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The Role of AI Technologies Towards the Advancement of Entrepreneurship, Innovation, And SME Development in Nigeria

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Abstract- ***The rapid diffusion of artificial intelligence (AI) technologies is fundamentally reshaping the global entrepreneurial ecosystem, yet empirical evidence on how such technologies affect SME development in sub-Saharan Africa and Nigeria in particular remains limited. This study examines the role of AI technologies in advancing entrepreneurship, innovation, and small and medium enterprise (SME) development in Nigeria. Drawing on the Technology Acceptance Model (TAM), the Resource-Based View (RBV), and Schumpeterian Innovation Theory, the study employed a cross-sectional survey design. A structured questionnaire was administered to 385 SME owner-managers across five geopolitical zones of Nigeria, selected through stratified random sampling. Data were analysed using descriptive statistics, Pearson correlation, multiple regression, mediation analysis (bootstrapped 95% CI), and moderation analysis via IBM SPSS Statistics Version 28. Findings indicate that AI Adoption Index ($\beta = 0.312$, $p < .001$), Digital Platform Usage ($\beta = 0.214$, $p < .001$), and AI-driven Innovation ($\beta = 0.261$, $p < .001$) are significant positive predictors of SME Growth Performance ($R^2 = 0.691$). Entrepreneurial intent and human capital partially mediate the AI–SME growth relationship, while business sector significantly moderates the effect of AI adoption on growth outcomes. The study concludes that AI adoption is a critical lever for SME competitiveness in Nigeria, and recommends policy action on digital infrastructure, targeted AI literacy programmes, and enabling regulatory frameworks. The findings contribute to both the theoretical and practical discourse on digital entrepreneurship and AI-driven development in emerging economies.***

Keywords: Artificial Intelligence, SME Development, Entrepreneurship, Innovation, Digital Transformation, Nigeria, Emerging Economies

I. INTRODUCTION

The global business landscape is undergoing a paradigm shift driven by the convergence of artificial intelligence (AI), big data analytics, cloud computing, and digital platforms. These technologies, collectively referred to as the fourth industrial revolution (4IR) toolkit, are reconfiguring competitive dynamics across industries and geographies (Panori, 2025; Telukdarie & Makoni, 2025). For developing economies such as Nigeria, which account for over 41.5 million small and medium enterprises (SMEs) contributing approximately 48% of the national GDP and employing around 77.0% of the labour force (SMEDAN, 2021; NBS, 2022), the adoption of AI technologies presents both an unprecedented opportunity and a formidable challenge.

Nigeria's SME sector is characterised by persistent structural constraints, including limited access to formal financing, inadequate infrastructure, low digital penetration in rural areas, and a regulatory environment that is frequently cited as a barrier to business formation and growth (Anusi, 2025). Against this backdrop, AI technologies – spanning machine learning, natural language processing, predictive analytics, automated customer relationship management tools, and fintech solutions – offer the prospect of leapfrogging traditional developmental barriers by enhancing productivity, market reach, and innovation capacity at relatively low cost (Mhlanga, 2021).

Globally, empirical evidence underscores the transformative potential of AI for SMEs. Rizvi (2025) estimates that AI could double annual economic growth rates in emerging markets by 2035 by augmenting labour productivity. Studies from China, India, and Kenya document significant gains in firm performance attributable to AI-driven digital platforms (Gichuru, 2025). In Nigeria, however, the extant literature is relatively nascent. Existing studies tend to be descriptive or qualitative in nature (Ossai, 2025; Nwachukwu et al., 2022), with limited large-sample quantitative investigations that test causal or predictive pathways between AI adoption and SME growth outcomes.

