

Economic Factors and SMEs Performance in Katsina State: Mediating Role of Access to Information and Communication Technology (ICT)

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Abstract

The study examined the effect of environmental factors on SMEs performance, with a mediating role for access to ICT. Based on the Technology Acceptance Model (TAM) and Dynamic Capabilities View theories; a cross-sectional research design was employed to collect data from the target respondents. The study population consisted of SME owners/managers from the manufacturing, educational, and service sectors operating in Katsina State, from which a sample of 300 was drawn. A PLS-SEM approach was used to analyze the data with the aid of Smart PLS 3.2.8. The results showed that economic environmental factors (tax policy, interest rate, inflation rate, and market uncertainty) were significantly and positively related to the performance of SMEs in Katsina State. The result also indicated that Access to ICT mediates the effect of the economic environment on SMEs performance.

Keywords: Access to ICT, Economic factors, Katsina State, SME performance, Technology Acceptance Model.

Background to the Study

Small and Medium-sized Enterprises (SMEs) are vital to economic development, driving job creation, income generation, and growth in both developed and developing economies. In developed nations, SMEs contribute over 50% to GDP and 60% to employment, while in developing economies, they account for approximately 33% of GDP and 45% of employment (Olughor, 2019). In Nigeria, SMEs contribute about 48% to GDP, but their potential remains underutilized due to various challenges (Tambari et al., 2018).

In Katsina State, Nigeria, SMEs play a significant role in employment, income distribution, and economic growth but face challenges from economic factors such as tax policies, inflation, interest rates, and market uncertainties. Tax policies significantly impact SME profitability and growth, with high rates limiting reinvestment and expansion, while favorable policies encourage innovation and investment (Cheong et al., 2020). Inflation increases production costs and reduces consumer demand, straining SME profitability (Eniola & Ektebang, 2019). High interest rates raise borrowing costs, restricting SMEs' access to capital for expansion or upgrades. Market uncertainties, driven by economic downturns or regulatory changes, further complicate planning and sustainability (Incekara, 2018).

Information and Communication Technology (ICT) adoption is a critical enabler for SMEs, enhancing efficiency, market access, and innovation, particularly in developing contexts like Nigeria (Rahayu & Day, 2017). However, the literature often overlooks ICT's mediating role in mitigating economic pressures on SMEs performance. This study

addresses this gap by examining how tax policy, inflation, interest rates, and market uncertainty affect SMEs performance in Katsina, with a focus on ICT's mediating role.

Objectives

The objectives of the study are to:

1. Examine the influence of economic factors (tax policy, inflation rate, interest rate, and market uncertainty) on SME performance in Katsina State.
2. Assess the level of access to ICT among SMEs in the state.
3. Determine the mediating role of access to ICT in the relationship between economic factors and SME performance.
4. Provide policy recommendations on how ICT adoption can enhance resilience against economic challenges.

2. Literature Review and Conceptual Framework

Concept of SME Performance

SME performance encompasses both financial and non-financial indicators used to evaluate the effectiveness, growth, and sustainability of small and medium-sized enterprises. Financial metrics typically include profitability, sales growth, and return on investment, while non-financial indicators involve customer satisfaction, operational efficiency, innovation capacity, and job creation (Chadwick et al., 2013; Georgiadis & Patelis, 2012). High-performing SMEs are often benchmarked to identify best practices and strategic positioning (Akrofi, 2016). According to Kilincarslan et al. (2020), a multidimensional approach, combining quantitative outcomes and qualitative achievements, provides a more holistic measure of SME success.

Concept of Business Environment

The business environment comprises internal and external factors influencing SME operations, such as clients, competitors, technological advancements, legal regulations, and socio-economic trends (Blurtit, 2013; Yusuf, 2014). It can be categorized into political, economic, socio-cultural, technological, infrastructural, and international factors (Litavniece & Znotiņa, 2015).

