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Technopreneurship and Small and Medium-Sized Enterprise Performance in North Central Nigeria: Evidence from Financial and Non-Financial Outcomes

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Abstract

This study examined the effect of technopreneurship on the performance of selected Small and Medium-Sized Enterprises (SMEs) in North Central Nigeria. The study was motivated by the increasing importance of digital technologies, technological innovation, and technology-enabled entrepreneurial practices in improving the competitiveness and sustainability of SMEs, alongside the limited empirical evidence that disaggregates technopreneurship into specific capabilities within the North Central Nigerian context. Technopreneurship was operationalized through Digital Market Engagement (DME), Technological Operations Integration (TOI), Innovation Orientation (IO), and Technological Collaboration and Human Capital (TCHC), while SME performance was examined through financial and non-financial outcomes. The study adopted an explanatory cross-sectional survey design. The population was estimated at 57,125 SMEs across Benue, Kogi, Kwara, Nasarawa, Niger, Plateau and the Federal Capital Territory, from which 400 respondents were targeted and 368 questionnaires were returned; after data screening, 314 usable responses formed the basis of the inferential analysis. Data were analysed using descriptive statistics, Pearson correlation and multiple regression. The results showed that all four dimensions of technopreneurship had positive and statistically significant effects on financial performance: DME ($\beta = 0.278$, $p < 0.001$), TOI ($\beta = 0.264$, $p = 0.001$), IO ($\beta = 0.216$, $p = 0.006$), and TCHC ($\beta = 0.172$, $p = 0.013$). The same dimensions significantly influenced non-financial performance: DME ($\beta = 0.335$, $p < 0.001$), TOI ($\beta = 0.278$, $p < 0.001$), IO ($\beta = 0.284$, $p = 0.001$), and TCHC ($\beta = 0.220$, $p = 0.002$). The findings indicate that the effects of technopreneurship are not confined to immediate financial outcomes but extend to customer satisfaction, service quality, operational efficiency, employee productivity, innovation capability and organizational reputation. The study concludes that technology-driven entrepreneurial capabilities constitute important strategic resources for SME performance in North Central Nigeria.

Keywords: Technopreneurship; Digital Market Engagement; Technological Operations Integration; Innovation Orientation; Technological Collaboration; Human Capital; SME Performance; North Central Nigeria.

Introduction

Small and Medium-Sized Enterprises (SMEs) occupy an important position in economic development because they contribute to employment creation, income generation, innovation and regional economic activity. However, SMEs operate in increasingly turbulent environments in which digitalisation, platform-based competition, changing customer expectations and rapid technological development continuously alter the conditions under which firms compete. In such an environment, business performance increasingly depends not only on conventional entrepreneurial competencies but also on the ability to identify, acquire, combine and deploy technological resources.

Technopreneurship represents the intersection of entrepreneurship and technology. It involves the use of technological knowledge, digital platforms, innovation processes and technology-related networks to identify opportunities, create value and improve business outcomes. Nambisan (2017) and Nambisan et al. (2019) position digital technologies as important enablers of entrepreneurial action and innovation. Similarly, the Resource-Based View

(RBV) argues that firm-specific resources and capabilities can become sources of competitive advantage when they are valuable, difficult to imitate and effectively organised (Barney, 1991). In SMEs, technopreneurial capabilities may therefore provide mechanisms through which resource constraints can be partially overcome and market opportunities can be exploited more efficiently.

The present study conceptualizes technopreneurship as a multidimensional capability consisting of Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital. Digital Market Engagement captures the strategic use of social media, e-commerce, online advertising and digital communication to reach customers and strengthen relationships. Technological Operations Integration refers to the incorporation of digital systems into accounting, inventory management, production, logistics, customer relationship management and related processes. Innovation Orientation reflects a firm's commitment to creativity, experimentation and continuous improvement. Technological Collaboration and Human Capital capture external technology partnerships, knowledge-sharing relationships and employees' digital competencies.

These capabilities may affect SME performance through different pathways. Digital market engagement can expand customer reach and improve customer acquisition. Technological integration can reduce operational errors, improve information flow and increase productivity. Innovation orientation can support product, service and process renewal, while collaboration and human capital can improve knowledge acquisition and the capacity to use technology effectively. The source study therefore distinguishes between financial performance—represented by profitability, revenue growth and market expansion—and non-financial performance, including customer satisfaction, operational efficiency, employee productivity, innovation capability and organizational reputation.

