

Artificial intelligence adoption and small business growth in sub-Saharan Africa

Dogo Edafe Bawa, Ariyo Oluwajuwon Gabriel, Joshua Temitayo Ayomide, Amos-Fidelis
Nneoma Benita

Abstract

Small businesses are critical to the development of Sub-Saharan African emerging economies, as they contribute significantly to economic growth and advance sustainable development goals. However, these enterprises face persistent challenges to their growth potential, as evidenced by declining firm size, low market growth, and poor market position. Artificial intelligence (AI) adoption has emerged as a transformative force, offering innovative pathways to solving diverse business problems. It provides transformative solutions that enable small businesses to optimise operations, improve customer engagement, and enhance decision-making. Despite the current emphasis on AI Adoption, the impact of AI on business growth in developing economies remains underexplored. This study therefore examined the effect of adopting artificial intelligence on the growth of small businesses in Sub-Saharan Africa, with a focus on Nigeria, Ghana, and Sierra Leone. The survey research design was used. Primary data were collected from 404 owners/managers of small businesses in Sub-Saharan Africa. An adapted and validated research instrument was used to collect data. Data were analysed using descriptive and inferential statistics. Findings showed that the adoption of artificial intelligence had a positive and significant effect on the business growth dimensions of market growth ($\beta = 0.384, t = 7.370$), market position ($\beta = 0.373, t = 6.453$), and firm size ($\beta = 0.345, t = 6.453$). This study, therefore, revealed that AI adoption improved the growth of small businesses. The study recommends investing in and adopting artificial intelligence interventions, backed by supportive policies and capacity-building initiatives, to drive sustainable growth and bridge the digital divide in sub-Saharan Africa. The study suggests future research directions for expanding knowledge in this critical area.

Keywords: Artificial intelligence adoption, Business Growth, Customer engagement, Emerging economies, Small businesses, Sustainable development goals

Dogo Edafe Bawa, dogoe@babcock.edu.ng, Business Administration and Marketing Department, Babcock University, Ilishan-Remo, Ogun State, Nigeria, Ariyo Oluwajuwon Gabriel, Business Administration and Marketing Department, Redeemers University, Ede, Osun State, Nigeria, Joshua Temitayo Ayomide, Business Administration and Marketing Department, Redeemers University, Ede, Osun State, Nigeria, Amos-Fidelis Nneoma Benita, School of Graduate Studies, Valley View University, Oyibi, Ghana

INTRODUCTION

The activities of small businesses drive emerging economies in sub-Saharan Africa (Leger et al., 2025). Small businesses are crucial to the region's economic development, contributing substantially to employment generation and poverty reduction (Eze et al., 2023). According to Kibuacha (2023), small businesses account for 90% of all trades in sub-Saharan Africa. They are pivotal in achieving the Sustainable Development Goals (SDGs), particularly in promoting economic resilience, job creation (about 80%), and social inclusion (Oppong, 2022). Small businesses comprise about 70% of the gross domestic product (GDP) (Hansen-Addy et al., 2025; Yahaya & Nadarajah, 2023). However, these enterprises often face persistent challenges, and their growth trajectory is shaped by a complex interplay of opportunities and challenges, including limited access to financial resources, infrastructure deficiencies, and a rapidly evolving digital landscape (Endris & Kassegn, 2022; Kabongo et al., 2024). They lack insights (data) about their operations needed to provide the practical solutions that they need (Kibuacha, 2023), leading to poor growth of small businesses, evidenced by the decline in their market share and poor market growth (Ekeci et al., 2024).

Research has shown that small businesses face high failure rates, with approximately 30% failing within the first two years and about 50% within five years in the United States (Carter, 2021; Yahaya & Nadarajah, 2023). This figure reaches 70% within the first five years and up to 90% within the first ten years in Africa (Bushe, 2019). This affects their capacity for growth, which is the main problem this study seeks to address.

Adopting artificial intelligence (AI) in small businesses across Sub-Saharan Africa presents significant opportunities for economic growth, innovation, and competitiveness. As digital transformation becomes a key driver of business efficiency, integrating AI technologies into small businesses has been identified as a key enabler of their growth, allowing small businesses to leverage technology for efficiency, market expansion, and competitiveness (Achieng & Malatji, 2022). Integrating digital tools has enhanced operational productivity and provided access to new customer segments, yet the digital divide and infrastructural limitations remain significant barriers.

