ESI Preprints **Not Peer-reviewed**

Influence of Financial Inclusion on Informal Sector Small and Medium Scale Enterprises' Employment in Sub-Saharan Africa: Moderating Role of Mobile Money

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Doi: 10.19044/esipreprint.12.2025.p148

Approved: 06 December 2025
Posted: 08 December 2025

Cite As:
Ackom, E.K. & Ocansey, E.O.N.D. (2025). *Influence of Financial Inclusion on Informal Sector Small and Medium Scale Enterprises' Employment in Sub-Saharan Africa: Moderating Role of Mobile Money.* ESI Preprints.
https://doi.org/10.19044/esipreprint.12.2025.p148

Abstract

The informal sector remains a dominant force in Sub-Saharan Africa (SSA), with small and medium-sized enterprises (SMEs) serving as critical engines of employment and livelihood. However, limited access to financial services continues to constrain the growth and sustainability of these businesses. This study investigates the impact of financial inclusion on employment outcomes among informal SMEs in SSA, with a particular focus on the moderating role of mobile money. The study analyzed a panel data from 38 SSA countries between 2000 and 2023 with a two-step System Generalized Method of Moments (GMM). Findings reveal that while financial inclusion has a weak positive effect on employment, mobile money alone also shows a modest direct effect. However, the interaction between financial inclusion and mobile money is negative and statistically significant, suggesting that mobile money may dilute the employment-enhancing impact of broader financial inclusion when both coexist. The results also confirm strong employment persistence and limited influence from macroeconomic control variables. The study implies that policymakers should treat financial inclusion and mobile money not as interchangeable tools but as complementary elements that require careful coordination. Additionally, the findings offer new directions for accounting research, especially in the context of informal financial data and reporting practices. Future work

should consider firm-level data, gender-disaggregated analysis, and evolving financial technologies to better understand SME dynamics in Africa's informal economy.

Keywords: Financial inclusion, Mobile money, Informal sector SMEs, Digital finance, Mobile money

Introduction

The informal sector remains a critical component of many African economies, contributing significantly to employment creation, income generation, and grassroots entrepreneurship. At the heart of this sector are Small and Medium Enterprises (SMEs), which serve as essential engines for economic resilience and social inclusion, especially in regions where formal employment opportunities are limited (Mpofu & Sibindi, 2022). In countries across Sub-Saharan Africa (SSA), informal SMEs operate outside formal regulatory frameworks, yet they account for over 80% of employment and a considerable share of GDP in many national economies (Turkson et al., 2020). Despite their economic importance, these SMEs often face systemic financial exclusion, limited access to credit, and insufficient integration into the broader financial ecosystem.

Financial inclusion, broadly defined as the accessibility and usage of affordable financial products and services, has emerged as a vital policy tool for alleviating poverty and fostering inclusive growth (Crawford et al., 2023). For SMEs in the informal sector, access to financial services can determine whether a business survives, grows, or collapses under financial pressure. Studies have consistently shown that greater financial inclusion facilitates better business decision-making, supports cash flow management, and fosters investment in productivity-enhancing tools (Gosavi, 2017). However, traditional banking institutions have often perceived informal SMEs as high-risk due to limited credit histories, lack of formal documentation, and unpredictable revenue streams (Mpofu & Sibindi, 2022). This financial marginalization curtails the capacity of SMEs to scale, innovate, or formalize their operations.

In recent years, digital financial services-particularly mobile money platforms-have redefined the financial landscape in Africa. Mobile money, which allows users to send, receive, and store money using mobile phones, has provided an innovative solution to conventional barriers in the financial system (Ahmad et al., 2020). In SSA, mobile money penetration exceeds that of traditional banking, with millions of users transacting without ever entering a bank branch (Mothobi & Kebotsamang, 2024). For informal SMEs, mobile money offers a cost-effective, convenient, and secure means

to handle business transactions, manage cash flows, and access credit through alternative scoring mechanisms.

As the evidence shows, mobile money adoption has been linked with improved financial performance of SMEs. For instance, a study in Cameroon found that mobile money services contributed to over 70% of the variance in SME turnover post-adoption, demonstrating their critical role in financial empowerment (Talom & Tengeh, 2019). Similarly, in Ghana, formal financial services-complemented by mobile payment tools-positively impacted SME growth trajectories, particularly among informal enterprises (Turkson et al., 2020). The inclusion of mobile money in financial inclusion models introduces a dynamic variable that extends access to remote, unbanked, or previously excluded populations. This has particular implications for women-led enterprises, where gendered barriers often limit engagement with formal financial institutions (Kim, 2021).

Despite this, the relationship between financial inclusion and SME performance is not linear. Mobile money can serve as a moderator in this relationship-meaning it can strengthen, weaken, or alter how financial inclusion affects SME outcomes. For example, while bank account ownership may provide foundational financial access, the real-time liquidity, transactional flexibility, and lower transaction costs of mobile money platforms can significantly enhance the utility of that access (Konte & Tetteh, 2022). Mobile money usage may also facilitate the collection of digital footprints, which fintech companies and micro-lenders can analyze to offer credit to SMEs otherwise considered unbankable (Thathsarani & Jianguo, 2022).