Although previous studies generally report positive relationships between technology adoption, innovation and SME performance, important gaps remain. Much of the Nigerian evidence is concentrated in major commercial centres such as Lagos and Abuja, while North Central Nigeria has received comparatively less attention. Existing studies also frequently treat technology adoption or innovation as a single construct, which may conceal differences among individual technopreneurial capabilities. In addition, financial and non-financial outcomes are not always separated analytically. The present study responds to these gaps by examining the distinct effects of four technopreneurship dimensions on two performance domains among SMEs in North Central Nigeria.

The empirical basis for this manuscript is the supplied study, which covered SMEs in Benue, Kogi, Kwara, Nasarawa, Niger, Plateau and the Federal Capital Territory. The source document identifies a population of 57,125 SMEs, a target sample of 400, 368 returned questionnaires and 314 usable observations for the main inferential analysis.

Problem Statement

Despite the increasing diffusion of digital platforms, mobile payments, enterprise software and other technologies, many SMEs continue to experience performance constraints. These constraints include limited productivity, weak innovation capacity, restricted market reach,

managerial inefficiencies and difficulty in converting technology investments into measurable business value. The problem is particularly relevant in North Central Nigeria, where SMEs operate within infrastructural constraints, uneven broadband access and varying levels of digital literacy.

The literature also presents inconsistent evidence concerning the strength and form of the technopreneurship–performance relationship. Some studies report significant positive effects of innovation and technological capabilities, while others indicate that particular technological or innovation dimensions may have weaker or non-significant effects on some performance measures. Treating technopreneurship as a single undifferentiated construct may therefore conceal the specific capabilities that matter for different outcomes.

Accordingly, the central research problem is the insufficient empirical understanding of how distinct technopreneurial capabilities influence separate dimensions of SME performance in North Central Nigeria. The study addresses this problem by examining financial and non-financial performance separately and by estimating the effects of Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital.

Objectives of the Study

The general objective is to examine the effect of technopreneurship on the performance of selected SMEs in North Central Nigeria. The specific objectives are to:

- Examine the effect of Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital on the financial performance of selected SMEs in North Central Nigeria.
- Determine the effect of Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital on the non-financial performance of selected SMEs in North Central Nigeria.
- Assess the relative contribution of the four technopreneurship dimensions to financial and non-financial performance in order to identify the areas in which technology-driven entrepreneurial capabilities exert comparatively stronger effects.

Research Questions

- What effects do Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital have on the financial performance of selected SMEs in North Central Nigeria?
- What effects do Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital have on the non-financial performance of selected SMEs in North Central Nigeria?
- What is the relative contribution of the four technopreneurship dimensions to the financial and non-financial performance of selected SMEs in North Central Nigeria?

Research Hypotheses

H01: Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital have no significant effect on the financial performance of selected SMEs in North Central Nigeria.

H02: Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital have no significant effect on the non-financial performance of selected SMEs in North Central Nigeria.

Literature Review

Concept of Technopreneurship

Technopreneurship may be understood as entrepreneurial activity that is enabled, strengthened or transformed by technology. It goes beyond the passive adoption of technology because it combines technological capability with opportunity recognition, innovation and value creation. Nambisan (2017) describes digital entrepreneurship as entrepreneurial activity shaped by digital technologies, while Nambisan et al. (2019) emphasize the role of digital technologies in innovation processes and new forms of value creation.

In the present study, technopreneurship is treated as a multidimensional organizational capability. This approach is useful because digital marketing, operational integration, innovation and technological collaboration may not produce identical effects on firm outcomes. The source study specifically defines Digital Market Engagement, Technological Operations Integration, Innovation Orientation and Technological Collaboration and Human Capital as the four dimensions. □ filecite□ turn0file0□ L56-L70□

Digital Market Engagement and SME Performance

Digital Market Engagement refers to the use of digital platforms and communication technologies to reach, interact with and retain customers. It encompasses social media, online advertising, e-commerce, digital branding, content marketing and related activities. Digital channels can lower barriers to market entry, extend geographic reach and provide firms with customer information that can be used to improve marketing decisions.