Economic Factors

Economic factors, including tax policy, inflation, interest rates, and market uncertainty, significantly affect SME decision-making and performance (Auerbach, 2012; Tee et al., 2016). Tax policies shape revenue and growth (Tan & Tan, 2019) perceptions of the burden, fairness, and stability of tax obligations, inflation impacts costs and demand (Folorunso et al., 2021) how prevailing lending rates impact capital access and financial planning, interest rates influence borrowing costs (Ma & Wang, 2020) the perceived impact of rising costs on operational efficiency and pricing, and market uncertainty from trade restrictions or regulations adds complexity (Diez, 2021) perceived volatility and unpredictability in the business environment.

Economic Factors and SME Performance

Economic conditions strongly influence SME growth and employment. Studies, such as in Algeria, highlight the impact of external and internal factors on SME success (Bouazzai et al., 2015). In Central and Eastern Europe, macroeconomic indicators like GDP and wages drive SME employment growth (Rusu & Roman, 2016). The relationship between

economic factors and ICT adoption varies, with market scope and government support playing key roles.

Access to ICT

ICT enhances SME performance by improving efficiency, market access, and competitiveness through tools like e-commerce and communication systems (Arefin & Tawfiqur, 2020). Countries like Indonesia and the UK have seen increased productivity from ICT adoption (Rahayu & Day, 2017). However, successful implementation requires infrastructure, skilled personnel, and budget allocation (Mohamed, 2014).

ICT and SME Performance

ICT adoption positively impacts SME performance, particularly through network and communication technologies (Rahayu & Day, 2017). It enhances labor efficiency and profitability but requires effective integration. ICT also mitigates economic pressures, such as high taxes or inflation, by improving financial management and supply chain strategies.

Mediating Role of ICT

ICT mediates the relationship between economic factors and SME performance. For instance, accounting software aids tax management, while online platforms enhance financial access. Despite extensive research, gaps remain in understanding ICT's mediating role in specific regions like Katsina State, Nigeria, necessitating localized studies using methods like structural equation modeling (Mengistu, 2016).

Theoretical Underpinnings

This study was grounded by two prominent theoretical frameworks the Technology Acceptance Model (TAM) which examines perceived ease of use and usefulness in ICT adoption (Benbasat & Barki, 2007), and the Dynamic Capabilities View (DCV) which emphasizes adaptability through resources like ICT (Teece et al., 1997). They jointly offer a comprehensive lens through which to examine the complex relationships among economic factors, access to ICT, and SME performance in Katsina State.

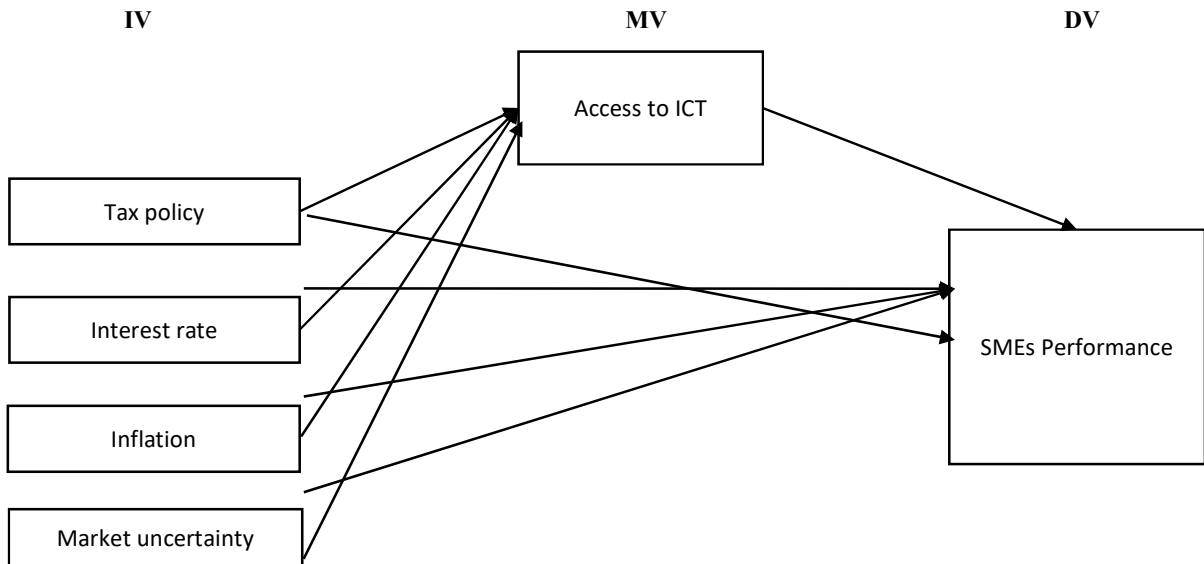
Together, TAM and DCV offer a robust theoretical foundation:

