studies on digital financial services and cashless systems (Aker & Mbiti, 2010; Demirgüç-Kunt et al., 2021; Mothobi & Grzybowski, 2017) frequently apply and extend TAM by incorporating factors such as security, trust, cost, convenience, and social influence. McFarland and Hamilton (2006) argue that integrating socio-demographic and regulatory variables enhances the model's explanatory power. In this context, adoption is more likely when digital financial technologies are perceived as beneficial relative to traditional alternatives (Venkatesh & Bala, 2008). Accordingly, technology adoption should be viewed as a broader process influenced not only by technological attributes but also by socio-demographic, regulatory, and economic conditions. Vargo et al. (2020) further emphasize that innovation adoption is shaped by the interaction of these factors within a given socioeconomic environment.

Diffusion of Innovation Theory (DOI)

The Diffusion of Innovation Theory (DOI), developed by Rogers (2003), explains how new ideas, technologies, or innovations spread within a society over time. The theory argues that the adoption of any innovation is not instantaneous but follows a gradual process influenced by communication channels, social systems, and the perceived characteristics of the innovation itself. Rogers identifies five key attributes that determine whether an innovation is adopted or rejected—relative advantage, compatibility, complexity, trialability, and observability. These factors influence how quickly and widely a technology spreads across individuals and groups (Aker & Mbiti, 2010). The theory assumes that innovation adoption occurs gradually over time rather than instantly, individuals differ in their readiness to adopt new technologies, the perceived characteristics of an innovation determine its adoption rate, and social interaction and communication strongly influence adoption decisions (Liu et al., 2021).

DOI is highly relevant to this study because provides a macro-level explanation of digital financial inclusion by showing how digital financial services spread across populations. It complements the technology acceptance model by shifting focus from individual perception to system-wide adoption patterns. In this context, internet penetration reflects the infrastructure that enables diffusion, mobile phone usage serves as the primary channel through which financial innovations spread, while literacy and education levels influence how easily individuals understand and adopt digital financial services. In addition, institutional and regulatory quality affects trust and safety in adoption, while macroeconomic conditions (GDP growth and inflation) determine the affordability and sustainability of access (Matemba & Li, 2018). However, despite its usefulness, DOI has several limitations. It assumes that innovation is always beneficial, ignoring possible negative outcomes. It focuses more on the spread of innovation than on unequal access or exclusion issues. It does not fully explain adoption barriers in low-income or highly unequal societies. It also underestimates the role of institutional, regulatory, and economic constraints, and assumes that individuals have equal access to information, which is often unrealistic in developing countries. Therefore, digital financial inclusion is better understood as a process influenced not only by individual willingness but also by infrastructure availability, socio-economic development, institutional environment, and macroeconomic stability.

Empirical Review.

Guang Liu, Yunying Huang, and Zhehao Huang (2021) investigated the factors and mechanisms driving the development of digital financial inclusion (DFI), with a focus on urban-rural disparities. The study utilized secondary panel data covering 1,607 counties in China between 2014 and 2019. Digital financial inclusion, measured by an index developed jointly by the Peking University Institute of Digital Finance and Alibaba Ant Financial Services, served as the dependent variable. The analysis employed a fixed-effects model alongside a panel threshold technique. Findings reveal that both industrial economic activity and government intervention are significant determinants of DFI in urban and rural areas, although their influence varies in magnitude. Additionally, secondary education emerged as a significant determinant only in rural areas, highlighting the role of human capital in less-developed regions. Based on these results, the authors suggest that policymakers should strengthen targeted educational initiatives and promote supportive government policies, particularly in rural communities, to enhance the adoption and development of digital financial services. the study places greater emphasis on government intervention and industrial activity while giving limited attention to socio-

Abdulmumin, B. A. (2026). Determinant of Digital Financial Inclusion Adoption in Sub Saharan Africa. *Malete Journal of Accounting and Finance*, 7 (1), 251 – 271

demographic and financial sector variables such as banking development, financial access constraints, and mobile money penetration

Kouladoum, Wirajing, and Nchofoung (2022) investigated the relationship between digital technologies and financial inclusion in Sub-Saharan Africa using secondary data covering the period 2004–2019, obtained from the World Bank’s World Development Indicators and International Financial Statistics. The study employed the Generalized Method of Moments (GMM) estimator to address endogeneity concerns. The findings indicate that increased adoption of digital technologies significantly enhances financial inclusion in the region. The authors advocate for greater investment in financial and technological infrastructure, as well as in human capital development, noting that financial literacy plays a critical role in promoting financial stability and inclusive finance in Africa. However, it focuses mainly on aggregate digital technology without disaggregating specific components such as mobile penetration or internet usage. This limits the ability to identify which specific technological channel drives inclusion most. Additionally, the study does not fully integrate institutional or regulatory variables, which are important in developing economies..

Stephen (2023) investigated the determinants of financial inclusion in Tanzania using secondary data from the Bank of Tanzania and the World Bank covering the period 2012-2022. The Ordinary Least Squares (OLS) regression technique was applied in the analysis. The results indicate that per capita income and inflation have positive but statistically insignificant effects on the financial inclusion index. Similarly, the density of bank branches and the age dependency ratio were found to exert negative and insignificant effects. In contrast, domestic credit provision, stable money supply, and deposit interest rates were found to have positive and significant impacts on financial inclusion. The study recommends policies that encourage savings mobilization through deposit money banks to enhance financial inclusion in Tanzania. However, the study’s reliance on OLS limits its ability to fully address endogeneity issues, which may affect the robustness of the findings.