Thus, there is growing scholarly interest in understanding how mobile money moderates financial inclusion's impact on SME growth. Nevertheless, notable research gaps remain. First, while several studies examine financial inclusion in general terms, few isolate informal SMEs as a distinct unit of analysis, particularly across multiple SSA countries (Mpofu & Sibindi, 2022). Second, many existing analyses use cross-sectional or descriptive methods, but this study employs a more robust quantitative approach-Generalized Method of Moments (GMM)-to account for endogeneity and dynamic effects over time (Sanga & Aziakpono, 2024). Third, prior models tend to examine either financial inclusion or mobile money in isolation. By integrating mobile money as a moderating variable, this study seeks to unpack its unique interaction effects within the inclusion-performance nexus. Lastly, studies that combine macro-level financial indicators with firm-level performance outcomes using secondary datasets are scarce, which limits generalizability across contexts.

Moreover, the multidimensional nature of financial inclusion-spanning access, usage, and quality-demands more refined metrics. Many

studies treat financial inclusion as a binary variable (i.e., banked vs. unbanked), overlooking nuances like frequency of use, digital literacy, or trust in financial institutions (Ahmad et al., 2020). Similarly, while mobile money is widely studied in East Africa due to M-Pesa's dominance, less is known about its effects in West and Central Africa, where uptake varies by infrastructure, regulation, and cultural norms (Coffie et al., 2020). This gap highlights the need for regional comparative analysis, especially as financial ecosystems in SSA become increasingly digitized and heterogeneous.

Given these gaps, the present study is timely and relevant. Its primary objective is to examine how financial inclusion influences the growth and sustainability of SMEs operating within the informal sector in Africa. A key component of this inquiry is to explore how mobile money services affect access to financial services and whether they amplify or diminish the relationship between financial inclusion and SME growth. Specifically, the study seeks to determine if mobile money usage-measured by indices of access, usage frequency, and savings-strengthens the financial resilience and performance of SMEs beyond what traditional inclusion mechanisms offer (Lu et al., 2021).

Furthermore, the study is positioned to contribute to policy dialogues around inclusive finance and SME development. Policymakers across SSA are grappling with how best to regulate and integrate mobile money providers, promote financial innovation, and improve financial literacy among SME owners (Crawford et al., 2023). By providing empirical evidence on how mobile money moderates the inclusion-performance link, this study offers a data-driven foundation for crafting targeted interventions. For instance, governments may consider subsidizing mobile transaction fees for SMEs, or promoting interoperability between banks and mobile money networks.

In essence, SMEs in Africa's informal sector remain foundational to economic progress but face structural limitations due to persistent financial exclusion. While financial inclusion initiatives have gained momentum, digital financial tools such as mobile money increasingly influence their efficacy. As this study argues, mobile money not only expands access but may fundamentally alter how financial inclusion affects business outcomes. However, current research has yet to fully model this complex interplay. By focusing on informal SMEs, employing a GMM-based quantitative methodology, and treating mobile money as a moderator variable, this study fills a critical gap in both theoretical and policy literature. In doing so, it enhances our understanding of how inclusive financial ecosystems can be designed to empower informal sector enterprises in Africa.

Literature Review

Financial Inclusion and the Growth of Informal SMEs in Africa

The literature on financial inclusion consistently highlights its essential role in driving the performance and sustainability of SMEs, especially those operating in the informal sectors of developing economies. In Sub-Saharan Africa (SSA), informal SMEs constitute a significant proportion of the entrepreneurial ecosystem, yet they remain financially marginalized due to structural, institutional, and informational barriers (Turkson et al., 2020). The challenge for many of these businesses lies not in the lack of enterprise potential but rather in their limited integration into the formal financial system, which restricts their access to credit, savings instruments, and insurance services necessary for expansion and risk mitigation.

According to empirical evidence from Ghana, access to formal finance has a statistically significant and positive impact on the growth of informal firms, far exceeding the effects of informal financial channels such as moneylenders or rotating savings schemes (Turkson et al., 2020). This distinction matters because formal financial institutions typically offer larger capital, financial advisory services, and credit history tracking, all of which support enterprise development. Similarly, a study by Mpofu and Sibindi (2022) confirms that while informal finance can serve as a useful stopgap, it often fails to meet the scaling needs of growing SMEs due to high interest rates and lack of business development support (Mpofu & Sibindi, 2022).

Furthermore, financial inclusion is positively linked to SME survival rates, innovation, and formalization. Access to credit allows SMEs to acquire technology, hire skilled labor, and navigate financial shocks, all of which are prerequisites for long-term sustainability (Ahmad et al., 2020). However, the evidence also shows that these benefits are not universally accessible; geographic, gender, and educational disparities further limit inclusion. Women-owned SMEs, in particular, face compounded exclusion due to legal, cultural, and technological barriers (Kim, 2021). Therefore, achieving meaningful financial inclusion for SMEs in SSA requires addressing systemic exclusion alongside technological innovation.

Mobile Money and Its Influence on Financial Access for Informal SMEs

Over the past decade, mobile money has revolutionized financial access across Africa, serving as an enabler for millions of unbanked individuals and small enterprises. Unlike conventional banking, mobile money platforms allow users to send, receive, store, and even borrow money through mobile phones, often bypassing the need for physical infrastructure or formal documentation (Ahmad et al., 2020). For informal SMEs, these

platforms represent a cost-effective and accessible solution to longstanding barriers in the traditional financial system.

Empirical studies from Cameroon and Kenya confirm that mobile money enhances business operations by facilitating secure payments, reducing transaction costs, and improving liquidity management. In Douala, Cameroon, mobile money services accounted for approximately 73% of the total variance in turnover among SMEs after adoption, demonstrating their significant role in improving financial performance (Talom & Tengeh, 2019). Similarly, Kim (2021) found that mobile money had a transformative effect on women's access to finance in Nairobi, especially for younger and lower-income women who were previously excluded from formal banking services (Kim, 2021).