Sub-Saharan African countries are vulnerable to the adoption of artificial intelligence (Ndibalema, 2025). Despite its promising benefits, AI adoption among small businesses in Sub-Saharan Africa remains limited due to structural and contextual challenges. The external business environment, including regulatory frameworks, market dynamics, and technological infrastructure, significantly influences how small businesses can integrate AI solutions into their operations (Eze et al., 2023). Furthermore, digital literacy gaps among entrepreneurs and employees create additional barriers to the successful implementation of AI technologies (Ndibalema, 2025). This highlights the need for targeted capacity-building initiatives and supportive policy frameworks to foster a more conducive environment for AI adoption.

Non-formal training programs and entrepreneurship development initiatives have also been identified as crucial elements in enhancing the technological capabilities of small business owners. These programs can bridge knowledge gaps and provide practical insights into using AI for business growth (Leger et al., 2025). Despite the potential of artificial intelligence adoption to

improve business growth, there are still unexplored research opportunities to examine this nexus for deeper insight. Specifically, Nwagbala et al. (2025) identified the need to explore the long-term impact of adopting artificial intelligence on the growth of small businesses in Africa.

This study, therefore, sought to explore the effect of AI adoption on the growth of small businesses in Sub-Saharan Africa. To achieve this objective, the researchers first examined existing literature and empirical evidence to broaden the understanding of the study variables. The methodology used to conduct this study was presented next, followed by the findings, the discussion of the findings, the summary, the conclusion, and suggestions for future studies. Understanding these dynamics is essential for policymakers, business owners, and stakeholders seeking to leverage the adoption of artificial intelligence for sustainable economic development and the growth of small businesses in the region.

LITERATURE REVIEW

This section presents the conceptual, empirical, and theoretical underpinnings of this study.

Artificial Intelligence Adoption

Adoption of Artificial Intelligence has been the focus of several recent studies (Agarwal et al., 2024; Neumann et al., 2024). Artificial intelligence adoption has been defined as the use of computer systems or machines capable of thinking and acting like humans to perform tasks that improve decision-making and learning and to determine the best solution to a business problem (Bhalerao et al., 2022; Neumann et al., 2024). AI is frequently defined as the ability of a system to collect and interpret external data, learn from it, and use those insights to achieve specific organisational goals and tasks through flexible adaptation (Hossain et al., 2022). In addition, artificial intelligence adoption refers to the process by which organisations use AI technologies, such as virtual assistants, language translators, and other computer systems, to automate tasks, analyse data, and improve decision-making (Chen & Zhang, 2024; Neumann et al., 2024). AI encompasses all systems designed to perform tasks that naturally require human intelligence, including thinking, learning, reasoning, problem-solving, perception, and language understanding (Russell & Norvig, 2021). Artificial intelligence adoption involves building these AI systems into existing workflows to enhance efficiency and effectiveness.

Among the numerous benefits of adopting artificial intelligence is its ability to improve business processes and reduce operational costs (Gans, 2023). The ability of artificial intelligence adoption to increase demand has also been found in the literature (Gans, 2023). One shortfall of AI adoption is that it has been identified as a general-purpose technology with high implementation complexity, differentiating it from other digital technologies (Neumann et al., 2024). This poses a challenge to its adoption, as it may not be easy to use or deploy and may require training, with close attention to the unique characteristics of the business in which it is to be adopted. Further, the challenge of data security and privacy, occasioned by the ever-increasing vulnerability to data breaches and cyber-attacks, puts most people off (Jain, 2023). Despite these identified shortfalls, the adoption

of artificial intelligence is quickly becoming an essential part of today's digital world and is shaping business operations.

The intensity of artificial intelligence adoption in businesses is based on technology opportunism, normative pressure, and top management support (Chen et al., 2025). Nwagbala et al. (2025) postulate that AI, once considered a choice for large enterprises with considerable resources, is increasingly within the reach of small businesses, offering new possibilities for growth, enhanced efficiency, and innovative solutions.