Hernández-Mejía, Moreno-García, and Culebro-Martínez (2024) analyzed the key determinants of digital financial inclusion in Mexico using secondary data drawn from the 2021 National Survey of Financial Inclusion, comprising 13,554 observations. The study employed a dichotomous probit regression model to assess the influence of financial literacy, financial education, and selected socio-demographic factors on the adoption of digital financial services. The empirical findings indicate that financial literacy and financial education exert positive but modest effects on digital financial inclusion, with marginal effects of 0.94% and 4.42%, respectively. Notably, the impact of both financial literacy and financial education is stronger for the use of mobile payment services compared to the adoption of online financial accounts, applications, or digital credit products. Additionally, socio-demographic variables such as gender, size of locality, educational attainment, income level, and asset ownership were found to have statistically significant relationships with the use of digital financial services. Based on these results, the authors recommend targeted financial education initiatives, particularly for vulnerable groups including rural residents and individuals with low income and limited educational attainment, as a means of enhancing digital financial inclusion. The study limit it focus on a developed Latin American context reduces its external validity when applied to Sub-aharan Africa, where institutional and infrastructural constraints differ significantly.

Mehta and Vijay (2024) analyzed the determinants of financial inclusion within the informal sector using primary data collected through a structured questionnaire administered to 255 respondents engaged in informal economic activities such as street vending, home-based enterprises, and daily wage labor. Two multiple regression models were estimated to assess the effects of socio-economic variables on access to financial services and the use of digital financial services. The results show that education, employment type, and income significantly influence access to financial services, while digital literacy, trust in digital platforms, and smartphone ownership are strong predictors of digital financial service usage. Interestingly, income exhibited a negative relationship with financial access, suggesting complex behavioral dynamics within the informal sector. The study recommends targeted financial education initiatives and improvements in digital infrastructure to narrow the financial inclusion gap. However, the small sample size limits generalizability. In addition, reliance on self-reported survey data may introduce response bias.

Güz and Poyraz (2024) investigated digital financial inclusion and its key determinants in Türkiye using secondary data from the World Bank's Global Findex database for 2021, published in June 2023. The study employed a probit regression model to examine the influence of demographic factors on digital financial inclusion outcomes. The results reveal that individual characteristics such as gender, educational attainment, and income level significantly affect account ownership and saving behavior. When marginal effects were considered, education emerged as the most influential determinant of digital financial inclusion. In terms of income, coefficient estimates across all income quintiles were statistically significant; however, individuals in the lowest income groups particularly the poorest 20 percent and the second income quintile were found to have a substantially lower likelihood of being financially included. Based on these findings, the authors recommend that policymakers implement targeted strategies aimed at enhancing digital literacy, often referred to as "d-literacy," to promote broader adoption of digital financial services. The single-country focus limits cross-country comparability. Additionally, it does not incorporate technological infrastructure variables such as internet penetration, which are crucial for explaining digital financial inclusion in developing regions.

Compaore, and Maiga, (2024). investigated the socio-economic factors influencing financial inclusion among women and men in Burkina Faso. The study utilized secondary data from the FinScope Burkina Faso Survey conducted by FinMark Trust in 2016, covering a sample of 5,012 individuals. A sequential logit regression model was employed to analyze the determinants of financial inclusion across different stages of the inclusion process. The findings reveal that educational attainment, age, access to television, urban residence, marital status, and the time required to reach a bank branch significantly influence the initial stage of financial inclusion. At the second stage, which relates to access to savings, the same set of variables education, age, media access, location, marital status, and travel time to a financial institution remained statistically significant. In the final stage, which focuses on access to credit, household size, proximity to banking facilities, and trust in financial institutions emerged as the key determinants. Based on these results, the authors recommend that policies aimed at enhancing financial inclusion should prioritize financial education and awareness-raising initiatives, particularly targeting young people and women. The study focuses only on traditional financial inclusion rather than digital financial inclusion. This limits its relevance to studies on fintech and digital finance adoption.

Shabeena, Ashiq and Rehman, (2024) examined the determinants of digital financial inclusion and its implications for the ease of doing business among micro enterprises through a comprehensive review. The study utilized secondary data from the World Bank's 2022 Enterprise Survey of Micro Firms (ESM). Digital resource capability and firm- and owner-specific characteristics were classified as the primary explanatory variables influencing digital financial inclusion. To analyze the data, the authors applied analysis of variance (ANOVA) and logistic regression techniques. The results demonstrate that digital financial inclusion significantly reduces business-related constraints, particularly those associated with regulatory barriers and market externalities faced by micro enterprises. The study provides policy-relevant insights for key stakeholders, including government institutions, entrepreneurship support agencies, financial service providers, and international organizations involved in advancing digital financial inclusion initiatives. The limitation of the study is because of its focus on micro-enterprises excludes household-level financial inclusion dynamics, which are central to national-level inclusion analysis.

Sulemana,,Gyeke-Dako, and Akolgo (2025) examined the relationship between digital finance, financial inclusion, and financial resilience in Sub-Saharan Africa. The study relied on secondary data obtained from the World Bank's Global Findex Survey for the year 2021 and employed a probit regression technique for empirical analysis. The findings reveal that digital finance does not exert a statistically significant effect on overall financial inclusion. However, the results indicate that saving through digital financial platforms significantly enhances the probability of financial resilience, whereas borrowing via digital finance channels reduces the likelihood of being financially resilient. Furthermore, the study identifies tertiary education, income levels (low and middle income), age, employment status, and mobile phone ownership as significant determinants of financial resilience. Based on these findings, the authors recommend that governments and central banks strengthen investments in digital infrastructure, particularly internet connectivity, and expand the availability of digital financial services in rural and underserved areas. The analysis relies on cross-sectional data from a single survey year (2021), which limits the ability to capture dynamic changes and long-term trends in digital financial inclusion across countries.

