ARTIFICIAL INTELLIGENCE ADOPTION AND INNOVATION STRATEGIES AMONG NIGERIAN SMES IN THE MANUFACTURING AND SERVICE SECTORS

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Abstract
Artificial Intelligence (AI), as an innovative technological discovery of the 21st century, is capable of transforming the way businesses innovate, compete, and create value across all sectors of the economy. Entrepreneurship has been identified as a field of study that examines how individuals within a society can identify opportunities, acquire resources, and create value through innovation. Creativity and innovation are hallmarks of entrepreneurship, making it a means through which the nation's economy can grow and develop. This study aims to determine the extent to which entrepreneurs in Nigeria's manufacturing and service sectors are leveraging AI tools and innovative strategies to continue playing a vital role in the economy. The Survey descriptive design was used for the study, and three research questions and two hypotheses were raised and tested. Through simple random sampling, 142 participated in the survey, comprising entrepreneurs, business owners, and employees in both the manufacturing and service sectors. The data collection instrument is a questionnaire titled "Questionnaire on Artificial Intelligence Adoption and Innovation Strategies among Nigerian SMEs in the Manufacturing and Service Sectors". The instrument had a Cronbach's Alpha coefficient of 0.78. Descriptive and inferential statistical tools were used to analyse the data collected. The study's findings revealed that the majority of respondents scored between medium and high levels of AI adoption and utilization. The hypotheses tested revealed that there was no statistically significant difference in the adoption and utilization of AI between the manufacturing and service sectors. However, a statistically significant difference was found in the innovative strategies adopted by the two sectors. The study recommends that entrepreneurs and policymakers should prioritise and boost innovative proficiency to move from only the use of AI to sustainable performance.

Keywords: Artificial intelligence, innovation strategies, entrepreneurs, enterprises, manufacturing firms, service providers

1.0 Introduction

Artificial intelligence (AI) refers to the process of developing systems that are enriched with intellectual processes similar to those displayed by human beings, such as the ability to reason, find meaning in concepts, generalise, or learn from experience. It is a branch of computer science that aims to develop intelligent machines capable of performing tasks that require human intelligence, such as sensing, reasoning, learning, predicting, and automating decisions (Copeland, 2020). AI is becoming universally embraced as a new

emerging technology due to its ability to reshape business strategy, operations, and business models in all organisations by converting data into scalable, repeatable decision-making and creative processes (Le Dinh, Vu, & Tran, 2025).

AI has been identified as a driving force for innovation, competitiveness, and growth in most economies. Some of the reasons for this are that businesses and enterprises can use data received from customer feedback, surveys and social media, which are enabled through the use of AI tools, in the following ways: to systematically test and evaluate new product ideas, features, or improvements before production and sale, which is known as product experimentation. In addition, personalisation can be achieved through data, as it enables entrepreneurs to understand customer behaviour and ensure that products and services are produced specifically to meet their needs. Furthermore, AI-enabled services through data collection can predict customer needs before they arise, and even individual preferences can be known through chatbots and voicebots, thereby providing personalised service, such as financial and health guidance, or product recommendations (Philip, Sascha, Dominik & Sascha, 2024). The objective of product experimentation is to save time, money, and reduce failure risks, while personalisation will help businesses to attract, retain, grow their customer base and stay competitive and AI-enabled services will expand business profit, increase customer loyalty, and make SMEs more competitive in both manufacturing and services sectors. The overall objective is to achieve business-model innovation and faster product innovation cycles.

Evidence from the Nigerian situation shows that small and medium-scale enterprises (SMEs) are instruments that aid economic growth/ development, the provision of employment opportunities, and poverty reduction in many economies. In Nigeria, MSMEs account for a very large share of enterprises, contributing an estimate of about 45–48% of GDP and providing the majority of employment. This makes SME productivity and resilience pivotal to national poverty-reduction goals and inclusive growth (PwC Nigeria, 2024).