Business Growth

Business growth involves expanding a firm's resources, operations, and market presence, which often leads to increased profitability and sustainability (Gonzales et al., 2023). Further, business growth is defined as the process of adapting and developing a business to increase the size and scale of its operations. Gillespie (2024) defined business growth as an increase in a firm's size, measured by indicators such as sales value, market share, number of stores, and market position; thus, business growth indicates the successful expansion of a business. Therefore, business growth is typically accompanied by enhanced resources and output. Frey et al. (2019) opine that it involves the expansion of a firm's size over time. Hence, the expansion of business operations can be measured through absolute or relative changes in size and market share (Adomako & Mole, 2018). Pros of business growth include the firm's ability to acquire new customers and secure significant financing; this has been shown to lead to favourable profits and contribute to the organisation's overall development. While business growth can benefit the firm by increasing revenue and market presence, it also has some drawbacks. Frey et al. (2019) identified significant drawbacks of business growth, including increased complexity, market risk, cultural challenges, and resource strain. Gillespie (2024) added that loss of control, market saturation, impact on quality, and increased competition were further cons of business growth. Therefore, how small businesses manage these potential challenges as they grow is vital for their overall sustainability.

Ugli (2024) argued that the random nature of small business growth cannot be predicted from a set of variables; however, deterministic models could be used to identify the internal and external indices that explain it. This study, therefore, conceptualised business growth in terms of market growth, market position, and firm size.

Artificial Intelligence Adoption and Business Growth

Recent studies have found that the adoption of artificial intelligence encompasses task automation and process innovation, thereby affecting the efficiency of business processes (Gans, 2023; Nwagbala et al., 2025). Baabdullah et al. (2021) found that adopting artificial intelligence enabled businesses to improve performance and sustain growth. The adoption of artificial intelligence significantly affects the market position dimension of business growth (Todmal et al., 2024). Chen et al. (2025) found that high AI adoption intensity improved business performance (market growth) by enhancing businesses' dynamic capabilities. Its low adoption, however, has been attributed to the associated high investment risk (Akoh, 2024). Further, Chen and Zhang (2024) found a positive and significant effect of artificial intelligence adoption on entrepreneurial activities. The study found that technological innovation and increased consumer demand resulted from the adoption

of artificial intelligence for business growth. In addition, Hossain et al. (2022) found a significant effect of artificial intelligence on business growth through improved products/services and competitiveness. Iyelolu et al. (2024) found that the adoption of artificial intelligence enhanced various aspects of small business operations; however, adoption is hindered by limited financial resources, a lack of technical expertise, resistance to change, and concerns about data security. The study also found that government support, public-private partnerships, and affordable AI-as-a-service models can help overcome these challenges.

Chen and Zhang (2024) found regional variations in the impact of artificial intelligence adoption on business activities, with areas with greater economic development, net population inflows, and the service sector experiencing larger impacts. Therefore, the top-level decision to maximise the adoption of artificial intelligence benefits business growth. Charlo's (2024) findings showed that, for small businesses to bridge the gap left by the COVID-19 pandemic, prepare for future uncertainties, and achieve sustainable growth, they must adopt artificial intelligence to improve performance and drive growth.

Dynamic Capabilities Theory (DCT)

Dynamic capabilities theory has primarily been used in the management literature to explore interactions. Dynamic capabilities have been defined as the higher-level competencies and skills that firms possess to create, integrate, and reconfigure internal and external resources to shape and respond to ever-changing market environments, thereby improving their performance (Hossain et al., 2022). This theory explains how organisations' innovative abilities are driven to respond to evolving environmental needs by reconfiguring tangible and intangible organisational resources, such as adopting artificial intelligence to enhance business growth. This theory helps explain how small businesses in Sub-Saharan Africa can leverage the adoption of artificial intelligence to sense, size, and reconfigure their current operations to drive business growth by improving market position, increasing firm size, and ensuring market growth (Chen et al., 2025). Dynamic capability theory is therefore used in this study to explain the linkage between artificial intelligence adoption and business growth of small businesses in Sub-Saharan Africa.