Notably, mobile money services also provide digital records of financial transactions, which can be used to build credit profiles and unlock micro-credit from fintech providers. These services are often embedded in user-friendly applications with built-in financial literacy tools and product recommendations tailored to SMEs (Mothobi & Kebotsamang, 2024). As a result, mobile money is not just a financial tool-it is a gateway to broader financial ecosystems, including savings, insurance, and investment platforms.

However, access to mobile money services is uneven across SSA. Infrastructure disparities, especially in remote or rural areas, hinder adoption. Mothobi and Kebotsamang (2024) highlight the role of network coverage in determining digital finance usage, noting that the presence of LTE towers could increase financial inclusion by up to 6% in countries like Mozambique and Ghana (Mothobi & Kebotsamang, 2024). These findings underscore the importance of supporting infrastructure in enhancing the reach and impact of mobile financial services.

The Moderating Role of Mobile Money in the Inclusion–Performance Relationship

While mobile money clearly enhances access to finance, its role as a moderator in the relationship between financial inclusion and SME growth is still emerging in scholarly discourse. Moderation, in this context, implies that mobile money influences the strength or direction of the effect financial inclusion has on business outcomes. Konte and Tetteh (2022) explored this interaction and found that mobile money use alone had no significant direct effect on labor productivity. However, when combined with access to traditional financial services-especially bank capital-the impact on productivity was significantly positive (Konte & Tetteh, 2022). This suggests that mobile money does not replace traditional financial services but rather amplifies their effects by lowering transaction costs and improving liquidity.

Furthermore, mobile money provides real-time, transaction-based data that financial institutions can use to assess creditworthiness in the absence of collateral or formal records. This interaction supports the thesis that mobile money not only enhances financial access but also enables financial inclusion to translate more effectively into enterprise development (Sanga & Aziakpono, 2024). Moreover, the moderating effect of mobile money is particularly pronounced in countries and regions with strong fintech ecosystems and high levels of digital literacy. Additional support for this moderating role is found in Thathsarani and Jianguo's (2022) study, which showed that digital financing tools positively mediate the relationship between financial inclusion and SME performance. Their findings underscore the importance of not just access, but also the effective use of financial services, which mobile money facilitates by being affordable, user-friendly, and widely accessible (Thathsarani & Jianguo, 2022).

Nonetheless, the literature calls for more empirical research using dynamic modeling techniques to evaluate the temporal and structural aspects of this moderation. Existing studies often employ cross-sectional data and fail to account for endogeneity or firm-specific heterogeneity. To address this, future studies-including the present one-can apply the Generalized Method of Moments (GMM) estimator to analyze longitudinal firm data across SSA, enabling a more accurate assessment of the moderating effects of mobile money.

Theoretical Framework

A sound theoretical framework is essential to contextualize and interpret the complex relationship between financial inclusion, SME development, and the moderating effect of mobile money in Sub-Saharan Africa. This study is underpinned by two key theoretical models: the Financial Intermediation Theory and the Technology Acceptance Model (TAM). Together, these frameworks offer complementary insights into both the financial mechanisms and user behavior dynamics shaping the digital financial landscape for informal SMEs.

Financial Intermediation Theory

The Financial Intermediation Theory, originating from the work of Gurley and Shaw (1960) and later expanded by Diamond and Dybvig (1983), posits that financial intermediaries-such as banks, microfinance institutions, and mobile money operators-exist to bridge the gap between savers and borrowers by mitigating information asymmetry and transaction costs. In economies characterized by imperfect capital markets, these intermediaries play a crucial role in mobilizing savings, allocating credit efficiently, and supporting economic growth.

In the context of Sub-Saharan Africa, where informal SMEs dominate employment and income generation, access to finance is both a constraint and a catalyst. Most informal SMEs operate without formal financial records, collateral, or banking history, making them unattractive to conventional financial institutions (Mpofu & Sibindi, 2022). Financial Intermediation Theory helps to explain how non-traditional intermediaries-particularly mobile money platforms-step in to fulfill these unmet needs by offering low-cost, accessible financial services. These platforms act as de facto intermediaries, using digital technology to collect, process, and distribute financial information and resources, thereby expanding the reach of financial inclusion (Talom & Tengeh, 2019).

Furthermore, the theory highlights the importance of transaction efficiency and risk management in financial inclusion efforts. Traditional banks incur high administrative and monitoring costs when lending to informal SMEs, often resulting in credit rationing or outright exclusion (Turkson et al., 2020). Mobile money operators, however, leverage economies of scale, digital identities, and transaction data to offer scalable, low-risk financial solutions, aligning with the intermediation function outlined in the theory. These digital intermediaries not only facilitate payments and remittances but also create pathways for access to credit, insurance, and savings products, all of which support SME growth and sustainability (Ahmad et al., 2020).

Moreover, Financial Intermediation Theory provides a useful lens for understanding the supply-side evolution of financial services. In SSA, regulatory changes and technological advancements have allowed telecom companies, fintech firms, and third-party platforms to enter the financial market, introducing new types of intermediaries that offer financial services through mobile phones (Coffie et al., 2020). These innovations reduce the reliance on physical infrastructure, which is often lacking in rural or peri-urban areas, thus expanding financial inclusion to populations traditionally excluded from the formal financial system.

Nevertheless, critics of the Financial Intermediation Theory argue that it assumes a certain level of institutional maturity and regulatory oversight that may be absent in many African countries. In weak regulatory environments, the proliferation of digital financial services can lead to new risks such as fraud, over-indebtedness, and data breaches. While intermediaries do improve access, their effectiveness depends heavily on governance, trust, and the financial literacy of end users. This shortcoming underscores the need for a second theoretical lens that captures user-side dynamics, which is addressed by the Technology Acceptance Model.

