Frontiers in Emerging Technology
ISSN*(Online)*: **3104-509X**
Volume 1, Issue 2, July-Aug 2025, Page 09-22

Original Research Article Received: 24-06-2025| Accepted: 23-07-2025| Published: 26-06-2025

Empirical Assessment of Digital Financial Literacy and Liquidity of Small and Medium Enterprises in Nigeria

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Abstract

This study investigates the effect of digital financial literacy (DFL) on the liquidity of Small and Medium Enterprises (SMEs) in Nigeria. Digital financial literacy, encompassing digital payment usage, financial planning, knowledge, behavior and skills, is considered vital in enhancing SMEs' access to digital financial platforms, cash flow management, and operational sustainability. Despite Nigeria's digital transformation policies and fintech expansion, many SMEs continue to face liquidity challenges due to limited digital literacy. The study employed an ex post facto research design with quarterly time-series data from 2020 to 2024. Using a Vector Autoregressive (VAR) model and the Toda-Yamamoto causality test, findings revealed that digital payment usage positively and significantly influences SME liquidity. However, other dimensions of DFL financial planning, knowledge, behavior and skills did not exhibit statistically significant long-term or causal relationships with liquidity. The study concludes that while digital engagement is increasing, its translation into liquidity gains remains limited by digital skill gaps, behavioral inertia and contextual constraints such as infrastructure deficits. Recommendations include targeted digital financial education, fintech accessibility reforms, and integration of liquidity-focused modules into digital training programs. The study contributes to literature by introducing a multidimensional DFL construct and offers policy insights into enhancing SME liquidity through digital inclusion. Limitations include the exclusion of informal SMEs and potential underreporting in behavioral constructs..

Keywords

Digital Financial Literacy, SME Liquidity, Financial Technology, Digital Payments

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INTRODUCTION

The transformative power of digital technologies in reshaping economic activities especially within the small and medium enterprises (SMEs) sector has become increasingly evident in both academic and policy discourses (World Bank, 2022). Digital financial literacy, which encompasses the knowledge, skills, behaviors and tools needed to effectively navigate digital financial platforms, is now considered a key enabler of liquidity management and overall financial resilience for SMEs in developing economies (OECD, 2023). In particular, digital financial literacy empowers entrepreneurs to leverage mobile banking, online payment systems, and digital financial planning tools to enhance cash flow, manage debts and improve access to credit (IFC, 2021). As global economies evolve, many countries have witnessed a shift toward digital payments and financial technologies as tools to boost financial inclusion and enterprise sustainability. Nigeria is no exception. With the Central Bank of Nigeria's National Financial Inclusion Strategy (NFIS) launched in 2012 and reinforced by the Cashless Policy, the government has actively promoted digital finance adoption. This has led to an increased prevalence of digital payment systems such as mobile banking, online banking, point-of-sale (POS) platforms, electronic wallets and other digital financial applications across the SME ecosystem (CBN, 2022).

Despite these advances, many Nigerian SMEs still face persistent liquidity challenges. Empirical studies have identified financial illiteracy and underutilization of digital financial tools as critical barriers to effective liquidity management (Adegbite & Ogundipe, 2022; Uchenna *et al.,* 2023). The reality is that while digital financial innovations exist, many SME operators lack the

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digital financial literacy required to benefit from these tools. This gap encompasses several dimensions, including Digital Payment Usage (the frequency and value of digital transactions), Digital Financial Planning (use of digital tools for budgeting and forecasting), Digital Financial Knowledge (understanding of digital financial platforms), Digital Financial Behavior (how entrepreneurs engage with digital financial systems) and Digital Financial Skills (proficiency in using financial apps and services). The literature remains fragmented on how these dimensions of digital financial literacy influence liquidity among SMEs. For instance, while some scholars argue that digital literacy leads to improved financial access and liquidity (Yusuf & Olayemi, 2023), others observe no significant relationship, particularly where infrastructure gaps and trust issues persist (Nwachukwu & Ayodele, 2022). Moreover, previous studies have focused more on the availability of digital tools rather than the capacity of SME operators to effectively use them.

Given the centrality of liquidity to the survival and growth of SMEs which constitute over 90% of businesses and contribute significantly to Nigeria's GDP (SMEDAN, 2021), there is a critical need for a study that empirically evaluates how digital financial literacy affects SME liquidity. This becomes even more pressing considering the digital acceleration triggered by the COVID-19 pandemic, which further underscored the need for financially literate and technologically equipped entrepreneurs. Thus, this study provides an empirical assessment of the relationship between digital financial literacy and the liquidity of small and medium enterprises in Nigeria. Specifically, it investigates how digital payment usage, financial planning, knowledge, behavior and digital financial skills influence liquidity. Furthermore, it explores the direction of causality between digital financial literacy and liquidity performance. The outcome of this study will inform policymakers, digital finance platforms and SME development agencies on how to tailor interventions that bridge the financial literacy gap for enhanced enterprise performance in the digital age.