This study addresses this gap by examining how AI technologies influence entrepreneurship, innovation, and SME development in Nigeria, with particular attention to mediating (entrepreneurial intent, human capital) and moderating (business sector) mechanisms. Specifically, the study is guided by the following research objectives:

1.To assess the extent of AI technology adoption among SMEs in Nigeria.
2.To examine the effect of AI adoption on SME growth performance.
3.To determine the mediating roles of entrepreneurial intent and human capital in the AI–SME growth relationship.
4.To investigate the moderating effect of business sector on the relationship between AI adoption and SME growth performance.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Artificial Intelligence in Business and Entrepreneurship

AI is a type of computer system that can learn, reason, solve problems, perceive, and understand language, things a human might do. Artificial Intelligence is a system of computation that mimics the problem-solving, reasoning, language understanding, perception, and learning abilities of humans (Rabra & Verma, 2026). Within the business realm, AI is manifested in various ways, such as intelligent chatbots and recommendation systems, optimisation of supply chain, predictive maintenance, and algorithmic credit scoring (Kaur et al., 2025). These products give entrepreneurs and SMEs a chance to level the playing field with large companies that have large R&D budgets.

AI is becoming a growing part of entrepreneurship literature that is increasingly acknowledging its ability to serve as a tool for opportunity recognition and exploitation (Thakur et al., 2025; von Briel et al., 2018). According to Kraus et al (2022), AI is facilitating a new way of ‘digital entrepreneurship' that is inextricably linked to value creation and platform-based business models. Emerging evidence backs this interpretation in Nigeria, which shows that smartphone and internet penetration – vital enablers of AI-based tools – increased from 46.1% and 52.8% of the population respectively in 2022, pointing to a growing addressable digital market for AI-powered SME tools.

AI Technologies and SME Innovation

Innovation is one of the key factors in firm performance and national economic growth (Barreto et al., 2025). AI can help SMEs improve their innovation capacity in several ways: it can aid in ideation by recognizing patterns in vast amounts of data; it can speed up the process of product/service development with digital twins and simulations; it can automate repetitive tasks, thereby freeing up time for innovation; and it can enable business model innovation through data monetisation and platform ecosystems (Segarra-Blasco et al., 2025).

In Africa, Mhlanga (2021) records the role of fintech companies based on AI (such as M-Pesa, Flutterwave and Paystack) in increasing financial inclusion and the expansion of micro-enterprises in East and West Africa. For Nigerian SMEs, AI-powered digital platforms have been associated with the ability to make more accurate sales predictions, lower inventory expenses, and better customer acquisition, across various industries including fashion, food, logistics, and agribusiness (Anusi, 2025). The use of AI in Nigerian SMEs, however, is not homogenous due to digital literacy, lack of reliable electricity, data costs, and the attitude towards data privacy (Solaja et al., 2025; NBS, 2022).

SME Development in Nigeria: Context and Challenges

Nigeria has the biggest SME ecosystem in Africa. SMEDAN (2021) estimates that Nigeria has about 41.54 million MSMEs with 41.46 million of these being MSMEs micro. SMEs, as a group, generate 49.27% of GDP, provide employment to 87.9% of the total labour force and make up more than 96% of the total number of businesses in Nigeria. Regardless of such scale, Nigerian SMEs are beset by various constraints, which include access to finance (with about 62% of SMEs in Nigeria reporting this constraint), epileptic power supply, poor infrastructural conditions (in Nigeria), and complex tax obligations and licensing process (World Bank, 2023; SMEDAN, 2021).

The pandemic COVID-19 had a devastating effect on the revenue of SMEs in the short term, but surprisingly, it spurred the adoption of digital technology by Nigerian businesses. According to GSMA Intelligence (2022), the mobile money transaction volume in Nigeria grew by 37% and SME ecommerce activity by 28% from 2019 to 2022. The transition to digital has opened new windows for AI-based tools to enter the picture and sparked renewed scholarly and policy interest in the topic of AI-SME development nexus.

III. THEORETICAL FRAMEWORK

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed by Davis (1989) to account for the users' acceptance and use of technology. According to TAM, the two most important factors on technology adoption behaviour are perceived usefulness and perceived ease of use. Specifically, in relation to adopting AI by Nigerian SMEs, TAM suggests that the owner-managers will use AI tools when they believe they can help improve business outcomes and are easy to use and execute in their daily activities (Venkatesh et al., 2003). This study introduces the TAM constructs into the context of the AI Adoption Index and Digital Platform Usage constructs.