From a financial perspective, stronger digital engagement can support sales growth and market expansion through broader customer acquisition and lower-cost promotional channels. From a non-financial perspective, continuous digital interaction may strengthen customer satisfaction, responsiveness, brand visibility and organizational reputation. The source study reports positive correlations between DME and financial performance ($r = 0.562$) and between DME and non-financial performance ($r = 0.585$).

Technological Operations Integration and SME Performance

Technological Operations Integration is the incorporation of digital systems and automated technologies into core business processes. Examples include accounting software, inventory management, customer relationship management, digital payment systems and automated workflows. Integration can improve the accuracy and timeliness of information, reduce repetitive work and support evidence-based decision-making.

Operational integration can influence financial performance by reducing costs, minimizing waste and improving resource allocation. It can also influence non-financial outcomes by increasing service consistency, employee effectiveness, operational flexibility and accountability. In the source study, TOI was positively correlated with financial performance (r = 0.528) and non-financial performance (r = 0.542).

Innovation Orientation and SME Performance

Innovation Orientation represents an organizational tendency to search for, experiment with and implement new ideas, products, services and processes. Innovation-oriented SMEs are more likely to challenge existing ways of doing business and to respond proactively to changes in customer needs and competitive conditions.

Innovation may produce financial benefits through new revenue streams, improved product differentiation and process efficiencies. Its non-financial effects may include stronger organizational learning, employee engagement, customer satisfaction, innovation capability and market reputation. The source data show positive correlations between IO and financial performance (r = 0.545) and between IO and non-financial performance (r = 0.568).

Technological Collaboration and Human Capital

Technological Collaboration and Human Capital combine external technological relationships with the knowledge and skills of employees. Partnerships with technology providers, research institutions, suppliers, industry networks and other stakeholders can provide SMEs with knowledge and technological resources that would otherwise be difficult to obtain. Human capital ensures that these resources can be implemented and adapted effectively.

Technological collaboration and employee digital competence may support financial performance by reducing trial-and-error costs, accelerating innovation and improving project execution. They may also strengthen non-financial outcomes through organizational learning, employee productivity, innovation capability and stakeholder relationships. The source study reports correlations of r = 0.518 with financial performance and r = 0.535 with non-financial performance.

SME Performance

SME performance is multidimensional. Financial indicators such as profitability, revenue growth and market expansion provide direct evidence of economic outcomes, whereas non-financial indicators capture customer satisfaction, service quality, operational efficiency, employee productivity, innovation capability and organizational reputation. The source study deliberately separates these dimensions rather than collapsing them into a single performance index. □ filecite□ turn0file0□ L620-L630□

Theoretical Framework
Resource-Based View

The Resource-Based View (RBV) explains performance differences through the strategic value of internal resources and capabilities. Barney (1991) argues that resources that are valuable,

rare, difficult to imitate and non-substitutable can provide the basis for sustained competitive advantage. In this study, the four technopreneurship dimensions are treated as capability bundles involving technology, routines, knowledge, managerial competencies and human capital. The source document explicitly anchors the study primarily on RBV and interprets the four dimensions as strategic technological capabilities. □ filecite□ turn4file7□ L1-L13□

Technology Acceptance Model

The Technology Acceptance Model (TAM) provides a complementary behavioural explanation for technology adoption. Davis (1989) proposes that perceived usefulness and perceived ease of use influence technology acceptance and use. Within SMEs, technology cannot generate organizational benefits unless owners, managers and employees actually adopt and utilize it. TAM therefore complements RBV by explaining the adoption process through which technological resources become operational capabilities.

Dynamic Capabilities Perspective

The study's conclusions also invoke the Dynamic Capabilities Perspective, which emphasizes the ability of firms to adapt, integrate and reconfigure resources in changing environments. This perspective is useful for interpreting innovation orientation and technological collaboration because SMEs must continuously renew their technological capabilities rather than simply acquire technology once.