While, TAM explains the individual-level decision to adopt technology based on perceptions and attitudes, DCV explains the firm-level capacity to leverage technology for strategic adaptation and performance.

In this study, economic factors serve as external pressures, access to ICT represents both an intervening variable and a strategic enabler, and SME performance was the ultimate outcome. These frameworks not only align with the research design but also enhance the study's explanatory power and practical relevance.

Conceptual Research Model

Below is the research model that guides the study. The research has the independent variable, economic environment, and the dependent variable, SME performance.



3. Methodology

This study utilized a descriptive survey design with a cross-sectional approach, collecting data at a single point in time to examine relationships between variables. The target population comprised 1,367 registered SMEs in Katsina State, Nigeria, as per SMEDAN & NBS (2017) data. It is pertinent to note that updated state-level figures are not provided in national reports yet. To ensure both feasibility and representativeness, a sample of 301 SMEs was selected using the Research Advisor Table (e.g., Krejcie & Morgan, 1970). This method provides a statistically sound sample proportion for population sizes between 1,200 and 1,500, yielding a recommended sample of around 300–307.

Data were collected via a structured self-administered questionnaire distributed by research assistants to SME owners/managers. The questionnaire employed a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. The scales were designed to capture the subjective perceptions of SME owners/managers, a method appropriate for behavioural and perceptual variables in social science research (Hair et al., 2019) which was divided into three sections:

Demographic Information; Captured background characteristics of respondents.

SMEs Performance Factors; Measured sales growth (the extent to which the enterprise has experienced increases in revenue over a specified period), job creation (the ability of the enterprise to generate new employment opportunities), and profitability (the degree to which the business has maintained a profit after costs), rated on the Likert scale to assess perceived SME performance.

Economic Factors; Evaluated perceptions of tax policy (perceptions of the burden, fairness, and stability of tax obligations), interest rates (how prevailing lending rates impact capital access and financial planning), inflation rates (the perceived impact of rising costs on

operational efficiency and pricing), and market uncertainty (perceived volatility and unpredictability in the business environment).

Data analysis was conducted using Structural Equation Modeling (SEM) with Smart-PLS 3, a robust tool for modeling complex variable relationships in management research. Reliability was assessed using Cronbach's Alpha, with most variables exceeding the 0.7 threshold, indicating acceptable internal consistency. One variable (interest rate) fell below this threshold but was retained as the overall questionnaire reliability was satisfactory, confirming its suitability for data collection.

4. Data Presentation and Analysis

Over 40 days, 300 questionnaires were distributed to manufacturing, educational and service SME owners/managers in Katsina state, facilitated by research assistants. Follow-up communication and gratitude contributed to a high response rate. Among 300, 5 questionnaires were unreturned. Two hundred and ninety-five were retrieved after significant effort. One questionnaire was incomplete, and 3 had outliers, totalling 9 invalid questionnaires. Two hundred and ninety-one valid questionnaires remained, consisting of a 98% valid response rate, meeting the acceptable threshold as recommended by Hair et al. (2018). Additionally, the sample size was deemed sufficient, fulfilling the guideline of having at least ten times the number of independent variables, as suggested by Pallant (2010) and Hair et al. (2017).