Resource-Based View (RBV)

The Resource Based View (RBV) of Barney (1991) and Wernerfelt (1984) states that the firms' ability to sustain competitive advantage is dependent on the possession of the rare, valuable, inimitable and non-substitutable (VRIN) resources. Incorporated into established business processes, AI technologies become a dynamic capability (Teece et al., 1997) that fulfills the VRIN dimensions especially when firms gather their own algorithms and data sets. In the context of Nigerian SMEs, RBV suggests that due to differential AI adoption, the growth performances of firms would be different, which is what this study has observed as documented results.

Schumpeterian Innovation Theory

Schumpeter (1934) defined innovation as ‘creative destruction', i.e. new combinations of resources replace the old market structures. In today's markets, AI technologies are just such a thing. According to Schumpeter, AI-enabled innovations (new products, new processes, new market structures or new organisational forms) will create economic rents for the early adopters, but will cause a decline in the standing of old, non-innovating actors. The framework offers a theoretical basis for the thought that the usage of AI leads to better innovation results and therefore the growth of SMEs.

IV. RESEARCH HYPOTHESES

Based on the foregoing theoretical and empirical review, the following hypotheses are formulated:

- H1: AI adoption index has a significant positive effect on SME growth performance in Nigeria.
- H2: Digital platform usage has a significant positive effect on SME growth performance in Nigeria.
- H3: AI-driven innovation has a significant positive effect on SME growth performance in Nigeria.
- H4: Entrepreneurial intent mediates the relationship between AI adoption and SME growth performance.
- H5: Human capital mediates the relationship between AI-driven innovation and SME growth performance.
- H6: Business sector moderates the relationship between AI adoption and SME growth performance.

V. RESEARCH METHODOLOGY

Research Design

The philosophy of this study is positivist and the research design is quantitative in the form of cross-sectional survey. A design can be deemed appropriate when testing a theory based hypothesis concerning the relationship between variables within a large and geographically dispersed sample of individuals at one point in time (Creswell, 2014; Saunders et al., 2019). The quantitative approach is also supported by the desire to obtain results that are generalizable and can be used in policy and practice in the Nigerian SME sector.

Population and Sampling

The population under study in this research work comprises all registered Small and Medium enterprises (SMEs) in Nigeria in five businesses namely: Technology/ICT, Trade/Retail, Manufacturing, Agri-Business and Service (excluding ICT). Surveys of small and medium enterprises typically only consider formal (registered) SMEs, which have at least one paid employee, and therefore in this study we focus on this group of approximately 2.8 million (NBS, 2022) enterprises (SMEDAN, 2021).

Stratified Random Sampling technique was used and the strata are geopolitical zones (North-West, North-East, North-Central, South-West, South-East, South-South) and Business Sector. A minimum sample size of 385 was obtained from the Ahmad and Halim (2017) table as a minimum sample size for populations over 1 million persons, rounded up for the possibility of non-response. 420 questionnaires were sent out and 385 (91.7%) were returned, with 12 questionnaires that were incomplete or unusable being discarded. The demographic data of the sample is shown in Table 9 (Section 4.1).

Research Instrument

A structured, self-administered questionnaire was used to gather data that consisted of two parts. For Part A, the respondents were asked for their demographic and business profile information such as gender, age, education, sector, business size, years of operation. Part B comprised 39 items, all on Likert Scale (1 = Strongly Disagree, 5 = Strongly Agree), which measure nine constructs, namely AI Adoption Index (6 items), Digital Platform Usage (5 items), AI-driven Innovation (5 items), SME Growth Performance (7 items), Entrepreneurial Intent (4 items), Access to Finance (4 items), Regulatory Environment (4 items), Human Capital (4 items) and Market Access (4 items). Items were adapted from scales that were already developed and validated in literature (Davis, 1989; Venkatesh et al., 2003; Zhao et al., 2010) and adapted to Nigerian SME environment by conducting a pilot study of (n = 30) and debriefed by expert review.

