

The Moderating Role of Development Financial Institutions on the Association Between Digital Technology and the Financial Performance of SMEs

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Abstract: Small and Medium-Sized Enterprises (SMEs) constitute an important segment economically in the world. However, insufficient digital transformation and ease of financing negatively affects their financial performance. This study explores the moderating role of Development Financial Institutions (DFIs) on the association between digital technology adoption and financial performance in SMEs. The study adopts a cross-sectional survey design to collect primary data from SMEs on their digital technology usage, financial performance, and access to DFI financing. The population of the study consists of existing SMEs in Zaria metropolis. A total of 237 questionnaires were administered. However, 228 questionnaires were returned and the data collected were coded accordingly. The findings of the study reveal that DFIs significantly strengthen the positive effects of digital technologies. The findings support the role of DFIs in financing digital adoption in improving financial performance.

Keywords: Digital technology, Financial Performance, SMEs, Development Financial Institutions

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INTRODUCTION

Small and medium size enterprises (hereafter SMEs) are important entities that drive the growth and development of the developed and underdeveloped economies. SMEs in Nigeria contributes significantly to reduction of poverty, job creation as well as business diversification. Nevertheless, these entities (SMEs) particularly those in the Northwestern Nigeria struggle with issues that include insufficient required infrastructure, and digital technology adoption (Palladan, et al., 2023).

Digital technology is expected to greatly boost the performance of SMEs by increasing the operational efficiency, growing the product market, as well as providing the management with a better tool for effective financial management. Some of these digital apparatuses include mobile payments, cloud computing, social media marketing among others. They are increasingly important in allowing SMEs to compete effectively in an ever-evolving, globalized economy

Rehman, et al., 2025). Yet, the acceptance of these digital technologies that are expected to be advantageous the SMEs in Northwestern Nigeria is still at its developing stage. This is attributed to the shortfall on the required infrastructure, digital literacy, and limited access to financing affordability. It was noted by previous studies (Etuk et al., 2024; Olateju, 2024) that SMEs in Nigeria suffers some setbacks in terms of financing that sometimes force them to rely on the available personal savings or obtain credit from informal sources. These means of sourcing fund are inadequate to finance large-scale investments or upgrading the existing installed technological infrastructure.

However, Development Financial Institutions (DFIs) are important actors in the economic ecosystem. These institutions tend to offer both support in terms of finance and technical knowhow to deserving industries or sectors and SMEs are among the beneficiaries (Ayyagari et al., 2017; Mashabathakga, 2023).

Additionally, DFIs are vital as they promote socioeconomic goals with a view of fostering SMEs by providing services that include credit and loan guarantees on the one hand and on the other hand facilitate the ease of accessing other financial services as well as advisory and programs for capacity building (Ayyagari et al., 2017). From the perspective of digital technology adoption, DFIs could act as an avenue to facilitate ease of access to the required finance for SMEs growth and development. Hence, helping them to address challenges and problems related to digital infrastructure and empowerment. Therefore, this study is aimed at exploring the moderating effect of DFIs on the relationship between digital technology adoption and the financial performance of SMEs in Northwestern Nigeria.

The rest of this paper is classified in the following ways. Review of existing literature is situated in section 2. The methodology of the study is provided in section 3. Empirical results and conclusions and recommendations of the study is presented in section 4 and 5 respectively.

Theoretical Review

The theoretical framework for understanding the findings of this study stem resource-based view (RBV) and dynamic capabilities views. According to the RBV, (Kasim & Munawarah, 2025), firms that have valuable, rare, and inimitable resources that have a greater tendency to achieve a competitive advantage as well greater financial performance improvement. In the context of this study, digital technology and DFIs can be regarded as a valuable resource that could be used in scoring higher efficiency, greater productivity, and more market access of SMEs.

The dynamic capabilities theory (DCT) attempts to clarify how capabilities and the available innovative resources could be explored. The combinations of capabilities can help business entities to attain competitive advantage that could be sustainable during a technological and market change (Teece et al., 1997). Hence, dynamic capability theory provides an insight on the justification behind the success of business enterprise in an environment that is driven by competition.