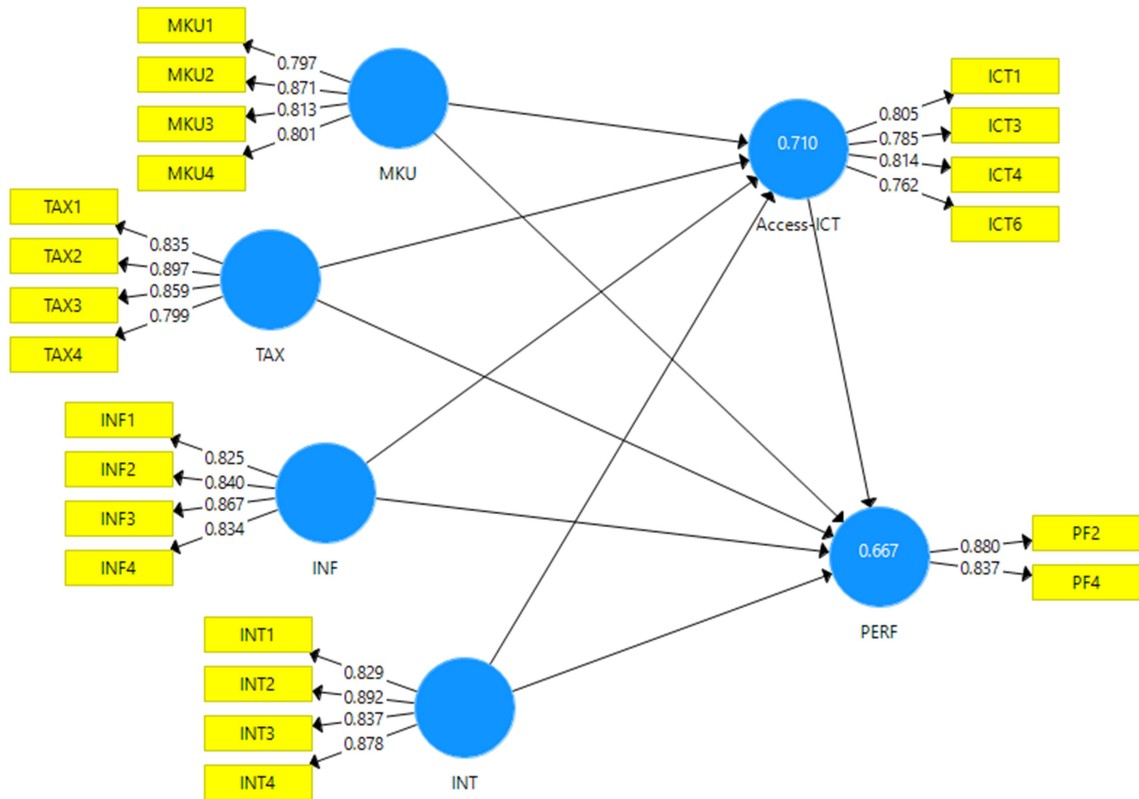
Response Rate of the Distributed Questionnaire

Response Rate	Frequency/Rate
Number of distributed questionnaires	300
Questionnaire not returned	05
Returned questionnaire	295
Returned and invalid questionnaire	04
Returned and valid questionnaire	291
Percentage of returned questionnaire	98%
Percentage of valid response rate	97%

Note: *Researcher's computation (2025)*

In the preliminary analysis, the study prepared the data for further examination. Missing values were addressed by identifying those using descriptive statistics, and mean substitution was employed to handle those missing values based on Hair et al. (2021) guideline. The study set a 10% threshold for missing value and found that only 0.09% of the total data set had missing values well below the limit, making them insignificant. Mean substitution was chosen to replace missing data because it retains the sample size and maintain statistical power. The assessment of outliers was carried out using Mahalanobis distance (D_2), which checks for multivariate outliers, as defined by Tabachnick and Fidell (2013). Multicollinearity, a condition where there is a significant linear relationship among explanatory variables in regression model, was also considered. Multicollinearity can impact the quality of coefficient estimates and statistical significance. The study highlighted the presence of multicollinearity when there is a correlation greater than 90% between latent independent variables, as per the criteria outlined by Hair et al. (2018) and Pallant (2010).