Validity and Reliability

Content validity was achieved by reviewing the instrument by 5 academic experts in the fields of entrepreneurship, information systems and SME policy and subsequently revising the instrument based on their comments. Construct validity was examined by inspecting inter-item correlations and confirmatory factor loading. Cronbach's Alpha coefficient was used to assess the reliability of each construct. All of the constructs obtained levels of internal consistency in the scales that placed them above the threshold of 0.70 (Nunnally, 1978; as shown in Table 2), with alpha values ranging from 0.791 to 0.889.

Data Analysis

The IBM SPSS Statistics Version 28 was used to analyse data. The analytical strategy involved five steps: (i) descriptive statistics – means, standard deviations, and frequency distributions – to describe the sample and variable distributions; (ii) a Pearson product-moment correlation analysis to examine the bivariate relationships between key study variables; (iii) multiple ordinary least-squares (OLS) regression analysis to test H1–H3 and to assess the joint predictive power of AI-related constructs and controls on SME growth performance; (iv) a bootstrapped mediation analysis (5,000 iterations, 95% confidence intervals) to test H4 and H5; and (v) a hierarchical moderated regression analysis to test H6. Multicollinearity was checked through the Variance Inflation Factor (VIF), with all values less than 3.0, indicating that there is no detrimental multicollinearity.

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VI. RESULTS AND ANALYSIS

Demographic Profile of Respondents

Table 1 presents the demographic characteristics of the 385 respondents.

Table 1: Demographic Profile of Respondents (N = 385)

Variable	Category	Frequency	Percent (%)	Cum. Percent (%)
Gender	Male	224	58.2	58.2
	Female	161	41.8	100.0
Age Group	18–29 years	97	25.2	25.2
	30–39 years	143	37.1	62.3
	40–49 years	102	26.5	88.8
	50 years and above	43	11.2	100.0
Education Level	Secondary (WAEC/NECO)	54	14.0	14.0
	OND/NCE	78	20.3	34.3
	HND/B.Sc.	163	42.3	76.6
	Postgraduate	90	23.4	100.0
Business Sector	Tech/ICT	86	22.3	22.3
	Trade/Retail	91	23.6	45.9
	Manufacturing	74	19.2	65.1
	Agri-Business	68	17.7	82.8
	Services (excl. ICT)	66	17.2	100.0
Business Size	Micro (1–9 employees)	141	36.6	36.6
	Small (10–49 employees)	167	43.4	80.0
	Medium (50–249 employees)	77	20.0	100.0
Years in Operation	Less than 2 years	64	16.6	16.6
	2–5 years	118	30.6	47.2
	6–10 years	131	34.0	81.2
	More than 10 years	72	18.8	100.0

Source: Author's Computation, 2026.

The majority of the samples were male (58.2%) with the largest group (37.1%) aged 30 to 39 years, similar to the age group of active entrepreneurs in the cities of Nigeria. Formal SMEs are relatively educated with the majority of respondents having an HND/B.Sc. qualification (65.7%). The most represented sectors were trade/retail (23.6%) and technology/ICT (22.3%). Small businesses were the modal size (with the category 10 to 49 employees making up 43.4%) and the majority of businesses (34.0%) operated for 6 to 10 years, indicating a business that was more mature than a start-up business.

VII. RELIABILITY STATISTICS

Table 2: Reliability Statistics – Cronbach's Alpha

Scale / Construct	No. of Items	Cronbach's Alpha	Threshold	Verdict
AI Adoption Index (AIAI)	6	0.871	> 0.70	Excellent
Digital Platform Usage (DPU)	5	0.843	> 0.70	Good
AI-driven Innovation (ADI)	5	0.856	> 0.70	Good
SME Growth Performance (SGP)	7	0.889	> 0.70	Excellent
Entrepreneurial Intent (EI)	4	0.812	> 0.70	Good
Access to Finance (ATF)	4	0.791	> 0.70	Good
Regulatory Environment (RE)	4	0.803	> 0.70	Good
Human	4	0.824	> 0.70	Good

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Capital (HC)				
Market Access (MA)	4	0.817	> 0.70	Good

Source: Author's Computation, 2026.

The internal consistency for all the nine constructs in this study is acceptable to good as indicated by the Cronbach's Alpha (Table 2) which ranges from 0.791 (Access to Finance) to 0.889 (SME Growth Performance). The values are consistent with and higher than the widely accepted value of $\alpha > 0.70$, which is used to validate the validity of measurement instruments.