Conceptual Model

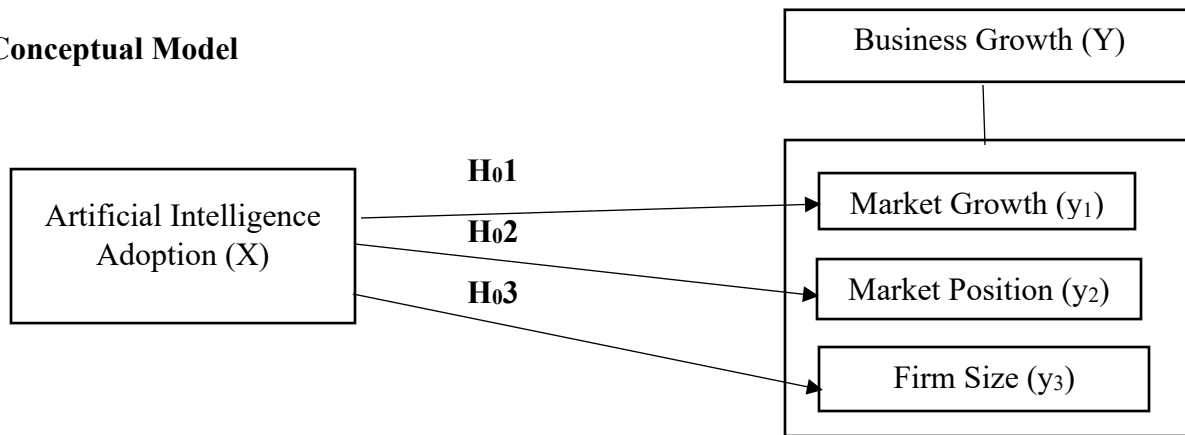


Figure 1: Researchers' Conceptual Model

Source: Researchers' Model (2025)

METHODOLOGY

This study adopted a cross-sectional survey design, enabling the researchers to collect data at a point in time from the selected SMEs more quickly, straightforwardly, and at a lower cost. (Setia, 2016). The study population consisted of 404 owners/managers of selected SMEs across small- and medium-scale enterprises in major business hubs in Nigeria, Ghana, and Sierra Leone, all in Sub-Saharan Africa. The domain of SMEs, however, was selected because it allowed an opportunity to combine several industries. The sample units for the study were the business owners or their managers because they better understood the organisation's state and performance than the other levels of employees.

Simple random sampling was adopted as the sampling technique to obtain primary data and first-hand information using a structured questionnaire (closed-ended), giving all participants an equal chance to be selected for the study. Meanwhile, the questionnaire, which was a Six-point Likert-type scale, was adopted. Furthermore, principal component factor analysis was conducted, and the factor loadings helped confirm the items' suitability for measuring the study variables. Items with low factor loadings were removed from the study. The average variance extracted (AVE) obtained was greater than 0.5 for all constructs used in the study. Thus, the validity of the research instrument was established. Likewise, the reliability test revealed composite reliability values ranging from 0.701 to 0.87. Partial Least Squares Structural Equation Modeling (PLS-SEM) path analysis was conducted in SmartPLS version 4.1.0.9 to examine interactions among the variables under investigation. Moreover, this method of analysis occurs because multiple connections or relationships can be analysed simultaneously, and more crucially, indirect effects can be estimated (Otache, 2019).

Model Specification

Variables of this study on Artificial Intelligence Adoption (AIA) and Business Growth (BG) are operationalised as presented below:

$$Y = f(X)$$

Where:

Y = Dependent Variable - Business Growth (BG)

X = Independent Variable - Artificial Intelligence Adoption (AIA)

Where:

$$Y = (y_1, y_2, y_3)$$

y_1 = Market Position (MP)

y_2 = Market Growth (MG)

y_3 = Firm Size (FS)

Three (3) hypotheses were formulated for this study, and the model for each of the hypotheses is given below:

H₀₁: Artificial Intelligence adoption has no significant effect on market growth

$$MG = \beta_0 + \beta_1 AIA_i + \varepsilon_i \text{----- Model 1}$$

H₀₂: Artificial Intelligence Adoption has no significant impact on market position

$$MP = \beta_0 + \beta_i AIA_i + \varepsilon_i \text{----- Model 2}$$

H₀₃: Artificial Intelligence Adoption has no significant effect on firm size

$$FS = \beta_0 + \beta_i AIA_i + \varepsilon_i \text{----- Model 3}$$

Where

β_0 = intercept of the model

β_i = coefficients of the independent variables

ε_i = random error term

RESULTS

PLS-SEM via Smart PLS version 4.1.0.9 was employed to test the three hypotheses raised in this study. By examining the path model, the path coefficients table showing the beta values, t values, and p values, the effect of artificial intelligence on business growth was analysed. Also, the R-value, R^2 , f^2 , and Q2 were assessed to confirm the results further.

