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Assessing the Technological Readiness of Small Businesses for Artificial Intelligence-Powered Transformation: A West African Context

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Abstract

This study was necessitated by the apparent hesitance of Small and Medium-sized Enterprises (SMEs) in West Africa to embrace AI for their transformation, prompting an examination of AI-powered business transformation in SMEs. Employing a qualitative research method, the study utilized secondary qualitative data and thematic analysis to identify key influencing factors and reviewed existing empirical evidence on challenges and opportunities. Findings revealed a significant awareness and usage gap among West African SMEs, with a high level of awareness of AI tools, which contrasts with minimal actual implementation. Despite this, SMEs hold a highly positive perception of AI's potential benefits, including enhanced customer relationship management (CRM), improved content creation, and increased operational efficiency. However, widespread adoption is consistently hindered by certain barriers such as inadequate digital infrastructure, digital skill gaps, high financial costs, organizational resistance to change, and challenges related to data quality and integration. The study concluded that while AI offers immense transformative potential for West African SMEs, realizing these benefits necessitates bridging the gap between awareness and implementation through targeted interventions. The study, therefore, recommended among others, government-led policy and infrastructure development, comprehensive digital literacy and AI skills training for SMEs owners and workers.

Keywords: Artificial Intelligence, Small and Medium-sized Enterprises, West Africa, Business Transformation, Digital Readiness, Technological Adoption.

Introduction

Contemporary human society has undergone significant changes due to modern technological advancements, and it is a clear fact that these developments such as the emergence of Artificial intelligence (AI) have greatly influenced all forms of human interaction, while profoundly affecting human activities (Jain, Kakade & Vispute, 2025; Yusuf, Durodola, Ocran, Abubakar, Echere & Paul-Adeleye, 2024). AI, since its inception, has infiltrated numerous industries, transforming operations in areas such as customer service, manufacturing, energy, logistics, healthcare, and education (Ocran, Yusuf, Owusu, Boateng & Obeng, 2024). A significant factor propelling this global change is the emergence of cloud-based AI technologies. These platforms have undeniably reduced

entry barriers, providing access to potent AI tools that were previously too costly or complicated for smaller organizations, igniting a global transformation that fundamentally alters how businesses function, compete, and expand (Kraus, Jones, Kailer, Weinmann, Chaparro-Banegas & Roig-Tierno, 2021).

Africa as a continent is increasingly acknowledging the significant and transformative possibilities of the Fourth Industrial Revolution (4IR), with AI at its centre, as a crucial facilitator for economic diversification, sustainable development, and improved global competitiveness (Dosso, Nwankwo & Travaly, 2021; Mphale, Gorejena & Nojila, 2024). This acknowledgment is further strengthened by the belief that AI can unlock new efficiencies, foster innovative business models, and tackle long-standing developmental issues that are unique to the African environment (Akoh, 2024).

Small and Medium-sized Enterprises (SMEs) are acknowledged as major drivers of economic development, job creation, and innovation in various economies around the world. Their impact is especially prominent in developing countries, where they serve as the backbone of national economies, making substantial contributions to Gross Domestic Product (GDP) and playing an important role in alleviating poverty (Abdulganiyu, Musa, Matayo, Saidu & Ahmed, 2023; Michael, 2025). Despite their tremendous potential and essential functions, studies have shown that SMEs constantly struggle to invest in expensive technologies or lack the financial means to adopt technological progress. Adding to this challenge, SMEs in developing nations encounter various hurdles in running their businesses. More than 80% of them do not survive beyond their initial three years (Michael, 2025). This mortality rate in the informal sector represents a considerable risk to the economic stability and growth potential of these nations.

It is, however, believed that the lack of substantial readiness of SMEs in West Africa for AI-powered business transformation is primarily driven by several persistent and related factors. Initial implementation costs, encompassing both initial investments in software and hardware and ongoing operational expenses, often restrict SMEs from acquiring these relevant resources (Arachie, Nwosu, Ugwuanyi & Ibrahim, 2025). Additionally, there is, to a large extent insufficiency of digital skills and technical expertise among the workforce, to meet up with the ever fast passed technological techniques, which severely impairs the capacity of SME owners and employees to explore, implement, and manage advanced AI tools effectively (Nwagbala, Ezeanokwasa, Nwachukwu, Uzodike & Nwosu, 2025). These challenges, when put together, compound to create a certain level of un-readiness, which, if not addressed, could affect the adoption or usage of AI tools for business transformation, and also prevent substantial derivation of positive outcomes from these technological innovations. It is upon these backdrops that this study seeks to assess the readiness of West African SMEs for AI-powered business transformation. The specific objectives include to:

1. Identify key factors influencing the readiness of SMEs for AI adoption in West Africa.
2. Review existing empirical evidence on the challenges and opportunities faced by SMEs in adopting AI technologies in West Africa.

Research Questions

1. What are the key factors influencing the readiness of SMEs for AI adoption in West Africa?
2. What are the existing empirical evidence on the challenges and opportunities faced by SMEs in adopting AI technologies in West Africa?