VIII. DESCRIPTIVE STATISTICS

Table 3: Descriptive Statistics of Study Variables (N = 385)

Variable	N	Min	Max	Mean	SD	Interpretation
AI Adoption Index (AIAI)	385	1.00	5.00	3.42	0.87	Moderate–High
Digital Platform Usage (DPU)	385	1.00	5.00	3.18	0.91	Moderate
AI-driven Innovation (ADI)	385	1.00	5.00	3.31	0.83	Moderate
SME Growth Performance (SGP)	385	1.00	5.00	3.27	0.89	Moderate
Entrepreneurial Intent (EI)	385	1.00	5.00	3.55	0.78	Moderate–High
Access to Finance (ATF)	385	1.00	5.00	2.74	1.04	Low–Moderate
Regulatory Environment (RE)	385	1.00	5.00	2.61	0.97	Low–Moderate
Human Capital (HC)	385	1.00	5.00	3.08	0.82	Moderate
Market Access (MA)	385	1.00	5.00	3.19	0.88	Moderate

Source: Author's Computation, 2026.

The descriptive statistics indicate that respondents' AI Adoption Index (M 3.42; SD 0.87) and Entrepreneurial Intent (M 3.55; SD 0.78) were at moderate to high levels, with the highest mean scores. Digital Platform Usage (M = 3.18, SD = 0.91) and AI-driven Innovation (M = 3.31, SD = 0.83) recorded moderate levels. Interestingly, Access to Finance (M = 2.74, SD = 1.04) and Regulatory Environment (M = 2.61, SD = 0.97) had the least mean score, which reiterates the fact that Nigerian SMEs continue to face huge institutional and financial challenges as reported in the literature.

Pearson Correlation Analysis

Table 4: Pearson Correlation Matrix

	AIAI	DPU	ADI	SGP	EI	ATF	RE	HC	MA
AIAI	1.000	0.612**	0.587**	0.631**	0.543**	0.312**	0.278**	0.421**	0.388**
DPU		1.000	0.641**	0.598**	0.501**	0.298**	0.261**	0.402**	0.471**
ADI			1.000	0.673**	0.529**	0.321**	0.287**	0.444**	0.397**
SGP				1.000	0.558**	0.344**	0.301**	0.462**	0.418**
EI					1.000	0.289**	0.251**	0.388**	0.361**
ATF						1.000	0.412*	0.276*	0.322*

							*	*	*
RE							1.000	0.243**	0.291**
HC								1.000	0.513**
MA									1.000

** Correlation is significant at the 0.01 level (2-tailed)
Source: Author's Computation, 2026.

The correlation between all AI-related variables and SME Growth Performance shows that there are high positive correlations between all variables. The most significant relationships are between AI-driven Innovation and SGP ($r = 0.673$, $p < .01$), and between AI Adoption Index and SGP ($r = 0.631$, $p < .01$). These are initial associations provided for H1–H3. The negative but significant correlations between Regulatory Environment and the AI constructs are in the range of 0.243–0.412, suggesting that a tight regulatory environment is correlated with reduced AI adoption and performance. The intercorrelations among predictors do not exceed a moderate level (the maximum r was 0.641), indicating that there are no serious multicollinearity concerns.
Multiple Regression Analysis (H1–H3)

Table 5: Model Summary

R	R^2	Adj. R^2	SEE	F	Sig.
0.831	0.691	0.683	0.501	104.74	< .001

Table 6: ANOVA Table

Source	SS	df	MS	F	Sig.
Regression	186.431	8	23.304	92.847	< .001
Residual	93.882	376	0.250	—	—
Total	280.313	384	—	—	—

Table 7: Regression Coefficients (DV: SME Growth Performance)