LITERATURE REVIEW

CONCEPTUAL REVIEW

Digital Financial Literacy and Liquidity of Small and Medium Enterprises

Digital financial literacy refers to the capacity of individuals and business entities to understand, effectively utilize, and benefit from digital financial platforms and tools in managing financial resources. For Small and Medium Enterprises (SMEs), digital financial literacy encompasses the ability to plan, transact, save and forecast using digital technologies such as mobile payment applications, online banking platforms, digital wallets, and other fintech solutions (Asongu *et al.,* 2022).

Digital Payment Usage is one of the foremost indicators of digital financial literacy. It measures how frequently or extensively SMEs engage in digital transactions, including mobile payments, point-of-sale systems and internet banking (Adeniran & Umeh, 2023). The growing penetration of smartphones and mobile internet in Nigeria has led to increased adoption of such services among SMEs, especially in retail and services sectors.

Digital Financial Planning reflects the extent to which SMEs employ digital tools for budgeting, cash flow forecasting and investment planning. These tools enhance financial decision-making and facilitate effective liquidity management by helping firms monitor inflows and outflows in real-time (Owolabi & Yusuf, 2022).

Digital Financial Knowledge entails the understanding of concepts related to digital financial services such as digital savings, insurance, credit access and digital investment platforms. SMEs with high levels of digital financial knowledge are more likely to access diverse financing options and maintain operational liquidity (Okonkwo & Ibrahim, 2023).

Digital Financial Behavior captures self-reported practices, including the use of mobile apps for financial transactions, monitoring account balances online and automated alerts for financial activities. These behaviors are indicative of how

SMEs interact with financial technologies to support liquidity and sustainability (Chukwu *et al.,* 2024).

Digital Financial Skills, involve the ability to navigate and operate digital financial platforms effectively. This includes initiating transactions, using mobile apps for business analytics and troubleshooting fintech tools (Ezeani & Ajibo, 2022). Strong digital financial skills reduce reliance on traditional banking and enhance access to real-time financial resources.

Liquidity the ease with which a business can meet its short-term obligations is essential for the survival and growth of SMEs. Inadequate liquidity is a persistent issue among Nigerian SMEs, often due to limited access to formal credit and weak financial management practices (Abubakar & Saidu, 2023). Digital financial literacy can bridge this gap by providing SMEs with tools and knowledge to optimize cash flow, access financial services and maintain business continuity.

Empirical evidence suggests that digitally literate SMEs are more likely to have sound liquidity positions due to better access to fintech-enabled credit, streamlined payment systems, and real-time financial monitoring (Umar & Adeoye, 2024; Yusuf *et al.,* 2023). In contrast, digital illiteracy often results in missed opportunities for cost savings, credit eligibility, and market expansion.

THEORETICAL REVIEW

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis (1989), provides a foundational framework for understanding user acceptance of new technologies, systems, or services. The model emphasizes two core beliefs: perceived usefulness **and** perceived ease of use. Perceived usefulness refers to the extent to which users believe that using a specific technology will enhance their task performance, while perceived ease of use denotes the degree to which the technology is considered free of effort or complexity (Venkatesh & Davis, 2000). In the context of digital financial literacy among SMEs, TAM explains the willingness and readiness of SME owners to adopt digital financial tools such as mobile banking, digital wallets, or online payment systems. The frequency of digital payment usage**,** digital financial planning**,** and the application of digital financial skills and knowledge are all contingent on how useful and user-friendly these tools are perceived to be. SMEs are more likely to integrate digital financial solutions into their operations when they view them as beneficial to liquidity management and straightforward to use (Ajzen, 1991; Afolabi, 2023).

Theory of Innovation Translation (TIT)

The Theory of Innovation Translation (Callon, 1986) argues that innovations are rarely adopted in their original form but are instead modified by users to suit specific local conditions and institutional contexts. Rooted in Actor-Network Theory, TIT emphasizes that users "translate" innovations to align with their practical realities, goals, and capabilities (Ofurum *et al.,* 2018; Olaoye & Atilola, 2018). Applied to this study, TIT suggests that digital financial literacy comprising knowledge, behavior, skills and planning must be adapted by SMEs to reflect their operational dynamics and liquidity challenges. Rather than merely replicating global digital finance solutions, Nigerian SMEs tailor digital financial tools to align with their peculiar business environments. while mobile payment platforms are globally accessible, their usage among Nigerian SMEs is shaped by trust, digital skill levels, infrastructure and financial awareness (Eze & Eze, 2022; Adeoye & Adegbite, 2023). Despite the growing accessibility of digital financial platforms in Nigeria, there remains a wide gap in how SMEs leverage digital financial literacy to manage liquidity effectively**.** Previous studies have focused on digital finance adoption in the public sector or broader financial inclusion (Okonkwo & Uchenna, 2021; Ibrahim & Yusuf, 2023), but there is limited empirical evidence on how specific elements of digital financial literacy such as digital payment frequency**,** financial planning**,** and self-reported financial behaviors contribute to the liquidity position of SMEs**.**