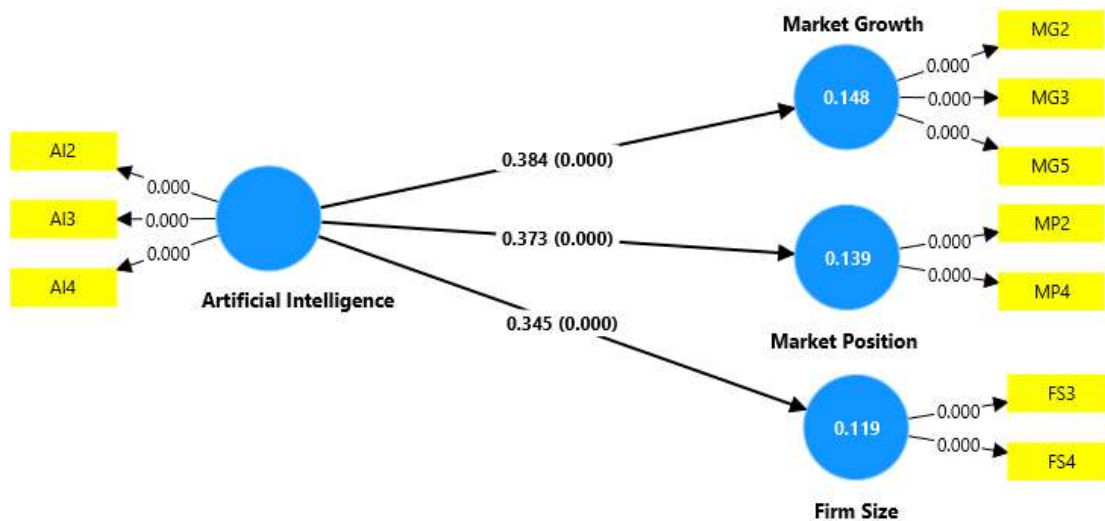


Figure 1: Path Analysis for the effect of Artificial Intelligence on Business Growth (market growth, market position, firm size)

Source: Researchers' Smart PLS 4.1.0.9 output (2025)

The outer (measurement) model of the Partial least squares structural equation modelling, presented in Figure 1, demonstrated the suitability of the items used to measure each variable in the study. The p-values were equal to 0.000, thus confirming their suitability. Similarly, the inner (structural) model showed the path coefficients and the corresponding p-values for each path analysed in the study on the effect of artificial intelligence adoption on business growth (market growth, market position, firm size). This result is further summarised in Table 1

Table 1

Summary of the Path Analysis for the Effect of Artificial Intelligence Adoption on Business Growth (firm size, market growth, market position)

	β	T statistics	P values	f^2	R	R^2	Q^2
Artificial Intelligence Adoption -> Market Growth	0.384	7.370	0.000	0.173	0.385	0.148	0.135
Artificial Intelligence Adoption -> Market Position	0.373	7.574	0.000	0.162	0.378	0.139	0.130
Artificial Intelligence Adoption -> Firm Size	0.345	6.453	0.000	0.135	0.345	0.119	0.107

Source: Researchers' Smart PLS 4.1.0.9 output (2025)

Table 1 summarises the path analysis results for the effect of artificial intelligence adoption on the business growth of SMEs in Sub-Saharan Africa. The results showed that the adoption of artificial intelligence had a positive and significant effect on the three dimensions of business growth used in this study. Specifically, artificial intelligence adoption had a positive and significant effect on market growth ($\beta = 0.384$, $t = 7.370$, $p = 0.000$), market position ($\beta = 0.373$, $t = 6.453$, $p = 0.000$), and firm size ($\beta = 0.345$, $t = 6.453$, $p = 0.000$). This result implies that the adoption of artificial

intelligence is an essential factor to consider when the goal is to improve the business growth of SMEs in Sub-Saharan Africa.

The correlation coefficient (R) from the analysis revealed weak positive relationships between artificial intelligence adoption and the various dimensions of business growth analysed: market growth ($R = 0.385$), market position ($R = 0.378$), and firm size ($R = 0.34$)⁵. This is based on Hair et al.'s (2021) suggestion that R values of 0.75, 0.50, or 0.25 for endogenous latent variables, as a rough rule of thumb, be described as substantial, moderate, or weak, respectively. Therefore, from the coefficient of determination (R^2 values obtained from the model, it can be observed that artificial intelligence adoption accounted for 0.148 (14.8%) of the variation in the market growth of the SMEs. In comparison, the remaining 85.2% changes in market growth were caused by other factors not captured in the study. In addition, artificial intelligence adoption accounted for 0.139 (13.9%) of the changes in SMEs' market position, while the remaining 86.1% were attributable to factors other than artificial intelligence adoption used in the study. Similarly, artificial intelligence accounted for 0.119 (11.9%) of the changes in SMEs' firm size, while the remaining 88.1% was attributed to other factors not captured in this study.