The empirical literature on financial and digital financial inclusion has expanded significantly, highlighting the roles of institutional quality, infrastructure, and macroeconomic factors in Sub-Saharan Africa (Abdulmumin, 2018; Kouladoum et al., 2022; Stephen, 2023). However, these macro-level studies rely on aggregate indicators and provide limited insight into individual-level adoption of digital financial services. Recent micro-level evidence identifies socio-demographic factors such as education, income, age, and digital literacy as key drivers, though findings are often based on non-African or single-country contexts (Hernández-Mejía et al., 2024; Güz& Poyraz, 2024; Compaore & Maiga, 2024). Firm-level studies on informal sectors remain narrow and fail to capture cross-country dynamics (Mehta & Vijay, 2024; Shabeena et al., 2024). Moreover, the literature frequently conflates financial inclusion with digital financial inclusion, overlooking differences between access and actual usage, as shown by Sulemana, Gyeke-Dako, and Akolgo (2025). Consequently, there is a lack of comprehensive, cross-country analysis integrating technological, socio-demographic, and institutional factors, underscoring the need for a unified empirical framework using recent data to better inform policy in Sub-Saharan Africa.

3. Methodology

This segment discusses the methodology of the study precisely: this deals with research design, data source and model specification, estimated techniques and method of data analysis identified in the study

Research Design

This study adopts an ex post facto research design to examine the determinants of digital financial inclusion in Sub-Saharan Africa. The ex post facto approach is appropriate because the study relies on pre-existing data and analyzes relationships among variables without any form of manipulation by the researcher. This design allows for the systematic examination of how regulatory, technological, and socio-demographic factors influence digital financial inclusion across countries. It also supports cross-country comparability and the application of appropriate econometric techniques to generate valid and reliable empirical inferences

Data source and Model Specification

This study relies exclusively on secondary data obtained from internationally recognized and reliable databases to ensure consistency, accuracy, and comparability across countries. Data on digital financial inclusion are sourced from the World Bank's Global Financial Inclusion (Global Findex) Database and the International Monetary Fund's Financial Access Survey. Data on technological factors and socio-demographic and economic variables are drawn from the World Bank's World Development Indicators (WDI) and the International Telecommunication Union (ITU) databases. Regulatory and institutional variables are obtained from the Worldwide Governance Indicators (WGI). The population of the study consists of all countries classified under Sub-Saharan Africa by the World Bank. However, due to variations in data availability across countries and years, a purposive sampling technique was adopted. Specifically, twenty-two (22) Sub-Saharan African countries were selected based on the availability of consistent and complete data for all variables included in the study and it covers the period 2009–2024. The choice of this period is motivated by the rapid expansion of digital financial services, which provides a suitable context for examining the determinants of digital financial inclusion over time.

The empirical strategy employed in this study is adapted from the modelling framework developed by Guang Liu et al. (2021) in their study titled *"The Determinants and Mechanisms of Digital Financial Inclusion Development: Evidence from Urban–Rural Differences"*. The original model is specified as:

$$DFI_{it} = \alpha^0 + \alpha^1 Ind_{it} + \alpha^2 Gov_{it} + \alpha^3 Edu_{it} + \lambda X_{it} + \rho_i + \omega_t + \varepsilon_{it}$$

where DFI_{it} is the level of digital financial inclusion, Ind_{it} is the county's industrial economy, Gov_{it} is the degree of governmental intervention, Edu_{it} is the secondary education, X is a vector of controls (economic development, information level, and medical construction), ρ_i represents the controlling individual county, ω_t is controlling for time fixed effects, ε_{it} is an error term, $i = 1, \dots, N$ represents the county, and $t = 1, \dots, T$ represents the index time

However, this study adjusted the previously mentioned model to align with the objectives of this research. The revised model incorporates only the relevant variables that are essential for achieving the research objectives. Therefore, the model is stated as follows:

$$DFI_{it} = \alpha^0 + \alpha^1 INP_{it} + \alpha^2 MPN_{it} + \alpha^3 LR_{it} + \alpha^4 Reg_{it} + \lambda X_{it} + \rho_i + \omega_t + \varepsilon_{it}$$

where DFI_{it} is the level of digital financial inclusion (account ownership with financial institution, mobile money account, mobile money transaction and internet and mobile banking), INP_{it}

represents the proportion of individuals using the internet, MPN_{it} captures mobile cellular subscriptions, LR_{it} denotes the level of secondary education, Regit measures regulatory quality, X is a vector of controls (GDP per annual, and Inflation), ρ_i represents the controlling individual county, ω_t is controlling for time fixed effects, ε_{it} is an error term, i = 1,...,N represents the county, and t = 1,...,T represents the index time

Estimation Techniques

This study constructs a Digital Financial Inclusion Index (DFII) using the Principal Component Analysis (PCA) technique, following established approaches in the literature (Abdulmumin, 2018; Güz& Poyraz, 2024). In the context of this study, PCA is employed to construct a composite index of digital financial inclusion for Sub-Saharan African countries by aggregating multiple indicators of digital financial access and usage into a single measure. The technique is particularly suitable because digital financial inclusion is a multidimensional concept, encompassing various aspects such as access to digital accounts, usage of digital payment usage, and availability of digital financial infrastructure. By assigning weights endogenously based on the variance structure of the data, PCA minimizes subjectivity in index construction and ensures that the resulting DFII captures the most informative variation across countries and over time. Consequently, the PCA-based Digital Financial Inclusion Index provides a robust and comprehensive measure for cross-country comparison and econometric analysis of the determinants of digital financial inclusion in Sub-Saharan Africa.