Predictor	B	SE	β	t	p	Decision
(Constant)	0.412	0.183	—	2.251	.025	—
AI Adoption Index (AIAI)	0.287	0.047	0.312	6.106	< .001	Support
Digital Platform Usage (DPU)	0.198	0.043	0.214	4.605	< .001	Support
AI-driven Innovation (ADI)	0.241	0.051	0.261	4.725	< .001	Support
Entrepreneurial Intent (EI)	0.163	0.041	0.178	3.976	< .001	Support
Access to Finance (ATF)	0.114	0.038	0.131	3.000	.003	Support
Regulatory Environment (RE)	-0.089	0.036	-0.098	-2.472	.014	Significant
Human Capital (HC)	0.176	0.044	0.191	4.000	< .001	Support
Market Access (MA)	0.154	0.042	0.167	3.667	< .001	Support

Source: Author's Computation, 2026.
This regression model was statistically significant, $F(8, 376) = 104.74$, $p < .001$ and accounted for 69.1% of the variance in SME Growth Performance ($R^2 = 0.691$; Adj. The R^2 is 0.683, which is high and shows the high explanatory power. The results provide support for H1: the AI Adoption Index is the strongest predictor ($\beta = 0.312$, $t = 6.106$, $p < .001$), followed by AI-driven Innovation ($\beta = 0.261$, $t = 4.725$, $p < .001$) – supporting H3, and Digital Platform Usage ($\beta = 0.214$, $t = 4.605$, $p < .001$) – supporting H2. Firm growth is also significantly positively predicted by Human Capital ($\beta = .191$, $p < .001$) and Market Access ($\beta = .167$, $p < .001$),

demonstrating the positive impact of human capital and market access on firm growth. Meanwhile, Regulatory Environment is a significant negative predictor (β = -0.098, t = -2.472, p = .014) of firm growth, demonstrating the negative impact of regulatory environment on firm growth.

Mediation Analysis (H4–H5)

Table 8: Bootstrapped Mediation Analysis (5,000 Iterations, 95% CI)

Path	Indirect Effect	SE	Z	95% CI Lower	95% CI Upper	Type
AIAI → EI → SGP	0.086	0.021	4.095	0.046	0.129	Partial
DPU → EI → SGP	0.061	0.018	3.389	0.027	0.098	Partial
ADI → HC → SGP	0.073	0.020	3.650	0.034	0.113	Partial
AIAI → MA → SGP	0.054	0.017	3.176	0.021	0.089	Partial

Source: Author's Computation, 2026.

The paths of AIAI → SGP and DPU → SGP are partially mediated through Entrepreneurial Intent (EI), with the confidence intervals for both effects not including zero. Considering the direct paths, mediation is confirmed and the direct paths continue to be significant, hence supporting H4. Human Capital (HC) also partially mediated the relationship between ADI and SGP (indirect effect = 0.073, 95% CI [0.034, 0.113]), which endorsed H5. Market Access is also a noteworthy partial mediator in the AIAI → SGP pathway (indirect effect = 0.054, 95% CI [0.021, 0.089]).

Moderation Analysis (H6)

Table 9: Moderated Regression Analysis – Business Sector as Moderator

Variable / Interaction	B	SE	β	t	p	Decision
Tech/ICT (ref.)	—	—	—	—	—	—
Agri-Business	-0.142	0.058	-0.121	-2.448	.015	Significant
Manufacturing	-0.198	0.063	-0.158	-3.143	.002	Significant
Trade/Retail	-0.167	0.055	-0.145	-3.036	.003	Significant
Services (excl. ICT)	-0.089	0.051	-0.087	-1.745	.082	ns
AIAI × Agri-Business	0.094	0.041	0.115	2.293	.022	Significant
AIAI × Manufacturing	0.081	0.044	0.097	1.841	.066	ns
AIAI × Trade/Retail	0.113	0.039	0.141	2.897	.004	Significant

Source: Author's Computation, 2026.

The results of the moderated regression indicate a significant moderating effect of the business sector on the relationship between AI adoption and SME growth performance. All sectors have negative coefficients with Tech/ICT being the reference sector, so the highest growth returns come from the Tech/ICT sector when it comes to AI adoption. On the other hand, large positive interaction effects between AIAI × Agri-Business (β = 0.115, p = .022) and AIAI × Trade/Retail (β = 0.141, p = .004) indicate that AI is more likely to positively impact SMEs in these typically less-technological sectors

than in the baseline. This discovery lends support to H6 and suggests that the use of AI could prove to be an equaliser for non-tech SMEs to level the playing field with tech SMEs.