Review of Related Literature

Technological Readiness

Technological readiness is a multifaceted concept that describes an individual's or an organization's preparedness and willingness to adopt and effectively utilize new technologies (Mphale, Gorejena & Nojila, 2024; Pingali Singha, Arunachalam & Pedada, 2023). Often used interchangeably with "e-readiness" or "digital readiness," it extends beyond mere access to technology, encompassing the internal and external conditions that enable successful integration and value creation from digital innovations (Pingali et al., 2023; Uren & Edwards, 2023). For SMEs, particularly in emerging markets, understanding and fostering technological readiness is critical for competitiveness, sustainability, and leveraging advanced tools like AI (Uren & Edwards, 2023).

Assessing technological readiness relatively involves assessing a complex array of dimensions that go beyond simply owning technology. Motjolopane and Chanza (2023) propose a comprehensive framework for SMEs' readiness for big data analytics and AI, identifying six pivotal dimensions: strategic leadership and organizational culture, information technology, security, and business model transformation, data analytics and governance, cost-benefit and risk management, and environmental factors. Similarly, in the context of the Fourth Industrial Revolution (4IR), Dosso et al. (2021) highlight digital infrastructure, education and skills, governance and demand readiness, and research and innovation potential as key dimensions of readiness for Sub-Saharan African economies. These frameworks underscore that a holistic assessment must consider the interplay between technological capabilities, human capital, data quality, and the overarching organizational and governance structures (Joubert, Murawski & Bick, 2023).

Several factors significantly influence an organization's technological readiness. Perceived usefulness (the belief that technology enhances performance) and perceived ease of use (the belief that technology is simple to use) are crucial, with the latter sometimes having a more significant positive influence on AI adoption readiness in emerging contexts (Benhayoun, Bougrine, & Sassioui, 2025; Flavián, Perez-Rueda, Belanche & Casalo, 2021). Infrastructural barriers, such as unreliable internet connectivity and erratic electricity supply, are major impediments, particularly in rural and underserved areas (Akpe, Mgbame, Ogbuefi, Abayomi & Adeyelu, 2023; Nwagbala et al., 2025). A pervasive lack of basic digital literacy and advanced ICT skills among SME owners and employees also hinders effective AI utilization (Akpe et al., 2023; Nwagbala et al., 2025; Okam, 2023). Furthermore, high upfront and ongoing costs, coupled with limited access to appropriate financing, pose

significant financial constraints (Michael, 2025). Organizational and cultural resistance to change, often stemming from fears of job displacement or perceived complexity, can also impede adoption (Nwagbala et al., 2025; Yusuf et al., 2024).

Ultimately, technological readiness is paramount for SMEs to successfully adopt AI and realize its transformative potential for enhanced operational efficiencies, cost reduction, and improved customer engagement (Jain et al., 2025; Nwagbala et al., 2025). However, a notable "awareness-usage gap" often exists, where SMEs are aware of AI's benefits but struggle with practical implementation due to underlying readiness deficits (Arachie et al., 2025). To systematically assess this, models like Technology Readiness Levels (TRL), adapted for AI systems (Lavin, Gilligan-lee, Visnjic, Ganju, Newman, Ganguly & Gal, 2022), and the Smart SME Technology Readiness Assessment (SSTRA) methodology (Saad, Bahadori & Jafarnejad, 2021), provide structured approaches. The Big Data Readiness Index (BDRI) also measures the level of preparation and willingness to exploit big data at a country level, highlighting varying readiness across African nations (Joubert, Murawski & Bick, 2023). For SMEs to harness AI for improved productivity, performance, and profitability, addressing technological readiness is not merely about acquiring new tools but about developing the holistic capabilities, human, organizational, and infrastructural to effectively integrate, manage, and derive strategic value from these advanced technologies (Uren & Edwards, 2023).

AI-Powered Business Transformation

AI-powered business transformation represents a fundamental and pervasive reshaping of organizational operations, strategies, and value creation, driven by the integration of AI technologies. This transformative process moves beyond mere digitalization, leveraging AI's capacity to mimic human intellect, analyze vast datasets, generate actionable insights, and make autonomous decisions with remarkable speed and accuracy (Li & Xu, 2022; Libai, Bart, Gensler, Hofacker, Kaplan, Kötterheinrich, & Sarstedt, 2020; Neha, Enakshi, Narotam & Amita, 2020; Shankar, 2018; Schwab, 2017; Xiong, Xia, & Wang, 2020). It signifies a shift towards intelligent automation and data-driven strategic planning across various industries, including manufacturing, marketing, finance, education, and healthcare (Neha et al., 2020). The increasing commercial viability and mainstream acceptance of AI, alongside advancements in computing power, open-source tools, and universal internet connectivity, have democratized access to these powerful capabilities, enabling even SMEs to engage in sophisticated digital transformation initiatives (Jain et al., 2025; Qureshi, 2024).

