

ADOPTION OF ARTIFICIAL INTELLIGENCE AND THE RESILIENCE OF
DIGITALLY TRANSFORMED SMEs IN ABUJA, NIGERIA

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ABSTRACT

This study investigates the impact of artificial intelligence (AI) adoption on the resilience of digitally transformed small and medium enterprises (SMEs) in Abuja, Nigeria. Despite extensive research on digital transformation, limited attention has been given to how AI adoption specifically affects firms that have previously undergone digital transformation. Anchored in organizational capability theory, this quantitative study examines three critical constructs of AI adoption: AI organizational readiness, AI market trend, and perceived AI benefits, and their influence on SME resilience. Using a cross-sectional survey design, data were collected from 384 digitally transformed SMEs in Abuja through online questionnaires. The analysis employed multiple regression analysis using SPSS version 23. The results show that three of the constructs influence SME resilience significantly in a positive direction ($R = 0.203$, $F = 32.30$, $p < 0.01$). Among them, the AI market trend had the most significant influence ($\beta = 0.300$, $p < 0.01$), and perceived benefits of AI came next ($\beta = 0.245$, $p < 0.01$), and last of all was AI organizational readiness ($\beta = 0.154$, $p < 0.01$). The results deepen the theory of dynamic capabilities for the AI age and offer practical recommendations to managers and policymakers in SMEs in terms of their decision-making over AI adoption strategy development to enhance organizational resilience.

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1. INTRODUCTION

The COVID-19 pandemic resulted in unforeseen disruption to business operations globally, thus encouraging businesses to rethink their business model and how reliant they should be on technology. The SME sector is commonly called the backbone of the economy, but was severely disrupted by the pandemic. SMEs make up a large percent of the Nigeria economy, 48 percent of GDP and 80 percent of non-oil based employment (SMEDAN, 2023). Digital SMEs were heavily concentrated within the Federal Capital Territory, Abuja, Nigeria and they had previously adapted to the use of technology to enhance market position.

Before AI emerged as a disruptive business technology in this part of the world, considerable research has been done on the role of digital transformation on SME performance, competitiveness and sustainability (Ben Slimane et al., 2022; Chaudhuri, Subramanian, & Dora, 2022). Digital technologies adopted by SMEs included, for example, cloud computing, enterprise resource planning systems, e-commerce technologies, mobile technologies that could significantly increase the market and operations efficiency, as well as customers' satisfaction (Ben Slimane et al., 2022; Valaskova et al., 2025). This led to the boom of the digital transformation initiatives in developing economies like Nigeria.

With the adoption of highly complex AI technologies such as generative AI and machine learning, research has begun to investigate AI adoption, barriers and outcomes but largely neglected the firms that had already undergone the process of digital transformation (Chaudhuri, Subramanian, & Dora, 2022). Such studies also focus on their ability to combine their current digital capabilities to improve organizational resilience, the capacity to anticipate, prepare for, respond to, and recover from disruptions (Drydakis, 2022).

Digitally transformed SMEs leverage current facilities to deploy AI, leading to improvement in adaptive capacity, operational continuity, and market competition (Ben Slimane et al., 2022). Therefore, the study investigated the relationship between organizational AI readiness, AI market trends and perceived AI benefits with regard to resilience of digitally transformed SMEs in Abuja to assist managers, policymakers and technology providers.

2. LITERATURE REVIEW

2.1 Theoretical Foundation: Organizational Capability Theory

The research is based on the capability view of organization which indicates that a sustainable

competitive advantage for an organization can be gained through building, integrating and reconfiguring internal and external capabilities to address dynamic business environments (Teece, Pisano, & Shuen, 1997). Ordinary capabilities are those to achieve technical fitness, dynamic capabilities can address those to reconfigure and integrate competencies to adapt to the dynamic environments. The theory has relevance to the adoption of AI by digitalized SMEs as previous digital investments build technological assets, organizational learning, and human capital for AI capabilities. Three dynamic capability stages-sensing, seizing, transforming helps explaining the adoption process of AI. The adoption is further influenced by managerial cognitive capabilities, in which managerial assessment of the values of AI and changes in market dynamics would further strengthen organizational resilience and build an AI ready organization (Helfat et al., 2007).

