

DIGITAL TRANSFORMATION STRATEGIES AND RESILIENCE OF SMEs IN FCT-ABUJA, NIGERIA

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ABSTRACT

Digital transformation has become a critical driver of business resilience, particularly for small and medium-sized enterprises (SMEs) operating in dynamic economic environments. This study examines digital transformation strategies and the resilience of SMEs in the Federal Capital Territory (FCT), Abuja. The study employs a descriptive survey research design, utilizing a structured questionnaire to collect primary data from a stratified random sample of 361 SMEs from a total population of 5,690 SMEs across various sectors, including retail, manufacturing, finance, information and communication technology (ICT), and service industries. Data analysis is conducted using descriptive and inferential statistics, with simple regression analysis applied to test the relationships between the proxies of digital transformation variables and the proxies of SME resilience. Findings revealed that digital infrastructure had significant effect on SME resilience, followed by cybersecurity strategies and digital supply chain management. The regression model explains approximately 69.3% of the variance in SME resilience, indicating that digital transformation strategies play a pivotal role in strengthening business continuity and adaptability. The study recommends that SMEs prioritize investments in digital infrastructure, enhance cybersecurity measures, and optimize supply chain management through digital integration to improve their resilience against economic disruptions.

Keywords: Digital Transformation, SME Resilience, Digital Infrastructure, Cybersecurity, Digital Supply Chain Management.

INTRODUCTION

Small and Medium Enterprises (SMEs) serve as the backbone of most economies worldwide, playing a fundamental role in job creation, economic diversification, and poverty reduction. In developed economies such as the United States, Germany, and the United Kingdom, SMEs thrive due to strong institutional support, access to financial resources, and the integration of advanced digital technologies. These factors enhance their competitiveness, resilience, and ability to scale. The rapid advancement of digital transformation, powered by Industry 4.0, artificial intelligence, big data analytics, cloud

computing, and the Internet of Things (IoT), has revolutionized business operations worldwide (Schwab, 2021). Digital transformation enables businesses to enhance efficiency, reduce operational costs, expand into new markets, and improve decision-making processes, thereby fostering resilience in an increasingly volatile and uncertain global economic landscape (OECD, 2023).

In emerging economies such as China, India, and Brazil, digital transformation has become a central pillar for SME growth and expansion. By leveraging digital technologies, businesses in these regions optimize their operations, improve

supply chain efficiencies, and enhance customer experiences. The increasing adoption of e-commerce platforms, fintech solutions, and digital marketing strategies has enabled SMEs to penetrate international markets, compete globally, and mitigate risks associated with economic instability (Kraemer-Mbula & Wunsch-Vincent, 2022). Despite these benefits, SMEs in developing economies continue to face significant barriers to digital adoption, including inadequate digital infrastructure, cybersecurity risks, and limited technical expertise (UNCTAD, 2021).

In the African context, SMEs play a crucial role in economic development, accounting for over 60% of employment and nearly 40% of GDP in some countries (African Development Bank [AfDB], 2021). However, African SMEs are often constrained by limited access to financing, weak infrastructure, and policy inconsistencies that hinder their growth potential. The outbreak of the COVID-19 pandemic highlighted the urgency of digital transformation, as businesses were compelled to pivot towards digital solutions such as online operations, remote work, and digital payment systems to remain operational. Countries such as Kenya, South Africa, and Nigeria have witnessed significant progress in digital adoption among SMEs, facilitated by increasing mobile penetration, fintech innovations, and government-backed digital initiatives (World Economic Forum, 2022).

Nigeria, as Africa's largest economy, depends heavily on SMEs for economic sustainability. The sector contributes approximately 48% to the national GDP and accounts for 96% of businesses operating in the country (Small and Medium Enterprises Development Agency of Nigeria [SMEDAN], 2022). However, Nigerian SMEs continue to face structural and operational challenges that hinder their full participation in the digital economy. Limited access to capital, regulatory bottlenecks, inadequate digital skills, and infrastructural deficiencies pose significant obstacles to digital transformation (Olayemi, 2023). While digital transformation has been identified as a key enabler of SME resilience, many businesses struggle with the effective implementation of digital strategies. The

inconsistent adoption of digital payment systems, cloud computing, customer relationship management (CRM) software, and e-commerce platforms underscores the financial and technological constraints faced by Nigerian SMEs (Eze et al., 2024).