The p-value for all measures of business growth used in the study was 0.000. This showed that the model was suitable for determining the effect of artificial intelligence adoption on the dimensions of individual business growth (market growth, market position, firm size). Based on the result, the null hypotheses raised in the study, H01, H02, and H03, were all rejected. Furthermore, this result was confirmed using Stone-Geisser's Q^2 predictive relevance test with partial least squares structural equation modelling. The Q^2 values obtained from the model were all greater than zero, confirming that the model was well-constructed and had predictive relevance for determining the effect of artificial intelligence adoption on business growth dimensions. Lastly, the F-Square (f^2) statistics were 0.135, 0.173, and 0.162 for the three dimensions of business growth, indicating that when the exogenous variable (artificial intelligence adoption) is removed from the model, the business growth dimensions are moderately affected. According to Cohen (1988), an f-square value of ≥ 0.02 is small, ≥ 0.15 is medium, and ≥ 0.35 is large. Based on the findings of this study, the adoption of artificial intelligence has a positive and significant effect on business growth. Therefore, the null hypotheses were rejected.

DISCUSSIONS

The findings from this study showed that the adoption of artificial intelligence has a positive and significant effect on business growth (market growth, market position, and firm size). This finding corroborates Achieng & Malatji (2022) and Ghimire et al. (2020), who found that the adoption of artificial intelligence significantly affects business growth and competitive advantage. Rubab (2023) measured business growth using profitability, productivity, and revenue growth and found that adopting artificial intelligence improved these dimensions. The findings of this study were consistent with dynamic capabilities theory (Hossain et al., 2022). Further, this study found that market growth was significantly affected by the adoption of artificial intelligence. This finding supports Chen et al. (2025), who observed an improvement in market performance driven by the intensity of artificial intelligence adoption. Similarly, the adoption of artificial intelligence significantly improved business growth and entrepreneurial activities through market expansion

(Charllo, 2024; Chen & Zhang, 2024; Dogo et al., 2024; Iyelolu et al., 2024; Nam et al., 2021). Managers of small businesses are better able to improve their business growth potential through artificial intelligence adoption, as it enables them to sense changes in the business environment and reconfigure their offerings and operations to respond to these changes in such a way that will improve their market position, market growth, and firm size, thus ensuring the growth of small businesses in Sub-Saharan Africa.

CONCLUSION

This study adds to the existing empirical literature on artificial intelligence adoption and the business growth of small businesses in Sub-Saharan Africa. Data collected from small business owners/managers were analysed, and the results showed that adopting artificial intelligence is vital for improving the business growth dimensions of firm size, market growth, and market position. These findings add to the call for these small businesses in Sub-Saharan Africa to invest in artificial intelligence to enhance their business growth potential. Artificial intelligence adoption has enhanced the execution of repetitive business operations, making them faster and more efficient. Also, decision-making for small businesses is made faster and more accurate when artificial intelligence is adopted. The significant drawbacks of adopting artificial intelligence have been the associated high costs, the lack of readily available skilled workers to use it, and constraints related to infrastructure and company size. If the management of small businesses could consider the long-term benefits of investing in artificial intelligence and its associated impact on business growth, they would see that the cost-benefit justifies their current investment in the long run. Further studies could examine the effect of adopting artificial intelligence on cost savings for small businesses in Sub-Saharan Africa.