2.2 Digital Transformation and SME Resilience

Digital transformation "is the process of using digital technologies to fundamentally alter the ways in which businesses operate and deliver value to customers." (Westerman, Bonnet, & McAfee, 2014, p. 5). It benefits SMEs by improving competition, performance, and market reach (Ben Slimane et al., 2022; Chaudhuri, Subramanian, & Dora, 2022). Digitally transformed SMEs responded well during Covid-19, using digital tools, remote working practices, and data analysis to mitigate the effects of disruption (Drydakis, 2022). Digital transformation enables better strategic alignment and capabilities for dual innovation, both of which have positive impacts on financial performance and labor productivity (Valaskova et al., 2025; Xing et al., 2025). The concept of "digital transformation fatigue" is also important and can lead to resistance in SMEs to further technological changes, particularly in emerging markets (Ekawaty et al., 2025). However, AI adoption can only take place with accumulated digital capabilities; and the extent to which these translate into resilience relies on the construct of AI adoption and its readiness.

2.3 AI Organizational Readiness and SME Resilience

Organizational readiness in the context of AI reflects the extent to which an organization can leverage, implement and deploy AI. It typically involves technical resources, organization structure and human resources (Polisetty et al., 2023; Schwaeke et al., 2024). The findings from research suggests that availability and readiness of resources have significant impacts on outcomes of technology adoption and innovation (Agrawal et al., 2024). Digital transformation

of SMEs is a prelude to AI adoption that requires not just infrastructure in the form of data management and cloud computing, but also data science skills, algorithm governance and ethical practices (Abhulimen & Ejike, 2024). Factors like top management support, organizational culture, and technological infrastructure is essential for technology adoption (Badghish & Soomro, 2024; Snchez et al., 2025) and this is evident in some studies utilizing TOE framework for AI adoption. Availability of the resource allows for efficient implementation and helps protect the human and financial resources of the organization. High levels of readiness make implementation risk-free and rapid integration possible, thus adding to the resilience.

Hypothesis 1: AI organizational readiness has a significant positive impact on the resilience of digitally transformed SMEs in Abuja.

2.4 AI Market Trend and SME Resilience

AI market trend is conceptualized as a customer's perception of direction and speed of AI adoption in their industry based on desire and competitor's AI adoption, as well as change in overall AI diffusion (Jalil et al., 2024; Amosu et al., 2024). Following institutional theory, mimesis isomorphic pressures are imposed on the organization in an attempt to remain legitimate and keep up with competitors' performance, so it also makes them adopting AI. In terms of digital transformation SMEs, market trends suggest their purely digital capabilities would soon become obsolete and needs be supplemented with AI capabilities. AI helps to minimize risks and increases competitive advantage, especially in the context of high adoption rate in some industries (Drydakis, 2022; Del Sarto & Piccaluga, 2021). Market trends also makes complements for AI easily obtainable; for example AI expertise, AI vendors' services and practices, and hence to build up a sustainable and resilient capability for SMEs to integrate AI.

Hypothesis 2: AI market trend has a significant positive impact on the resilience of digitally transformed SMEs in Abuja.

2.5 Perceived AI Benefits and SME Resilience

Perceived benefits of AI are defined as the opinion of decision-makers that adoption of AI will lead to increased operational efficiency and lower costs, better decision making, an enhanced customer experience, and greater capacity for innovation (Iyelolu et al., 2024; Kedi et al., 2024). In addition to its operational functions, the strategic benefits derived from AI such as foresight, customization, and automation can also influence adoption decisions. The ability to

leverage AI in prediction has been shown to lead to efficient inventory management and customer satisfaction (Amosu et al., 2024) and an ability to predict failures reduces systems failure and down time (Bello et al., 2024). The perceived benefits to a digitally transformed SME are evaluated in comparison with their current digital competencies which consequently drive the level of urgency for adoption, allocation of resources and the level of managerial commitment for further usage, while increased perceived benefits have a positive influence on organizational resilience.