Integrating RBV and DCT offers better view of the findings of this study. DFIs financing opportunity is not a common resources and it is important resources for all business entities if obtained. In this regard, if the financing activities coming from DFIs is channelled towards digital technology infrastructure, SMEs operations may likely improve its financial performance. More so, the ability of SMEs to acquire the needed as well as to effectively utilize digital technology depends on their accessibility to financial resources and supportive infrastructure.

These RBV and DCT are appropriate from the lens of digital technology transformation. This is because they explain the need for SMEs to advance and enhance their dynamic capabilities

to steer effectively in the growing digital era. For example, SMEs that leverages successfully on new technology will benefit from the internationalization of business (Cassetta et al., 2020) value creation (Vrontis et al., 2022) greater financial performance (Popović-Pantić et al., 2020; Teng et al., 2022).

(Ringle & Sarstedt, n.d., 2021) reported that DFIs in Nigeria provided financial support and technical assistance to SMEs, enabling them to adopt e-commerce platforms and digital payment systems. This will significantly improve the financial performance of the SMEs, since they will be able to access new markets and reduce as well transaction costs.

Similarly, a study by Jouanjean et al. (2013) noted that DFIs in Sub-Saharan Africa are key players in supporting the digital transformation in terms of financing provision to acquire the required digital tools and capacity-building programs.

Empirical literature

SMEs are among the major contributors towards the development and growth of economies around the world. According to (Al-Haddad et al., 2019) and (Costa Melo et al., 2023) SMEs significantly contribute in areas like employment, economic growth, and alleviation of poverty. In Nigeria for example, where large-scale industries are scanty, SMEs provide wide range of employment opportunities (Eniola & Entebang, 2015; Usman et al., 2018), increase income generation (Olateju, 2024) on the one hand, and on the other hand serve as a catalyst to the improvement of the economy (Kowo, 2019).

Instituting digital technology in SMEs will in no doubt facilitate in improving financial performance of these entities. Extant studies have argued that the adoption of these technology (cloud computing, mobile payments, and e-commerce platforms) SMEs could result in higher productivity and customer engagement in addition to having new markets for their products and services (Cassetta et al., 2020; Rupeika-Apoga et al., 2022).

Cassetta et al. (2020) in their study Italian SMEs showed that digital technology has a positive effect on the internationalisation of businesses. This result is subject to building the production activities on the relevant technology, driven by innovations, and the use of suitable human capital investments. Etuk et al. (2024) revealed that digital transformation significantly influences service marketing strategies and customer engagement in Nigeria. Evidence from Finnish market revealed that performance measurement systems significantly mediate the relationship between digital-related human and collaboration capabilities on financial performance (Nasiri et al., 2020).

Khan et al. (2022) examined the impact of technological innovation on environmental and economic performance. The findings showed that technological innovation positively leads to economic and environmental performance of SMEs operating in China and Pakistani markets. In line with this findings, Mushtaq et al. (2024) from Pakistani market reported a positive impact of digital transformation on business performance of SMEs.

However, (Olateju, 2024) in his study on digital technology of SMEs in Nigeria failed to find a significant association between digital technology and financial performance. The findings were attributed to the high cost of digital technology infrastructures and government physical policies (for example, taxation).

Olomu et al. (2023) emphasize the valuable effects of adopting Internet-based technological innovations on improving customer relationships, product and service features, and the reputation of firms. Similarly, Nguyen et al (2023) in their study highlighted the positive aspect of digital transformation as well as innovative capabilities on value creation and operational

outcomes in SMEs. These findings signified the strategic benefit of leveraging digital technologies on sustainable growth of business. This evidence also supported the prior findings of (Kulathunga et al., 2020) that technological and financial literacy influence positively affect the Sri Lankan SMEs performance.

Furthermore, Perera (2021) identifies the impact of IT technologies and digital tools on increasing business value. By advantageously employing digital platforms for targeted marketing and customer engagement initiatives. In this note, SMEs can grow customer relationships by carefully enhancing brand reputation in existing marketplace. Along this line, Arobo (2022) underscored the strategic significance of digital marketing initiatives in driving SME growth and competitiveness. SMEs may effectively address customers' needs and build long-term loyalty. These will result in higher customers' retention and advancement of sales which is achieved via personalised digital marketing promotions and online communication channels. The benefits on the use of digital technologies transformation in SMEs have been highlighted by various studies (Adewale & Aremu, 2021; Amadi & Chukwuma, 2021; Chen & Lee, 2022; Garcia & Martinez, 2022; Johnson & Smith, 2020; Kumar & Verma, 2020; Ogunleye & Folarin, 2019; Williams & Taylor, 2019).