In the Federal Capital Territory (FCT), Abuja, SMEs operate within a competitive and evolving business landscape. Despite Abuja's status as Nigeria's administrative and commercial hub, SMEs in the region face operational inefficiencies, market volatility, and economic uncertainties that threaten their sustainability (Adebayo & Yusuf, 2023). Digital transformation presents a strategic opportunity for SMEs in Abuja to enhance their resilience by improving operational efficiency, enabling data-driven decision-making, expanding market reach, and fostering innovation. However, the extent to which digital transformation strategies contribute to SME resilience in the FCT remains underexplored (Ogunleye et al., 2024). This study seeks to bridge this knowledge gap by investigating the impact of digital transformation on the resilience of SMEs in FCT-Abuja.

Despite the increasing recognition of digital transformation as a crucial enabler of business resilience, many SMEs in FCT-Abuja struggle to adopt and effectively implement digital strategies. Several factors, including inadequate access to digital infrastructure, insufficient technical expertise, and financial limitations, continue to hinder the ability of SMEs to leverage digital tools for long-term sustainability (Aisha & Abdullahi, 2024; Lawal & Abdullahi, 2024). Additionally, SMEs in the region encounter challenges related to cybersecurity threats, low digital literacy levels, and resistance to technological change, all of which further impede the seamless integration of digital solutions into their operations (Eze et al., 2024).

Furthermore, while some SMEs in FCT-Abuja have integrated digital marketing, e-commerce, and digital payment systems into their business models, the extent to which these digital strategies contribute to business resilience remains unclear. Empirical studies (Adomako et al., 2021 & While Eze et al., 2024) focusing on

the impact of digital transformation on SME resilience within the Nigerian context remains limited, leaving a significant knowledge gap. This study aims to address this gap by providing empirical evidence on the effectiveness of digital transformation strategies in enhancing SME resilience in FCT-Abuja. The findings of this study are expected to guide SMEs, policymakers, and industry stakeholders in making informed decisions on strategic digital adoption, policy interventions, and sustainable business practices. The primary objective of this study is to assess the effect of digital transformation strategies on the resilience of SMEs in FCT-Abuja. Specifically, the study seeks to:

- i. Analyze the effect of digital infrastructure on operational efficiency within SMEs.
- ii. Investigate the effect of digital supply chain management on business resilience.
- iii. Assess the effect of cybersecurity strategies in sustaining SME operations in FCT-Abuja.

LITERATURE REVIEW

Concept of Digital Transformation

Digital transformation refers to the integration of digital technologies into all aspects of an organization's operations, fundamentally changing how businesses function, deliver value to customers, and enhance operational efficiency (Bican & Brem, 2020). This transformation is driven by the adoption of technologies such as cloud computing, big data analytics, artificial intelligence (AI), and the Internet of Things (IoT). Rather than being merely a technological upgrade, digital transformation is a strategic shift that fosters innovation, enhances competitiveness, and streamlines business processes (Verhoef et al., 2021). For Small and Medium Enterprises (SMEs), digital transformation has become essential for survival and growth in an increasingly digital economy.

Business Resilience and Its Determinants

Business resilience refers to an organization's capacity to withstand and adapt to disruptions while maintaining operational effectiveness (Pal et al., 2021). For SMEs, resilience is influenced by several key determinants, including financial stability, operational flexibility, robust supply chain networks, and the ability to innovate (Chowdhury et al., 2023).

Financial stability ensures that SMEs can absorb shocks, invest in new opportunities, and sustain long-term operations. Operational flexibility allows businesses to pivot quickly in response to market changes, consumer behavior shifts, or unexpected disruptions (Nguyen et al., 2022).