Empirical Review and Research Gap

Evidence reviewed in the source document generally supports a positive technology–performance relationship, but the studies vary in construct definition, geographical setting and analytical approach. Lohor and Jilang (2025), for example, examined technopreneurship and SME growth in North Central Nigeria using technological innovation, R&D innovation and technological opportunities and reported positive effects. Bakare et al. (2024) found that ICT use significantly affected SME performance in North Central Nigeria, although the study focused on rice milling SMEs. Adetowubo-King et al. (2024) reported significant technology-related effects on medium-scale enterprise performance in Lagos. Okpalaoka et al. (2023) examined technological innovation capabilities among manufacturing SMEs in Lagos, while Okohue (2020) investigated product and process innovation in Abuja.

These studies establish useful foundations but leave several gaps. First, many studies focus on technology adoption, innovation or technological entrepreneurship as broad constructs rather than the four-dimensional technopreneurship framework adopted here. Second, evidence from North Central Nigeria remains relatively limited compared with major commercial centres. Third, financial and non-financial performance are not consistently separated. Fourth, the source study applies simultaneous multiple regression models that allow the individual effects of the four dimensions to be assessed while controlling for the presence of the other dimensions.

Methodology

Research Design

The study adopted an explanatory survey research design using a cross-sectional approach. The design was appropriate because the study sought to examine the relationships between multiple technopreneurship dimensions and SME performance without manipulating the study variables. Structured questionnaires were used to collect standardized responses from owners, managers and senior staff with knowledge of technology practices and organizational performance.

Population and Sample

The population consisted of SMEs operating in Benue, Kogi, Kwara, Nasarawa, Niger, Plateau and the Federal Capital Territory. The source study estimated the population at 57,125 SMEs, based on SMEDAN and NBS data. A Taro Yamane calculation produced approximately 397 respondents; this was rounded to 400 to allow for non-response. The target was proportionally distributed across the seven areas.

Of the 400 questionnaires administered, 368 were returned, representing a 92.0% response rate. Following data screening, 314 usable responses were retained for the main inferential analysis. The final analytical sample therefore represents 78.5% of the original target of 400 questionnaires.

Sampling Technique

A multi-stage sampling procedure was adopted. The geographical area was first defined as the North Central zone; major commercial centres were then identified; SMEs were selected from available business directories and related records using simple random procedures; and respondents were selected from owners, managers and senior staff who possessed sufficient knowledge of the firms' technological activities and performance.

Measurement of Variables

Technopreneurship was measured using four dimensions: Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital. SME performance was measured using financial and non-financial indicators. Financial performance covered revenue growth, profitability and market expansion. Non-financial performance covered customer satisfaction, operational efficiency, employee productivity and organizational reputation. The measurement items were adapted from established scales and modified for the SME context.

Data Analysis

Data analysis involved descriptive statistics, diagnostic tests, Pearson product-moment correlation and multiple regression. Diagnostic procedures included tests of normality, multicollinearity, heteroscedasticity, autocorrelation and linearity. The source study reports that all five OLS assumptions were satisfied. VIF values ranged from 2.142 to 2.568, tolerance values

ranged from 0.390 to 0.467, Breusch-Pagan and White tests were non-significant, Durbin-Watson statistics were 1.892 and 1.945, and Ramsey RESET tests were non-significant.

Model Specification

Two regression models were estimated:

Model 1: FP = β0 + β1DME + β2TOI + β3IO + β4TCHC + ε
Model 2: NFP = β0 + β1DME + β2TOI + β3IO + β4TCHC + ε
Where FP = financial performance; NFP = non-financial performance; DME = Digital Market Engagement; TOI = Technological Operations Integration; IO = Innovation Orientation; TCHC = Technological Collaboration and Human Capital; β0 = constant; β1–β4 = regression coefficients; and ε = error term.

Results

1 Descriptive Statistics

Variable	Mean	Std. Dev.	Skewness	Kurtosis
Digital Market Engagement	3.61	0.78	-0.25	-0.31
Technological Operations Integration	3.4	0.85	-0.18	-0.45
Innovation Orientation	3.49	0.82	-0.22	-0.38
Technological Collaboration & Human Capital	3.46	0.8	-0.2	-0.38
Financial Performance	3.35	0.92	-0.12	-0.52
Non-Financial Performance	3.6	0.82	-0.22	-0.35