The core of AI-powered business transformation lies in its ability to enhance operational efficiencies, foster innovation, and deepen customer engagement. AI streamlines operations by automating routine, repetitive tasks such as inventory management, invoicing, and customer service interactions via Chabot, thereby reducing costs and minimizing human error (Akoh, 2024; Friday et al., 2024; Nwagbala et al., 2025; Yusuf et al., 2024). This automation frees up human capital to focus on higher-value, strategic initiatives

that demand creativity and complex problem-solving (Jain et al., 2025). Furthermore, AI empowers businesses to personalize customer experiences, tailor marketing campaigns, and develop new business models by analyzing market trends and consumer behaviour (Abrokwah-Larbi & Awuku-Larbi, 2024; Jain et al., 2025; Nwagbala et al., 2025; Wagobera, Ejimuda, Idemudia, & Ijomah, 2023). The integration of AI into cloud solutions further facilitates this transformation, allowing businesses to scale operations efficiently without significant upfront investments in IT infrastructure (Abubakar & Volikatla, 2021; Qureshi, 2024).

A critical component of AI-powered business transformation is the evolution of business intelligence (BI) and analytics. AI-powered BI transforms raw data into strategic solutions, enabling enhanced decision-making and competitive advantage (Islam, Desai, Rabbani, Ahmad, & Snigdha, 2025; Zwingmann, 2022). Predictive analytics, a sophisticated application of AI, allows SMEs to anticipate future trends, optimize demand forecasting, and gain deeper customer behaviour insights (Ocran et al., 2024; Opoku et al., 2024). This capability shifts businesses from reactive to proactive strategies, improving financial planning, optimizing resource allocation, and enhancing supply chain management (Ocran et al., 2024). By providing crucial foresight into cash flow and aiding in comprehensive risk assessment, AI-driven analytics directly contributes to improved productivity, effectiveness, and profitability, which is particularly vital for the survival and growth of SMEs in dynamic markets (Ocran et al., 2024).

Despite the immense potential, AI-powered business transformation is not without significant challenges, particularly for SMEs. Key impediments include cost constraints, cybersecurity risks, resistance to change, high implementation costs for hardware, software, and specialized expertise, which are often prohibitive for businesses with tight budgets (Agbo-Adediran, Adeusi, Bello & Afolabi, 2025; Ocran et al., 2024; Yusuf et al., 2024). A pervasive lack of skilled personnel and foundational digital literacy among the workforce severely impairs the capacity to implement and manage AI systems effectively (Arachie et al., 2025; Nwagbala et al., 2025; Yusuf et al., 2024). Furthermore, inadequate technological infrastructure, such as unreliable internet and electricity, undermines the consistent operation of AI solutions (Arachie et al., 2025; Nwagbala et al., 2025). Organizational and cultural resistance to change, often fuelled by fears of job displacement or scepticism about AI's complexity, also significantly impedes adoption (Chrzanowska et al., 2024; Agbo-Adediran et al., 2025; Yusuf et al., 2024). Overcoming these multi-dimensional barriers requires targeted policy interventions, capacity-building initiatives, and a supportive ecosystem to fully unlock the transformative power of AI for sustainable business evolution (Akoh, 2024; Jain et al., 2025; Karulkar et al., 2025; Yusuf et al., 2024).

Empirical Insight

Arachie, Nwosu, Ugwuanyi and Ibrahim (2025) investigated the performance implications of AI adoption, focusing on Generative AI and ChatBots on Customer Relationship

Management (CRM) capability among SMEs in Southeastern Nigeria. The study adopted a survey research design, and a structured questionnaire was distributed electronically to 371 digitally literate SME owners, which constituted the sample size from a population of 11,231 SMEs across the five south-eastern states in Nigeria, with 310 valid responses analyzed using descriptive and inferential statistics, including regression analysis at a 5% level of significance. The findings revealed a notable gap between awareness and actual usage of AI tools. While SMEs demonstrated moderate awareness of Generative AI and ChatBots, practical application remained significantly low. However, the perception of their potential benefits, such as improved content creation, faster customer responses, and enhanced service delivery, is highly positive. Regression results confirmed that both Generative AI and ChatBot usage significantly and positively influence CRM capability, jointly accounting for 98.1% of the variance.

Agbo-Adediran, Adeusi, Bello and Afolabi (2025) explored the role of AI and ICT in improving customer engagement in SMEs by analyzing their benefits, adoption barriers, and integration strategies. Using theoretical frameworks such as the Technology Acceptance Model (TAM) and the Resource-Based View (RBV), the study examined the factors influencing AI and ICT adoption. AI-driven tools, including Chabot, predictive analytics, and personalized marketing systems, offer SMEs the ability to deliver tailored experiences, automate interactions, and optimize decision-making. ICT platforms, such as cloud-based CRM systems and social media marketing tools, further amplify these capabilities by facilitating seamless communication, data collection, and customer insights. Despite these advantages, it was revealed that SMEs struggle with digital transformation due to cost constraints, cybersecurity risks, and resistance to change.

Benhayoun, Bougrine and Sassioui (2025) examined the factors that influenced the readiness to adopt AI tools within Moroccan auditing firms. A quantitative research design was used, using survey data to examine the influence of perceived usefulness (PU), ease of use (EU) and top management commitment (TMC) on AI adoption readiness (AIAR) in auditing. A conceptual model, drawing from the technology acceptance model (TAM) and supported by findings from previous literature, was proposed. The model was tested using partial least squares, structural equation modelling on data collected from 116 Moroccan respondents. The study confirmed that PU and TMC do not significantly influence the AIAR in auditing in Morocco, whereas the EU is positively and significantly associated with the AIAR.