Hypothesis 3: Perceived AI benefits have a significant positive impact on the resilience of digitally transformed SMEs in Abuja.

2.6 Research Gap and Study Contribution

The existing body of literature on AI adoption and SME resilience has both potential and limitations. Researchers have focused predominantly on generalizing AI adoption across the SME sector rather than in specifically digitally transformed enterprises and development countries, especially in the context of Sub-Saharan Africa. Limited attention has been paid to exploring how to model the constructs of AI adoption to enhance SME resilience. To this end, this research builds on the established body of knowledge to focus on digitally transformed SMEs in Abuja, Nigeria, with particular emphasis on how organization readiness, trends in the markets and perceived benefit influences resilience both separately and in combination. The results contribute to organizational capabilities theory of AI adoption and provide relevant insights for SME managers in developing nations in particular, how digitally sophisticated organizations can deploy AI to boost operational capability, ensure business continuity, strengthen operational flexibility and improve their competitive position.

3.0 METHODOLOGY AND DATA

3.1 Theoretical Framework

This research is grounded on the theory of organizational capability, which indicates that organizational capability is necessary for sustained performance while dynamic capability facilitates organizational adjustment. Digital transformation provides basic digital capability. The application of AI in an SME is a dynamic capability of remodeling resources based on market trends and opportunities. The theory model (Figure 1) depicts AI organizational readiness, AI market trend and the perceived benefits of AI as independent variables to impact SME resilience, while the constructs of resources, external pressures, and management

perceptions simultaneously shape AI adoption effectiveness, thereby enhancing SMEs' resilience by adaptive ability, operational flexibility and optimal decision-making.

3.2 Research Design

This research adopted a quantitative cross-sectional survey design to examine the hypothesized relationships between AI adoption constructs and resilience outcome in digitally transformed SMEs in Abuja. This research approach will allow for statistical inference and generalizability while also portraying the status of current AI adoption and levels of resilience. This research is exploratory and is designed to investigate initial evidence of the relationship between AI adoption and resilience, in an environment lacking extensive research on these constructs. While the hypotheses generated are theory based, this study acknowledges the lack of empirical evidence on digitally matured SMEs in Nigeria.

3.3 Population and Sampling

Target population includes Digitally transformed SMEs in Abuja where a digitally transformed SME is defined as an SME that has adopted a minimum of one digital technology: cloud computing, ERP, e-commerce, CRM, digital payments etc. This is to enable them have basic digital skills for AI adoption. SMES are classified based on their employee range by SMEDAN and they include small (10-49) and medium (50-249), thus micro-enterprises are not part of this population. As there is no such registry to show the number of transformed SMEs in Abuja, the population is estimated to be around 5,000 enterprises based on SMEDAN and Abuja Chamber of Commerce data, and using Yamane's formula to calculate sample size

$n = N / (1 + N(e^2))$ Where $N = 5,000$ (population size) and $e = 0.05$ (margin of error at 95% confidence level): $n = 5,000 / (1 + 5,000(0.0025)) = 5,000 / 13.5 = 370$

Notwithstanding the intended sample size, the lack of structured database for contacting the SMEs resulted in the use of snowball sampling method. Hence, the survey link was distributed through networks and affiliations across Abuja Chamber of Commerce and Industry, Abuja Enterprise Agency, and digital technology user groups to trigger other chain-referrals towards securing high participation in the study.

3.4 Instrumentation and Measures

An online questionnaire with 15 questions in 2 parts was developed to collect data from the respondents through different online platform (Google Form & SurveyMonkey). Part A contains demographic information (5 items: age group [18-25, 26-35, 36-45, 46-55, 56+],

gender, job title, time since digitally transformed and current AI adoption level [no AI to fully adopted]). Part B measures the constructs (10 items) using a 5 point Likert scale: AI Organizational Readiness (Q6-Q8), AI Market Trend (Q9-Q11) and perceived benefits of AI (Q12-Q14). A single item was used to measure SME Resilience, adapting and responding to and recovering from shocks and changes (Fisher, Matthews, & Gibbons, 2016, Q15). Each statement was carefully crafted to reflect the technical resources, skills, pressures in the market and business improvements which suit the scope and context of digitally transformed SMEs adopting AI.