The adoption of AI for SMEs becomes very important both for the manufacturing and the service sectors. In the manufacturing sector, defects in products, wastage of raw materials, and other inputs can be reduced to the barest minimum, while product consistency can be achieved. This will be achieved through computer vision and predictive analytics. Furthermore, the adoption of AI by manufacturers would enable them to save time and cut costs that would be spent on hiring specialists, like financial analysts and marketing experts, because AI tools act as a "virtual analyst" and takes over the tasks that need advanced skills (Le Dinh, Vu, & Tran, 2025).

Service providers, on the other hand, the adoption of AI will assist both service providers and customers to communicate easily through chatbots and voicebots, which makes increasing demand to be handled without rising costs, which invariably leads to rapid business growth. In addition, AI enables the entrepreneur to advertise to the target audience who are prospective customers, because data such as past purchases, location, and interests can be relied upon instead of focusing on everyone, which will enhance marketing and sales. Furthermore, the back-office automation, such as accounting (generating invoices), payroll, HR (managing employees), inventory tracking, and scheduling (assigning shifts), are handled by AI tools, thereby saving cost, ensuring accuracy, and promoting efficiency (Arachie, Nwosu, Ugwuanyi & Ibrahim, 2025).

The adoption of AI by entrepreneurs cannot be overemphasised because of the immense benefits that accrue both to the business owners and to the Nigerian economy. Some authors in their study highlighted the benefits of AI adoption by entrepreneurs in the Manufacturing and Service sectors. Iyamah and Ogu (2024), for instance, reported that components of AI infrastructure, such as data accessibility, processing capability, and skilled labour, significantly contribute to SME performance by improving decision-making, operational optimization, and innovation. SMEs that build up AI infrastructure see better outcomes. Similarly, Muktar, Ufua, and Okorie (2024) explore the role of Artificial Intelligence capabilities on the growth of small and medium-sized enterprises in Nigeria. The results revealed that AI innovation indicators are positively related to SME growth, and AI-related employment indicators also exert direct effects. The results show that AI capability helps SMEs in manufacturing, hospitality, ICT, and administrative services to grow through innovation and by creating employment.

Small and medium-scale entrepreneurs in Nigeria face some challenges in their attempt to adopt AI and innovative strategies for the optimum performance of their business. Some authors in their studies identified barriers to the adoption, among the challenges identified includes: High Cost/ Financial Constraints, Lack of Digital Skills / Skilled Workforce, Weak Infrastructure / Data Infrastructure and Regulatory / Privacy / Ethical / Trust Concerns (Iyamah & Oguh, 2024; PWC Nigeria, 2025; Usman, Halidu & Aliyu, 2025).

1.1 Statement of the Problem

The discovery of Artificial Intelligence and the tools for its adoption are now being embraced globally. In the field of entrepreneurship, the immense benefits of its adoption have been reported by several studies (Iyamah & Oguh, 2024; Muktar, Ufua, & Okorie, 2024; Arachie, Nwosu, Ugwuanyi, & Ibrahim, 2025), such as optimum business performances, better customer engagement, process automation,

and others; however, many Nigerian SMEs still lag in adopting these technologies (Adelekan & Afolabi, 2022).

The awareness of AI benefits has become significant, but utilisation and adoption are yet to be fully embraced by SMEs, which could be due to inadequate digital skills, high implementation costs, and limited technological infrastructure (Okeke & Nwankwo, 2021). These challenges are compounded by Nigeria's poor infrastructure, such as frequent disruption of electricity supply and unstable internet access, which hinders SMEs' ability to integrate AI tools effectively (Ojo & Akinlabi, 2023).

