Survival Strategies and SMEs Sustainability in Lagos State: The Moderating Role of Artificial Intelligence Adoption

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ABSTRACT

Small and medium-sized enterprises (SMEs) in emerging economies operate in a volatile business environment which threatens their long-term sustainability. In view of this development, this study examines the nexus between survival strategies and sustainability of food and beverage manufacturing SMEs in Lagos State, Nigeria, with special reference on the moderating role of artificial intelligence (AI) adoption. Using a descriptive research design while a cross-sectional survey approach was used to administer the study' survey to the participants of the study. With the aid of a proportionate stratified sampling technique, 295 participants were selected from ten notable government registered food and beverage manufacturing SMEs. Data obtained were analyzed via partial least square structural equation modeling (SMART PLS SEM). The outcome of the study shows that strategic networking, innovation, diversification and cost control strategy improved SMEs sustainability to a great extent. AI adoption positively moderates the relationship between survival strategies and SMEs sustainability. The study concluded that alignment of AI tools with survival strategies improves SMEs sustainability. Therefore, AI plays a vital role in strengthening the effectiveness of survival strategies towards achieving superior sustainability outcomes. This study makes significant contribution to extant literature in the field of SME and technology management by empirically proven that the AI is not just a technological tool but a strategic resource that strengthens the efficacy of survival strategies. To this effect, the study recommended that, government should provide a supporting environment for AI adoption such that creates room for digital infrastructural development, engenders regulatory support for SMEs and encourages public private partnership that can make AI infrastructures easily available SMEs

Keywords: *Artificial Intelligence, Cost control, Diversification, Innovation, Survival strategies, Sustainability*.

1. INTRODUCTION

The growth and development of most nations' economies round the globe is most often traceable to the sustainability of small businesses in such areas. Small and medium-sized enterprises (SMEs) form the bedrock of nation's wealth especially in the area of job creation and resource utilization. Nigeria's SMEs account for 80% of employment creation and contribute about 50% towards the Nation' GDP (SMEDAN, 2021). Within this background, the manufacturing SMEs represent 10% of Nigerians' MSMEs which makes a significant contribution to GDP (NBS, 2026). However, despite this significant contribution towards the nation' wealth, most SMEs are worst affected during economic downturns (Koporcic, *et al*., 2026). The survival and the sustainability of most SMEs in Nigeria is being threatened based on the report of the Nigerian Economic Summit Group (NESG), (2024) which confirms the fact that between year 2023 and 2024, 30% representing 8 million of the registered 24 million micro, small and medium enterprises (MSMEs) in Nigeria shut down operation as result of turbulent business environment and economic reforms.

SMEs adopt various forms of survival strategies for several reasons which include: to cope with economic shocks, maintain business operation, manage crisis disruption, reduce business risk, improve business resilience and remain competitive in the face of innovation and technological changes (Japhet et al., 2025). SMEs survival strategies are deliberate actions/moves taken by SMEs in order survive, stay competitive and overcome external threats. Some of the traditional survival strategies used by SMEs include; business networking, diversification, government support systems, etc. (Phiri, *et al*., 2025). On the other hand, Okeke, (2024) describes SMEs sustainability as the ability to maintain extensive operations, sustain profitability and environmental performance, couple with being socially responsible. Meanwhile, artificial intelligence adoption involves the utilization of digital systems in making automated decisions, enhance resources and optimizing strategic agility (Chatterjee, *et al*., 2021; Maroufkhani, *et al*., 2022).

Existing literature reveals important synergies in the relationship between survival strategies, SMEs sustainability and artificial intelligence. Adebisi and Bakare, (2019) examined the relationship between survival strategies and SMEs sustainability in Nigeria. The duo emphasize that SMEs utilizing product/service differentiation and cost leadership competitive strategies are more sustainable than their competitors who are not using such strategies. In a related version, customer focused strategy (customer relationship management) as form of survival strategy improves revenue streams and organizational sustainability of manufacturing SMEs (Berkata & Kero, 2025). Studies on the moderating role of artificial intelligence adoption on survival strategies and SMEs sustainability are rare in emerging economies (Arroyabe, 2024). Most studies (Apostoaie *et al*. 2025; Farhana *et al*. 2025; Noor, Zainuddin, and Fuzi 2025) on AI adoption, survival strategies and SMEs sustainability were carried out in developed nations. Also, most existing studies (Khanyile, *et al*., 2025; Okoro, *et al*., 2025; Phiri, *et al*., 2025) which focused on traditional strategies; networking, partnership, diversification etc, narrowed the conceptualization of survival strategies. In order to fill the gap identified in the literature, this study investigates the moderating role of artificial intelligence adoption in the nexus between survival strategies and SMEs sustainability**.**