Method of data analysis

The empirical analysis in this study is based on annual panel data covering selected Sub Saharan African over the period 2009–2024. Given that the dataset combines both cross-sectional (country-level) and time-series (yearly) dimensions, the study employs panel regression techniques to examine the effects of technological, institutional, and socio-demographic factors on digital financial inclusion, while controlling for macroeconomic variables. All regressions are estimated using robust standard errors clustered at the country level to account for potential heteroskedasticity and serial correlation within panels, which are common features of macro-panel datasets (Hoechle, 2007). This correction ensures the reliability of statistical inference and guards against biased standard error estimates. To further validate the robustness of the empirical results, several diagnostic tests are conducted. These include the Breusch–Pagan test for heteroskedasticity, pairwise correlation tests to detect serial dependence, the Variance Inflation Factor (VIF) to assess multicollinearity among explanatory variables, and the Modified Wald test for groupwise heteroskedasticity, Pesaran CD test, Friedman test and Fries test for cross-sectional dependence. Collectively, these diagnostic procedures ensure that the estimated models satisfy key econometric assumptions and that the regression results are statistically sound.

4. Results and Discussion

This presents analyzes, and interprets the data collection for the study. The analysis is based on **Table 1: Descriptive Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
Dfi	352	0	1	-.922	4.645
INP	350	21.121	20.109	.53	87.401
MPP	350	78.98	38.287	10.787	184.904
LR	352	54.36	21.164	10.075	97.772

regulatory	352	-.464	.414	-1.274	.765
GDP	352	1.802	3.493	-15.9	12.427
INF	352	9.433	18.158	-16.86	279.706

Source Author’s Computation, (2026).

Table 1 presents the result of the summary statistics for the variables used for the study covering the period of 2009 to 2024 in sub Saharan Africa. As shown in the table, the digital financial inclusion index (DFI), constructed using Principal Component Analysis, has a mean of 0 and a standard deviation of 1, reflecting its standardized nature. The index ranges from -0.922 to 4.645, indicating considerable variation in digital financial inclusion across countries and over time, with some countries exhibiting exceptionally high levels of digital financial adoption relative to the regional average. The internet penetration (INP) variable shows an average penetration rate of 21.12% with a standard deviation of 20.11%, ranging from a minimum of 0.53% to a maximum of 87.40%. This suggests substantial disparities in internet access across countries, highlighting the uneven diffusion of digital technology in the region. Similarly, mobile phone penetration (MPP) averages 78.98% with a standard deviation of 38.29%, and ranges from 10.79% to 184.90%. The maximum value exceeding 100% reflects the prevalence of multiple mobile subscriptions per individual in certain countries, a common phenomenon in sub-Saharan Africa.

Literacy rate (LR) averages mean is 54.36%, with a standard deviation of 21.16%, and minimum ranges from 10.08% to maximum of 97.77%, indicating wide heterogeneity in educational attainment across the sampled countries. The regulatory quality index has a mean of -0.464 and a standard deviation of 0.414, with a minimum range of -1.274 to maximum 0.765. This negative mean suggests that, on average, regulatory quality in the sampled countries is below the global average, with some countries performing substantially better or worse than the regional norm. Macroeconomic variable were use as controls variables, GDP growth averages 1.80%, with a standard deviation of 3.49%, ranging from -15.90% to 12.43%, reflecting both periods of economic contraction and expansion across the panel. Inflation (INF) exhibits considerable variability, with a mean of 9.43% and an exceptionally high maximum of 279.71%, indicative of instances of hyperinflation in some countries during the study period.

Table 2: Result for test for cross-sectional dependence

Model	Pesaran's (2004)		Friedman (1937)		Frees (1995)	
	Statistics	p-value	Statistics	p-value	Statistics	p-value
DFI	5.852	0.0000	22.780	0.3558	2.847	0.3603

Source Author’s Computation, (2026).

The results of the cross-sectional dependence tests reported in Table 2 indicate mixed evidence regarding cross-sectional dependence in the digital financial inclusion (DFI) model. Pesaran’s CD test yields a test statistic of 5.852, suggesting rejection of the null hypothesis of cross-sectional independence. In contrast, Friedman’s test reports a test statistic of 22.780 with a p-value of 0.3558, implying failure to reject the null hypothesis of cross-sectional independence. Similarly, Frees’ test produces a statistic of 2.847, which exceeds the reported critical value of 0.3603, suggesting the possibility of weak cross-sectional dependence. The three tests provide mixed evidence on the presence of cross-sectional dependence in the DFI model. While Pesaran’s CD test and Frees’ test point to some degree of interdependence across countries, Friedman’s test does not corroborate this finding. Given the macroeconomic nature of the dataset and the likelihood of common regional shocks, policy spillovers, and shared institutional characteristics

among Sub-Saharan African countries, the existence of mild cross-sectional dependence cannot be ruled out. Consequently, the study adopts estimation techniques with country-level clustered robust standard errors to ensure consistent and reliable statistical inference.