3.5 Data Analysis

SPSS 23 was used in the data analysis stage-1 (Descriptive statistics used to define sample characteristics), stage-2 (Cronbach's alpha used to test for reliability of measures) and stage-3 (Correlation used to test for bivariate relations) and finally stage-4 (Multiple regression to test for the expected relationship). The regression model used here was to test the relationship of AI adoption constructs on SME resilience.

$$RES = \beta_0 + \beta_1(OAR) + \beta_2(AMT) + \beta_3(PAB) + \varepsilon$$

Where: RES = SME Resilience (dependent variable); OAR = AI Organizational Readiness; AMT = AI Market Trend; PAB = Perceived AI Benefits; β_0 = Constant term; β_1 , β_2 , β_3 = Regression coefficients; and ε = Error term

Simple regressions assessed individual independent variable effects, followed by a full multiple regression; model fit used R^2 , adjusted R^2 , F-statistics, and Durbin-Watson diagnostics.

4. RESULTS AND DISCUSSION OF FINDINGS

4.1 Demographic Characteristics

Majority 68.4% of the 384 respondents were within the age range 26-45 years (38.5% in 26-35 and 29.9% in 36-45), suggesting decision-makers in digitally transformed SMEs are in the middle of their career-span, implying a likely combination of experience and receptivity to innovation. Gender of the respondents was 53.9% male and 46.1% female, indicating efforts toward gender equilibrium in Nigeria SME leadership. In terms of positions held by respondents, 29.9% are Owners/CEOs, 28.9% are Managers and 19.8% are Supervisors; all three categories represent key decision-making strata. Duration of digital transformation most frequently reported were between 4-6 years (29.4%), 2-4 years (23.2%), and 6-8 years (20.6%), denoting a state of moderate or mid-term digital maturity. AI usage varied from not adopted (22.1%), initial (23.4%), intermediate (25.8%), advanced (16.1%), to fully integrated (12.5%),

indicating transitional AI maturity and growth space.

4.2 Descriptive Statistics and Reliability Analysis

Mean for Descriptive statistics revealed AI Market Trend obtained highest mean score ($M = 3.527$, $SD = 0.750$), next are Perceived AI Benefits ($M = 3.268$, $SD = 0.785$) and AI Organizational Readiness ($M = 3.150$, $SD = 0.822$). SME Resilience reported a moderate to high average score of $M = 3.279$ ($SD = 0.728$). All multi-item constructs achieved excellent reliability with Cronbach's alpha values greater than 0.70 (Nunnally, 1978); AI Organizational Readiness ($= 0.922$), AI Market Trend ($= 0.914$), and Perceived AI Benefits ($= 0.913$).

4.3 Correlation Analysis

From the correlation matrix of the variables of the study, all the independent variables are positively related with SME Resilience; they are AI Market Trend ($r = 0.317$, $p < 0.01$), Perceived AI Benefits ($r = 0.278$, $p < 0.01$), AI Organizational Readiness ($r = 0.183$, $p < 0.01$). Low correlation coefficient among the independent variables ($r < 0.05$) can be interpreted as multicollinearity problem is not so much to worry about regression analysis.

4.4 Regression Analysis

All three hypotheses were supported in terms of having positive and significant relation. Result of the regression analysis showed that Model 1 explained relationship between AI Organizational Readiness and SME resilience, and this relationship was significantly positive ($= 0.162$, $p < 0.01$) with $R = 0.033$. Model 2 tested effect of AI Market Trend and the effect was significantly positive ($= 0.308$, $p < 0.01$) with $R = 0.100$. Model 3 tested effect of Perceived AI Benefits and the effect was significantly positive ($= 0.258$, $p < 0.01$) with $R = 0.077$. Finally, Model 4 tested full model of the multiple regression analysis, and all the independent variables are added to the regression. Overall model was significant ($F = 32.30$, $p < 0.01$) and explained 20.3% of the variance in the SME resilience ($R = 0.203$, Adjusted $R = 0.197$).