Digital Transformation and SME Resilience

Empirical studies have consistently demonstrated a strong positive correlation between digital transformation and SME resilience (Matarazzo, et al., 2021). Research indicates that digitally transformed enterprises contributed \$13.5 trillion to the global GDP in 2018, with projections reaching \$53.3 trillion by 2023, accounting for more than 50% of global economic activity (World Economic Forum, 2023). In Nigeria, the National Information Technology Development Agency (NITDA) highlights that digitalizing Micro, Small, and Medium Enterprises (MSMEs) could increase the nation's GDP by approximately \$50 billion (NITDA, 2022).

Digital transformation strengthens SME resilience by enabling automation, enhancing data-driven decision-making, and improving customer relationship management. Businesses that adopt digital payment systems, e-commerce platforms, and cloud-based collaboration tools are better equipped to withstand disruptions such as economic downturns, pandemics, or market fluctuations (Chowdhury, et al., 2023).

Digital Infrastructure and Operational Efficiency

The availability, accessibility, and quality of digital infrastructure are fundamental determinants of operational efficiency for small and medium-sized enterprises (SMEs). Digital infrastructure refers to the technological foundation that supports business operations, including high-speed internet connectivity, cloud

computing services, data storage solutions, and digital communication tools. These technological assets are crucial for streamlining business processes, improving productivity, and enabling seamless collaboration among employees, suppliers, and customers (Pal et al., 2021).

Reliable internet connectivity, for example, ensures that SMEs have uninterrupted access to online markets, digital payment platforms, and customer engagement tools (Lawal & Abdullahi, 2024; Nnajofo et al., 2024). This accessibility significantly enhances transaction speed, reduces operational delays, and improves overall business responsiveness.

Digital Supply Chain Management and Business Resilience

The integration of digital technologies into supply chain management is a transformative strategy that strengthens SME resilience and adaptability in a rapidly evolving business environment. Digital supply chain management (DSCM) involves leveraging advanced digital tools to automate and optimize key supply chain processes such as procurement, inventory management, logistics, and distribution (Bican & Brem, 2020). Technologies such as the Internet of Things (IoT), artificial intelligence (AI), blockchain, and predictive analytics enable SMEs to enhance supply chain visibility, minimize operational disruptions, and improve overall efficiency.

One of the primary advantages of DSCM is real-time tracking and monitoring of goods throughout the supply chain. IoT-enabled sensors and RFID tracking systems provide SMEs with accurate, real-time data on inventory levels, shipment status, and delivery schedules. This transparency helps reduce stockouts, prevent overstocking, and enhance logistical efficiency, ultimately lowering costs and improving customer satisfaction (Pal et al., 2021).

Cybersecurity Strategies and Sustained Operations

As SMEs undergo digital transformation, they become increasingly vulnerable to cybersecurity threats that can compromise business operations,

financial stability, and customer trust. Cyberattacks such as data breaches, ransomware, phishing schemes, and distributed denial-of-service (DDoS) attacks pose significant risks, particularly for SMEs lacking robust cybersecurity defenses (Hanelt et al., 2021). A single cybersecurity incident can result in severe consequences, including unauthorized access to sensitive business data, financial fraud, legal liabilities, and reputational damage. Given that many SMEs operate with limited cybersecurity expertise and financial resources, they often become prime targets for cybercriminals seeking to exploit vulnerabilities in digital systems.

Theoretical Framework

This study is underpinned by the Dynamic Capabilities Theory which was first proposed by Teece, Pisano, and Shuen in 1997. This theory argues that an organization's ability to integrate, builds, and reconfigure internal and external competencies in response to environmental changes is fundamental to achieving and sustaining a competitive advantage. Despite its practical applications, the Dynamic Capabilities Theory has faced criticism from scholars. One major critique is that the theory lacks precise measurement parameters, making it challenging to quantify an organization's dynamic capabilities (Easterby-Smith, Lyles, & Peteraf, 2009). Additionally, some researchers argue that the theory is more applicable to large corporations with abundant resources rather than SMEs, which often operate under financial and operational constraints (Winter, 2003). These limitations raise concerns about the scalability and feasibility of the theory in the SME sector. The implications of this theory for the current study suggest that SMEs in FCT-Abuja must actively develop their digital capabilities to maintain resilience amid economic uncertainties. The ability to incorporate emerging technologies, consistently upgrade digital skills, and rapidly respond to environmental changes is essential for ensuring long-term business viability.