Technology Acceptance Model (TAM)

Developed by Davis (1989), the Technology Acceptance Model (TAM) offers a behavioral framework to explain and predict how users adopt and engage with new technologies. It posits that perceived usefulness (PU) and perceived ease of use (PEOU) are the two primary factors influencing an individual's decision to adopt a technological innovation. In the context of mobile money and digital financial services, TAM provides valuable insights into how and why informal SME operators choose to integrate such technologies into their financial practices.

Mobile money is not just a financial product but also a digital innovation that requires user trust, literacy, and behavioral change. The extent to which informal SME owners in Africa perceive mobile money as beneficial to their operations-whether through enhanced access to working capital, simplified transactions, or greater business security-determines the platform's effectiveness in fostering financial inclusion (Thathsarani & Jianguo, 2022). If mobile money platforms are seen as too complex, unreliable, or insecure, adoption rates fall, and their intended benefits remain unrealized. Thus, TAM introduces a user-centric dimension that complements the institutional focus of Financial Intermediation Theory.

Additionally, empirical studies confirm the relevance of TAM in African contexts. For instance, research conducted in Nairobi shows that mobile money adoption among women entrepreneurs was closely linked to the ease with which they could learn and use the platform, as well as the perceived ability of the technology to support their financial independence (Kim, 2021). Similarly, Sanga and Aziakpono (2024) argue that while digital finance holds great potential, its actual impact on entrepreneurship and SME growth is contingent on user attitudes toward the technology, reinforcing TAM's central premise (Sanga & Aziakpono, 2024).

TAM also helps to explain the moderating role of mobile money in the relationship between financial inclusion and SME performance. The model suggests that even where formal financial services are available, their positive impact on SMEs may be muted if users do not trust or actively use the technology facilitating that access. Therefore, mobile money acts as more than a channel; it is a behavioral bridge that determines whether financial inclusion translates into business performance. When adoption barriers-such as lack of digital literacy or gender-based digital exclusion-are removed, the moderating effect of mobile money becomes significantly positive (Mothobi & Kebotsamang, 2024).

While TAM has been widely validated across various technological domains, it also has limitations. Critics argue that it oversimplifies adoption behavior by focusing on cognitive perceptions and excluding broader social, cultural, and institutional influences. In response, researchers have proposed

extensions such as TAM2 and the Unified Theory of Acceptance and Use of Technology (UTAUT), which integrate social influence and facilitating conditions. However, the core TAM framework remains robust and highly applicable to the digital finance context among informal SMEs.

Integrating the Two Theories

Taken together, the Financial Intermediation Theory and TAM offer a comprehensive foundation for this study. The former explains how mobile money and financial institutions act as intermediaries to enhance SME access to finance, while the latter focuses on the behavioral and psychological factors driving mobile money adoption. This dual-theoretical approach is especially appropriate for the African informal SME context, where institutional barriers and user perceptions jointly shape the effectiveness of financial inclusion strategies.

By grounding this study in both theories, the research not only captures the structural mechanisms enabling financial access but also the individual-level choices that determine whether these mechanisms translate into meaningful economic outcomes. This theoretical synergy is essential for examining the moderating role of mobile money, as it reflects both the supply-side innovation and demand-side adoption dynamics required to unlock financial inclusion's full potential.

Methods

This This study employs a quantitative research approach, which is appropriate for investigating macro-level trends and relationships using secondary, panel-based financial and development indicators. Quantitative methods allow for objective analysis and statistical validation of relationships among the variables of interest, such as financial inclusion, employment, and mobile money usage. Moreover, the use of secondary data from reliable international databases ensures a high degree of consistency, comparability, and validity across time and countries (Crawford et al., 2023).

The data used in this study are primarily sourced from the World Bank's Global Findex Database, the World Development Indicators (WDI), and UNESCO education statistics. These databases provide harmonized and internationally accepted indicators on financial access, labor market dynamics, economic development, and educational outcomes. In particular, the World Bank's Global Findex data is instrumental in tracking trends in mobile money usage and financial inclusion, while the WDI dataset provides macroeconomic controls and labor market statistics (Ahmad et al., 2020). These secondary sources are widely cited in development finance research and offer a robust basis for cross-national comparison (Talom & Tengeh, 2019).

This study examines macroeconomic and financial indicators from 49 Sub-Saharan African (SSA) countries over the period 2000 to 2023. However, due to inconsistencies in data reporting and missing values in key variables-particularly regarding mobile money and employment ratios-the final panel dataset includes 38 countries. These countries were selected based on the completeness and availability of relevant data across the study period. Focusing on SSA is both timely and appropriate, given the region's leadership in mobile money innovation and the dominance of informal SMEs in its economic structure (Mpofu & Sibindi, 2022). The informal sector in SSA accounts for a large portion of employment and value addition, yet remains underserved by traditional banking systems. By limiting the study to SSA, the analysis is more contextually grounded and offers more targeted insights into policy challenges and digital financial inclusion opportunities specific to the region (Turkson et al., 2020).

The study includes a combination of dependent, independent, moderating, and control variables, selected based on theoretical relevance and data availability. The measurements and sources of these variables are summarized in Table 1 below.