REFERENCES

- Achieng, M. S., & Malatji, M. (2022). Digital transformation of small and medium enterprises in Sub-Saharan Africa: A scoping review. *Journal for Transdisciplinary Research in Southern Africa*, 18(1), 1-13. <https://doi.org/10.4102/td.v18i1.1257>
- Adomako, S., & Mole, K. F. (2018). *Small business growth and performance*. Sage. <https://bradscholars.brad.ac.uk/handle/10454/17327>
- Agarwal, P., Swami, S., & Malhotra, S. K. (2024). Artificial intelligence adoption in the post COVID-19 new-normal and role of smart technologies in transforming business: a review. *Journal of Science and Technology Policy Management*, 15(3), 506-529. doi: 10.1108/JSTPM-08-2021-0122
- Akoh, E. N. (2024). Adoption of artificial intelligence for manufacturing SMEs' growth and survival in South Africa: A systematic literature review. *International Journal of Research in Business & Social Science* 13(6), 23–37. www.ssbfnct.com
- Baabdullah, A. M., Alalwan, A. A., Slade, E. L., Raman, R., & Khatatneh, K. F. (2021). SMEs and Artificial Intelligence (AI): Antecedents and consequences of AI-based B2B practices. *Industrial Marketing Management*, 98, 255-270.
- Bhalerao, K., Kumar, A., Kumar, A., & Pujari, P. (2022). A study of barriers and benefits of Artificial intelligence adoption in small and medium enterprises. *Academy of Marketing Studies Journal*, 26, 1-6.
- Bushe, B. (2019). The causes and impact of business failure among small to micro and medium enterprises in South Africa. *Africa's Public Service Delivery and Performance Review*, 7(1), a210. <https://doi.org/10.4102/apsdpr.v7i1.210>
- Carter, T. (2021). The true failure rate of small businesses. Retrieved from [The True Failure Rate of Small Businesses | Entrepreneur](https://www.entrepreneur.com/article/123456)
- Charllo, B. V. (2024). AI empowerment in SMEs: Bridging the post-pandemic recovery and innovation gap. *Design of Single Chip Microcomputer Control System for Stepping Motor*, 3(1), 1–4. [https://doi.org/10.47363/jaicc/2024\(3\)291](https://doi.org/10.47363/jaicc/2024(3)291)
- Chen, K., & Zhang, S. (2024). Impact of artificial intelligence on entrepreneurial activity-empirical evidence from Chinese cities. *Technology Analysis & Strategic Management*, 36(12), 4701-4714. <https://doi.org/10.1080/09537325.2023.2268210>
- Chen, J., Zhou, W., & Frankwick, G. L. (2025). Firm AI adoption intensity and marketing performance. *Journal of Computer Information Systems*, 65(2), 172-189. <https://doi.org/10.1080/08874417.2023.2277751>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd Ed.). New York: Routledge.
- Dogo, E. B., Asikhia, O., Amos-Fidelis, B. N., Makinde, O. G. (2023). Operational resilience, critical success factor for technological performance. *International Research Journal of Economics and Management Studies*, 2(2), 352-363.
- Ekechi, C. C., Chukwura, E. G., & Oyeniyi, L. G. (2024). A review of small business growth strategies in African economies. *International Journal of Advanced Economics*, 6(4), 76-94. doi: 10.51594/ijae.v6i4.1071
- Endris, E., & Kassegn, A. (2022). The role of micro, small and medium enterprises (MSMEs) to

- the sustainable development of sub-Saharan Africa and its challenges: A systematic review of evidence from Ethiopia. *Journal of Innovation and Entrepreneurship*, 11(1), 20. <https://doi.org/10.1186/s13731-022-00221-8>
- Eze, B. U., Olojede, P., & Oigiangbe, O. B. (2023). External business environment and small business performance in Sub-Saharan Africa: A conceptual review. *Academic Research & Reviews in Social, Human and Administrative Sciences-II*, 220.
- Frey, N. C., Matin, S., Stanley, H. E., & Salinger, M. A. (2019). Universal fluctuations in growth dynamics of economic systems. *Scientific Reports*, 9(1), 713. <https://doi.org/10.1038/S41598-018-38088-Z>
- Gans, J. S. (2023). Artificial intelligence adoption in a competitive market. *Economica*, 90(358), 690-705. doi: 10.1111/ecca.12458
- Ghimire, A., Thapa, S., Jha, A. K., Adhikari, S., & Kumar, A. (2020, October). Accelerating business growth with big data and artificial intelligence. In 2020 fourth international conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC) (pp. 441-448). IEEE.
- Gillespie, A. (2024). Growth and international business strategies. <https://doi.org/10.1093/hebz/9780198849537.003.0009>
- Gonzales, C. J. M., Chávez, C. W., Berrio, H. J., & Santos, M. A. B. (2023). *Business growth and its relationship with the profitability of a commercial MSE in Arequipa, Peru. Región Científica*.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *An introduction to structural equation modelling. In partial least squares structural equation modelling (PLS-SEM) Using R* (pp. 1-29). Springer, Cham.
- Hansen-Addy, A. E., Parrilli, M. D., & Tingbani, I. (2025). The impact of the regulatory business environment on SMEs' funding choices in developing countries: Evidence from Africa. *International Journal of Finance & Economics*, 30(1), 941-960. DOI: 10.1002/ijfe.2951
- Hossain, M. A., Agnihotri, R., Rushan, M. R. I., Rahman, M. S., & Sumi, S. F. (2022). Marketing analytics capability, artificial intelligence adoption, and firms' competitive advantage: Evidence from the manufacturing industry. *Industrial Marketing Management*, 106, 240-255. doi: 10.1016/j.indmarman.2022.08.017
- Iyelolu, T. V., Agu, E. E., Idemudia, C., & Ijomah, T. I. (2024). Driving SME innovation with AI solutions: Overcoming adoption barriers and future growth opportunities. *International Journal of Science and Technology Research Archive*, 7(1), 36-54. <https://doi.org/10.53771/ijstra.2024.7.1.0055>
- Jain, R. (2023). The Impact of Artificial Intelligence on Business: Opportunities and Challenges. *SSRN Electronic Journal*, 6(2). <https://doi.org/10.2139/ssrn.4407114>
- Kabongo, J. D., Abugre, J. B., & Sigué, S. P. (2024). *Understanding Entrepreneurship in Sub-Saharan Africa: A Venture-ship Approach* 3–10. https://doi.org/10.1007/978-3-031-50128-9_1
- Kibuacha F. (2023). Africa MSME Pulse Survey Report 2023. Retrieved from <https://www.geopoll.com/blog/africa-msme-pulse-2023/>
- Leger, M., Arsenijevic, J., & Bosma, N. (2025). The role and effectiveness of non-formal training