This theory was considered as the bases for this study because it offers a more comprehensive framework by emphasizing the continuous development, integration, and reconfiguration of digital competencies in response to changing

environmental conditions. Given the unpredictable and volatile business environment in which SMEs in FCT-Abuja operate, the ability to swiftly adapt to technological advancements, enhance operational agility, and innovate digital processes is crucial for resilience.

Empirical Review

Several empirical studies have demonstrated the positive impact of digital transformation on business resilience among small and medium-sized enterprises (SMEs). Adomako et al. (2021) conducted a study on Digital Transformation Strategies and SME Resilience: Evidence from Emerging Economies. The study employed a quantitative survey research design and focused on a population of 400 SMEs across three countries: Ghana, Nigeria, and Kenya. The authors used stratified random sampling to ensure adequate representation from different sectors within these economies. The findings revealed that SMEs that adopted emerging digital communication technologies, particularly during the COVID-19 pandemic, demonstrated significantly higher resilience than those that did not.

A study by Ogunleye et al. (2024), titled "Digital Infrastructure and SME Resilience," examined the role of digital infrastructure in sustaining SME operations in Nigeria. This research employed a cross-sectional survey research design and surveyed a population of 400 SMEs located in both urban and rural areas of Nigeria. The authors used stratified random sampling to ensure equal representation of SMEs across different locations. The findings revealed that strong digital infrastructure enhances business continuity, operational efficiency, and market competitiveness.

Another study by Eze et al. (2024), titled "Cybersecurity Strategies and SME Resilience," focused on the importance of cybersecurity in sustaining SME operations. This study utilized an experimental research design and involved a population of 150 SMEs that had implemented cybersecurity frameworks. The sample was selected using cluster sampling, grouping SMEs based on their cybersecurity adoption level. The findings revealed that robust cybersecurity

frameworks effectively mitigate risks associated with cyber threats and enhance business continuity. The study concluded that cybersecurity is a crucial determinant of SME resilience in an increasingly digitalized economy. However, a key critique of this study is that it does not examine the financial constraints SMEs face in implementing cybersecurity measures, which could be a major barrier to widespread adoption.

Study Gaps

Existing studies on digital transformation and SME resilience (Adomako et al., 2021) lack sector-specific insights, particularly in finance, healthcare, retail, and manufacturing within FCT-Abuja. While Eze et al. (2024) highlight the benefits of digital adoption, they do not sufficiently address challenges (Kraemer-Mbula & Wunsch-Vincent, 2022; Eze et al., 2024). Most studies employ cross-sectional designs (Ogunleye et al., 2024; Osifo, 2023) and research on SME decision-making in digital adoption strategies remains insufficient. Comparative analyses across emerging economies (Adomako et al., 2021; Olayemi, 2023) and the impact of AI, IoT, and blockchain on SME resilience (Osifo, 2023) are also underexplored. Addressing these gaps will enhance knowledge on effective digital transformation strategies for SME resilience in FCT-Abuja.

METHODOLOGY

The study adopts a descriptive survey research design, which is considered appropriate for examining the relationships between digital transformation strategies and SME resilience which is chosen because it allows for an in-depth analysis of existing conditions, behaviors, and relationships among variables.

The population for this study comprises all registered small and medium-sized enterprises (SMEs) operating in various sectors within the Federal Capital Territory (FCT), Abuja. According to the National MSME Survey Report (2023), there are approximately 5,690 SMEs actively engaged in different industries within the region.

To determine the appropriate sample size, Krejcie and Morgan's (1970) sample size determination table is applied. Based on this statistical approach, for a total population of 5,690 SMEs, the recommended sample size is approximately

361 SMEs (see, appendix i). The study employs a stratified random sampling technique to ensure fair representation across the various SME sectors in FCT-Abuja. The proportional allocation formula is applied as follows:

Table 1: The Sample Size Allocation

SMEs Classifications	Proportion of population	Sample size proportion
Retail SMEs	1,800	114
Manufacturing SMEs	1,200	76
Finance SMEs	900	57
ICT SMEs	850	54
Service SMEs	940	60
Total	5,690	361

Source: Author's source, (2025)

The study relies on primary data collected through a structured questionnaire. Additionally, secondary data is gathered from relevant sources such as reports from the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), the National Bureau of Statistics (NBS), and other scholarly publications.