Research shows that the mode of adoption across sectors is not the same; SMEs in the manufacturing sector require more complex and automation-focused AI solutions when compared with their counterparts in the service sector, because they rely more on data-driven tools (Agyapong et al., 2022). However, with the significant improvements in the management of businesses, empirical evidence is little in the Nigerian context of SMEs in the manufacturing and service sectors, specifically adopting AI and translating this into specific innovation strategies. Most researchers often look at entrepreneurial activities as a single group, without differentiating by sector, that is, whether it is manufacturing or service. Hence, the availability of a limited and sector-specific understanding of which AI tools are being used by Nigerian manufacturing and service SMEs, how AI is adapted into the enterprise formal innovation strategies, and the ecosystem conditions that assist successful AI-driven innovation in these sectors.

This study is embarked upon to fill this gap. Filling up this gap matters because SMEs are known to account for a large percentage of employment of economic resources in Nigeria, and an inappropriate use of AI can slow down the pace of productivity and competitiveness. Filling this gap will therefore provide executable recommendations for entrepreneurs, managers, researchers, and policymakers seeking to leverage AI for industrial advancement and service innovation in Nigeria.

1.2 Objectives of the Study
1. To examine the level of artificial intelligence adoption and utilisation among Nigerian SMEs in the manufacturing and service sectors.
2. To identify the innovation strategies adopted by these SMEs.
3. To compare AI adoption/utilisation and innovation practices between the manufacturing and service sectors.

1.3 Research Questions
1. What is the level of artificial intelligence adoption and utilisation among Nigerian SMEs in the manufacturing and service sectors?

2. What innovation strategies are most commonly implemented?
3. Are there sectoral differences in AI adoption/utilisation and innovation strategies?

1.4 Hypotheses

1. There is no significant difference between AI adoptions and utilisation among SMEs in the manufacturing and service sectors.
2. There is no significant difference between innovation strategies among SMEs in the manufacturing and service sectors.

2.0 Review of Literature
2.1 Theoretical Framework

The theoretical framework for the study is Technology-Organization-Environment (TOE), developed by Tornatzky and Fleischer (1990). The TOE framework explains how these three factors, environment, technology, and organization, assist business firms in utilizing and implementing technological innovations.

The environmental factors are about how external forces affect adoption, such as competition, patronage, the regulatory agencies, and industry guidelines. In Nigeria, competition, digitalization policies of the government, and global market forces motivate SMEs to explore AI for survival and growth.

The technological factors are concerned with AI technologies available to SMEs, the benefits to be gained, integration with existing procedures, and the financial implications. For SMEs in Nigeria, the technological factor shows the extent to which AI solutions such as chatbots, predictive analytics, or automation tools can be integrated into their business models to promote innovation.

Organisational factor involves the internal resources and features of a business firm, such as the managerial team, manpower, digital skills, business size, and financial capabilities. However, some SMEs have challenges with inadequate resources and skill shortage, which limit the adoption. Organisations with entrepreneurial leadership and flexible business operations are more likely to deploy AI for innovative strategies.

The TOE framework applies to this study because it allows a systematic review of how internal capacities of an organisation, external pressures in the environment, and the nature of AI itself, which is driven by technology, combine to influence the innovative strategies of SMEs. When these three elements are deployed for AI adoption, the framework highlights

the conditions under which SMEs can utilise AI to achieve innovation and competitiveness sustainability.

2.2 The Concept of Artificial Intelligence

Artificial intelligence (AI) is the ability of a digital device to perform intelligent activities that human beings perform. The term relates to the development of systems endowed with the intellectual processes identified with human beings. These range from the ability to reason, discover meaning, problem-solving, critical thinking, and learn from experience. The development of digital computers can be traced to the 1940s; they are programmed to carry out very complex tasks, such as discovering proofs for mathematical theorems, and later adapted to perform non-mathematical tasks with accuracy. With the remarkable progress in computer processing speed and memory capacity, no programs have been identified that can replace total human flexibility over wider domains or in tasks requiring daily knowledge.

However, some programs have attained the performance levels of human experts and professionals in carrying out certain definite tasks, so that artificial intelligence in this limited sense is found in applications as diverse as medical diagnosis, computer search engines, voice or handwriting recognition, and chatbots (Copeland, 2025).