Consequently, the significant contribution of modern technology to SME performance has been acknowledged in markets such as China, Japan, India, South Korea, the UK, and the US. These market took the full benefits of the knowledge economy through increased technological literacy to develop their countries, particularly the SME sector (Kulathunga et al., 2020). Based on these arguments, we hypothesized that

H₁: Digital technology and the financial performance are positively related.

Moderating effect of development financial institutions financing

Development Financial Institutions (DFIs) are vital financial intermediaries particularly in developing markets. These institutions are carefully designed to support businesses that traditional financial institutions cannot address their needs. DFIs provide financing, technical assistance, and capacity-building programs to promote economic development, especially in areas such as infrastructure, energy, agriculture, transport, and small-scale industries among others (Marbuah et al., 2022). In Nigeria, DFIs such as the Bank of Industry (BOI), the Nigerian Export-Import Bank (NEXIM), and the Development Bank of Nigeria (DBN) are very important because of their role in supporting SMEs by offering finances such as loans, guarantees, and equity investments. (Gyimah & Agyeman, 2019) noted that DFI investments have considerable impact on employment while Attridge et al. (2019) indicated the strategic importance of DFIs in critical infrastructure. These infrastructures can be in the form of financial resources needed to invest in digital technologies by the SMEs which will support their operations.

DFIs in digital technology adoption context could strengthen the relationship between digital technology and financial performance. SMEs may overcome their challenges about digital adoption through obtaining affordable financing and technical assistance from the DFIs (Thathsarani & Jianguo, 2022).

As part of their mandates, DFIs also support SMEs in various ways technical training and capacity building programs to mention but few. These roles played by the DFIs help in addressing the gap on digital literacy and empower SMEs to adopt digital technologies in ways that enhance their financial performance. According to Marbuah et al. (2022) DFIs offer training programs with a view to help SMEs improve their capabilities technologically and competitiveness. In this vein, it is argued that DFIs can bring in SMEs owners and technology providers in context of digital

transformation, thus, enabling the acquisition of affordable digital infrastructure. Prior evidence has indicated the potential of DFIs to positively influence the financial performance of SMEs from the lens of digital technology adoption. Manyanga et al. (2023) investigated how debt financing affects the financial performance of 210 SMEs in Zimbabwe using a structured questionnaire. The findings of the study showed that show that debt financing in the form of short and long-term, and trade credit positively impacted on the financial performance of the sampled SMEs. Prior evidence (Ahmad & Ejaz, 2019; Meher & Ajibie, 2018; Slav'yuk & Slaviuk, 2019) have revealed that long term debt has a positive effect on financial performance. Consequently, Xu et al. (2021) posited that SMEs used more long-term debt with a view of financial performance improvement. consistent with these arguments, we hypothesized that

H₂: DFIs financing positively moderates the relationship between digital technology and financial performance

METHOD

The study adopts a cross-sectional survey design to collect primary data from SMEs on their digital technology usage, financial performance, and access to DFI financing. The population of the study consists of existing SMEs in Zaria metropolis. As a result of infinite nature of the population (that is lack of verifiable and documented records of SMEs in Zaria metropolis), a population of 307 SMEs were determined. The study developed a questionnaire based on the prior research (Cassetta et al., 2020; Hussain et al., 2022; W. Manyanga et al., 2023; Teng et al., 2022; Trinugroho et al., 2022) on digital technology, DFIs financing and financial performance of SMEs. A pilot study was carried out using the instrument with a view to enhance its validity and reliability. Some few modifications were made for improving its quality. Furthermore, construct validity and reliability tests were carried out for the purpose of validation. A total of 237 questionnaires were administered during the process. Out of this, 228 questionnaires were returned and the data collected were coded accordingly.

Table 1. Coding

Variables	Code
Financial Performance	FP
Digital Technology	DT
DFIs Financing	DF

Researchers, 2025

The study validated all responses using the data collecting tool to ensure that there is no missing data and other issues that may disrupt the final results. The study used Structural Equation Modelling (SEM) analysis by employing Partial Least Square (PLS) to investigate the moderating role of development financial institutions financing (DFIs) on the association between digital technology and the financial performance of SMEs in Zaria Metropolis.