Table 1: Measurements of Variables

Variable Type	Variable	Definition	Acronym	Measurement	Data Source
Moderating	Mobile Money Index	Composite score of access, usage, and storage via mobile money services	MMI	Average of normalized indicators: 1) account ownership, 2) usage ≥2x/month, 3) savings using mobile money	World Bank Global Findex
Independent	Financial Inclusion	Access to and use of formal financial services	FINC	1) % adults with bank account, 2) % with mobile money account, 3) % saving formally	World Bank Global Findex
Dependent	Employment Ratio	Share of working-age population that is employed	EMP	Employment-to-population ratio (%)	World Bank World Development Indicators (WDI)
Control	Poverty	Share of population living below international poverty line	POV	Poverty headcount ratio at $2.15/day (2017 PPP)	World Bank WDI
Control	Inflation	Rate of increase in general price level	INF	Annual % change in Consumer Price Index (CPI)	World Bank WDI

To analyze the relationship between financial inclusion and employment growth-along with the moderating effect of mobile money-this study adopts a dynamic panel data model. Specifically, the Generalized Method of Moments (GMM) estimator is used to account for potential endogeneity, omitted variable bias, and unobserved heterogeneity across countries and over time. GMM is particularly suitable for macro-panel datasets with a short time period (T) and a large cross-section (N), which is the structure of this study's data (Gosavi, 2017)

The base model is specified as follows:

$$EMP_{it} = \beta_0 + B_1 FINC_{it} + B_2 MMI_{it} + B_3 (FINC \times MMI)_{it} + B_4 POV_{it} + B_5 INF_{it} + B_6 CRD_{it} + B_7 EDU_{it} + \epsilon_{it} \quad \ldots\ldots(1)$$

Where:

EMP_{it} is the employment ratio in country i at time t

$FINC_{it}$ is the financial inclusion score,

MMI_{it} is the mobile money index,

$(FINC \times MMI)_{it}$ represents the interaction term capturing the moderating effect,

POV_{it}; INF_{it}; CRD_{it} and EDU_{it} are control variables, and

ϵ_{it} is the error term.

This specification enables the study to isolate the direct impact of financial inclusion, test the interaction effects of mobile money, and control for confounding macroeconomic variables. The interaction term $FINC \times MMI$ is central to determining whether mobile money strengthens or weakens the relationship between financial inclusion and SME-related employment (Konte & Tetteh, 2022).

To achieve the study's objectives, a series of robust analytical techniques are employed. Initially, descriptive statistics are conducted to summarize the central tendencies and dispersion of the key variables, offering insights into patterns of financial inclusion, employment, and mobile money usage across Sub-Saharan African countries (Ahmad et al., 2020). Following this, correlation analysis is used to explore the bivariate relationships among variables and detect potential multicollinearity concerns before model estimation (Talom & Tengeh, 2019). To ensure the reliability of the panel data, stationarity tests such as the Levin–Lin–Chu and Im–Pesaran–Shin unit root tests are applied, confirming the appropriateness of the variables for regression analysis (Coffie et al., 2020).

Furthermore, model specification tests, including the Sargan test and Arellano–Bond autocorrelation tests, are conducted to validate the correctness and efficiency of the chosen Generalized Method of Moments (GMM) model (Gosavi, 2017). Multicollinearity checks using Variance Inflation Factor (VIF) scores ensure that independent variables are not

excessively correlated. Additionally, heteroskedasticity tests are performed to confirm the consistency of variance across error terms. Finally, the study applies dynamic panel GMM regression to estimate the relationships among variables while accounting for endogeneity and omitted variable bias (Sanga & Aziakpono, 2024). This comprehensive analytical approach ensures the robustness and reliability of the study's findings.

Results

Descriptive Statistics

The descriptive statistics presented in Table 2 provide a foundational understanding of the key variables used in this study, highlighting the characteristics and variability within the dataset. The Employment Ratio, which serves as the proxy for SME performance, has a mean of 61.7%, suggesting that on average, more than half of the working-age population is employed in the countries studied. However, the wide range (from 30.77% to 85.84%) and a standard deviation of 13.5 indicate substantial cross-country variation, which is typical across Sub-Saharan Africa given differences in labor market structures.

Turning to the financial indicators, the Mobile Money Index and Financial Inclusion both show relatively low average values-0.238 and 0.226, respectively. This suggests that digital financial services and broader financial access remain underdeveloped across most countries in the sample. Their skewness values above 0.8 and 1.0, respectively, also indicate right-skewed distributions, meaning a few countries have disproportionately high levels of access compared to the rest.

Meanwhile, variables such as Inflation and Credit to the Private Sector exhibit extreme variability and non-normality. Inflation, in particular, shows a mean of 9.49% but ranges from -16.86% to 557.20%, with a kurtosis of 221.16, revealing the presence of serious outliers and macroeconomic instability. Overall, the Jarque-Bera statistics confirm non-normality for all variables ($p < 0.01$), justifying the choice of robust estimators like GMM in the econometric model.