The AI applications are now being used globally. Many countries are now addressing the issues and leveraging the benefits of this emerging technology. Many African governments are taking deliberate actions to support the development of AI in their country. The Nigerian government, for instance, has started to support and engage partnerships and stakeholders on the strategy for AI development. The Minister in charge of Science and Technology announced the creation of the National Agency for Research in Robotics and AI.

2.3 Innovation strategies among SMEs

An innovative strategy is a business plan that maps out how an organisation will create, develop, and implement new or improved products, services, or processes to achieve its goals. Resource allocation for innovation is aimed at gaining a competitive advantage through new technologies, improved customer value, or optimised operations. An innovation strategy involves many steps, which include determining the goals, having a clear understanding of the market forces, defining the value proposition, understanding strengths and developing them and with the

ultimate aim of setting up innovation processes and systems.

There are several types of innovation strategies among SMEs in Nigeria that bear different features in their functionality. Some of them are Open Innovation, Innovative Process, and Innovative Output**.** Open Innovation refers to the ability of entrepreneurs to collaborate with external stakeholders, like higher institutions of learning, research institutions, suppliers, and other businesses, to improve their innovative capacity. The importance of these collaborations includes: passing knowledge/information among the institutions, new technology discoveries are shared, and hence SMEs can come together to develop innovative solutions. This open innovation gives SMEs the opportunity to engage professionals, cut down on innovation expenses, and fasten product development cycles (Kaya et al., 2020). The innovative process covers the strategies used by SMEs to develop and implement new ideas, products, or services. It includes research and development (R&D) activities, streamlining operations, and the adoption of digital tools to increase productivity.

Businesses that prioritise innovative processes will improve operational efficiency, reduce production costs, and offer good-quality products or services. For instance, integration of AI-driven analytics, such as 24/7 customer support, analysis of customer feedback and reviews, swift issue resolution, and AI-powered tools that can analyse customers' emotions by facial recognition, etc. All these assist customer interactions and improve service delivery. Innovative output is concerned with tangible outcomes of innovation efforts, such as new product launches, service improvements, and enlarged market share. The effectiveness of an SME's innovation strategy is often evaluated based on its ability to create commercially viable products, develop intellectual property assets, and introduce market-disruptive solutions (Kaya et al., 2020).

2.4 Sectoral differences: Manufacturing versus Service SMEs

The immense benefits of the adoption and utilisation of AI, as well as the impact of the innovative strategies adopted among Small and Medium Scale enterprises (SMEs), are significant. However, the nature and operational characteristics of SMEs in the manufacturing sector and the service providers could account for some variations in these benefits and impacts.

In a paper on the influence of artificial intelligence on the manufacturing industry in South Africa, the findings revealed that there was a significant association between the usage of AI and a range of performance indicators, which also proves that organisations that have adopted AI technology benefited because greater productivity was recorded, improved quality control measures, and there was better supply chain management. Furthermore, findings also emphasised the necessity of

workforce transformation because of AI adoption (Nzama, Epizitone, Moyane, Nkomo, & Mthalane, 2024). Looking at the service providers, Huang and Rust (2021) in a paper titled "Engaged to a Robot? The Role of AI in Service" reported that AI has been identified to boost the digital transformation of service operations, mechanical AI-like robots allow service providers to progressively automate their business, production methods, and operations to improve efficiency. However, service industries are different when compared to manufacturing industries, because the end product, which is the service, is created by both the service provider and the service customer. Therefore, when analysing the role of AI in operations within service industries, it is important to give consideration to customers' perceptions of AI-empowered service operations.