Digital Market Engagement recorded the highest mean among the four technopreneurship dimensions (3.61), followed by Innovation Orientation (3.49), Technological Collaboration and Human Capital (3.46), and Technological Operations Integration (3.40). Non-financial performance (3.60) had a higher mean than financial performance (3.35), suggesting that respondents perceived stronger current outcomes in customer, operational and organizational domains than in direct financial outcomes. □ filecite□ turn3file0□ L1-L8□

2 Correlation Results

Variable	DME	TOI	IO	TCHC	FP	NFP
DME	1.000	0.452	0.518	0.498	0.562	0.585
TOI	0.452	1.000	0.485	0.462	0.528	0.542
IO	0.518	0.485	1.000	0.512	0.545	0.568
TCHC	0.498	0.462	0.512	1.000	0.518	0.535
FP	0.562	0.528	0.545	0.518	1.000	0.682
NFP	0.585	0.542	0.568	0.535	0.682	1.000

All bivariate relationships were positive and statistically significant at $p < 0.001$. The strongest relationship among the predictors was between DME and IO ($r = 0.518$), while the strongest relationship involving the outcome variables was between financial and non-financial performance ($r = 0.682$). None of the predictor correlations approached a level suggesting serious multicollinearity. □ filecite□ turn2file9□

3 Regression Results: Financial Performance

Predictor	B	SE	β	t	p
Constant	0.482	0.218	—	2.211	0.028
Digital Market Engagement	0.328	0.085	0.278	3.859	<0.001
Technological Operations Integration	0.302	0.087	0.264	3.476	0.001
Innovation Orientation	0.226	0.082	0.216	2.752	0.006
Technological Collaboration & Human Capital	0.181	0.072	0.172	2.506	0.013

All four predictors had positive and statistically significant effects on financial performance. Digital Market Engagement recorded the largest standardized coefficient (β = 0.278), followed by Technological Operations Integration (β = 0.264), Innovation Orientation (β = 0.216), and Technological Collaboration and Human Capital (β = 0.172). The significance levels indicate that each predictor made a statistically significant contribution at the 5% level. The source study consequently rejected the null hypotheses for the individual financial-performance effects.

4. Regression Results: Non-Financial Performance

Predictor	B	SE	β	t	p
Constant	0.512	0.198	—	2.586	0.01
Digital Market Engagement	0.352	0.078	0.335	4.513	<0.001
Technological Operations Integration	0.268	0.075	0.278	3.573	<0.001
Innovation Orientation	0.285	0.082	0.284	3.476	0.001
Technological Collaboration & Human Capital	0.225	0.072	0.22	3.125	0.002

The non-financial performance model was statistically significant, with R = 0.718 and R^2 = 0.515. Thus, 51.5% of the variation in non-financial performance was jointly explained by the four technopreneurship dimensions. DME had the largest standardized coefficient (β = 0.335), followed by IO (β = 0.284), TOI (β = 0.278), and TCHC (β = 0.220). All four effects were statistically significant. □ filecite□ turn2file11□

Relative Contribution of the Predictors

The standardized coefficients provide a basis for comparing the relative contribution of the four dimensions within each regression model. For financial performance, the coefficients were DME (0.278), TOI (0.264), IO (0.216) and TCHC (0.172). For non-financial performance, they were DME (0.335), IO (0.284), TOI (0.278) and TCHC (0.220). Thus, DME had the largest standardized coefficient in both models, while TCHC had the smallest coefficient in both models. These comparisons describe the estimated relative magnitude of the predictors in this sample; they do not imply that a single capability is sufficient for SME performance.

Discussion of Findings

Technopreneurship and Financial Performance

The results demonstrate that technopreneurship dimensions are significantly associated with financial performance. Digital Market Engagement produced the largest standardized coefficient, indicating that SMEs with stronger digital customer engagement reported stronger

revenue, profitability and market expansion outcomes. This is consistent with the logic that digital channels can extend market reach, improve customer acquisition and provide more efficient promotional mechanisms.

The significant effect of Technological Operations Integration indicates that technology embedded in accounting, inventory, production, payment and related processes can contribute to financial outcomes by reducing operational inefficiencies and improving resource allocation. Innovation Orientation also demonstrated a significant effect, supporting the view that product, service and process renewal can generate new revenue opportunities and strengthen competitive positioning. Finally, the significant contribution of Technological Collaboration and Human Capital indicates that technological resources are more useful when employees possess the knowledge and skills required to deploy them and when SMEs can access external technological expertise.