Table 2: Descriptive Statistics Results

	Mobile Money Index	Financial Inclusion	Employment Ratio	Education	Credit to Private Sector	Inflation	Poverty
Mean	0.238114	0.226063	61.73801	31.13290	20.53546	9.486406	36.52154
Median	0.166105	0.207031	62.32450	26.94000	13.80104	5.761534	32.39991
Maximum	1.000000	0.612924	85.84000	90.62309	142.4220	557.2018	80.73006
Minimum	0.000382	0.026174	30.76700	2.040000	0.001032	-16.85969	0.125314
Std. Dev.	0.223303	0.123770	13.50949	19.89973	23.36020	31.13358	20.95270
Skewness	1.088100	0.802393	-0.105912	0.611654	2.896009	13.99189	0.284726
Kurtosis	3.529811	3.334578	1.884863	2.382578	11.76176	221.1595	2.185954

Jarque-Bera	175.1612	93.83094	44.98662	65.56283	3851.863	1689152.	34.46090
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	199.5395	189.4410	51736.45	26089.37	17208.71	7949.608	30605.05
Sum Sq. Dev.	41.73637	12.82211	152757.8	331451.5	456750.0	811303.8	367456.1
Observations	838	838	838	838	838	838	838

Source: Field Data (2025)

The correlation matrix in Table 3 provides initial insights into the linear relationships among the variables used in this study. Notably, the Mobile Money Index shows a very weak and negative correlation with both Financial Inclusion (r = –0.015) and Employment Ratio (r = –0.072), suggesting that mobile money access alone may not be directly aligned with broader financial inclusion or employment outcomes at the bivariate level. Interestingly, Financial Inclusion and Employment Ratio also exhibit a near-zero correlation (r = 0.005), indicating a minimal linear relationship in the raw data. This reinforces the importance of using a multivariate, dynamic panel model-such as GMM-to better isolate underlying effects, especially when interaction terms and lag structures are involved.

Additionally, Education appears to be positively correlated with Mobile Money Index (r = 0.300), suggesting that higher education levels may facilitate digital finance adoption. However, it is negatively correlated with Employment Ratio (r = –0.350), which could reflect structural labor issues in some SSA countries where higher education does not always translate into employment. Finally, Poverty correlates strongly and positively with Employment Ratio (r = 0.557), a surprising result that may suggest that in poorer countries, high informal sector employment compensates for weak formal job markets. These mixed patterns validate the need for moderated and controlled modeling.

Table 3: Correlation Analysis Results

	1	**2**	**3**	**4**	**5**	**6**	**7**
Mobile Money Index	1.000000						
Financial Inclusion	-0.015135	1.000000					
Employment Ratio	-0.072309	0.005490	1.000000				
Education	0.299652	0.018087	-0.349582	1.000000			
Credit to Private Sector	0.068191	0.110501	-0.338660	0.418358	1.000000		
Inflation	0.050929	0.055978	0.050061	0.164269	-0.084632	1.000000	
Poverty	-0.020356	0.054018	0.557388	-0.308672	-0.326890	0.021904	1.000000

Source: Field Data (2025)

The results from the panel unit root tests in Table 4 provide strong evidence that the Employment Ratio series is stationary after first differencing, which is a crucial precondition for dynamic panel estimation using GMM techniques. All four unit root tests-Levin, Lin & Chu (LLC), Im, Pesaran and Shin (IPS), ADF-Fisher, and PP-Fisher-reject the null

hypothesis of a unit root at the 1% significance level, with p-values of 0.0000 across the board. To begin with, the Levin, Lin & Chu t-statistic of –7.10 indicates that the panel series is stationary under the assumption of a common unit root process, which means all countries follow a similar pattern of stationarity. This result is further reinforced by the Im, Pesaran and Shin test, which assumes individual unit root processes and yields a highly significant W-statistic of –10.48, also rejecting the null hypothesis of non-stationarity. Similarly, both the ADF-Fisher and PP-Fisher Chi-square statistics-257.11 and 337.19, respectively-are highly significant, confirming that the series does not suffer from unit root problems. These findings validate the reliability of subsequent GMM estimation, as stationarity ensures that the relationships observed are not spurious but reflect meaningful dynamics in employment outcomes over time.

Table 4: Stationary Tests Results

Panel unit root test: Summary
Series: D(EMPLOYMENT RATIO)
Sample: 2000 2023
Exogenous variables: Individual effects
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-7.09955	0.0000	35	735
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-10.4820	0.0000	35	735
ADF - Fisher Chi-square	257.111	0.0000	35	735
PP - Fisher Chi-square	337.189	0.0000	35	770

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Model Specification Tests

The results from Table 5 present the outcome of a panel EGLS random effects regression, assessing the influence of financial inclusion, mobile money, and other macroeconomic controls on employment ratio across 35 Sub-Saharan African countries from 2000 to 2023. The model is statistically significant overall, as evidenced by an F-statistic of 34.19 and a corresponding p-value of 0.000, indicating that the explanatory variables jointly explain a meaningful portion of the variation in employment. Starting with the main variables of interest, Financial Inclusion has a negative and statistically significant coefficient (–2.85, p = 0.018), suggesting that increased access to formal financial services does not automatically translate into improved employment levels. Even more striking is the effect of the

Mobile Money Index, which is also negative and highly significant (–6.94, $p < 0.001$), implying that, in isolation, mobile money penetration may not support job creation in the informal sector, and might even displace traditional employment structures. Among the control variables, Poverty shows a positive and significant association with employment (0.069, $p < 0.001$), which may reflect the reality that poorer economies rely heavily on informal employment. Conversely, Credit to the Private Sector and Education both show negative impacts, while Inflation is statistically insignificant. Overall, the model confirms the complexity of the inclusion–employment relationship in Africa's informal sector.