3.0 Methodology

The research design adopted for the study is a descriptive Survey because it is the most suitable for determining the level of adoption of AI and the innovative strategies employed by entrepreneurs in the manufacturing and service sectors. The study population is entrepreneurs in both the manufacturing and service sectors in Lagos and Ogun State. Through simple random sampling, a total of 142 entrepreneurs participated in the study. The Questionnaire on Artificial Intelligence Adoption and Innovation Strategies among Nigerian SMEs in the Manufacturing and Service Sectors was used for data collection, which had a Cronbach Alpha Coefficient of 0.78. The instrument had two sections; the first section requested the biodata of the respondents, which included gender, age, type of enterprise, and position in business. The second section comprises 20 items requesting respondents to agree or disagree with statements about AI adoption and Innovative strategies of entrepreneurs. The Likert scale type, ranging from strongly disagree to strongly agree, on a rating scale of 1-4, is the response format of the data collection instrument. The Questionnaire was hosted on the internet, and the link (https://forms.gle/LeeWbnCYFMYWQhaB7) for completing the google form was sent out to the target respondents. Frequency, percentages, and the t-test were used to analyse data collected from the study. The Statistical Package for Social Scientists (SPSS) version 27 was used to analyse the data collected. All hypotheses were tested at a 0.05 level of significance.

4.0 Data Presentation and Analysis
4.1 Socio-Demographic Analysis of Respondents
Table 1: Classification of Respondents by Age, Enterprise Type, Business Position and Gender

Variable	Category	Frequency (N)	Percentage (%)
Age	25 years & below	43	30.3
	26–35 years	27	19.0
	36–45 years	18	12.7
	46 years and above	54	38.0
Total		142	100
Enterprise Type	Manufacturing	63	44.4
	Service	79	55.6
Total		142	100
Business Position	Owner	67	47.2
	Manager	20	14.1
	Others (e.g., supervisors, employees)	55	38.7
Total		142	100
Gender	Male	58	40.8
	Female	84	59.2
Total		142	100

Note. N = 142 respondents.

The demographic analysis taken for the study was gender, age, type of enterprise, and position in business. Looking at gender, female participants in the study showed a percentage of 59.2% which is higher than males of 40.8%. The age distribution shows that, those aged 46 years and above were38% while those aged 25 years and below were 30.3%. Service-provider firms were 55.6% of the sample, compared to 44.4% in manufacturing. This reveals the increased service providers in Nigeria's SME business terrain, which is consistent with global trends where services such as ICT, finance, and creative enterprises are now adopting AI tools for management and operational efficiency. The largest for business position was owners (47.2%), followed by employees/others (38.7%), and managers were 14.1%, showing that majority of the responses were directly from business owners, hence the data is very reliable for decisions regarding AI adoption and innovation strategies among enterprises.

4.2 Analysis of Responses

The analyses of responses are presented in line with the first research question raised and the two hypotheses formulated and tested by the study.

4.2.1 Analysis of Research Question

Research Question 1: What is the level of artificial intelligence adoption and utilisation among Nigerian SMEs in the manufacturing and service sectors?

To determine the level of artificial intelligence adoption and utilization among respondents, frequency and percentage distributions were computed. The results presented in Table 2 show degrees of adoption and utilisation levels among the respondents.

Table 2: **Frequency and Percentage Distribution of Respondents' Level of Artificial Intelligence Adoption and Utilization (AIAU)**

AIAU Score (%)	Frequency (N)	Percentage (%)
53.13	5	3.5
56.25	5	3.5
59.38	7	4.9
62.50	9	6.3
65.63	6	4.2
68.75	17	12.0
71.88	15	10.6
75.00	10	7.0
78.13	17	12.0
81.25	13	9.2
84.38	8	5.6
87.50	11	7.7
90.63	7	4.9
93.75	5	3.5
96.88	6	4.2
100.00	1	0.7
Total	**142**	**100.0**

Note. AIAU = Artificial Intelligence Adoption and Utilization.