Technopreneurship and Non-Financial Performance

The four technopreneurship dimensions also significantly influenced non-financial performance. The magnitude of the DME coefficient was higher for non-financial performance ($\beta = 0.335$) than for financial performance ($\beta = 0.278$), suggesting that digital engagement may first manifest through customer and organizational outcomes before producing stronger financial effects. This interpretation is consistent with the source study's conclusion that technology adoption can strengthen customer satisfaction, service quality, employee productivity, innovation capability and organizational reputation before these gains are fully reflected in profitability.

Technological Operations Integration significantly improved non-financial performance, consistent with the expectation that integrated digital processes improve service consistency, operational efficiency and employee effectiveness. Innovation Orientation also showed a substantial effect, reflecting the role of continuous improvement and experimentation in organizational learning and adaptability. Technological Collaboration and Human Capital made a significant contribution as well, demonstrating the importance of employee digital competencies and knowledge-sharing networks.

Theoretical Implications

The findings provide empirical support for the Resource-Based View because the four technopreneurship dimensions can be understood as organizational capabilities that contribute to performance when effectively deployed. They also complement the Technology Acceptance Model by showing that the performance implications of technology depend on actual organizational use rather than technology possession alone. Finally, the results are compatible with the Dynamic Capabilities Perspective because innovation, technological adaptation and collaboration represent mechanisms through which SMEs can renew and reconfigure resources in changing markets.

Empirical Contribution

The principal empirical contribution is the disaggregation of technopreneurship into four dimensions and the separate estimation of financial and non-financial performance. The source study also contributes geographical evidence from North Central Nigeria, an area characterized by varying levels of technological infrastructure and digital literacy. The use of 314 usable observations across diverse SME activities provides evidence that can inform further regional and sectoral studies. filecite turn1file3

Conclusion and Recommendations

Conclusion

This study examined the effect of technopreneurship on the performance of selected SMEs in North Central Nigeria using Digital Market Engagement, Technological Operations Integration, Innovation Orientation, and Technological Collaboration and Human Capital as explanatory dimensions. The evidence indicates that all four dimensions have positive and statistically significant effects on both financial and non-financial performance. The results therefore demonstrate that technopreneurship is not limited to technology acquisition; its performance implications arise from how firms deploy digital market capabilities, integrate technology into operations, pursue innovation and develop the human and collaborative capabilities required to use technology effectively.

The findings also show that the estimated effects are stronger for non-financial performance in several dimensions, reinforcing the importance of considering customer, operational, employee and reputational outcomes alongside financial indicators. The overall evidence supports a capability-based understanding of technopreneurship in which technology becomes valuable when embedded in organizational routines, innovation processes and human capabilities.

Recommendations

- SME owners and managers should strengthen Digital Market Engagement through systematic use of social media, e-commerce, online customer communication and digital analytics, while aligning digital activities with clear market objectives.
- SMEs should prioritize the integration of appropriate digital systems into accounting, inventory, payment, customer relationship and operational processes to improve information quality, efficiency and decision-making.
- Managers should establish an innovation-oriented organizational culture that encourages experimentation, continuous improvement, product and service development and responsiveness to changing customer needs.
- SMEs should invest in employee digital skills and establish partnerships with technology providers, universities, research institutions, industry networks and other relevant organizations to improve access to knowledge and technological expertise.
- Government and SME-support institutions should improve access to digital infrastructure, technology training, innovation finance and technology incubation programmes, particularly for SMEs operating outside major commercial centres.

Limitations and Future Research

The cross-sectional design limits strong causal interpretation because the study observes relationships at one point in time. The use of self-reported questionnaire data may also introduce response and common method biases. The geographical focus on North Central Nigeria limits direct generalization to other regions, while informal and rural enterprises were not fully represented. The models also excluded factors such as access to finance, managerial competence, competitive intensity, organizational culture and macroeconomic conditions. Future research should use longitudinal designs, objective financial and operational records, multi-source data and comparative studies across Nigeria's geopolitical zones. Future studies may also test moderators such as firm age, size, sector, access to finance and digital infrastructure.

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