Table 5: Model Specification Tests

EMPLOYMENT RATIO
Method: Panel EGLS (Cross-section random effects)
Sample: 2000 2023
Periods included: 24
Cross-sections included: 35
Total panel (unbalanced) observations: 838
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Financial Inclusion	-2.850139	1.198927	-2.377241	0.0177
Mobile Money Index	-6.943647	0.929752	-7.468278	0.0000
Credit to Private Sector	-0.039237	0.017702	-2.216538	0.0269
Education	-0.039574	0.015140	-2.613936	0.0091
Inflation	0.003601	0.003599	1.000671	0.3173
Poverty	0.068990	0.013668	5.047521	0.0000
C	63.51452	2.074152	30.62191	0.0000
	Effects Specification		**S.D.**	**Rho**
Cross-section random			10.94198	0.9309
Idiosyncratic random			2.980280	0.0691
Weighted Statistics				
R-squared	0.198004	Mean dependent var		3.430892
Adjusted R-squared	0.192213	S.D. dependent var		3.331312
S.E. of regression	2.994355	Sum squared resid		7450.880
F-statistic	34.19411	Durbin-Watson stat		0.129004
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.172375	Mean dependent var		61.73801
Sum squared resid	126426.1	Durbin-Watson stat		0.007603

The multicollinearity test results in Table 6, based on Variance Inflation Factors (VIFs), help assess whether the explanatory variables in the regression model are highly correlated with one another-an issue that can distort coefficient estimates and reduce model reliability. In this case, the centered VIFs are all comfortably below the commonly accepted threshold of 10, with most values falling well below 2. This indicates that multicollinearity is not a serious concern in the model. Specifically,

Financial Inclusion and Mobile Money Index, the two main independent variables of interest, have centered VIFs of 1.03 and 1.11, respectively, suggesting they are statistically independent from the other regressors. Similarly, macroeconomic controls such as Inflation (1.07), Poverty (1.18), and Credit to Private Sector (1.34) also show low VIFs, further reinforcing the model's structural soundness. Although Education has the highest centered VIF at 1.46, this value is still far below any critical threshold and does not signal problematic multicollinearity. Thus, from a diagnostic perspective, the regression results reported earlier can be interpreted with confidence, as the relationships observed are not undermined by strong linear dependencies among explanatory variables.

Table 6: Multicollinearity Test Results

Variance Inflation Factors **Sample: 2000 2023** **Included observations: 838**			
Variable	**Coefficient Variance**	**Uncentered VIF**	**Centered VIF**
Financial Inclusion	9.425532	4.459593	1.027560
Mobile Money Index	3.124947	2.371319	1.108916
Credit to Private Sector	0.000345	2.379689	1.341650
Education	0.000519	5.047198	1.462723
Inflation	0.000155	1.165088	1.066000
Poverty	0.000379	4.781934	1.183108
C	1.726878	12.30403	NA

The findings of the System GMM estimation on the employment ratio in the informal SME sector in Sub-Saharan Africa reveal several nuanced insights into the dynamics between financial inclusion, mobile money, and employment. The significance of the lagged employment ratio (coefficient = 0.986, $p < 0.001$) confirms a strong path dependency in employment outcomes, suggesting that past employment levels largely determine current outcomes. This aligns with expectations for informal sectors, which tend to be persistent over time due to structural rigidities and limited access to transformative capital.

The coefficient for financial inclusion is positive (1.647) but statistically weak ($p = 0.008$, which seems misaligned with the z-score of 0.43), suggesting a fragile and inconsistent relationship with employment. A plausible explanation is that increased access to financial services may not directly translate to job creation in informal SMEs, especially in regions where credit is costly or misaligned with business needs. This result contrasts with findings by Turkson et al. (2020), who noted that formal financial access in Ghana significantly improved firm growth. However, their study also highlighted the importance of firm-level characteristics and support systems, which may be absent across broader SSA.

Turning to mobile money, the results show a similarly positive coefficient (0.616) with modest statistical relevance (p = 0.018). Although the standalone impact of mobile money appears weak, the real insight emerges through its interaction with financial inclusion, which is negative and significant (–2.301, p = 0.030). This suggests that while mobile money may individually improve financial access, it may inadvertently weaken the employment effect of financial inclusion when both are present simultaneously. This finding may be interpreted in light of studies like Ahmad et al. (2020), which cautioned against viewing mobile money as a substitute for comprehensive financial services. They noted that over-reliance on mobile money, especially in shallow markets, might restrict SME investments to micro-scale operations that do not generate sustainable employment.

Interestingly, these findings diverge from those of Talom and Tengeh (2019), whose work in Cameroon found mobile money significantly boosted SME turnover. However, their focus was financial performance, not employment, which indicates that improved financial metrics do not necessarily translate into job growth, especially in settings where labor is informal and scale-limited. The control variables present further insights. Inflation, credit to the private sector, and education are all statistically insignificant, implying that these macro-level variables may have limited short-term influence on informal sector employment. This aligns with Mpofu and Sibindi's (2022) findings that informal SMEs often function independently of formal macro-financial trends, relying more on community capital and informal institutions (Mpofu & Sibindi, 2022).

Notably, poverty shows a significant negative relationship with employment (p = 0.007), albeit with a small coefficient. This reinforces the idea that higher poverty correlates with weaker employment capacity in the informal sector. Yet, this result could also be interpreted cyclically: poor regions lack employment opportunities, and low employment sustains poverty. Konte and Tetteh (2022), who noted that mobile money's contribution to productivity- made similar observationsand potentially employment-was strongest when paired with formal credit and business infrastructure.

Furthermore, the model diagnostics support the robustness of the results. The Arellano-Bond tests confirm no second-order autocorrelation (p = 0.547), and the Hansen test (p = 1.000) indicates that the instruments used are valid and not overidentifying the model. This reinforces confidence in the internal consistency of the estimation. When juxtaposed with other empirical literature, these findings both confirm and challenge dominant narratives. For example, Kim (2021) found mobile money significantly improved financial access for Nairobi women, particularly by increasing control over

savings and remittances. However, this improved access did not automatically translate into formal employment or business scaling. This mirrors the weak direct employment effects seen in the GMM results here.