Measurement Model Assessment

As part of the strategy of assessing the model, reliability of each item, its internal consistency, as well as convergent validity, and discriminant validity were employed in the study. The reliability of individual item in the constructs was analysed using the outer loadings construct indicators. According to (Hair et al., 2017) 0.70 serves as the rule of thumb for outer loading for already developed scale. Hence, making the constructs to be reliable and acceptable in research. Of the 19 items that measures 3 reflective constructs, the study deleted 3 items

because they fall short of the rule of the thumb. Consequently, 16 items emerged and used for the analysis.

RESULTS AND DISCUSSION

A. Research Result

1. Measurement Model Assessment

Table 2. Loadings of the outer layer

	FP	DT	DF
FP_1	0.72		
FP_2	0.74		
FP_4	0.80		
FP_5	0.77		
FP_6	0.81		
DT_2		0.71	
DT_3		0.79	
DT_4		0.87	
DT_5		0.79	
DT_6		0.73	
DT_7		0.81	
DF_1			0.81
DF_4			0.73
DF_5			0.82
DF_6			0.71
DF_7			0.73

Field Survey computed data, 2025

The coefficient of Cronbach alpha was used to analyse the internal consistency reliability of measurement model. The research constructs coefficient according to (Taber, 2018) should not be less than 0.6. Evidence from Table 3 indicates that none of these coefficient is having a value below the threshold of the 0.6 and thus consistent with existing evidence (W. Manyanga et al., 2023) hence agrees with the threshold.

Table 3. Internal Consistency Reliability

Var	C-Alpha	rho_A	C-Reliability	Av. Vari. Ext. (AVE)
FP	0.81	0.80	0.86	0.67
DT	0.62	0.63	0.84	0.61
DF	0.67	0.59	0.75	0.64
RK	0.95	0.89	0.87	0.66

Field Survey computed data, 2025

This study assesses the discriminant validity using Fornell and Larcker (1981) criterion. Accordingly, a reflective construct is expected to have discriminant validity if the square root of its average variance extracted (AVE) is greater than its correlation with another reflective construct in the existing model (Fornell & Larcker, 1981).

The square root of the financial performance (FP), digital technology (DT), and development financial institution (DF) as indicated in Table 4 are 0.76, 0.74, and 0.77 respectively. Looking at these figures, the constructs used in the work have satisfied with this

criterion of discriminant validity. This is because the square roots of their respective AVEs is higher than the correlation with each constructs. This is reflected in Table 4.

Table 4. Analysis of Fornell & Larcker

Var.	BP	CA	EA
FP	0.76		
DT	0.27	0.74	
DF	0.28	0.12	0.77

Field Survey computed data, 2025

1. Structural Model Assessment

a. Association between digital technology and financial performance of SMEs (Structural Model)

The first hypothesis of the study tested the association between digital technology and financial performance of SMEs. Table 5 shows the results of the structural model that examines the association between digital technology (DT) and financial performance (FP) of SMEs.

Table 5. Direct results of the Regression

Path	Path Coeff. (β)	Std. Error	t-value	p-value
DT \rightarrow FP	0.58	0.05	9.12	0.000
R ²	0.34			
Adj R ²	0.33			

Field Survey computed data, 2025

The structural model explains the direct effect of the associations, the t-value, and p-value to depict the hypothesis significance. As can be seen from Table 5 the association is positive and statistically significant. Indicating that an increase in digital technology will lead to an improvement in the financial performance of the SMEs. That is higher engagement in digital technologies will in return create more value to the SMEs. This result is in agreement with the findings of prior studies (Cassetta et al., 2020; Etuk et al., 2024; Nasiri et al., 2020; Rupeika-Apoga et al., 2022). The R-squared (R²) denotes the influence of the exogenous latent variables on the latent endogenous variable. From the Table 5, the R² is 0.34 which means that digital technology accounts for up to 34% percent of the variation of financial performance.

b. The moderating role of DFIs financing on the relationship between digital technology and financial performance

The study also examined the hypothesis on the moderating effect of DFIs financing on the association between digital technology and financial performance.