Ojubanire, Kolapo, Berbain and Sebti (2025) assessed the awareness and readiness for Industry4.0 in African emerging economies. It also investigated the factors affecting the adoption of Industry4.0 among Nigerian SMEs based on the Diffusion of Innovation theory using quantitative methodology. A total sample of 377 employees were selected. The results showed a positive but weak correlation between awareness and perceived readiness and the adoption of Industry 4.0, suggesting that other factors such as trialability, compatibility, and relative advantage play a significant role in Industry 4.0 adoption. The main challenges identified included high investment costs, a lack of managerial will,

perceived complexity, and a shortage of adequately skilled human resources. The perceived level of readiness for Industry 4.0 reveals most SMEs were at the computerisation stage, indicating a significant gap in Industry 4.0 readiness. Theoretically, the study explored the DOI theory in the African context by introducing awareness and perceived readiness as additional factors for adoption, while managerially providing insights for industry 4.0 adoption in resource-constrained economies such as Africa.

Nwagbala, Ezeanokwasa, Nwachukwu, Uzodike, and Nwosu (2025) explored the potential benefits of AI adoption for African SMES. Several challenges hinder widespread implementation, such as limited access to finance and technology, inadequate infrastructure, lack of skilled workforce, and regulatory uncertainties. Data were generated via the Internet, newspapers, newsletters, libraries, and other documented materials pertinent to the study. However, the study highlighted how AI can drive operational efficiency, reduce costs, and promote sustainable business practices. Furthermore, cultural attitudes towards technology adoption can also impact the pace at which SMES embrace AI solutions.

Ocran, Yusuf, Owusu, Boateng and Obeng (2024) examined the revolutionary implications of AI-driven analytics on small and medium-sized organizations (SMEs). The research aimed to explore how AI-powered analytics, particularly in predictive and prescriptive forms, can add value to SMEs by enhancing demand forecasting, customer behavior insights, and financial planning. To determine how AI-driven analytics might affect SMEs, a thorough assessment of the literature was undertaken. The study revealed that SMEs implementing predictive analytics experience notable improvements in areas such as inventory management, revenue generation, and overall operational efficiency

Yusuf, Durodola, Ocran, Abubakar, Echere and Paul-Adeleye (2024) examined the impact of AI and digital transformation on SMEs across continents. The research systematically reviewed existing literature, guided by the PRISMA framework, to identify the barriers and enablers of AI adoption in SMEs across these diverse regions. The study identified key challenges, including limited financial resources, lack of skilled personnel, data security concerns, and organizational resistance to change. These barriers vary across continents; for instance, African SMEs often struggle with the high costs of AI implementation and lack of resources and expertise, while European SMEs face stringent regulatory challenges and a lack of infrastructure and finances. In contrast, Asian SMEs, particularly in developing countries, grapple with sustainability and sustainable regulatory and cultural barriers. However, it's important to note that the potential of AI to enhance operations and customer engagement is a universally recognized benefit.

Mphale, Gorejena, and Nojila (2024) employed a systematic reviews and meta-analyses (PRISMA) guideline to survey the existing literature (academic and grey literature) published between 2015 and 2024 on Botswana's digital readiness. The review examined several areas of technological readiness, including e-commerce legislation, Information and Communication Technology (ICT) education, infrastructure investment, government

online services, e-participation initiatives, internet costs, policy framework, cybercrime threats, and overall technology adoption. Results showed that while Botswana has made progress in digital integration, its digital maturity is still evolving. Strengths were found in areas including; e-commerce legislation, ICT education, and infrastructure investment.

Abrokwah-Larbi and Awuku-Larbi (2024) empirically investigated the relationship between AI in marketing (AIM) and business performance from the resource-based view (RBV) perspective. A survey strategy was used to collect data from 225 small and medium enterprises (SMEs) respondents who were on the registered list of the Ghana Enterprise Agency in the Eastern Region of Ghana. Structural equation modeling – path analysis was used to estimate the impact of AIM on the performance of SMEs. The analyzed data showed that AIM has a significant impact on the financial performance, customer performance, internal business process performance, and learning and growth performance in the case of SMEs in Ghana.

Akoh (2024) analyzed the adoption of AI for manufacturing SMEs' growth and survival in South Africa: A systematic literature review. The study advanced research and practice related to adopting artificial intelligence (AI) in the context of South Africa (SA). The study evaluated AI adoption by South African manufacturing SMEs; established the challenges faced by manufacturing SMEs in adopting AI; and developed a framework for adopting AI for manufacturing SMEs' growth and survival. The study adopted a systematic literature review approach. Articles from Scopus and Google Scholar databases, ranging from the years 2018 to 2024, were used. Of the 206 articles found, 54 were shortlisted. The systematic review analysis was performed using the PRISMA framework. The results identified that AI adoption by South African manufacturing SMEs is low, limiting their innovation and productivity. The results also showed, despite the numerous benefits AI adoption can offer manufacturing SMEs in the country, a major constraint is the lack of a framework to enhance adoption and implementation.