- programmes for entrepreneurship in sub-Saharan Africa: A systematic literature review. *Entrepreneurship & Regional Development*, 37(1-2), 214-247. <https://doi.org/10.1080/08985626.2024.2348046>
- Nam, K., Dutt, C. S., Chathoth, P., Daghfous, A., & Khan, M. S. (2021). The adoption of artificial intelligence and robotics in the hotel industry: prospects and challenges. *Electronic Markets*, 31, 553-574. <https://doi.org/10.1007/s12525-020-00442-3>
- Ndibalema, P. (2025). Digital literacy gaps in promoting 21st century skills among students in higher education institutions in Sub-Saharan Africa: A systematic review. *Cogent Education*, 12(1), 2452085. <https://doi.org/10.1080/2331186X.2025.2452085>
- Neumann, O., Guirguis, K., & Steiner, R. (2024). Exploring artificial intelligence adoption in public organisations: a comparative case study. *Public Management Review*, 26(1), 114-141. <https://doi.org/10.1080/14719037.2022.2048685>
- Nwagbala, S. C., Ezeanokwasa, F. N., Nwachukwu, R., Uzodike, N. J., & Nwosu, O. P. (2025). AI adoption and sustainability of SMES in Africa: Opportunities and challenges. *International Journal of Science and Research Archives*, 14(1), 467-475. DOI: 10.30574/ijrsra.2025.14.1.0009
- Opong, N. B. (2022). Sustainable development goals and small and medium enterprises: A comparative study of emerging economies and sub-Saharan Africa. *Global Business Review*, 09721509221087848.
- Otache, I. (2019). The mediating effect of teamwork on the relationship between strategic orientation and performance of Nigerian banks. *European Business Review*, 31(5), 744–760. <https://doi.org/10.1108/EBR-10-2017-0183>
- Russell, S. J., & Norvig, P. (2021). *Artificial Intelligence: A Modern Approach* (4th ed.). Pearson. - Scientific Research Publishing. www.scirp.org. <https://www.scirp.org/reference/referencespapers?referenceid=3352205>
- Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. *Indian Journal of Dermatology*, 61(3), 261.
- Todmal, A., Patil, P. S., Talwar, E., Gondane, V. A., & Waghmare, G. (2024, May). AI Along with Strategic Competitive System for Developing Early Adopters and Market Positioning System. In 2024 4th International Conference on Advanced Computing and Innovative Technologies in Engineering (ICACITE) (pp. 988-993). IEEE.
- Ugli, B. K. F. (2024). The impacting factors on small business growth. *Frontline Marketing, Management and Economics Journal*, 4(01), 24-36. <https://doi.org/10.37547/marketing-fmmej-04-01-04>
- Yahaya, H. D., & Nadarajah, G. (2023). Determining key factors influencing SMEs' performance: A systematic literature review and experts' verification. *Cogent Business & Management*, 10(3). <https://doi.org/10.1080/23311975.2023.2251195>