Table 6. Regression result of the Interaction

Path	Path Coeff. (β)	Std. Error	t-value	p-value
DT \rightarrow FP	0.40	0.06	6.67	0.000
DFIs \rightarrow FP	0.30	0.07	4.29	0.001
DT \times DFIs \rightarrow FP	0.20	0.05	4.00	0.002
R ²	0.42			
Adjusted R ²	0.40			

Field Survey computed data, 2025

The variable of interest here is DT × DFIs. The result shows that the interaction term is positive and statistically significant. Thus, revealing that having DFIs, financing digital technology will lead to higher performance of the SMEs. That is strengthen the performance of the SMEs. The R² in this interaction model 0.42 which is higher than 0.34 as indicated in the direct model. This means that DFIs financing has moderated the relationship between digital technology financial performance of the SMEs. More so including the DFIs in the second estimates as moderating variable improves significantly the explanatory power of the model. from 34% to 42%. Consequently, the adjusted R² considers the adjustment for the number of predictors to ensure the absence of overfitting in the model fitness. The results lend support of early studies (Ahmad & Ejaz, 2019; W. Manyanga et al., 2023; Meher & Ajibie, 2018; Slav'yuk & Slaviuk, 2019) that long-term debt financing greatly enhances financial performance.

2. Research Discuss

The results of the study indicate that the adoption of digital technology has a positive and significant effect on the financial performance of SMEs in Zaria Metropolis. This suggests that increased use of digital tools, such as mobile payments, cloud computing, e-commerce, and social media, can enhance operational efficiency, expand market reach, and support more effective financial management. These findings are consistent with previous studies showing that digital orientation and technological capabilities can drive SMEs' financial performance and innovation capacity through the utilization of digital platforms and fintech services (Mangifera et al., 2022). The adoption of digital technology as a valuable resource supports the Resource-Based View perspective, while SMEs' ability to adjust strategies and processes through digitalization highlights the relevance of Dynamic Capabilities Theory.

In addition, this study finds that financing from Development Financial Institutions (DFIs) strengthens the relationship between digital technology adoption and financial performance, while also improving the model's ability to explain variations in SME performance (R² increased from 0.34 to 0.42). This indicates that DFIs not only provide access to capital but also facilitate investment in digital infrastructure and technical training that support SMEs' digital transformation. These findings are consistent with studies conducted in Africa and the European Union, which highlight the role of DFIs in providing financing that helps overcome funding constraints, promotes innovation, and enhances SME business performance (E. a. Manyanga, 2023).

From a theoretical perspective, these results extend the literature on the moderating role of DFIs in the relationship between digitalization and SME financial performance, emphasizing that the effectiveness of digital technology adoption depends not only on SMEs' internal capabilities but also on the availability of financial support from external institutions. These findings have practical implications for governments and policymakers, who may view DFIs as facilitators of digital transformation, for example through credit guarantee schemes, technology grants, or blended finance initiatives. For SME practitioners, these findings highlight the importance of combining digital technology adoption with access to formal financing in order to maximize the positive impact on financial performance.

Despite the strength of these findings, this study is limited to SMEs in Zaria Metropolis, and therefore caution should be exercised when generalizing the results to other regions. Future research could explore the moderating effects of DFIs across different sectors or countries and incorporate additional forms of support, such as technical training or policy incentives, to further

understand the mechanisms influencing the relationship between digitalization and SME performance.

CONCLUSIONS

This study examines the role of DFIs in SMEs operations. The findings of the study reveal that DFIs significantly strengthen the positive effects of digital technologies. The findings support the role of DFIs in financing digital adoption in improving financial performance. The finding of the study has some practical implications. Policymakers should collaborate with DFIs to design targeted financial products that encourage digital technology adoption among SMEs. DFIs should invest in training programs to enhance digital literacy and technical skills among SME owners and employees. Governments and DFIs should work together to expand digital infrastructure, ensuring affordable and accessible tools for SMEs. DFIs must tailor their financial services to address the unique needs of SMEs, including flexible loans and mentorship programs for digital transformation. Encourage partnerships between DFIs, tech providers, and SMEs to create ecosystems that foster innovation, reduce costs, and streamline technology adoption.

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