Arachie, Dibua and Idigo, (2023) examined the role of AI in small business operations. Specifically, the study identified areas where AI could be deployed, barriers to the deployment of AI, identified AI tools in business, and ascertained the number of SMEs that consciously use any form of AI in their business operations. The study adopted a descriptive design. The population of the study was 27546 small businesses that were registered under the Corporate Affairs Commission (CAC), and a sample size of 379 was arrived at by adopting Krejcie and Morgan's 1970 sample size determination formula. The source of data was solely primary through interviews, which later formed a stepping stone for the structured questionnaire used for the study. The instrument was validated and tested for reliability. Data analysis was performed using descriptive statistics consisting of frequencies and percentages. Results revealed that most SMEs in Nigeria are still operating manually; hence, they do not enjoy the massive potential of AI deployment and remain perpetually small in size.

Methodology

This study employs a qualitative approach, utilizing secondary qualitative data, which allows for an in-depth exploration of complex issues, enabling a detailed understanding of the perceptions, underlying factors, challenges, and opportunities related to AI adoption in the specific region. Additionally, it supports a comprehensive evaluation of existing knowledge and theoretical frameworks, offering detailed insights into the complex nature of AI readiness. These make this method suitable for this study. The data for this research covered the period from 2015-2025, and was gathered from existing published scholarly works, carefully sourced from a wide range of verifiable academic and reputable industry publications. These sources included peer-reviewed articles from academic journals, accessible through well-established academic databases such as Web of Science, Google Scholar, ScienceDirect, Semantic Scholar, ResearchGate and Academia. The inclusion criteria included the consideration of only articles written within 10 years, must be peered-reviewed, written in English and the full versions of the article must be available. Any paper that fell short of these criteria were excluded. This approach ensures a broad and deep review of the current literature, allowing for the synthesis of diverse perspectives and empirical evidence related to the readiness of West African SMEs for AI-powered business transformation. A total of 57 articles were initially downloaded from the aforementioned research databases, but after applying the inclusion and exclusion criteria, a total of 18 articles were finally used for the study. Though suiting to this study, using secondary qualitative sources has some inherent limitations like contextual issues and not being very certain about the methodologies used in some of the studies included. The study employed thematic analysis, which involved a systematic and rigorous process of reviewing, interpreting, and synthesizing collected secondary qualitative data.

Data Analysis

The studies used in the literature review of this study, along with other pertinent verifiable documents, formed the core dataset. Each selected document was thoroughly reviewed to ensure its direct relevance to the study's objectives. Key information, including definitions, theoretical frameworks, empirical findings, challenges, opportunities, and recommendations related to AI, in the context of SMEs, particularly in West Africa and other developing economies, was extracted. The process began with a rigorous reading of all relevant documents to identify recurring themes, patterns, and key concepts related to AI-powered business transformation and SME readiness. These identified themes were then categorized and analyzed to address the study's objectives.

Thematic Analysis Findings

1. Identification of Key Factors Influencing the Readiness of SMEs for AI Adoption in West Africa: The analysis identified several interconnected factors influencing AI readiness, categorized across various dimensions:

- Technological factors: This includes the availability and quality of essential ICT infrastructure, such as reliable internet connectivity, consistent electricity supply, and access to cloud platforms (Dosso et al., 2021; Mphale et al., 2024; Akpe et al., 2023).
- Human Capital: This pertains to the digital literacy levels and technical expertise of the workforce and leadership, including the availability of skilled personnel and adequate training programs (Akpe et al., 2023; Dosso et al., 2021; Nwagbala et al., 2025; Okam, 2023).
- Financial constraints: This encompasses the financial capacity to invest in AI solutions, manage costs, and assess ROI (Motjolopane & Chanza, 2023; Nwagbala et al., 2025; Ocran et al., 2024; Yusuf et al., 2024).
- Structure and Culture of organizations: This involves strategic leadership, a supportive organizational culture, and the ability to overcome resistance to change (Motjolopane & Chanza, 2023; Nwagbala et al., 2025; Yusuf et al., 2024).
- Availability and Governance of data: This refers to the capacity to collect, integrate, and analyze high-quality data, ensuring data security and privacy (Motjolopane & Chanza, 2023; Ocran et al., 2024; Yusuf et al., 2024).
- Government Policies and environmental factors: This includes regulatory frameworks, government initiatives, and ecosystem support (Dosso et al., 2021; Jain et al., 2025; Motjolopane & Chanza, 2023; Nwagbala et al., 2025).