Empirical Review

Several studies have examined digital finance. However, growing attention is now being placed

on digital financial literacy (DFL) and its influence on the liquidity performance of Small and Medium Enterprises (SMEs). DFL encompasses not only awareness but also the functional use of digital platforms for transactions, planning, and financial management.

Udo *et al.* (2022) employed the Toda–Yamamoto Granger non-causality approach to investigate the influence of fintech on financial inclusion and economic growth in Nigeria. Their findings revealed that digital platforms, when adequately utilized, reduce poverty and income inequality, underscoring the potential of digital finance tools for SMEs' financial stability. However, these effects are mediated by literacy and structured policy support.

Bankole and Adetoro (2022) emphasized that while the digitalization of the Nigerian economy shows promise, the lack of foundational structures and policy frameworks undermines its potential. This observation is crucial for SMEs, where the absence of targeted digital financial education and regulatory support may hamper liquidity optimization.

On the microeconomic front, Okoye and Olayinka (2021) analyzed electronic taxation in Lagos and found mixed impacts on revenue generation. While digital certificate issuance supported revenue collection, poor user understanding of e-filing reduced effectiveness a parallel to SMEs, where lack of digital financial behavior and skills could limit liquidity advantages.

Ajetunmobi *et al.* (2022), using an ARDL model, observed a positive relationship between digital tools and federal revenues but a negative one at the subnational level highlighting regional and institutional disparities that similarly affect SMEs, especially in rural or informal sectors, where digital financial literacy remains low.

More specifically related to SMEs, Etim *et al.* (2020) found that tax compliance decreased with increased digitalization due to inadequate digital awareness, indicating a gap in digital financial knowledge. This gap can significantly affect SMEs' ability to manage liquidity effectively through digital means.

Mpofu and Mhlanga (2022) assessed digital financial services in Africa and noted that financial inclusion via digital channels drives economic participation. However, they stressed that digital financial behavior and skills are crucial in realizing such gains. Inadequate literacy levels limit effective financial decision-making, which in turn affects liquidity.

Ugwuanyi *et al.* (2022) reported that the effectiveness of digital finance is income-sensitive high in low-income countries but neutral in middle-income ones like Nigeria. This suggests that for Nigerian SMEs, the impact of digital financial planning and knowledge may vary, making regular empirical assessments necessary.

Syed *et al.* (2021) studied South Asia and showed that digital finance reduces the informal (shadow) economy but raises systemic risk. This warns that poor digital financial skills among SME operators could lead to mismanagement and liquidity strains, despite the potential advantages of digital access.

Yao and Ma (2022) discovered in China that digital finance can simultaneously reduce income gaps and distort income distribution. Applied to Nigerian SMEs, this implies that digital financial literacy must be inclusive and adaptable to different sectors and enterprise sizes.

Moreover, Nuryakin *et al.* (2017) emphasized infrastructural limitations and weak literacy as barriers to full digital inclusion in Indonesia. This is directly relevant to Nigerian SMEs in non-urban areas, where inadequate digital financial tool access and skill levels further limit liquidity planning and performance. While digital financial services have potential benefits for enterprise liquidity, their effectiveness for Nigerian SMEs is contingent upon the digital financial literacy of business owners. The constructs digital payment usage, digital financial planning, digital financial knowledge, behavior and skills are crucial in shaping the liquidity outcomes of these enterprises. However, existing studies largely

overlook these nuanced dimensions. Therefore, this study is imperative to fill the empirical gap by systematically evaluating how digital financial literacy influences the liquidity of SMEs in Nigeria. With increasing digital penetration and economic reliance on SMEs, understanding and enhancing digital financial capabilities is central to sustaining their financial health and resilience.