2. LITERATURE REVIEW

2.1 Theoretical framework

2.1.1 Dynamic Capabilities Theory

The Dynamic Capabilities (DC) theory emanated as result of the failure of the resource base view theory in explaining superior performance in a dynamic business environment. The theory explains how firms can mix, shape and reconfigure their internal and external competencies to respond to dynamic business environment (Teece, Pisano & Shuen, 1997). The DC theory pinpoints the fact that, the extent of the swiftness and adaptableness of SMEs in an unpredictable business environment will determine the level of their survival and sustainability. This follows that, when manufacturing SMEs adopts AI tools, their dynamic capabilities will be improved as result of the fact there would be; a quicker response to market changes, real-time market analysis will be generated, decision making would be further enhanced while business processes can be adjusted in a flexible manner. In summary, this theory suggests that improvement in the rate at which SMEs adapt to a turbulent business environment is largely dependent on its ability to leverage of AI which help to strengthen the relationship between survival strategies and sustainability.

2.1.2 Technology–Organization–Environment (TOE) Framework

The TOE framework was proposed by Tornatzky and Fleischer (1990). TOE explains how technologies are being adopted by firms based on three contextual factors; technological, organizational, and environmental factors respectively. The technological context of the model deals with the extent to which firm; perceive the usefulness of a technology, how easy it is to use and the degree of compatibility. More so, organizational context refers to firm' internal capabilities required for implementation and utilizing of such technology and this include: leadership style, firm size, rate of investment in research and development, skills, etc. (Tornatzky

& Fleischer, 1990). The theory further suggests that environmental factors (customer pressure, geographical location, competition, governmental regulations, etc.) play a major role in determining the extent of adoption of a particular technology. To this effect, this theory suggests that AI adoption symbolizes the technological background that forms how SMEs implement survival strategies while operating within the organizational dimension of TOE. Therefore, it can be deduced from this theory that, SMEs' technological innovation might improve its organization processes in the presence of the appropriate internal capabilities and environmental conditions which might result attainment of sustainability outcomes.

2.2 Conceptual framework

2.2.1 Strategic Networking and Sustainability

Strategic networking is a novel strategy used by SMEs especially in the time of economic downturns. In the context of SMEs, strategic networking refers to the ability of SMEs to create, maintain and control relationship with stakeholders such as: customers, suppliers, competitors, etc (Sedmak, *et al*., 2025). Recent empirical evidence shows that there are various reasons why strategic networking significantly influences SMEs sustainability: Capoani, *et al*., (2026) opined that improvement in SMEs access to knowledge and market intelligence through strategic networking improves SMEs sustainability. Similarly in a resource–inhibited environment, the combination of network capital and digital association significantly enhance sustainable SMEs performance (Bindeeba, *et al*., 2026).

By extension, SMEs that are deeply involved in social networks have the capacity to pursue sustainable innovation and are not in any way incapacitated by economic uncertainty. Strategic networking in this regard improves SME sustainability via knowledge acquisition (Khan, et al, 2024). In the same vein, innovation development, serves as a catalyst for improvement of SMEs performance and sustainability when SMEs adopt entrepreneurial networking strategy. This assertion is corroborated by the fact that, networking nurtures innovation capability which in turn link networking actions with sustainable firm performance (Sendawula, *et al*., 2023). Conversely, Boadi, *et al*, (2025) argued that networking alone is not sufficient to bring about sustainability except if such networking initiative is aligned with the appropriate dynamic capabilities and human resource strategies. Begum, *et al*., (2025) and Bichinho, *et al*., (2025) confirmed a positive and significant relationship exist between strategic networking and the three phases of sustainability (economic, social and environmental). Based on the foregoing discussion, it can be inferred that, strategic networking does not only have the capacity to promote sustainability among SMEs, it also transforms SMEs from being a standalone entity to partakers of a broader economic ecosystem. To this end, this study put forward its first hypothesis;