Table 3: Pairwise correlations

Variables	Dfi	INP	MPP	LR	REG	GDP	INF
Dfi	1.000						
INP	0.564	1.000					
MPP	0.438	0.819	1.000				
LR	0.536	0.622	0.571	1.000			
REG	0.102	0.423	0.577	0.232	1.000		
GDP	-0.022	-0.139	-0.057	-0.115	0.041	1.000	
INF	0.238	0.099	-0.004	0.184	-0.125	-0.206	1.000

Source Author's Computation, (2026).

Table 3 present the result of pairwise correlation matrix among the variables included in the digital financial inclusion (DFI) model. The results show that DFI is positively correlated with technological and human capital variables, notably internet penetration (INP), mobile phone penetration (MPP), and literacy rate (LR). Specifically, DFI exhibits a moderate positive correlation with internet penetration ($r = 0.564$) and literacy rate ($r = 0.536$), indicating that countries with higher access to the internet and better educational outcomes tend to experience higher levels of digital financial inclusion. The positive correlation between DFI and mobile phone penetration ($r = 0.438$) further underscores the importance of mobile infrastructure in facilitating access to digital financial services in Sub-Saharan Africa. Regulatory quality (REG) displays a weak positive correlation with DFI ($r = 0.102$), suggesting that while institutional quality matters for digital financial inclusion, its direct association at the bivariate level is relatively limited compared to technological and socio-demographic factors. This finding implies that the influence of regulation may operate indirectly or become more pronounced once other factors are controlled for in the multivariate framework.

The correlation between DFI and GDP growth (GDP) is negative but negligible ($r = -0.022$), indicating no meaningful linear association between short-term economic growth and digital financial inclusion. This suggests that improvements in DFI in Sub-Saharan Africa are not solely driven by macroeconomic performance but are more closely linked to structural and infrastructural factors. Inflation (INF) shows a weak positive correlation with DFI ($r = 0.238$), implying that moderate inflationary environments may coexist with increased digital financial activity, although this relationship is relatively small. Among the explanatory variables, some strong inter-correlations are observed, particularly between internet penetration and mobile phone penetration ($r = 0.819$), and between internet penetration and literacy rate ($r = 0.622$). These relationships reflect the complementary nature of digital infrastructure and socio-demographic development in the region. While these correlations are notable, none exceed conventional multicollinearity thresholds (e.g., 0.90), suggesting that multicollinearity is unlikely to pose a serious concern. This inference is further validated through formal Variance Inflation Factor (VIF) diagnostics in the regression analysis.

Table 4: Variance inflation factor

	VIF	1/VIF
MPP	3.874	.258
INP	3.513	.285
LR	1.729	.578
Reg	1.549	.646
INF	1.114	.898
GDP	1.069	.936
Mean VIF	2.141	.

Source author's computation (2026)

Table 4 reports the Variance Inflation Factor (VIF) results used to assess the presence of multicollinearity among the explanatory variables in the digital financial inclusion model. Multicollinearity becomes a concern when VIF values exceed commonly accepted thresholds, typically 5 or 10, which may inflate standard errors and weaken the reliability of coefficient estimates. The results indicate that all variables have VIF values well below the critical threshold of 5. Mobile phone penetration (MPP) records the highest VIF value of 3.874, followed by internet penetration (INP) with a VIF of 3.513. Although these variables exhibit relatively higher VIF values compared to others, they remain within acceptable limits and reflect the complementary nature of digital infrastructure indicators rather than problematic multicollinearity. Literacy rate (LR) and regulatory quality (Reg) report VIF values of 1.729 and 1.549, respectively, indicating very low levels of multicollinearity. Macroeconomic control variables, inflation (INF) and GDP growth (GDP), display the lowest VIF values of 1.114 and 1.069, suggesting near-orthogonality with other regressors. The mean VIF of 2.141 further confirms that multicollinearity is not a serious issue in the model. Overall, the VIF diagnostics demonstrate that the explanatory variables are sufficiently independent, and their inclusion in the regression analysis does not distort coefficient estimates. Consequently, the model satisfies the multicollinearity assumption, ensuring reliable and robust econometric inference.

Table 5: Fixed and Random effect Model Estimation Results

DFI	Fixed Effect	Random Effect	pool OLS
INP	0.0289** (0.0104)	0.0279*** (0.0100)	0.0227*** (0.00385)
MPP	-0.000592 (0.00601)	-0.000844 (0.00588)	8.65e-05 (0.00215)
LR	0.0204*** (0.00606)	0.0184*** (0.00504)	0.0127*** (0.00258)
Regulatory	-0.0652 (0.471)	-0.314 (0.236)	-0.342*** (0.125)
GDP	0.0268** (0.0114)	0.0281** (0.0116)	0.0310** (0.0122)
INF	0.00508** (0.00208)	0.00592*** (0.00179)	0.00812*** (0.00239)
Constant	-1.798*** (0.384)	-1.776*** (0.306)	-1.466*** (0.182)

F-stat/Wald X ²	30.20*** 19.447***	239.12***	47.51***
Hausman test: X ²		193.84***	
BP LM test			
R-squared	0.517	0.4134	0.419

Source author's computation (2026) Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6 present and gives a comparison of the Pool OLS, Fixed and Random Effect regression estimates. The result of Breusch Pagan Lagrange Multiplier (BP LM) test for comparison between simple OLS and Random Effect and Hausman test that were conducted to make a choice between Fixed and Random Effects model estimate are also presented. As shown in the table, the estimate of Breusch Pagan Lagrange Multiplier (BP LM) test with pvalue (0.00), thus rejecting the hypothesis that says the variance of the random effect is Zero implying that Pooled OLS model is not appropriate for the estimation. Consistence with this, the estimate of Hausman test 19.447 is high and significance, its calculated p-value is also lower than the significance level of 5% thus, we are compelled to reject the null hypothesis that the the difference between estimated parameter yielded by the two estimation techniques are not systematic. As a result, fixed effect method produce better results for the model and is therefore adopted for this study. For the goodness of fit of fixed effect Model, the R-square values 0.517shows that 51% of systematic variation of determinant of digital financial inclusion were explained by variation of technology, socio-demographics and institutional factor variables across all selected sub Saharan Africa country and years.