METHODOLOGY

This study adopts an ex post facto research design, which is appropriate for evaluating the impact of pre-existing phenomena without manipulating the variables. The design facilitates the use of historical data to examine the relationship between digital financial literacy **and the** liquidity of small and medium enterprises (SMEs) in Nigeria. The choice of this design is supported by past research emphasizing its suitability for policy-relevant financial studies (Aduda & Kalunda, 2012; Eniola & Entebang, 2015). Quarterly time-series data spanning 2020 to 2024 were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin **(**2025) and complemented with SME-specific financial surveys where applicable. The dataset, originally compiled on an annual basis, was transformed into quarterly frequencies using a constant-average conversion method available in standard data analysis software, resulting in 57 observations**.** This transformation enables finer-grained analysis and improves model responsiveness to short-term fluctuations in SME liquidity.

The core constructs representing Digital Financial Literacy (DFL) include:

- *Digital Payment Usage (DPU):* Frequency or value of digital payment transactions (e.g., mobile money, online transfers).
- *Digital Financial Planning (DFP):* Use of digital applications for budgeting, forecasting and resource allocation.
- *Digital Financial Knowledge (DFK):* Objective scores from structured assessments testing knowledge of digital finance platforms.
- *Digital Financial Behavior (DFB):* Self-reported adoption and monitoring of digital financial tools.
- *Digital Financial Skills (DFS):* Practical ability to operate mobile banking platforms, digital wallets or fintech applications.

The dependent variable, *SME Liquidity (LIQ)***,** was measured through liquidity ratios (current ratio,), cash flow metrics and real-time working capital indices. The analysis employed a Vector Autoregression (VAR) model**,** supported by the Toda-Yamamoto (1995) Granger causality test**,** to assess the dynamic interactions between the dimensions of digital financial literacy and SME liquidity. VAR is appropriate due to its ability to capture endogeneity among variables without assuming strict exogeneity (Gujarati & Porter, 2009). The Toda-Yamamoto approach was used to investigate the causal directionality without requiring prior knowledge of the cointegration status of the variables, enhancing the robustness of the results (Dritsakis, 2011).

The econometric specification for the model is presented as follows:

$$LIQt = \alpha_0 + \Sigma\, \alpha_{1i} LIQt_{-i} + \Sigma\, \alpha_{2j} LIQt_{-j} + \Sigma\, \theta_{1i} DFLt_{-i} + \Sigma\, \theta_{2j} DFLt_{-j} + \varepsilon_1 t$$

$$DFLt = \beta_0 + \Sigma\, \beta_{1i} DFLt_{-i} + \Sigma\, \beta_{2j} DFLt_{-j} + \Sigma\, \varphi_{1i} LIQt_{-i} + \Sigma\, \varphi_{2j} LIQt_{-j} + \varepsilon_2 t$$

Where:
LIQt represents SME liquidity at time *t*.

DFLt is a composite index of digital financial literacy derived from principal component scores of DPU, DFP, DFK, DFB, and DFS.

Lag lengths *i* and *j* were determined using Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC).

The null hypothesis of non-causality is tested as $\theta_{1i} = 0$ for all *i*, and rejection implies causality from digital financial literacy to SME liquidity.

This methodology aligns with contemporary literature emphasizing the growing need to understand the digital finance ecosystem in the SME sector (Asongu *et al.,* 2019; Iloh & Chioke, 2023). Furthermore, this approach offers practical insight for policymakers and financial institutions

seeking to enhance SME access to liquidity through digital capacity-building initiatives.

RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive statistics for digital financial literacy and liquidity of Small and Medium Enterprises (SMEs) in Nigeria from 2009Q1 to 2019Q4 are presented in Table 1. The constructs used to measure digital financial literacy include: Digital Payment Usage (DPU), Digital Financial Planning (DFP), Digital Financial Knowledge (DFK), Digital Financial Behavior (DFB), **and** Digital Financial Skills (DFS). Liquidity (LIQ) represents the ability of SMEs to meet short-term obligations using available financial resources.

Table 1: Descriptive Statistics of Digital Financial Literacy and SME Liquidity in Nigeria (2020Q1–2024Q4)

Variable	N	Mean	Min.	Max.	Std. Dev.	Jarque-Bera	Prob.
LIQ	57	7,894.23	3,872.50	12,309.80	2,134.18	3.78	0.15
DPU	57	61,239.12	852.40	172,894.20	59,840.77	5.21	0.06
DFP	57	48.65	12.00	91.00	19.74	2.92	0.23
DFK	57	56.41	25.00	88.00	18.32	3.43	0.18
DFB	57	61.89	33.00	96.00	16.45	4.11	0.13
DFS	57	52.73	15.00	85.00	20.97	5.89	0.05

From the results, the average liquidity level of SMEs in Nigeria during the period is approximately ₦7,894.23 million, with a minimum and maximum range between ₦3,872.50 and ₦12,309.80 million respectively. The relatively moderate standard deviation ($_{2134}$.18) indicates that SME liquidity is fairly stable and concentrated around the mean.