Table 1: Factors Influencing the Readiness of SMEs for AI Adoption in West Africa

S/N	Codes	Theme	Description	References
1	ICT Infrastructure	Technological Factors	Availability and quality of essential ICT infrastructure, such as reliable internet connectivity, consistent electricity supply, and access to cloud platforms.	Dosso et al., 2021; Mphale et al., 2024; Akpe et al., 2023
2	Digital Literacy, Skilled Workforce	Human Capital	Digital literacy levels and technical expertise of the workforce and leadership, including availability of skilled personnel and training programs.	Akpe et al., 2023; Dosso et al., 2021; Nwagbala et al., 2025; Okam, 2023
3	Cost, ROI	Financial Constraints	Financial capacity to invest in AI solutions, manage costs, and assess return on investment (ROI).	Motjolopane & Chanza, 2023; Nwagbala et al., 2025; Ocran et al., 2024; Yusuf et al., 2024

S/N	Codes	Theme	Description	References
4	Leadership, Resistance to Change	Structure and Culture of Organizations	Strategic leadership, supportive organizational culture, and ability to overcome resistance to change.	Motjolopane & Chanza, 2023; Nwagbala et al., 2025; Yusuf et al., 2024
5	Data Management, Privacy	Availability and Governance of Data	Capacity to collect, integrate, and analyze high-quality data, ensuring data security and privacy.	Motjolopane & Chanza, 2023; Ocran et al., 2024; Yusuf et al., 2024
6	Regulations, Government Support	Government Policies and Environmental Factors	Regulatory frameworks, government initiatives, and ecosystem support.	Dosso et al., 2021; Jain et al., 2025; Motjolopane & Chanza, 2023; Nwagbala et al., 2025

Source: Researcher's Compilation, 2025

Table 1 reveals the themes for key factors influencing the readiness of SMEs for AI adoption in West Africa. The Table contains the codes leading to the themes, description of the themes and the citations backing up each code/theme.

2. Review of Existing Empirical Evidence on the Challenges and Opportunities Faced by SMEs in Adopting AI Technologies in Developing Economies: Empirical evidence highlights a significant "awareness-usage gap" in West African SMEs. While SMEs show moderate to high awareness of Generative AI and ChatBots, their actual day-to-day usage remains notably low (Arachie et al., 2025). This contrasts with findings from Ghana, where SMEs actively adopt AI in marketing.

Key Challenges Identified:

- Infrastructural Limitations: Unreliable internet connectivity, high subscription costs, and limited electricity access are fundamental barriers (Arachie et al., 2025; Mphale et al., 2024; Nwagbala et al., 2025).
- Digital Skill Gaps: Many SME owners and workers lack sufficient digital literacy and specific AI expertise (Akpe et al., 2023; Arachie et al., 2025; Nwagbala et al., 2025; Okam, 2023; Yusuf et al., 2024).
- High Costs and Financial Barriers: Prohibitive implementation costs and limited access to finance deter investment (Nwagbala et al., 2025; Ocran et al., 2024; Yusuf et al., 2024).
- Organizational Resistance: Fear of job displacement, perceived complexity, and lack of awareness contribute to slow adoption (Akpe et al., 2023; Benhayoun et al., 2025; Nwagbala et al., 2025; Yusuf et al., 2024).

- Data-Related Issues: Poor data quality, availability, and integration, along with security concerns, hinder effective AI utilization (Ocran et al., 2024).
- Policy and Ecosystem Gaps: Insufficient strategic support and inadequate national AI policy frameworks impede widespread adoption (Dosso et al., 2021; Mphale et al., 2024; Yusuf et al., 2024).

Table 2: Empirical Evidence on the Challenges Faced by SMEs in Adopting AI Technologies in Developing Economies

S/N	Codes	Theme	Description	References
1	Connectivity, Power Supply, Cost	Infrastructural Limitations	Unreliable internet connectivity, high subscription costs, and limited electricity access are fundamental barriers.	Arachie et al., 2025; Mphale et al., 2024; Nwagbala et al., 2025
2	Digital Literacy, AI Skills	Digital Skill Gaps	Many SME owners and workers lack sufficient digital literacy and specific AI expertise.	Akpe et al., 2023; Arachie et al., 2025; Nwagbala et al., 2025; Okam, 2023; Yusuf et al., 2024
3	Implementation Costs, Access to Finance	High Costs and Financial Barriers	Prohibitive implementation costs and limited access to finance deter investment.	Nwagbala et al., 2025; Ocran et al., 2024; Yusuf et al., 2024
4	Job Displacement, Complexity, Awareness	Organizational Resistance	Fear of job displacement, perceived complexity, and lack of awareness contribute to slow adoption.	Akpe et al., 2023; Benhayoun et al., 2025; Nwagbala et al., 2025; Yusuf et al., 2024
5	Data Quality, Security	Data-Related Issues	Poor data quality, availability, and integration, along with security concerns, hinder effective AI utilization.	Ocran et al., 2024
6	AI Policy, Ecosystem Support	Policy and Ecosystem Gaps	Insufficient strategic support and inadequate national AI policy frameworks impede widespread adoption.	Dosso et al., 2021; Mphale et al., 2024; Yusuf et al., 2024

Source: Researcher's Compilation, 2025

Table 2 reveals the themes for key challenges faced by SMEs in adopting AI technologies in developing economies. In the Table are the codes which led to the themes, the description of the themes and the citations used in supporting the themes.