Measurement Model (PLS Algorithm)



Indicator item reliability

Variables	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Access to ICT	0.719	0.822	0.537
Inflation rate	0.706	0.837	0.632
Interest rate	0.838	0.902	0.755
Market Uncertainty	0.784	0.874	0.698
Performance	0.785	0.860	0.608
Tax	0.767	0.864	0.680

It is evident that the items assessing various variables exhibit Cronbach's Alpha values surpassing 0.7. This indicates that all the items listed in Table 4.1 were retained for analysis. Likewise, Table 4.1 also illustrates that each construct demonstrates a composite reliability coefficient exceeding 0.7, and all constructs meet the established threshold of at least 0.5 for Average Variance Extracted (AVE) per the criteria outlined by Tabachnick and Fidell (2013). This confirms the validity and reliability of the collected data.

This further assesses the distinctiveness of the constructs, a test for discriminant validity was conducted, and the outcomes of this analysis are presented in Table 4.2.

*Discriminant Validity
Fornell and Lacker*

	Access-ICT	INF	INT	MKU	PERF	TAX
Access-ICT	0.792					
INF	0.687	0.842				
INT	0.661	0.838	0.859			
MKU	0.785	0.632	0.682	0.821		
PERF	0.747	0.662	0.619	0.697	0.859	
TAX	0.730	0.773	0.748	0.648	0.749	0.849

Note: Diagonal elements (figures in bold) are the square root of the variance (AVE) shared between the constructs and their measures. Off-diagonal elements are the correlations among constructs.

4.1 Discriminant Validity Assessment

Table 4.2 displays results for discriminant validity using the Fornell-Larcker criterion. The square root of AVE values for each latent variable is compared with other correlations. All correlations are below the square root AVE values, indicating discriminant validity. Recent research suggests that the Fornell-Larcker criterion may be insufficient for some instances. Henseler (2018) proposes the Heterotrait-monotrait ratio (HTMT) as an alternative. The HTMT estimates the correlation between constructs if accurately measured. Two methods for assessing discriminant validity using HTMT are presented by Henseler et al. (2015): using a predefined threshold or statistical testing. Using HTMT as a criterion, a threshold value of 0.90 is suggested for closely related constructs and a more conservative value like 0.85 for distinct constructs. Alternatively, statistical inference involves examining if the correlation between latent variables significantly deviates from 1.00 through bootstrap confidence intervals. In this study, the researcher investigated whether the upper limit of the HTMT 95 percent confidence interval is below 0.90 or 0.85, ensuring discriminant validity.

Table 4.1 above revealed that all items measuring different variables have a Cronbach's Alpha value above 0.7. This means all the items were retained. Similarly, on Table 4.11, all constructs have a composite reliability coefficient more significant than 0.7, which meets the minimum benchmark for AVE, which is 0.5 (Tabachnick & Fidell, 2013). This means the data collected are valid, reliable, and tested for discriminant validity as presented above.

Table 4.3

Discriminant Validity Using HTMT

	Access- ICT	INF	INT	MKU	PERF	TAX
Access-ICT						
INF	0.812					
INT	0.779	0.784				
MKU	0.845	0.735	0.834			
PERF	0.843	0.835	0.817	0.827		
TAX	0.836	0.846	0.812	0.752	0.825	

Note: INF = Inflation rate, INT = Interest rate, MKU = Market uncertainty, PERF = Performance, TAX = Tax rate.

4.2 Assessment of the Structural Model

In this study, the measurement model was assessed through structural equation modeling (SEM) in the data analysis phase. The variables of interest underwent bootstrap analysis with 291 cases, employing 5000 bootstrap iterations to ascertain the significance of path coefficients in direct and mediating relationships, following Becker et al.'s (2018) methodology.