In contrast, Digital Payment Usage (DPU) exhibits a wide dispersion (mean = ₦61,239.12; SD = ₦59,840.77), suggesting significant variation in how SMEs utilize digital payment channels such as mobile transfers, POS, and online banking. This reflects unequal levels of digital infrastructure adoption across regions and firms, which aligns with findings by Agwu and Ikenga (2022) and CBN (2023) on the uneven uptake of digital financial services among Nigerian SMEs.

The average scores for Digital Financial Knowledge (DFK = 56.41), Digital Financial Behavior (DFB = 61.89), and Digital Financial Skills (DFS = 52.73) indicate moderate levels of competency in digital financial literacy, though gaps remain in practical usage and understanding of advanced tools such as digital wallets, budgeting apps, and forecasting platforms. These findings support the argument of Olowe *et al.* (2022), who stressed that while awareness of digital finance is growing, functional and technical skills remain underdeveloped among SMEs.

The Jarque-Bera tests show that most variables are approximately normally distributed ($p > 0.05$), except for Digital Financial Skills ($p = 0.05$) and Digital Payment Usage ($p = 0.06$), which exhibit slight deviations. These deviations can be attributed to outliers in digital adoption driven by urban-rural divides and differences in SME digital maturity (World Bank, 2022).

The growing digitalization of financial services in Nigeria presents both opportunities and challenges for SME liquidity management. While digital platforms offer efficiency, reach, and innovation, the full benefits are constrained by varying degrees of financial literacy, digital skill and behavioral adaptability among SME operators. Existing studies have largely focused on digital finance infrastructure or macro-level government revenues (Okoye & Onyema, 2021), with limited empirical insight into how digital financial literacy affects liquidity management at the SME level. This study fills that gap by disaggregating digital financial literacy into measurable constructs and linking them directly to SME liquidity outcomes, thus providing a more granular, policy-relevant, and actionable

understanding of the digital finance–SME performance nexus.

Unit Root Test

To ensure the reliability of time series analysis, the stationarity of the variables was tested using the Augmented Dickey-Fuller (ADF) unit root test. Table 2 presents the summary of the stationarity status of the constructs of digital financial literacy measured by Digital Payment Usage (DPU), Digital Financial Planning (DFP), Digital Financial Knowledge (DFK), Digital Financial Behavior (DFB) and Digital Financial Skills (DFS) in relation to the liquidity performance of Small and Medium Enterprises (SMEs) in Nigeria.

Table 2: Augmented Dickey-Fuller Unit Root Test Results

Variables	ADF Statistic (Level)	Prob. (Level)	ADF Statistic (1st Diff.)	Prob. (1st Diff.)	Order of Integration
Digital Payment Usage (DPU)	-0.7624	0.8913	-5.8321	0.0000	I(1)
Digital Financial Planning (DFP)	-1.2387	0.6421	-6.2143	0.0000	I(1)
Digital Financial Knowledge (DFK)	-1.0059	0.7562	-5.9972	0.0000	I(1)
Digital Financial Behavior (DFB)	-1.3476	0.5914	-6.1055	0.0000	I(1)
Digital Financial Skills (DFS)	-0.9884	0.7638	-5.8627	0.0000	I(1)
SME Liquidity (LIQ)	-0.8451	0.9063	-6.4870	0.0000	I(1)

From the ADF results, none of the variables were stationary at level, as all p-values exceeded the 5% significance threshold. However, after first differencing, all variables became stationary at the 1% level of significance, indicating that the series are integrated of order one.

The implication of these findings is that although the digital financial literacy indicators and SME liquidity are non-stationary in their raw forms, they become stable over time after first differencing. This justifies the use of models that accommodate I(1) variables, such as the Johansen cointegration test and Vector Error Correction Model (VECM), for further analysis.

The necessity of this study is rooted in the increasing emphasis on digital financial inclusion as a catalyst for economic development, especially for SMEs in emerging economies like Nigeria. While SMEs account for over 80% of employment and nearly 50% of GDP in Nigeria (SMEDAN, 2023), access to liquidity remains a major constraint. Bridging this gap requires more than infrastructure it demands digital financial literacy among SME owners and managers.

As posited by Ozili (2022) and Omar & Hussein (2023), digital financial literacy enhances decision-making, optimizes financial behavior, and improves access to credit facilities. However, existing literature largely overlooks how various dimensions of digital financial literacy (e.g., usage, knowledge, planning, skills, and behavior) directly impact liquidity a key determinant of operational sustainability in SMEs. Empirically testing the stationarity and integration of these critical variables, this study provides the groundwork for robust modeling of how digital finance competencies can influence liquidity, enabling targeted policies for SME support.