Strategic Opportunities Identified:

- Enhanced Operational Efficiencies: AI automates routine tasks, reducing costs and human error, leading to improved productivity (Akoh, 2024; Friday et al., 2024; Nwagbala et al., 2025; Yusuf et al., 2024).
- Improved Customer Engagement: AI, particularly ChatBots, enhances CRM through faster responses, 24/7 service, and personalized interactions (Arachie et al., 2025; Nwagbala et al., 2025; Wagobera et al., 2023).
- Fostering Innovation: Generative AI helps SMEs create new content and business ideas, accelerating product innovation (Arachie et al., 2025; Nwagbala et al., 2025).
- Data-Driven Decision-Making: Predictive analytics improves demand forecasting, financial planning, and risk assessment, enabling proactive strategies (Adesina et al., 2024; Ocran et al., 2024; Opoku et al., 2024).
- Market Access and Competitiveness: Digital transformation and AI enable SMEs to expand market reach and compete effectively with larger firms (Jain et al., 2025; Nwagbala et al., 2025; Yusuf et al., 2024).

Table 3: Empirical Evidence on Strategic Opportunities by SMEs in Adopting AI Technologies in Developing Economies

S/N	Codes	Theme	Description	References
1	Automation, Productivity, Cost Reduction	Enhanced Operational Efficiencies	AI automates routine tasks, reducing costs and human error, leading to improved productivity.	Akoh, 2024; Friday et al., 2024; Nwagbala et al., 2025; Yusuf et al., 2024
2	ChatBots, CRM, 24/7 Service	Improved Customer Engagement	AI, particularly ChatBots, enhances CRM through faster responses, 24/7 service, and personalized interactions.	Arachie et al., 2025; Nwagbala et al., 2025; Wagobera et al., 2023
3	Generative AI, New Ideas, Innovation	Fostering Innovation	Generative AI helps SMEs create new content and business ideas, accelerating product innovation.	Arachie et al., 2025; Nwagbala et al., 2025
4	Predictive Analytics, Forecasting, Planning	Data-Driven Decision-Making	Predictive analytics improves demand forecasting, financial planning, and risk assessment, enabling proactive strategies.	Adesina et al., 2024; Ocran et al., 2024; Opoku et al., 2024
5	Digital Transformation, Market Reach	Market Access and Competitiveness	Digital transformation and AI enable SMEs to expand market reach and compete effectively with larger firms.	Jain et al., 2025; Nwagbala et al., 2025; Yusuf et al., 2024

Source: Researcher's Compilation, 2025

Table 3 shows the themes for strategic opportunities by SMEs in adopting AI technologies in developing economies. The Table contains the codes leading to the themes, description of the themes and the citations backing up each code/theme.

Discussion of Findings

The result from the data analysis of this study yielded critical insights into the readiness of West African SMEs for AI-powered business transformation, revealing a complex interplay of awareness, perceived benefits, and persistent barriers. The findings are discussed about prior empirical evidence, positioning the study within the broader literature on AI adoption and SME performance in emerging markets. A prominent finding from the analysis is the significant disparity between the awareness of AI tools and their actual practical application among SMEs in West Africa, particularly in South-eastern Nigeria (Arachie et al., 2025). While SMEs demonstrate a moderate to relatively high awareness of Generative AI (Mean=1.65) and ChatBots (Mean=1.61), their day-to-day usage remains notably low. For instance, items directly assessing the actual use of Generative AI for content creation or idea generation consistently fell below the acceptance threshold (Means ranging from 1.15 to 1.3). Similarly, despite high awareness of ChatBots, practical usage indicators, such as employing them for customer communication or inquiry responses, recorded mean scores below the acceptance benchmark (ranging from 1.06 to 1.13) (Arachie et al., 2025). This finding aligns with observations from other contexts, such as Germany, where Schönberger (2023) reported that only 28% of surveyed SMEs had successfully integrated AI solutions despite awareness. Similarly, Muzuva, Zhou and Zondo (2024) found that Generative AI adoption in South African SMEs was constrained by limited technical knowledge and high costs, despite existing enthusiasm for the technology. However, this contrasts with findings from Ghana, where Abrokwah-Larbi and Awuku-Larbi (2022) reported active AI adoption in marketing by SMEs, suggesting potential regional or contextual differences in digital readiness across West Africa. The differences in adoption may be as a result of different operational environment, government supports and infrastructural differences. The SME sector in West Africa is largely informal, undercapitalized, and dominated by micro-enterprises. These businesses often lack structured organizational processes and are excluded from formal financing and policy dialogues, with very few exceptions in the region. This makes digital transformation more difficult compared to SMEs in more formalized environments. Additionally, linguistic diversity and low English proficiency in some regions present unique usability challenges for off-the-shelf AI tools that are not localized. The regional variance in technological development, regulatory commitment, and infrastructure investment further complicates AI adoption.