The study examines the direct influence of independent variables (Tax, Inflation rate, Interest rate, and Market uncertainty) on the dependent variable (SME performance). Additionally, the mediating role of access to Information and Communication Technology (ICT) in the connection between independent variables and the dependent variable is investigated.

Bootstrapping

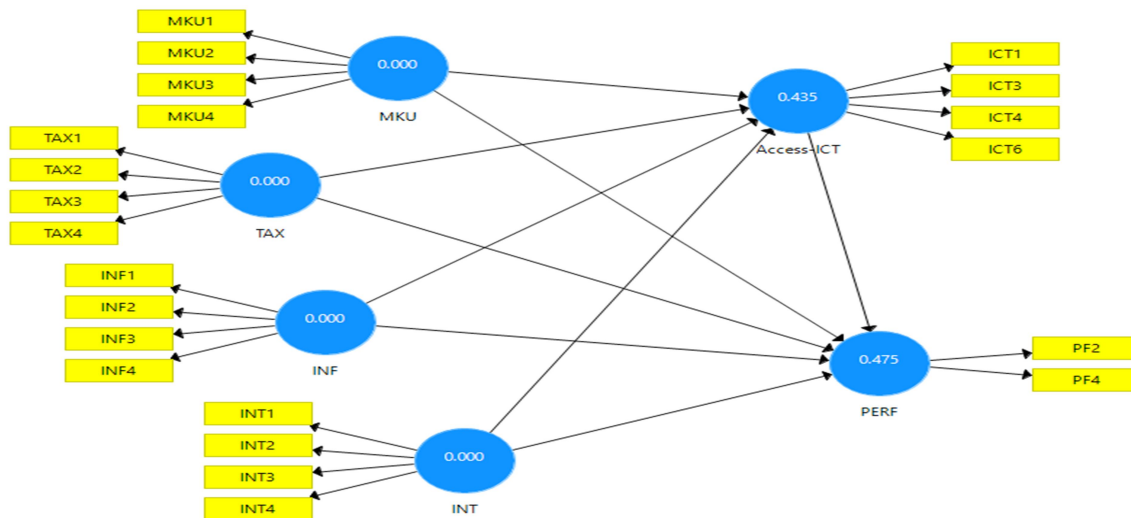


Figure 4.4 the outcomes of the structural model, illustrating both the direct and indirect relationships among the independent, mediating, and dependent variables. This diagram also presents the interpretation of the results, highlighting the direct effects of independent variables (IVs) on the dependent variable (DVs) as well as the mediating effects.

Test of Hypotheses

Hypotheses	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Access-ICT -> PERF	0.272	0.080	3.392	0.001
INF -> Access-ICT	0.190	0.080	2.365	0.018
INF -> PERF	0.109	0.079	1.501	0.134
INT -> Access-ICT	-0.086	0.074	1.141	0.254
INT -> PERF	-0.103	0.081	1.344	0.179
MKU -> Access-ICT	0.525	0.046	11.272	0.000
MKU -> PERF	0.229	0.074	3.099	0.002
TAX -> Access-ICT	0.308	0.073	4.243	0.000
TAX -> PERF	0.393	0.080	4.881	0.000

4.3 Discussion of Findings

4.3.1 Measurement Model Validation

The study's measurement model demonstrated robust psychometric properties, validating the reliability and validity of the research instruments. All constructs achieved Cronbach's Alpha coefficients exceeding 0.7, with values ranging from 0.706 (inflation rate) to 0.838 (interest rate), indicating satisfactory internal consistency. The composite reliability coefficients surpassed the 0.7 threshold for all variables, while Average Variance Extracted (AVE) values met the minimum requirement of 0.5, confirming convergent validity. The discriminant validity assessment using both the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT) confirmed that the constructs were sufficiently distinct. The HTMT values remained below the conservative threshold of 0.85, providing strong evidence for discriminant validity. These findings establish a solid foundation for interpreting the structural relationships between economic factors, ICT access, and SME performance.