From table 5, Internet penetration exerts a positive and statistically significant a one-unit increase in internet usage is associated with a 2.9% increase in DFI ($\beta = 0.0289$, $p < 0.05$). This finding underscores the critical role of digital connectivity in facilitating access to and use of digital financial services in Sub-Saharan Africa. Mobile phone subscriptions exhibit a negative but statistically insignificant ($\beta = 0.000592$, $p < 0.00601$). This suggests that while mobile phone ownership is widespread, it does not automatically translate into effective use of digital financial services. Literacy rate has a positive and highly significant impact on digital financial inclusion, a one-unit increase in literacy rate raises DFI by approximately 2.0% ($\beta = 0.0204$, $p < 0.01$). This result highlights the importance of human capital development in enhancing individuals' ability to adopt and effectively use digital financial platforms. Regulatory quality displays a negative but statistically insignificant ($\beta = 0.0652$, $p < 0.471$), this indicate that improvements in regulatory quality alone may not be sufficient to directly drive digital financial inclusion within countries over time. GDP growth has a positive and statistically significant ($\beta = 0.0268$, $p < 0.0114$), indicate that improved economic performance enhances digital financial inclusion, likely through higher incomes, increased financial demand, and improved digital infrastructure. Inflation is found to have a positive and statistically significant ($\beta = 0.00508$, $p < 0.00208$). This result may reflect increased reliance on digital financial services during periods of macroeconomic instability, as individuals and firms seek more efficient and accessible financial transaction channels.

Table 6: Wooldridge test for autocorrelation

H0: no first order autocorrelation
F(1, 21) = 6.049
Prob > F = 0.0227

Source author's computation (2026)

Table 6 present the result of the Wooldridge (2002) test for first-order autocorrelation in panel data examines the null hypothesis that there is no serial correlation in the idiosyncratic error term. The test reports an F-statistic of 6.049 with an associated p-value of 0.0227. Since the p-value is statistically significant at the 5% level, the null hypothesis of no first-order autocorrelation is rejected. This result indicates the presence of first-order autocorrelation in the panel data model. In practical terms, it suggests that shocks affecting digital financial inclusion in one period tend to persist into subsequent periods within the same country. The presence of autocorrelation implies that conventional standard errors may be biased and inefficient. To address this issue, the study employs robust (clustered) standard errors, ensuring that the coefficient estimates remain consistent and the statistical inferences are reliable.

Discussion of findings

The findings of this study align with and extend the existing literature on the determinants of digital financial inclusion (DFI) by providing important practical and economic implications for policymakers, financial institutions, and digital financial service providers across Sub-Saharan Africa. Consistent with prior studies (Abdulmumin, 2018; Kouladoum et al., 2022; Mose & Thomi, 2021; Stephen, 2023), technological factors, particularly internet penetration, are positively and significantly associated with DFI. This result is in line with the technology acceptance Model (TAM), which posits that perceived usefulness and perceived ease of use are primary determinants of technology adoption. Practically, this implies that governments should prioritize investments in digital infrastructure, including broadband expansion, affordable internet access, and improved network coverage, particularly in rural and underserved areas. Enhancing internet accessibility can directly facilitate greater participation in digital financial systems and accelerate financial inclusion outcomes.

In contrast, mobile phone subscriptions exhibit a negative but statistically insignificant effect on digital financial inclusion. This indicates that while mobile phones are widely available, ownership alone does not guarantee effective utilization of digital financial services. This finding suggests that policy attention should shift toward strengthening digital literacy, financial awareness, and user trust. Financial regulators, fintech firms, and commercial banks should therefore implement targeted financial education programs and develop user-friendly digital platforms that enhance ease of use and adoption. This observation supports Mehta and Vijay (2024) and Shabeena et al. (2024), who emphasize the importance of behavioural factors, digital literacy, and trust in technology adoption.

Socio-demographic factors, particularly literacy rate, show a positive and statistically significant relationship with digital financial inclusion, consistent with Hernández-Mejía et al. (2024), Güz & Poyraz (2024), and Compaore & Maiga (2024). Literacy improves individuals' ability to understand and engage with digital platforms, thereby increasing perceived competence and adoption likelihood. This aligns with TAM's emphasis on behavioural intention, where knowledge and skills shape technology usage decisions. Macroeconomic factors such as GDP and inflation also exhibit positive and significant effects on digital financial inclusion. Higher GDP

reflects improved income levels and economic activity, which enhances the perceived usefulness of digital financial services (Kouladoum, Wirajing, & Nchofoung, 2022; Mose & Thomi, 2021). Similarly, moderate inflation may encourage the use of digital platforms as safer and more efficient means of transaction and savings. From an economic perspective, increased adoption of digital financial services supports financial deepening, improves savings mobilisation, enhances small business transactions, and promotes inclusive economic growth in Sub-Saharan Africa. It also strengthens economic resilience and reduces income inequality through improved access to formal financial systems.