Despite the low actual usage rates, the analysis reveals that SMEs generally hold a positive perception of AI's potential impact on CRM and overall business operations (Arachie et al., 2025). Most items assessing the usefulness of Generative AI and ChatBots in enhancing customer communication, generating creative business content, and responding promptly to customer inquiries received mean scores above the acceptance benchmark. For example,

Generative AI was perceived to help SMEs generate new and creative ideas (Mean=3.88) and create better content faster (Mean=3.89), while ChatBots were highly rated for improving quick responses (Mean=4.29) and offering round-the-clock service (Mean=3.92) (Arachie et al., 2025). This positive perception resonates with empirical work by Selamat and Windasari (2021), who emphasized that personalized ChatBot interactions significantly enhance customer engagement and satisfaction among SMEs. Similarly, Magdalena (2023) found that ChatBots improved shopping intent and CRM performance, especially when exhibiting human-like interactivity and ease of use. Wagobera et al. (2023) also reported that AI ChatBots, when integrated into marketing platforms, improved customer interaction and service efficiency. However, this cognitive alignment with AI's value has not yet translated into widespread behavioural adoption among Nigerian SMEs, unlike observations by Drydakis (2022), who found that active AI deployment by SMEs during the COVID-19 pandemic led to reduced business risks and improved resilience. Again, this could be as a result of awareness and skill gaps as observed in the analysis.

The regression analysis in the study by Arachie et al., (2025) provided conclusive evidence that both Generative AI and ChatBot usage have a statistically significant and positive impact on CRM capability among SMEs. The model summary indicated a very strong relationship, with an R-squared value of 0.981, meaning that 98.1% of the variance in CRM capability can be jointly explained by the use of Generative AI and ChatBots. Individually, both Generative AI (unstandardized coefficient B = 0.538, p-value = 0.000) and ChatBot usage (unstandardized coefficient B = 0.525, p-value = 0.000) demonstrate a statistically significant positive effect on CRM capability (Arahie et al., 2025). Notably, ChatBot usage appears to have a slightly stronger standardized effect (beta=0.537) compared to Generative AI (beta=0.458), suggesting it's more direct and visible role in improving customer engagement for SMEs that have adopted these tools. These findings are consistent with prior research, such as Wahab and Radmehr (2024), who showed that AI assimilation significantly enhances firm performance through improved customer agility and knowledge absorption. Similarly, Wahab, & Radmehr (2024), (2020) found that embedded AI capabilities contributed to optimized decision-making and superior customer experiences, leading to overall firm performance improvement. Further support comes from Panigrahi, Shrivastava, Qureshi, Mewada, Alghamdi, Almakayeel, and Qureshi, (2023), who linked ChatBot usage with increased innovation capability and supply chain resilience, and Huseyn, Ruiz-Gándara, González-Abril and Romero, (2024), who demonstrated that SMEs with trained personnel were more likely to leverage Generative AI for competitive advantage. This strong statistical potential for AI to enhance CRM capability, however, stands in stark contrast to the low actual usage rates observed in the descriptive analysis. This discrepancy points to a significant latent potential for digital transformation that is not yet being fully tapped, likely due to persistent contextual barriers such as high costs, inadequate training, and insufficient infrastructure (Badghish and Soomro 2024; Olan et al. 2022, as cited in Arachie, 2025).

Conclusion

This study conducted a thorough evaluation of the readiness of West African SMEs for AI-powered business transformation. By adopting a qualitative methodology and integrating insights from comprehensive secondary data through thematic analysis, the study revealed a gap between awareness and actual usage of AI among West African SMEs. Despite a strong understanding and favourable attitudes towards AI's potential benefits, such as improving CRM, enabling creativity through content generation, and optimizing operational efficiencies, this cognitive alignment has not reliably resulted in widespread practical implementation. The analysis also pointed out various interrelated factors that together hinder AI adoption. Although AI possesses significant transformative potential for West African SMEs, paving the way for greater competitiveness, sustainable growth, and better operational and financial outcomes, harnessing this potential requires a focused and multi-faceted approach to close the existing gap between awareness and practical application.

This study has some limitations which are germane for intending researchers in this area. The concentration on qualitative analysis using thematic analysis constitute a major limitation to the study as the generalizability of the study is severely limited by this. There are also methodological and data collection limitations. Collecting data solely from secondary qualitative source, whose contexts differ from the current environment also limits the study. hence, it is recommended to future researchers to make the study more empirical by collecting data from different sources including interview, questionnaire and some secondary quantitative sources.

Recommendations

This study makes the following recommendations:

1. Policies and infrastructural development led by the government should be implemented and geared towards national AI strategies, along with providing subsidized access to AI tools. This involves making substantial investments in robust digital infrastructure, such as dependable internet connectivity and a consistent electricity supply, to establish a strong foundational environment for SMEs in this region.
2. Digital literacy and AI skills training and programs should be designed and implemented by the relevant authorities, ranging from fundamental digital literacy to advanced AI expertise and data literacy, for SME owners and employees in order to close the skills gap, empower them, and translate AI awareness into actual usage.
3. Designing of localized and user-friendly AI solutions is vital to motivating technology developers into creating AI tools that are spontaneous, mobile-friendly, and specifically adapted to the local needs, languages, and operational contexts of West African SMEs to overcome perceived complexity and enable adoption.

4. It is also essential to enhance collaborative systems and peer learning opportunities that build strategic partnerships among SMEs, technology providers, and academic institutions, where successful AI adopters can share experiences and best practices, should be taken into consideration.

Emphasizing data governance and quality is important in aiding SMEs to enhance their processes for data collection, filtration, and integration, as high-quality and well-managed data are necessary for successfully implementing and utilizing AI.

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