The analysis reveals that many of the respondents scored between 68.75% and 78.13%, which portrays medium to high levels of AI adoption and utilization. However, few respondents (less than 5%) reported very low (below 56.25%) or very high (above 93.75%) levels of adoption, indicating that while AI technologies are increasingly being integrated, complete utilization remains limited among respondents.

4.2.2. Analysis of Hypotheses

Hypothesis 1: There is no significant difference between AI adoptions and utilisation among SMEs in the manufacturing and service sectors.

Table 3: T-test of Difference between AI Adoptions and Utilisation among SMEs in the manufacturing and service sectors.

<div align="center">Levene's Test of Equality of Variance</div>

AIAU	F	Sig	t	df	Sig(2-tailed)
Equal Variances Assumed	1.400	.239	.128	140	.898
Equal Variances not Assumed			.126	124.614	.900

The result of the independent samples *t*-test, which was conducted to compare Artificial Intelligence Adoption and Utilisation (AIAU) scores between the groups, revealed that the Levene's test indicated that the assumption of equal variances was met, F (1,140) = 1.40, p = 239. The results revealed no statistically significant difference between the groups, t (140) = 0.13, p = .898, with a mean difference of 0.25 (SE = 1.95). The 95% confidence interval for the mean difference ranged from -3.60 to 4.10, suggesting that both groups had similar levels of AI adoption and utilisation. Therefore, the stated hypothesis is upheld; we therefore conclude that there is no significant difference between AI adoption and utilisation among SMEs in the manufacturing and service sectors

Hypothesis 2: There is no significant difference between innovation strategies among SMEs in the manufacturing and service sectors.

Table 4: T-test of the Difference between Innovation Strategies among SMEs in the Manufacturing and Service Sectors.

Levene's Test of Equality of Variance

IS	F	Sig	t	df	Sig, (2-tailed)
Equal Variances Assumed	.171	.680	-2.108	140	.037
Equal Variances not Assumed			-2.097	130.056	.038

The result of the independent samples t-test, which was conducted to compare the mean scores of Innovative Strategy (IS) between the two groups, revealed that the Levene's test for equality of variances indicated that the assumption of equal variances was not violated, F (1,140) = 0.171, p = .680. There was a statistically significant difference between the two groups, t (140) = -2.11, p = .037, with a mean difference of -3.32 (SE = 1.57). This implies that there is a significant variation in innovative strategy scores between the manufacturing and the service sectors.

Therefore, the stated hypothesis is rejected, and we conclude that there is a significant difference between innovation strategies among SMEs in the manufacturing and service sectors.

5.0 Discussion of Findings

The findings from the response to Research Question 1 on the level of adoption of AI and utilization revealed a moderate percentage value. The implication of this is that most respondents are in the intermediate stage of AI adoption, indicating a partial integration of AI-based solutions, such as automation tools, predictive

analytics, and digital service delivery enhancements. This trend supports prior evidence that Nigerian SMEs are still transitioning from awareness to full-scale implementation of AI-driven systems (Adelekan & Ajayi, 2023; Nwosu et al., 2024).

The first hypothesis tested revealed that there is no significant difference in the adoption and utilisation of AI among the entrepreneurs in the manufacturing and service sectors in the economy. This implies that entrepreneurs in both sectors are capable of taking advantage of the AI tools for scalability; that is, the adoption and utilization of AI tools will enable businesses to serve more customers, enter new markets, or increase production, and also handle more data and users. This finding is similar to what was reported in the study conducted on exploring the role of artificial intelligence capabilities on small and medium-sized enterprises' growth in Nigeria.

The study examined the relationship between Artificial Intelligence (AI), innovation, employment, and the growth of SMEs in Nigeria. Results of the study revealed that AI innovation indicators have a favourable relationship with SMEs' growth. It was also indicated that AI employment indicators had a direct relationship with the latent factor. The concluding results showed that when AI constructs are applied, the indicators (direct, indirect, and total effect) have a great impact on SMEs' growth. What this implies is that SMEs that adopted and utilised AI tools in the operation of their

enterprises experienced astronomical growth (Itai, Daniel, & Uchechukwu, 2024).