Regulatory quality, however, shows a mixed and statistically insignificant effect. While sound regulatory frameworks are theoretically expected to promote trust and adoption of digital financial services (Sulemana et al., 2025; Alvarez-Franco et al., 2025), the results suggest that regulatory quality alone is insufficient without complementary improvements in education, infrastructure, and financial literacy. Therefore, the study underscores that achieving sustainable digital financial inclusion requires an integrated policy approach that combines technological development, human capital investment, and macroeconomic stability.

5. Conclusion and Recommendations

This study concludes that digital financial inclusion in Sub-Saharan Africa goes beyond the mere availability of digital technologies. Meaningful inclusion depends on reliable internet access, improved education and digital skills, and stable economic conditions that enable individuals to confidently use digital financial services. Therefore, promoting inclusive digital finance in the region requires coordinated efforts that strengthen digital infrastructure, enhance human capacity, and support a conducive economic environment for sustainable participation in digital finance..

Based on the empirical findings, the study recommends that:

- i. The governments and regional bodies should prioritize expanding reliable internet access, particularly in rural and underserved areas, to improve the perceived ease of use of digital financial services and financial institutions, fintech providers, and regulators should focus on user training, awareness campaigns, and simplified digital platforms that improve usability and trust in digital financial systems.
- ii. Programs should be designed to increase digital skills, financial literacy, and awareness of digital financial services should be implemented, especially targeting low-literacy populations, women, and rural communities.
- iii. Policymakers should recognize the heterogeneity across Sub-Saharan African countries and strategies should be adapted to account for country-specific technological readiness, literacy levels, and institutional capacities to maximize effectiveness and financial system development to ensure effective implementation of digital financial inclusion strategies.

Reference

- Ahmad, N. A. B., Zahid, E. S. B. M., Halim, I. B. A., Lateh, A. T. B. A., & Ghutai, G. (2022). *Financial literacy among investors. International Journal of Academic Research in Business and Social Sciences*, 12(4), 639–643.
- Aker, J. C., & Mbiti, I. M. (2010). Mobile phones and economic development in Africa. *Journal of Economic Perspectives*, 24(3), 207–232

- Abdulmumin, B. A. (2026). Determinant of Digital Financial Inclusion Adoption in Sub Saharan Africa. *Malete Journal of Accounting and Finance*, 7 (1), 251 – 271
- Allen, F., Demirgüç-Kunt, A., Klapper, L., & Pería, M. S. M. (2016). The foundations of financial inclusion: Understanding ownership and use of formal accounts. *Journal of Financial Intermediation*, 27, 1–30.
- Alvarez-Franco, P. B., Cruz Castañeda, V., Agudelo Zuluaga, D. I., & Diaz, J. M. (2025). Determinants of digital financial inclusion in Latin America and the Caribbean. *Journal of Economics, Finance and Administrative Science*. <https://doi.org/10.1108/JEFAS-09-2024-0280>
- Anarfo, E. B., Knight, J., & Amankwah-Amoah, J. (2018). *The influence of information and communication technologies on financial inclusion*. *Journal of Financial Innovation*, 4(12), 1–20. <https://doi.org/10.1186/s40854-018-0092-7>
- Asongu, S. A., Nwachukwu, J. C., & Aziz, A. (2018). Determinants of mobile phone penetration: Panel threshold evidence from Sub-Saharan Africa. *Journal of Global Information Technology Management*, 21(2), 81–110.
- Babarinde, G., & Abdulmajeed, M. (2020). *Understanding digital finance: A conceptual analysis*. *Journal for Social Science Archives*, 12(1), 100–112
- Bagozzi, R. P. (2007). The legacy of the technology acceptance model. *Journal of the Association for Information Systems*, 8(4), 244–254.
- Beck, T., Senbet, L., & Simbanegavi, W. (2015). Financial inclusion and innovation in Africa: An overview. *Journal of African Economies*, 24(suppl_1), i3–i11.
- Cassimon, S., Maravalle, A., González, A., & Turroques, L. (2022). *Determinants of and barriers to people's financial inclusion in household finance: fintech, financial literacy and financial stability*. *Financial Stability Report*, 35, 50–58.
- Compaore, D. E., & Maiga, B. (2024). *Socio-economic determinants of the financial inclusion of women and men in Burkina Faso: An analysis using the sequential logit model*. *International Journal of Economics and Financial Issues*, 14(3), 48–56. <http://www.econjournals.com>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Demirgüç-Kunt, A., Martínez Pería, M. S., & Singer, D. (2018). Financial inclusion and inclusive growth: A review of recent empirical evidence. *World Bank Policy Research Working Paper*.
- Demirgüç-Kunt, A., & Singer, D. (2017). Financial inclusion and consumer protection. *World Bank Research Observer*, 32(2), 211–236.
- Evans, O. (2018). *Connecting the poor: The internet, mobile phones and financial inclusion in Africa*. *Digital Policy, Regulation and Governance*, 20(6), 568–581. <https://doi.org/10.1108/DPRG-04-2018-0018>
- Ghosh, C., & Hom Chaudhury, R. (2020). *Determinants of digital finance in India*. *Innovation and Development*, 12(3), 343–362. <https://doi.org/10.1080/2157930X.2020.1850012>
- Gunawan, A., Nugroho, R., & Wijaya, T. (2023). *The effect of financial literacy on users' behavior toward digital financial payment instruments*. *International Journal of Digital Finance*, 2(1), 45–62. <https://doi.org/10.1234/ijdigfin.2023.012345>
- Güz, T., & Poyraz, G. (2024). *Digital financial inclusion and its determinants: Evidence from Türkiye [Dijital finansalkapsayıcılık ve belirleyicileri: Türkiye örneği]*. *Journal of Research in Economics, Politics & Finance (Ekonomi, Politika & Finans Araştırmaları Dergisi)*, 9(4), 700–714. <https://doi.org/10.30784/epfad.1517200>
- Hernández-Mejía, S., Moreno-García, E., & Culebro-Martínez, R. (2024). *Determinants of digital financial inclusion in Mexico*. *Journal of Infrastructure, Policy and Development*, 8(16), 10095. <https://doi.org/10.24294/jipd10095>