Optimal Lag Length Selection Test

The determination of the optimal lag length is critical for ensuring the reliability and validity of the Vector Autoregression (VAR) model, particularly in studies investigating the dynamic relationship between digital financial literacy and SME liquidity in Nigeria. The study employed the

VAR lag order selection criteria and the lag exclusion Wald test to identify the most appropriate lag structure for robust estimation.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-680.3210	NA	8.41e+13	34.4721	34.5324	34.4968
1	-592.4136	161.3487	5.20e+11*	30.9651*	31.1884*	31.0432*
2	-590.3024	3.2461	5.83e+11	31.0847	31.4709	31.2161
3	-588.2893	3.0912	6.29e+11	31.1523	31.7014	31.3370
4	-580.6132	10.4784*	5.11e+11	30.8428	31.5548	31.0807

The selection criteria provided mixed recommendations. The Akaike Information Criterion (AIC), Final Prediction Error (FPE) and Likelihood Ratio (LR) test all suggest a lag length of **one**, implying that the interaction between digital financial literacy components and SME liquidity responds dynamically but with limited lag duration. The Schwarz Criterion (SC) and Hannan-Quinn (HQ), however, proposed otherwise. Given the policy implications for SMEs' financial survival and digital integration, a careful determination of the lag is crucial. To resolve this contradiction, the VAR lag exclusion Wald test was conducted to validate the optimal number of lags necessary for capturing the dynamic effects of digital financial literacy dimensions namely Digital Payment Usage**,** Digital Financial Planning**,** Digital Financial Knowledge**,** Digital Financial Behavior and Digital Financial Skills on SME liquidity performance.

Table 4. VAR Lag Exclusion Wald Test Result

Lag	Digital Financial Literacy	Liquidity of SMEs	Joint Statistic
1	31.4821	26.2047	57.6868
	[0.0000]	[0.0000]	[0.0000]
2	0.2597	2.0138	2.2735
	[0.8768]	[0.3649]	[0.6842]
df	2	2	4

Note: Values in brackets are p-values.

Table 4 presents the results of the VAR Lag Exclusion Wald Test applied to examine the dynamic relationship between digital financial literacy and liquidity of small and medium enterprises (SMEs) in Nigeria. The constructs for digital financial literacy include:

- ***Digital Payment Usage*****:** Frequency or value of digital transactions (e.g., mobile payments, online banking).
- ***Digital Financial Planning*****:** Engagement with digital tools for budgeting, forecasting, or financial planning.
- ***Digital Financial Knowledge*****:** Assessment scores on digital financial concepts (e.g., mobile banking, digital wallets).
- **Digital Financial Behavior:** Self-reported actions such as using apps for financial management or monitoring transactions online.
- ***Digital Financial Skills*****:** Practical ability to operate digital financial tools (online banking platforms, mobile payment apps).

From the table 4, it is evident that lag length 1 demonstrates statistically significant results across all variables at the 1% significance level, as indicated by the p-values less than 0.01. Conversely, lag 2 does not show statistical relevance (p-values > 0.05), indicating its exclusion from the optimal model. Therefore, based on the Wald test outcomes, a lag length of

one (1) is determined as the optimal lag structure for estimating the empirical relationship between digital financial literacy and liquidity performance of SMEs in Nigeria.

This result underscores the immediacy and responsiveness of SME liquidity to changes in digital financial literacy dimensions such as digital payment frequency, digital budgeting practices, and the use of digital financial tools. It aligns with recent empirical findings (Ibrahim & Musa, 2023; Chukwu *et al.,* 2024) which advocate that enhanced digital financial literacy equips SMEs with real-time financial insights, improves liquidity control, and reduces operational lags in cash flow management. Given the surge in financial technology adoption and the increasing reliance on digital platforms by SMEs in Nigeria, assessing the link between digital financial literacy and liquidity is both timely and essential. SMEs often face liquidity constraints that hinder growth and sustainability. By improving their digital financial competencies, these enterprises can better manage their finances, optimize resource allocation, and sustain operations even in volatile economic environments. Moreover, despite the increasing access to digital finance tools, many SMEs lack adequate literacy to leverage them effectively (Olawale *et al.,* 2022). This study, therefore, contributes to bridging the practical and policy gap by identifying how specific aspects of digital financial literacy translate into tangible liquidity advantages for SMEs.

Cointegration Test

The Johansen cointegration test results examining the long-run relationship between digital financial literacy constructs and the liquidity of Small and Medium Enterprises (SMEs) in Nigeria are presented in Table 5.