4.3.2 Economic Factors and SME Performance

The analysis of economic factors indicates that SMEs in Katsina State exhibit significant vulnerability to macroeconomic fluctuations, with notable correlations identified between performance and tax policy ($r = 0.749$), market uncertainty ($r = 0.697$), inflation rate ($r = 0.662$), and interest rate ($r = 0.619$). Tax policy is the primary factor, demonstrating a significantly stronger correlation than reported by Cheong et al. (2020), while offering substantial empirical support for the theories proposed by Tan and Tan (2019). The correlation with market uncertainty provides more precise quantitative evidence compared

to the qualitative findings of Diez (2021) and contrasts with the weaker associations identified by Rusu and Roman (2016) in more developed economies. The study offers more robust empirical evidence regarding the effects of inflation compared to the conceptual analysis by Eniola and Ektebang (2019) and the moderate results presented by Folorunso et al. (2021). The association with interest rates, consistent with the findings of Ma and Wang (2020), demonstrates increased sensitivity, likely indicative of the constrained financing alternatives in developing economies. A key finding is that these correlations are consistently stronger than those observed in developed markets, indicating that SMEs in developing contexts such as Katsina State exhibit heightened sensitivity to economic pressures.

4.3.3 ICT as a Strategic Resource and Mediator

This study indicates that access to ICT is strongly correlated with various economic factors, providing insights that enhance understanding beyond prior research. The correlation between ICT access and market uncertainty ($r = 0.785$) significantly surpasses the relationships found in previous studies, offering more robust empirical evidence than the research conducted by Rahayu and Day (2017) in Indonesia and the UK, which indicated moderate positive associations between ICT adoption and business resilience with outspecific relationship quantification. The strong correlation between ICT access and market uncertainty exceeds the findings from analogous contexts in developing economies, thereby offering substantial support for the Dynamic Capabilities View. Teece et al. established theoretical foundations for ICT as an adaptive capability. (1997). This study provides more substantial empirical validation than earlier applications of the Dynamic Capabilities View (DCV) in research on small and medium-sized enterprises (SMEs). The correlation strength indicates that ICT may act as a more significant buffer against environmental volatility in developing economies such as Nigeria than in the more stable business environments previously examined. The relevance of TAM is supported by a significant correlation between ICT access and performance ($r = 0.747$), surpassing the correlations commonly found in TAM-related research. Benbasat and Barki's (2007) foundational research on Technology Acceptance Model indicated moderate relationships between perceived usefulness and technology adoption outcomes. By contrast, the current study reveals a significantly stronger association within the context of Nigerian SMEs. This improved correlation indicates that the advantages of ICT adoption are likely to be more significant for SMEs in resource-constrained settings than for those in developed economies. The comparative analysis with international research indicates that the ICT-performance relationship identified in this study ($r = 0.747$) is significantly stronger than the correlations reported by Arefin and Tawfiqur (2020) in their multi-country analysis of ICT and SME competitiveness. The current findings also exceed the moderate associations documented by Mohamed (2014) in examining ICT implementation requirements, suggesting that, when infrastructural and skill barriers are overcome, the performance benefits of ICT adoption may be more substantial in developing economies. The correlations between ICT access and individual economic factors (tax policy: $r = 0.730$; inflation: $r = 0.687$; interest rates: $r = 0.661$) provide novel empirical evidence of ICT's mediating potential, extending beyond the conceptual frameworks proposed by Mengistu (2016). The relationships observed are consistently stronger than those documented in

earlier studies investigating ICT's role in alleviating economic pressure. This indicates that technology adoption may hold significant value for SMEs, confronting the complex challenges of developing economies.

4.3.4 Implications for SMEs Performance

Theoretical assumptions from earlier studies are backed up by real-world evidence that having access to ICT makes SMEs more resilient to economic hardship. There are strong links between ICT and economic factors, which suggests that adopting technology could help SMEs find better ways to deal with problems than they have in the past.