To ensure the validity of the research instrument, the questionnaire is reviewed by experts in business management and digital transformation. Reliability is measured using Cronbach's Alpha, which yields a coefficient of 0.81, surpassing the threshold of 0.7 for internal consistency.

Data is collected using both physical distribution and online surveys via Google Forms. The collected data is analyzed using descriptive and inferential statistics. Descriptive statistics, including mean, frequency, and percentage

distributions, are used to summarize the data. Inferential statistics, specifically simple regression analysis, is employed to determine the effect of each digital transformation strategy on SME resilience. Statistical analyses are conducted using the Statistical Package for Social Sciences (SPSS) version 26. The regression equations are:

$$OE = \beta_0 + \beta_1 DI + \varepsilon \text{ -----i}$$

$$BR = \beta_0 + \beta_1 DSCM + \varepsilon \text{ -----ii}$$

$$SMEO = \beta_0 + \beta_1 CS + \varepsilon \text{ -----iii}$$

Where: OP=Operational Efficiency, BR=Business Resilience, SMEO=SME Operations: dependent variable, DP=Digital Infrastructure, DSCM=Digital Supply Chain Management, CS=Cybersecurity Strategies: β_0 : intercept, β_1 : slope coefficient and ε : error term

RESULTS AND DISCUSSIONS

Response Rate

Table 2: Response Rate

Questionnaires	Frequency	Percentage (%)
Distributed	361	100.0
Returned	342	94.7
Not Returned	19	5.3

Source: Computed by Author using SPSS Statistical Software (Version 26).

The table above shows that only 19 questionnaires were not returned, representing 5.3% of the total distribution. The low non-

response rate minimizes potential bias and strengthens the study's overall conclusions.

Table 3: Descriptive Analysis of Digital Transformation Strategies

Digital Transformation Strategy	Mean (M)	Standard Deviation (SD)
Digital Infrastructure	3.84	0.76
Digital Supply Chain Management	3.67	0.81
Cybersecurity Strategies	3.72	0.78

Source: Computed by Author using SPSS Statistical Software (Version 26).

The findings indicate that digital infrastructure is perceived as the most impactful digital transformation strategy (M = 3.84, SD = 0.76), followed by cybersecurity strategies (M = 3.72, SD = 0.78) and digital supply chain management (M = 3.67, SD = 0.81). This suggests that SMEs prioritize technological infrastructure in their digital adoption efforts.

Hypothesis Testing:

Hypothesis One

Ho1: Digital infrastructure does not significantly impact operational efficiency within SMEs.

Table 4: Model Summary Result on Digital Infrastructure and Operational Efficiency

Model	R	R Square	Adjusted R Square	Std. Error
1	0.635	0.403	0.399	0.572

a. Predictors: (Constant), Digital Infrastructure

Computed by Author using SPSS Statistical Software (Version 26)

Table 5: ANOVA Result on Digital Infrastructure and Operational Efficiency

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	52.341	1	52.341	159.73	0.000*
Residual	77.509	340	0.228		
Total	129.850	341			

a. Predictors: (Constant), Digital Infrastructure

b. Dependent Variable: Operational Efficiency

Computed by Author using SPSS Statistical Software (Version 26)

Table 6: Regression Coefficients

Predictor Variable	Beta (β)	t-value	Sig. (p-value)
Digital Infrastructure	0.635	12.64	0.000*

a. Dependent Variable: Operational Efficiency

Computed by Author using SPSS Statistical Software (Version 26)

Table 5, which is model summary presents the model summary shows that the correlation coefficient (R) between digital infrastructure and operational efficiency is 0.635, indicating a strong positive relationship. The R Square value of 0.403 suggests that 40.3% of the variation in operational efficiency can be explained by digital infrastructure, while the remaining 59.7% is influenced by other factors. The adjusted R Square value of 0.399 further confirms the model's reliability.