The second hypothesis tested revealed a significant difference in the innovative strategies of the entrepreneurs in manufacturing and the service sectors. This variation shows that innovation is highly shaped by contextual realities, such as firm size, industry type, leadership style, and the availability of technological infrastructure. In addition, what could account for this difference may also be the approach or implementation of innovative strategies employed by entrepreneurs in both sectors. A small-scale manufacturer producing furniture, for example, can integrate AI-driven design tools to create unique products based on the customers' preferences, the aim is to improve design and quality of products to continue to meet new market demands, which could be known as a product differentiation strategy.

Similarly, a financial services firm can introduce AI-powered chatbots to provide 24/7customer support and address issues quickly. This is an innovation strategy that is targeted towards providing better service offers through digital proficiency. The result of this study seems to be similar, though with different variables, to the one conducted by Ayinaddis (2025) on artificial intelligence adoption dynamics and knowledge in SMEs and large firms: A systematic review and bibliometric analysis. It was reported that, though both SMEs and large-scale established firms recognize how

AI can transform their operations, their mode of implementation differs because of the peculiarity of needs and the size of the firm. Large-scale firms can implement AI better because they have more resources and have well-grounded practices, while SMEs are faced with barriers that are associated with their nature that necessitate unique solutions and support systems to enable them to adapt to AI technologies.

5.1 Conclusion

The study was conducted to ascertain the adoption and utilization of Artificial Intelligence (AI) and its relationship with innovative strategies among Nigerian SMEs in the manufacturing and service sectors. The findings revealed that AI adoption and utilization levels were similar across both sectors, but there were significant differences in the implementation of innovative strategies. This indicates that AI has become a universally accepted technological tool among SMEs, but its application for innovation differs in terms of organisational context, resources, and management approach. The study reiterates that innovation in SMEs is boosted by technology adoption and internal capabilities, leadership vision, and industry dynamics. When these factors are strengthened, they will help to improve the relationship between AI adoption and innovation results, which will encourage more competition and sustainable enterprise development within Nigeria's SME ecosystem

5.2 Recommendations

The following recommendations are made in line with the objectives of the study:

1. The collaboration of the private sector, government agencies, and institutions of learning to provide continuous AI literacy and digital innovation training for SME owners and managers will strengthen their technical and strategic capacities. This would promote improved digital capacity building.

2. Policy interventions by all stakeholders should recognize the contextual differences between manufacturing and service firms by creating the appropriate AI and innovation support programs that meet each specific sector's needs and operations.

3. Entrepreneurs in both manufacturing and service sectors should go beyond basic AI adoption and consistently integrate AI into their business practices and innovation strategies, such as product design, service delivery, marketing, and process management, which will result in efficiency and competitiveness.

4. Provision of accessible funding, like grants or tax incentives, by financial institutions and development agencies that will enable SMEs to invest in AI tools, research, and innovation infrastructure.

5. Collaborative innovation networks should be encouraged among SMEs, such as partnerships with research institutions, universities, and technology hubs to jointly develop AI-driven innovations, share knowledge, and promote collective learning for sustainable growth.

5.3 Implications for Future Research

Future research should build on these findings by exploring the mechanisms linking AI adoption to innovation performance within different organizational contexts. While this study revealed that innovation strategies are contextually variable, further empirical work could examine the mediating roles of leadership orientation, digital competence, and organisational culture in strengthening the AI-innovation relationship. Comparative studies across different regions of Nigeria or Sub-Saharan Africa could also provide valuable insights into how the environment and educational institutions influence technological innovation among SMEs. In addition, longitudinal surveys are recommended to determine the emergence of AI adoption and its impact on business growth and sustainability. This validation is important as it would confirm the results, strengthen policies and practices for a robust, innovation-driven SME sector in developing economies.

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