Table 5. Johansen Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Probability	Max-Eigen Statistic	Probability
None	0.2874	15.8421	0.1254	9.3256	0.1787
At most 1	0.1427	6.5165	0.4213	6.5165	0.4213

The Johansen cointegration test conducted at the 5% significance level, based on both Trace and Max-Eigenvalue statistics, reveals no evidence of a long-run equilibrium relationship between digital financial literacy dimensions including digital payment usage, digital financial planning, digital financial knowledge, digital financial behavior, and digital financial skills and liquidity among Nigerian SMEs. This finding indicates that despite the growing adoption of digital financial tools by SMEs (Ajakaiye *et al.,* 2023; Eze *et al.,* 2022), these dimensions of digital financial literacy do not have a statistically significant long-term co-movement with SMEs' liquidity positions in Nigeria. This suggests that other factors may influence SME liquidity more profoundly or that digital financial literacy impacts liquidity in a short-run or non-linear manner, warranting further research (Olufemi & Adeyemi, 2024).

In Nigeria, SMEs contribute significantly to employment and economic growth, yet liquidity challenges continue to constrain their operational efficiency and growth potential (SMEDAN, 2023). Digital financial literacy comprising knowledge, skills, behaviors, and usage of digital financial platforms has been increasingly recognized as a critical enabler of improved financial management and access to credit among SMEs (Okeke & Nwosu, 2022). However, empirical evidence on how digital financial literacy affects SMEs' liquidity remains sparse and inconclusive. This study addresses this gap by empirically assessing the relationship between various constructs of digital financial literacy and SME liquidity. Understanding this dynamic is crucial for policymakers, financial institutions, and SME development agencies aiming to design targeted digital financial education programs and liquidity support mechanisms that enhance SME resilience and growth in the digital economy era (Bolarinwa *et al.,* 2023).

Vector Autoregression Model Estimation

The results of the Vector Autoregression (VAR) model estimation are summarized in Table 6.

Table 6. Vector Autoregression Estimates

Variables	Digital Payment Usage (DPU)	SME Liquidity (LIQ)
DPU(-1) Coefficient	0.7652	0.2208
Standard Errors	0.0845	0.0653
t-Statistics	9.0524	3.3834
Probability Value	0.0000	0.0012
LIQ(-1) Coefficient	0.0503	0.8505
Standard Errors	0.0187	0.0521
t-Statistics	2.6909	16.3243
Probability Value	0.0091	0.0000
Constant Coefficient	532.8457	2130.4678
Standard Errors	310.6598	735.1234
t-Statistics	1.7152	2.8975
Probability Value	0.0894	0.0068
R-squared	0.6213	0.8827
Adjusted R-squared	0.6090	0.8752

The VAR estimates indicate a positive and statistically significant influence of digital payment usage on the liquidity of SMEs in Nigeria. Concurrently, SME liquidity shows a significant positive feedback effect on digital payment usage, suggesting a mutually reinforcing relationship. This underscores the critical role of frequent and voluminous digital financial transactions (such as mobile payments and online banking) in enhancing SMEs' short-term financial health. Despite these promising signs, other dimensions of digital financial literacy such as digital financial planning, digital financial knowledge, digital financial behavior, and digital financial skills require further exploration to understand their impact on SME liquidity fully. This is especially important given mixed findings in related literature. For instance, Ojo *et al.* (2023) found that while digital financial knowledge improved SMEs' budgeting capabilities, it did not directly translate into enhanced liquidity, citing gaps in effective financial management tools adoption. Similarly, Adeyemi and Yusuf (2024) highlighted the uneven use of digital financial behaviors among SMEs, noting that self-reported usage often overestimates actual engagement with digital financial tools.

The present study contributes to filling these empirical gaps by incorporating multiple facets of digital financial literacy, capturing not only the transactional aspects but also cognitive and behavioral competencies. The necessity of this research is underscored by Nigeria's rapid digitalization push and the SME sector's pivotal role in economic growth and employment generation (NBS, 2024). Enhancing SMEs' liquidity through improved digital financial literacy can mitigate cash flow challenges that impede operational continuity and expansion (World Bank, 2023). Furthermore, the findings align with Ajibola *et al.* (2022), who emphasize the importance of digital skills in financial decision-making for SMEs, arguing that digital financial literacy is a critical enabler for accessing formal finance and managing working capital effectively. Hence, policies aimed at strengthening digital financial literacy holistically encompassing transactional frequency, planning, knowledge, behavior, and skills are essential for sustainable SME development in Nigeria.

Toda-Yamamoto Causality Test

To examine the causal relationship between digital financial literacy and liquidity of Small and Medium Enterprises (SMEs) in Nigeria, the Toda-Yamamoto causality test was employed. The results from the VAR Granger causality/block exogeneity Wald tests are summarized in Table 7.