The ANOVA results in Table 5 reveal that the regression model is statistically significant ($F = 159.73$, $p = 0.000$). Since the significance value ($p < 0.05$), the null hypothesis (H_{01}) is rejected, confirming that digital infrastructure significantly affects operational efficiency in SMEs.

As shown in Table 6, the regression coefficient (β) for digital infrastructure is 0.635, meaning that a one-unit increase in digital infrastructure leads to a 63.5% increase in operational efficiency. The t-value of 12.64 and the significance level ($p = 0.000$) further indicate that digital infrastructure is a significant predictor of operational efficiency.

Based on these findings, the null hypothesis (H_{01}) is rejected, and it is concluded that digital infrastructure has a significant positive impact on operational efficiency within SMEs. This suggests that businesses investing in digital infrastructure are likely to experience enhanced efficiency in their operations.

Hypothesis Two

Ho1: Digital supply chain management does not significantly influence business resilience.

Table 7: Model Summary Result on Digital Supply Chain Management and Business Resilience

Model	R	R Square	Adjusted R Square	Std. Error
1	0.528	0.279	0.276	0.618

a. Predictors: (Constant), Digital Supply Chain Management

Computed by Author using SPSS Statistical Software (Version 26)

Table 8: ANOVA Result on Digital Supply Chain Management and Business Resilience

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	36.221	1	36.221	94.33	0.000*
Residual	93.629	340	0.275		
Total	129.850	341			

a. Predictors: (Constant), Digital Supply Chain Management

b. Dependent Variable: Business Resilience

Computed by Author using SPSS Statistical Software (Version 26)

Table 9: Coefficients Results on Digital Supply Chain Management and Business Resilience

Predictor Variable	Beta (β)	t-value	Sig. (p-value)
Digital Supply Chain Management	0.528	9.71	0.000*

a. Dependent Variable: Business Resilience

Computed by Author using SPSS Statistical Software (Version 26)

The model summary in Table 7 indicates a correlation coefficient (R) of 0.528, suggesting a moderate positive relationship between digital supply chain management and business resilience. The R^2 value of 0.279 implies that 27.9% of the variation in business resilience can be explained by digital supply chain management, while the remaining 72.1% is influenced by other factors.

The ANOVA results in Table 8 reveal that the model is statistically significant ($F = 94.33$, $p = 0.000$). Since the p-value is less than 0.05, the null hypothesis (H_0) is rejected, confirming that digital supply chain management significantly influences business resilience.

As shown in Table 9, the regression coefficient (β) for digital supply chain management is 0.528,

indicating that a one-unit increase in digital supply chain management leads to a 52.8% improvement in business resilience. The t-value (9.71) and the p-value of 0.000 further confirm that this relationship is statistically significant. Based on these findings, the null hypothesis (H_0) is rejected, and it is concluded that digital supply chain management has a significant positive impact on business resilience. This implies that SMEs that implement digital supply chain strategies are more likely to enhance their resilience and adaptability in dynamic market conditions.

Hypothesis Three

H0: Cybersecurity strategies do not significantly sustain SME operations.

Table 10: Model Summary on Cybersecurity Strategies and SME Operations

Model	R	R Square	Adjusted R Square	Std. Error
1	0.590	0.348	0.345	0.591

a. Predictors: (Constant), Cybersecurity Strategies

Computed by Author using SPSS Statistical Software (Version 26)

Table 11: ANOVA Result on Cybersecurity Strategies and SME Operations

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	45.174	1	45.174	129.67	0.000*
Residual	84.676	340	0.249		
Total	129.850	341			

a. Predictors: (Constant), Cybersecurity Strategies and SME Operations

b. Dependent Variable: SME Operations

Computed by Author using SPSS Statistical Software (Version 26)

Table 12: Coefficients Results on Cybersecurity Strategies and SME Operations

Predictor Variable	Beta (β)	t-value	Sig. (p-value)
Cybersecurity Strategies	0.590	11.39	0.000*

a. Dependent Variable: SME Operations

Computed by Author using SPSS Statistical Software (Version 26)

The model summary in Table 10 indicates a correlation coefficient (R) of 0.590, suggesting a strong positive relationship between cybersecurity strategies and SME operations. The

R^2 value of 0.348 implies that 34.8% of the variation in sustaining SME operations can be explained by cybersecurity strategies, while the

remaining 65.2% is influenced by other factors not included in the model.