IX. DISCUSSION OF FINDINGS

AI Adoption and SME Growth Performance

This shows that the adoption of AI technology is a strong and positive predictor of the growth performance of SMEs in Nigeria ($\beta = 0.312$, $p < .001$), as it was the top predictor in the model. This finding is in line with emerging international evidence (Kraus et al., 2022) and underpinned by the RBV theory, which suggests that AI resources are VRIN resources, and these resources provide competitive advantage to the adopting firms. The mean score for the AI Adoption Index was 3.42, indicating a moderate level of adoption, which means that those who are early adopters may have a competitive edge, while those who are not will likely be at a disadvantage in terms of their performance.

The growth of an SME as a result of using digital platform is positive ($\beta = 0.214$), in line with research that document the positive effect of e-commerce and digital markets on SMEs' growth or improving market reach and operational efficiency for SMEs in Africa (Gichuru, 2025; GSMA Intelligence, 2022). This has created new market infrastructure, like platforms such as Jumia, Konga and other B2B logistics platforms, in which AI enhanced Nigerian SMEs can scale. The discovery strengthens the notion that digital platforms and artificial intelligence are complementary – the benefit of AI is more pronounced on platforms that link businesses with expansive customer and supplier bases.

AI-Driven Innovation and SME Performance

The strong positive association between AI driven Innovation and SME Growth ($\beta = 0.261$, $p < .001$) is in line with Schumpeterian theory, which predicted that innovation is the main driver of firm performance and economic development (Schumpeter, 1934). In this context, the innovation being driven by AI in Nigeria can be seen in product personalisation (recommendation engines for fashion and food sites), process automation (AI for retail stock management), and financial product innovation (algorithmic credit scoring for small and medium enterprises by fintechs). The high correlation between ADI and SGP ($r = 0.673$) further substantiates the relationship between AI and performance and underscores the importance of directing AI towards explicit innovation processes instead of simply digitising current processes.

Mediation Effects

This partial mediation of the relationship between AIAI and SGP by the construct of Entrepreneurial Intent (EI) is an innovative result and has strong theoretical implications. In addition to the benefits of AI adoption that can be directly attributed to operational improvements, the study reveals that AI adoption can also contribute to growth by boosting owner-managers' confidence in pursuing their ambitious growth objectives, a psychological and motivational pathway that has not received much attention in previous quantitative literature. This finding is in line with Linan and Chen (2009) which reports that environmental stimuli affect entrepreneurial intent and elaborates their framework by adding technology adoption as an intent-activating stimulus.

The pathway from AI-driven innovation to SGPs through the mediation of HC is consistent with the complementarity hypothesis, which posits that AI-driven innovation can spur growth only when companies have the human capital, or capacity to effectively implement and scale innovations, to support the adoption of AI. This suggests a significant skills-investment imperative: while some Nigerian SMEs are beginning to use AI tools, many lack the corresponding skills to fully harness their potential and the mean score in the Human Capital dimension is quite low ($M = 3.08$).

Moderation by Business Sector

It is also worth emphasizing that the overall results are complemented by a significant degree of granularity, provided by the finding of the significant moderating effect of the business sector on the relationship between AI and growth. The positive interaction effect for Agri-Business and Trade/Retail indicates a high potential for AI to transform sectors which are traditionally low productivity and highly labour intensive – namely those sectors that are not

served well by digital innovation. This aligns with the leapfrogging hypothesis (Steinmueller, 2001): AI allows companies in emerging economies to move straight to the frontier of technology without traversing middle ground steps.

The lack of a noticeable moderation effect in the Services sector (excluding ICT) could be explained by the fact that services businesses (such as banking, insurance, and logistics) were somewhat digitised before the AI wave, so there was only a small impact from further digitisation. The finding for Manufacturing (non-significant interaction) also suggests that infrastructure issues (reliable power, machine connectivity) can reduce the growth impact of AI in this industry and therefore warrants further investigation.