- H1: AI Organizational Readiness positively impacts SME resilience ($\beta = 0.154$, $t = 3.786$, $p < 0.01$). **Supported.**
- H2: AI Market Trend positively impacts SME resilience ($\beta = 0.300$, $t = 6.739$, $p < 0.01$). **Supported.**
- H3: Perceived AI Benefits positively impacts SME resilience ($\beta = 0.245$, $t = 5.770$, $p < 0.01$). **Supported.**

The Durbin-Watson statistic is 1.980 which shows no autocorrelation in residuals. All predictors had VIF under 2.0, and multicollinearity was not an issue.

4.5 Discussion of Findings

Results of the model have validated that AI Adoption constructs has the capability to influence digitally transformed SMEs' resilience. H1 was supported, stating that AI Organizational Readiness affects SMEs' resilience ($= 0.154$), which are congruent to organizational capability and resource-based theories (Teece, Pisano, & Shuen, 1997; Agrawal et al., 2024; Polisetty et al., 2023). Readiness is based on possessing sufficient resources (technical, compatible, human resource), and the capability to adapt with AI, yet it is insufficient on its own, as it needs to be coupled with concurrent response to market trend and perceived benefit (Abhulimen & Ejike, 2024; Schwaeke et al., 2024).

AI Market Trend has the largest influence ($=0.300$) (H2), reinforcing the effects of institutional pressure and rivalry within a competitive environment (Jalil et al., 2024; Badghish & Soomro, 2024). AI Perceived Benefits are also significant, influencing SMEs' resilience ($=0.245$) (H3) because the study has addressed how managers cognitively perceives AI benefits and has commitment to leverage from it (Amosu et al., 2024; Bello et al., 2024; Iyelolu et al., 2024; Kedi et al., 2024).

The proposed model demonstrates 20.3% of total variance for SME resilience through its assumption that AI adoption functions as a dynamic capability which has been enhanced through SME digitalization (Ben Slimane et al., 2022; Westerman, Bonnet, & McAfee, 2014; Ekawaty et al., 2025; Sn Sanchez et al., 2025). SME managers have the ability to balance the 3 variables which form the AI adoption construct and policy makers have the possibility to foster the AI adoption with the help of clear system of support and positive achievements to the public.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This research aims to determine how AI adoption affects resilience among digitally transformed SMEs in Abuja, Nigeria, using the perspective of organizational capability theory. Data from survey responses of 384 SMEs indicates that AI organizational readiness, market trends, and anticipated benefits positively affects resilience. The study findings emphasize that AI adoption is indeed an independent phase in capability building after digital transformation has begun. The validity of organizational capability theory is tested, emphasizing path dependence, external influence and manager's thoughts and decisions in the capability building process. The study's contribution is by adding empirical findings to AI adoption among SMEs from a developing economy, highlighting how it is similar and yet different to developed

economies considering factors like lack of infrastructural capabilities and market pressures.

5.2 Recommendations

1. SMEs need to establish AI readiness capabilities through their training programs. This process requires organizations to assess their existing capabilities through assessment tools while training their workforce and developing their data systems and infrastructure.
2. SMEs must track current market developments in artificial intelligence technology. Organizations should monitor how the industry embraces new technologies and they should study their competitors while conducting customer interviews to determine what customers expect from artificial intelligence.
3. SMEs should create strategies which will help workers understand how artificial intelligence technologies create value. Organizations should start pilot projects and share their successful results with staff members while they plan their project activities and track how much value artificial intelligence has delivered to their organization.
4. SMEs need to refocus by executing its AI programmes in such a way that it fosters market awareness and align with its corporate objectives.