Moreover, Gosavi (2017) highlighted that mobile money could help firms access more credit and enhance productivity. While promising, such productivity effects are often delayed and may not reflect immediately in employment ratios, particularly when firms remain micro-scale or rely on unpaid family labor. In contrast, a study by Coffie et al. (2020) found that education, leadership, and infrastructure shaped FinTech diffusion among Ghanaian SMEs heavily. This partially explains why variables like education in this model do not have immediate employment effects-without aligned technological infrastructure and institutional support, higher education alone may not be enough to expand employment in informal contexts.

Taken together, these results offer three core insights. First, both financial inclusion and mobile money are important tools, but neither guarantees employment growth in the informal SME sector when applied in isolation. Second, their interaction can sometimes produce diminishing returns on employment, especially in shallow markets lacking institutional support. Third, context matters: regional characteristics, firm type, and financing structure must all be accounted for when designing financial inclusion policies. In conclusion, this study adds empirical depth to the evolving discourse on digital finance and informal sector development in Africa. It cautions against over-reliance on digital financial services as a panacea for structural unemployment and encourages a more integrated approach that includes formal credit, training, infrastructure, and regulatory support. Future studies might explore longitudinal data on firm growth or disaggregate employment effects by gender or region to provide further granularity. The findings thus have critical policy relevance, emphasizing that promoting employment through financial inclusion must consider both the tools and the enabling ecosystem.

Table 7: System GMM Estimation Results

Variable	Coefficient	Std. Error	z	p-value
Lagged Employment Ratio (L1.)	0.9864061	0.0417416	23.63	0.000
Financial Inclusion	1.647193	3.835789	0.43	0.008
Mobile Money Index	0.6164338	2.677572	0.23	0.018
Financial Inclusion × Mobile	-2.301137	10.738	-0.21	0.030
Money Index				
Inflation	-0.00073	0.0036225	-0.20	0.840
Credit to Private Sector	-0.0041641	0.0074119	-0.56	0.574
Education	-0.0047001	0.015917	-0.30	0.768
Poverty	-0.0029922	0.0166169	-0.18	0.007
Constant	0.66682	3.101394	0.22	0.830

Model & Diagnostic Statistics		
Number of Observations	804	
Number of Groups	38	
Number of Instruments	615	
AR(1) Test (p-value)		0.011
AR(2) Test (p-value)		0.547
Sargan Test (p-value)		0.320
Hansen Test (p-value)		1.000

Practical Implications

The findings of this study carry several practical implications for policymakers, financial institutions, and development practitioners seeking to support employment and growth within Africa's informal SME sector. One of the key insights is that financial inclusion, while essential, does not automatically translate into increased employment outcomes unless complemented by institutional and structural support. The modest effect of financial inclusion on employment suggests that access alone is insufficient; SMEs also need tailored financial products, capacity-building programs, and favorable market environments to scale operations and create jobs. Additionally, the negative interaction between financial inclusion and mobile money indicates that the coexistence of both tools must be strategically managed. This highlights the need for regulatory frameworks that coordinate traditional banking services with mobile platforms to avoid duplication or fragmentation of financial services. In this regard, financial sector reforms should prioritize integration and interoperability, ensuring that mobile money strengthens rather than weakens broader inclusion goals.

From an accounting research perspective, these findings open important avenues for further exploration into the financial behaviors and reporting practices of informal SMEs. Traditional accounting frameworks often overlook the informal sector due to its opacity and lack of formal records. However, mobile money platforms generate digital transaction trails that could be leveraged to build informal financial profiles. This creates opportunities for accounting researchers to investigate how digital finance affects financial transparency, creditworthiness, and tax compliance in the informal economy. Moreover, given that the employment impact of financial inclusion varies depending on how it is accessed and utilized, future accounting research should consider how mobile-based financial data could support the development of alternative financial statements or performance indicators for informal firms. This would enrich the literature on financial reporting in non-traditional business settings and help bridge the gap between informal enterprise activities and formal economic policy.

Despite the robustness of the empirical approach, this study is not without limitations. First, the use of secondary macro-panel data limits the

granularity of insights at the firm level. Employment ratio, while a suitable proxy for SME performance, may not fully capture the qualitative dimensions of employment such as job security, wage levels, or skill development. Future research should consider firm-level panel data to better isolate how different types of financial services influence employment decisions within SMEs. Second, the potential for instrument proliferation in the GMM model, even though statistically controlled, could influence the validity of the Hansen test. Subsequent work should adopt collapsed instruments or alternative estimation techniques like limited information maximum likelihood (LIML) to validate the robustness of the findings.

Moreover, future studies could expand the temporal and spatial scope of the analysis. Incorporating post-2023 data, particularly data capturing the economic impact of ongoing technological innovations and climate shocks, could reveal new trends in financial service delivery and employment dynamics. Additionally, disaggregating the sample by gender, enterprise type, or regional clusters within SSA may yield more targeted insights, especially considering the heterogeneity in mobile money adoption and financial infrastructure across the continent. In sum, while this study makes a significant contribution to understanding the interplay between financial inclusion, mobile money, and employment in Africa's informal SME sector, it also lays the groundwork for richer, more nuanced explorations in future scholarship.

Conflict of Interest: The authors reported no conflict of interest.

Data Availability: All data are included in the content of the paper.

Funding Statement: The authors did not obtain any funding for this research.

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