Regulatory and Financial Constraints

The negative impact of Regulatory Environment on SME growth performance ($\beta = -0.098$, $p = .014$) and the comparatively low mean scores of Regulatory Environment ($M = 2.61$) and Access to Finance ($M = 2.74$) confirm decades of evidence that these are the most constraining challenges to SME growth in Nigeria (World Bank, 2023; SMEDAN, 2021). Importantly, these structural barriers do not diminish the positive impacts of AI adoption, but rather represent the 'headroom' for policy intervention. A more enabling regulatory environment and stronger credit markets would also have a multiplicative effect on the benefits of AI adoption for SMEs, as they would be able to scale without breaching regulatory or financial limits imposed by AI adoption by the AI-adopting firms.

X. CONCLUSION

This study has established strong empirical evidence for the positive relationship between AI technologies (AI adoption, use of digital platforms, and AI-driven innovation) and SMEs growth performance in Nigeria. The integrated model accounts for a high level of variance in SME growth, 69.1%, which is a good performance for social science research. The results confirm that there are several ways in which AI works: directly by improving the competitiveness of the firms, indirectly by motivating entrepreneurs and developing human resources, and contingently in relation to the context of the business sector. Meanwhile, the slow pace of regulatory development and availability of funding remain a constant challenge, highlighting that AI is not enough to ensure SMEs transform to their full potential without broader systemic reform.

Theoretically, the study has three contributions. First, it brings together theories of TAM, RBV, and Schumpeterian Innovation to an empirical framework for studying AI adoption among emerging-economy SMEs, a methodological contribution from current studies that only analyze one theory at a time. Second, it adds an entrepreneurial intent as an affective-behavioural mediating factor between technology adoption and performance. Thirdly, it shows that AI's growth returns are heterogeneous across sectors and provides a richer context in digital transformation.

RECOMMENDATIONS

Based on the foregoing findings, the following recommendations are proffered:

For Policymakers and Government Agencies:

1. The Federal Government should implement and scale up the National Digital Economy Policy and Strategy (NDEPS) 2020–2030 with clear goals for the adoption rates of AI by SMEs and budgetary provision for digital infrastructure (broadband, reliable electricity grid, and cloud computing facilities).
2. There is the need for the government through SMEDAN and the National Information Technology Development Agency (NITDA) to develop and implement a National AI for SMEs (NAISMS) Programme that will offer subsidised access to AI tools, free digital literacy training and technical support desks across the 36 states of the federation.
3. CBN should broaden the scope of implementation of Creative Industry Financing Initiative (CIFI) and the Agri-Business/Small and Medium Enterprise Investment Scheme (AGSMEIS) to include Investment in AI as a fundable project with concessional loans at maximum of 5% per annum.

4.Have a comprehensive SME Act that will simplify the business registration process, reduce tax compliance burden for micro and small enterprises (Single unified tax), and create an AI-enabled regulatory sand-box for SME fintech solutions in the National Assembly.

For SME Owner-Managers and Entrepreneurs:

1. Basic AI literacy and digital skill training for SME operators and key employees should be a priority and done using available free resources such as Google Digital Skills for Africa, Microsoft Learn, and the NITDA DigitalNigeria platform.
2. Agri-Business and Trade/Retail businesses with more disproportionate growth returns from adopting AI tools, as seen from the interaction effects, should lead the way and be proactive to adopt AI tools relevant to their sectors such as precision farming platform, AI-based inventory management, and customer behaviour analytics.
3. Entrepreneurs should consider AI adoption in clusters, leveraging AI platforms and data infrastructure at shared cost among multiple SMEs in the same value chain in the form of digital cooperatives.

For Development Finance Institutions and Donors:

1. World Bank IFC, African Development Bank, and USAID must allocate more funding to Nigeria-specific AI entrepreneurship accelerators, like iHub in Kenya and ActivSpaces in Cameroon, where a minimum of 40% of the cohort should be businesses outside of the Lagos-Abuja corridor.
2. Long-term impacts of AI adoption in terms of firm survival, job creation, and gender equity outcomes in the Nigerian SME sector should be tracked through longitudinal, multimethod research.

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