This study builds on Bouazzai et al.'s (2015) work on the factors that affect the success of SMEs in Algeria by showing that ICT can help ease economic pressures. The study revealed several things that affect the performance of SMEs. However, the current research focusses on how adopting new technologies might help overcome certain economic problems.

Rusu and Roman (2016) discovered that macroeconomic variables had an effect on the expansion of small and medium-sized businesses (SMEs) in Central and Eastern Europe. The patterns of correlation that were seen match and go beyond what was expected. This study implies that economic variables may have a bigger impact on SMEs in West Africa because the institutions and markets there aren't as developed. Incekara's (2018) conceptual approach is backed up with perceptual measurements of how SME operators deal with market instability and trouble with planning. The association strengths are larger than in perception-based research, which suggests that Nigerians may experience economic pressures more strongly than people in rich countries.

The study adds to the body of research on SME performance by providing real-world evidence to back up Litavniece and Znotiņa's (2015) theory, which listed elements of the business environment but didn't say how strong the connections were. Current quantitative research gives policymakers and practitioners useful information that can help them make SMEs more resilient through targeted actions.

5.1 Conclusion

This study provides compelling evidence from Katsina State, Nigeria, establishing a significant relationship between economic factors such as tax policy and market uncertainty, ICT access, and the performance of Small and Medium-sized Enterprises (SMEs). This study makes substantial contributions to the field by demonstrating that these connections are more pronounced than in previously documented studies, particularly in developing economies. Methodologically, it advances research by validating more reliable instruments. Simultaneously, theoretically, it offers a more powerful explanatory framework by integrating the Technology Acceptance Model (TAM) and Dynamic Capabilities View (DCV). Ultimately, the findings address a critical gap in the regional-specific literature and have significant implications, underscoring the urgent need for targeted policy reforms in taxation and market regulation, coupled with strategic technology adoption initiatives, to enhance SME resilience and competitiveness in Nigeria and similar emerging economies.

5.2 Recommendations

1. To cultivate a conducive environment for SMEs, it is imperative to focus on policy recommendations that emphasize governmental actions aimed at establishing a more favourable and predictable business landscape. This entails implementing SME-friendly tax reforms, such as graduated tax scales and simplified digital compliance mechanisms, to alleviate the financial burden on small and medium-sized enterprises (SMEs).
2. Policymakers should also endeavour to stabilise the market through consistent regulatory frameworks and enhance the dissemination of economic data.
3. Notably, substantial government investment in Information and Communication Technology (ICT) infrastructure, including broadband access and technology hubs, is crucial to providing SMEs with the digital foundation necessary for growth, ideally facilitated through public-private partnerships.
4. To complement these governmental initiatives, SMEs and development organisations must undertake proactive strategic measures.
5. SMEs are encouraged to prioritise technology adoption as a core strategy for resilience, investing in digital tools for financial management, customer relations, and market access while also considering collaborative networks to share costs and expertise.
6. In support, development organisations should offer comprehensive capacity-building programs that integrate ICT training with business strategies, advocate for improved access to affordable financing, and conduct ongoing research and monitoring. This approach ensures that support programs are effective, evidence-based, and aligned with the evolving needs of the businesses that they aim to serve.

5.3 Future Research Direction

To enhance the understanding of SME performance, future research should adopt more dynamic and specific methodologies. This includes conducting longitudinal studies to observe how the relationships between economic factors and ICT evolve over time, performing sector-specific analyses to distinguish between industries, and undertaking comparative cross-regional studies to comprehend the influence of local contexts. Additionally, research should concentrate on the practical implementation of ICT solutions, investigating the particular barriers and success factors for technology adoption by small businesses. The effective application of these insights necessitates a coordinated, multi-stakeholder approach, involving government agencies, development organizations, the private sector, and SME owners. These stakeholders must collaborate to address both policy-level constraints and firm-level capabilities, thereby enhancing SME performance and contributing to broader economic development in Katsina State and Nigeria as a whole.

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