The ANOVA results in Table 11 reveal that the model is statistically significant ($F = 129.67$, $p = 0.000$). Since the p -value is less than 0.05, the null hypothesis (H_0) is rejected, confirming that cybersecurity strategies have a significant impact on sustaining SME operations.

Table 12 presents the regression coefficient (β) for cybersecurity strategies, which is 0.590. This indicates that a one-unit increase in cybersecurity strategies enhances SME operations by 59.0%. The t -value (11.39) and the p -value of 0.000 further validate the significance of this relationship. Based on these findings, the null hypothesis (H_0) is rejected, demonstrating that cybersecurity strategies play a crucial role in sustaining SME operations. This suggests that SMEs that invest in robust cybersecurity measures are better positioned to enhance their operational efficiency, protect critical data, and ensure long-term business continuity.

Discussion of Findings

The findings highlight the significant role of digital transformation strategies in enhancing SME resilience in FCT-Abuja. Regression analysis revealed that digital infrastructure, cybersecurity strategies, and digital supply chain management collectively contribute to SME resilience in terms of (Operational Efficiency, Business Resilience and sustaining SME Operations), with digital infrastructure accounting for the highest variance ($R^2 = 0.403$). This underscores the critical role of digital tools in enabling SMEs to navigate disruptions and remain competitive, aligning with previous studies (Schwab, 2021; OECD, 2023). Among the examined strategies, digital infrastructure emerged as the most influential factor ($\beta = 0.635$, $p < 0.001$), emphasizing the importance of investments in broadband connectivity, cloud computing, and automation. SMEs that leverage digital infrastructure improve business continuity and operational efficiency, reinforcing findings by Ogunleye et al. (2024).

Cybersecurity strategies also had a significant positive effect on sustaining SME operations ($\beta =$

0.348, $p < 0.001$). Given the growing threat of cyber-attacks, SMEs should implement encryption technologies, firewalls, and secure payment gateways while providing regular cybersecurity training. This supports Eze et al. (2024), who emphasized the role of robust cybersecurity frameworks in mitigating risks and ensuring business continuity.

Digital supply chain management contributed positively to SMEs business resilience ($\beta = 0.279$, $p < 0.001$) by enhancing operational efficiency through real-time tracking, inventory management, and AI-driven logistics. This facilitates adaptability to market fluctuations, aligning with Kraemer-Mbula & Wunsch-Vincent (2022), who highlighted the importance of digital supply chains in emerging markets. Overall, the study confirms that digital infrastructure is the most crucial driver of SME resilience, followed by cybersecurity strategies and digital supply chain management. These findings reinforce the need for SMEs to prioritize digital investments to enhance sustainability and adaptability in uncertain business environments.

CONCLUSION AND RECOMMENDATIONS

Based on the findings, the study concludes that digital transformation strategies are fundamental to enhancing the resilience of SMEs in FCT-Abuja. The integration of digital infrastructure, cybersecurity measures, and digital supply chain management enables SMEs to improve operational efficiency, mitigate risks, and sustain growth in a competitive business environment. In light of the study's findings, the following recommendations are proposed to enhance the digital transformation of SMEs in FCT-Abuja:

- i. SMEs should prioritize investments in broadband connectivity, cloud computing, and automation tools. By strengthening their digital infrastructure, businesses can improve efficiency, enhance customer interactions, and remain competitive in an increasingly digital economy.

- ii. Given the rising threat of cyber-attacks, SMEs should implement comprehensive cybersecurity frameworks.
- iii. SMEs should integrate digital supply chain solutions such as enterprise resource planning (ERP) systems, artificial intelligence-driven logistics, and blockchain technology.

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