5.3 Limitations and Future Research Directions

This study has some limitations. The cross-sectional nature of this study cannot infer causal relationships and it warrants longitudinal study. It should be desirable to use multidimensional measures for resilience beyond the one item used in this study, comprising anticipatory, adaptive, and recovery resilience. Snowball sampling might lead to a sample selection bias toward tech-savvier firms. The results of the Abuja context should not be assumed to be universal across different geographical regions and for developing economies. Additional moderating variables like industry, firm size, competitive intensity should be investigated, and qualitative methods should be used to provide more insights into SMEs' experience of AI adoption.

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APPENDIX A: DETAILED STATISTICAL RESULTS

Table A1: Item-Level Descriptive Statistics

Item	Mean	Std. Dev	Skewness	Kurtosis
Q6	3.12	1.02	-0.15	-0.42
Q7	3.18	0.98	-0.22	-0.38
Q8	3.15	1.05	-0.18	-0.45
Q9	3.52	0.89	-0.35	-0.28
Q10	3.48	0.92	-0.28	-0.35
Q11	3.54	0.94	-0.42	-0.22
Q12	3.31	0.95	-0.25	-0.32
Q13	3.22	1.01	-0.19	-0.41
Q14	3.28	0.98	-0.21	-0.38
Q15	3.28	0.73	-0.45	0.12

Table A2: Regression Diagnostics

Test	Statistic	Result
Durbin-Watson	1.980	No autocorrelation
VIF (OAR)	1.02	No multicollinearity
VIF (AMT)	1.01	No multicollinearity
VIF (PAB)	1.03	No multicollinearity

Normality (Shapiro-Wilk)	p = 0.12	Residuals approximately normal
Homoscedasticity (Breusch-Pagan)	p = 0.34	No heteroscedasticity

Table A3: Alternative Model Specifications

Model	R ²	Adjusted R ²	AIC	BIC
OAR only	0.033	0.031	836.25	847.62
AMT only	0.100	0.098	808.67	820.04
PAB only	0.077	0.075	818.37	829.74
Full Model	0.203	0.197	766.11	783.67

APPENDIX B: FIGURES

Figure 1: Conceptual Framework



Figure 2: Regression Results Visualization

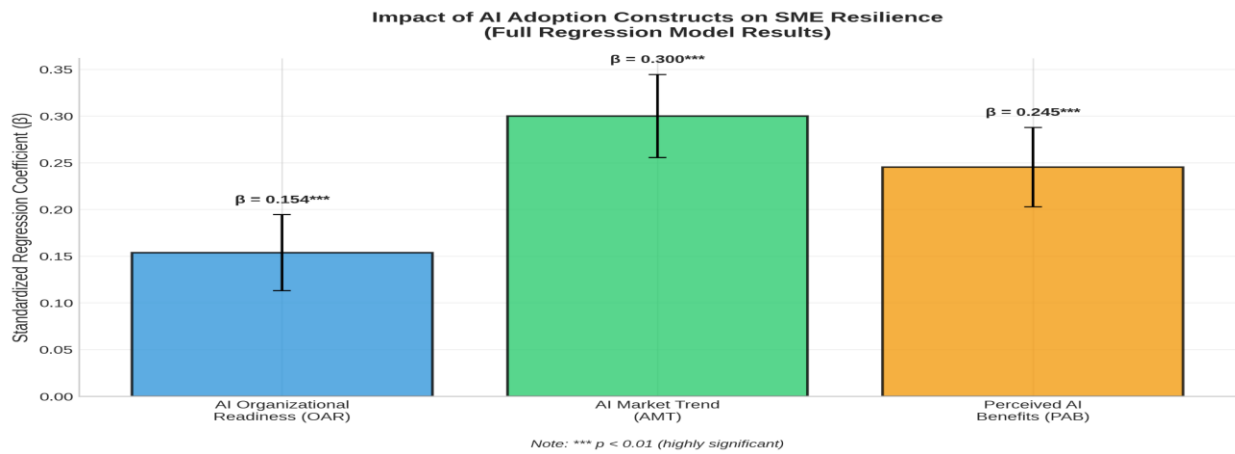


Figure 3: Correlation Matrix Heatmap