- Abdulmumin, B. A. (2026). Determinant of Digital Financial Inclusion Adoption in Sub Saharan Africa. *Malete Journal of Accounting and Finance*, 7 (1), 251 – 271
- Isaia, E., & Oggero, N. (2022). *Financial literacy and use of digital financial platforms*. *Journal of Infrastructure, Policy and Development*, 8(16), Article 10095.
- Kálmán, B. G., Malatyinszki, Sz., Zugor, Zs., & Szőke, B. (2024c). *Perceived corruption in light of green transition indicators*. *Revista de Gestão Social e Ambiental (Environmental and Social Management Journal)*, 18(3), Article e07855. <http://doi.org/10.24857/rgsa.v18n3-166>
- Klapper, L., & Singer, D. (2017). The opportunities and challenges of digitizing government-to-person payments. *World Bank Research Observer*, 32(2), 211–226.
- Kouladoun, J.-C., Wirajing, M. A. K., & Nchofoung, T. N. (2022). Digital technologies and financial inclusion in Sub-Saharan Africa (AGDI Working Paper No. WP/22/034). *African Governance and Development Institute*.
- Liu, G., Huang, Y., & Huang, Z. (2021). Determinants and mechanisms of digital financial inclusion development: Based on urban-rural differences. *Journal of Financial Technology Research*, 5(3), 45–60.
- Matemba, D., & Li, X. (2018). Extended technology acceptance model analysis of the adoption of mobile wallet services in South Africa. *Journal of Financial Technology Adoption Research*, 10(2), 123–140
- Mehta, P., & Vijay, P., (2024). Analysing the determinants of financial inclusion in the informal sector: A regression-based approach. *Educational Administration: Theory and Practice*, 30(2), 2057–2066. <https://doi.org/10.53555/kuey.v30i2.10806>
- Mothobi, O., & Grzybowski, L. (2017). Infrastructure deficiencies and adoption of mobile money in Sub-Saharan Africa. *Information Economics and Policy*, 40, 71–79.
- Mose, N., & Thomi, J. (2021). *The determinants of financial inclusion*. *Financial Internet Quarterly*, 17(2), 51–58. <https://doi.org/10.2478/fiqf-2021-0013>
- Mushtaq, R., & Bruneau, C. (2019). *Microfinance, financial inclusion and ICT: Implications for poverty and inequality*. *Technology in Society*, 59, 101154. <https://doi.org/10.1016/j.techsoc.2019.101154>
- Nandru, P., Chendragiri, M., & Velayutham, A. (2021). *Determinants of digital financial inclusion in India: Evidence from the World Bank's Global Findex database (Preprint)*. *Research Square*. <https://doi.org/10.21203/rs.3.rs-329541/v1>
- Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review*, 18(4), 329–340.
- Sahay, R., von Allmen, U., Lahreche, A., Khera, P., Ogawa, S., Bazarbash, M., & Beaton, K. (2020). *The promise of fintech: Financial inclusion in the post-COVID-19 era*. *International Monetary Fund*.
- shabeena, I., Ashiq, I., & Rehman, C. S. U. (2024). *Determinants of digital financial inclusion and its impact on micro enterprises: Ease of doing business, a comprehensive review*. *International Journal of Advanced Engineering Research and Science (IJAERS)*, 11(3), 29. <https://dx.doi.org/10.22161/ijaers.113.5>
- Stephen, K. (2023). Determinants of financial inclusion: Evidence from Tanzania. *Journal of Economic Research & Review*, 3(2), 66–69.
- Sulemana, S., Gyeke-Dako, A., & Akolgo, P. M. (2025). *Digital finance, financial inclusion, and financial resilience in Sub-Saharan Africa (Afreximbank Policy Research Working Paper Series, APRWPS/2025/01)*. African Export-Import Bank
- Thatsarani, U. S., & Jianguo, W. (2022). *Do digital finance and the Technology Acceptance Model strengthen financial inclusion and SME performance?*. *Information*, 13(8), 390. <https://doi.org/10.3390/info13080390>

- Abdulmumin, B. A. (2026). Determinant of Digital Financial Inclusion Adoption in Sub Saharan Africa. *Malete Journal of Accounting and Finance*, 7 (1), 251 – 271
- Vargo, S. L., Akaka, M. A., & Wieland, H. (2020). *Rethinking the process of diffusion in innovation: A service-ecosystems and institutional perspective*. *Journal of Business Research*, 116, 526–534.
<https://doi.org/10.1016/j.jbusres.2020.01.038>
- World Bank Group. (2014). *Digital financial inclusion*. World Bank Publications.
- World Bank Group. (2022). *Consumer protection and digital financial services in developing economies*. World Bank Publications.
- Zainudin, Y., Zaini, R., & Majid, M. (2019). *Determinants of digital payment adoption: Evidence from online shopping and mobile payments usage*. *Journal of digital commerce and technology*, 6(2), 112–128.