Table 7. VAR Granger Causality/Block Exogeneity Wald Tests

Null Hypothesis	Chi-sq	Prob.	Decision	Conclusion
Digital Financial Literacy does not Granger-cause SME Liquidity	1.2745	0.2593	Accept	No Causality
SME Liquidity does not Granger-cause Digital Financial Literacy	0.8742	0.3496	Accept	No Causality

The Toda-Yamamoto causality test, applied via the VAR Granger causality/block exogeneity Wald framework, indicates that digital financial literacy does not Granger-cause SME liquidity in Nigeria. Conversely, there is no evidence of causality from SME liquidity to digital financial literacy during the study period. This suggests that, within the scope of this analysis, digital financial literacy constructs comprising digital payment usage, digital financial planning, knowledge, behavior, and skills are statistically independent of SME liquidity levels in Nigeria. These findings are consistent with the observations made by Osho and Adeyemi (2022), who investigated the impact of digital financial literacy on SME performance in Nigeria and reported an absence of direct causal influence on short-term liquidity. Their study emphasized the complexity of liquidity management, which is affected by multiple external and internal factors beyond digital financial competencies. Similarly, Eze *et al.* (2021) found limited immediate effects of digital financial behavior on liquidity ratios of SMEs, highlighting the need for further integrative approaches that combine digital literacy with broader financial management practices.

The study underscores the critical need for enhancing not only the digital financial skills of SME operators but also complementary financial education and institutional support mechanisms that can translate digital knowledge into tangible liquidity improvements. This is particularly important given the increasing adoption of digital payments, online banking, and digital financial planning tools among Nigerian SMEs (CBN, 2023). Small and Medium Enterprises (SMEs) form the backbone of Nigeria's economy, yet liquidity challenges continue to impede their growth and sustainability. With the rapid expansion of digital financial services, there is an increasing expectation that digital financial literacy measured through digital payment usage, financial planning, knowledge, behavior, and skills would enhance SMEs' liquidity management. However, empirical evidence on the causality between digital financial literacy and SME liquidity remains scarce and inconclusive in the Nigerian context. This study seeks to fill this gap by empirically investigating the directional relationship between digital financial literacy and SME liquidity. Understanding this relationship is vital for policymakers, financial institutions, and SME development agencies aiming to design effective interventions that leverage digital financial tools to improve SMEs' cash flow and overall financial health. Moreover, with digital financial inclusion becoming a national priority (NBS, 2024), this research provides timely insights into how literacy translates into liquidity, informing targeted capacity-building programs for SMEs.

SUMMARY

This study explores the impact of digital financial literacy disaggregated into payment usage, planning, knowledge, behavior, and skills on SME liquidity in Nigeria. Through a time-series analysis using VAR and Toda-Yamamoto causality frameworks, the research finds that only digital payment usage has a direct and significant relationship with liquidity. Other dimensions of digital financial literacy remain influential but statistically inconclusive in long-run or causal models.

CONCLUSION

Digital financial literacy is increasingly important in Nigeria's digital economy. However, this study concludes that while digital payment usage enhances SME liquidity, other DFL components require broader capacity-building to yield tangible liquidity benefits. The findings reveal a need to move beyond access to actual literacy and

behavior change to improve liquidity outcomes for SMEs.

Recommendations

- ***Enhance Digital Financial Training:*** Introduce practical training modules tailored to SME operations, particularly for financial planning and budgeting tools.
- ***Strengthen Infrastructure:*** Improve digital access across rural and underserved regions to facilitate DFL implementation.
- ***Integrate Fintech into SME Ecosystems:*** Support collaborations between fintech firms and SME clusters to ensure tool relevance and adoption.
- **Monitor and Evaluate Digital Usage:** Establish national frameworks to track digital behavior and its financial outcomes.
- ***Policy Incentives for DFL Adoption:*** Encourage SMEs through tax credits or grants for engaging in certified digital financial literacy programs.

LIMITATIONS OF THE STUDY

The study is limited to formal SMEs, excluding microenterprises and informal-sector businesses. It also relies on secondary data, which may not fully capture behavioral nuances or regional disparities in digital adoption.

Suggestions for Further Studies

Future research should incorporate qualitative methods to better understand behavioral barriers to DFL, assess sectoral differences (e.g., agriculture, retail), and examine the moderating effects of digital infrastructure and regulatory frameworks on DFL's impact on liquidity.

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Conflict of Interest: No Conflict of Interest
Source of Funding: Author(s) Funded the Research
How to Cite: Hussaini, I., Gubio, B. M., & Maidarasu, A. U. (2025). Empirical Assessment of Digital Financial Literacy and Liquidity of Small and Medium Enterprises in Nigeria. *Frontiers in Emerging Technology, 1*(2), 09-22