H_1; Strategic networking has a positive effect on SMEs' sustainability

2.2.2 Diversification and Sustainability

Diversification refers to firm' ability to expand into new products, markets, or business with the aim of reducing risk and pursuing growth opportunities. Burdiarto, *et al*., (2022) demonstrated that diversification positively influenced SMEs sustainability by helping them spread their business risks across various products /markets. This act improves their long-term survival, financial stability and the rate at which they adapt to turbulent business environment. In essence, diversification is a critical factor that determines the extent of SMEs sustainability within an industry. A diversified SMEs will reduce the danger of depending on a single market and lessen business risks (Lee *et al*., 2024). Salsabil (2024), investigated SMEs sustainability during economic down turn and concluded that, diversification strategy adopted by SMEs during economic downturn helped them ensure business continuity. This outcome is made possible by the fact that these firms were able to offer various products tailored towards meeting customers need and were able to capture new customer segment. However, Burdiarto *et al.* (2022) argued that diversification may increase operational cost while Khudaykulov, (2022) assert that diversification depend heavily on managerial capability. In view of the highlighted constraints, it can infer that diversification strategy may not habitually guarantee SMEs sustainability except

when it rightly matched with firm capabilities and other environmental conditions. Based on the aforementioned facts, this study put forth is second proposition as;

H_2; Diversification has a positive effect on SMEs' sustainability

2.2.3 Innovation and Sustainability

Innovation strategy is crucial to SMEs survival because of their exposure to competitive and technological pressures (Olaleye, *et al*., 2024). DeJong, (2025) describes innovation as the idea of creating, developing, and implementing new products, services, processes, or business models that create value. The main categories of innovation include: process, product organizational and marketing innovation respectively (Muparangi & Makudza , 2020). Extant literature shows that both product and process innovation positively influenced firm performance. For instance, product innovation helps SMEs serve new markets by meeting the need of an emerging market, increasing its market share which eventually leads to firm' growth (Amoah and Jibril, 2020). Similarly, process innovation helps to reduce operational costs, boost efficiency, increase flexibility, enhances customer satisfaction and financial performance (Christian, 2025). Zhang et al., (2022) posits that the triple-bottom-line sustainability is significantly influenced by innovation activities such as enhanced production process and product redesign. Consequently, innovation strategy improves operational sustainability via reduction in waste production and improving efficiency. This act makes SMEs achieve sustainability as a result of their ability to save cost (Becerra-Vicario *et al.,* 2023). Similarly, process and product innovation influence stakeholders trust and environmental accountability. This means that, innovation strategies promote sustainability via corporate social responsibility (Becerra-Vicario, *et al*., 2023). Hidayat and Pok (2025) proposed that, SMEs are able to successfully execute both product and process innovations as result of their continuous organizational learning, knowledge and intellectual capital, which often result to sustained business performance and competitiveness. To this effect, innovation strategies especially process and product innovation are seen as important factors that drive SMEs sustainability. On this note this study put forward its third hypothesis as;

H_3; *Innovation strategy has a positive effect on SMEs' sustainability*

2.2.4 Cost Control and Sustainability

A cost control or cost reduction strategy is a plan that is centered on reducing expenses so as to preserve profitability while maintaining some level of competitiveness (Ben-Caleb, *et al*., 2019). Cost control is an important strategy for SMEs survival because most SMEs have limited financial capacity. Findings from the study of Omula, *et al.,* (2025) who investigated the influence of cost reduction approach on the profitability of SMEs in Nigeria, shows that firms that are able to control discretionary costs had stronger financial sustainability. Hence, cost reduction positively influenced SMEs economic sustainability and survival. Similarly, Fadjarenie, *et al.,* (2024) who examined the effect of cost reduction strategies (like lean production and expense monitoring) on firm sustainability in the Indonesian manufacturing industries, concluded that, both operational efficiency and firm sustainability were positively affected by cost reduction strategy. However, certain authors portrayed the role of digitalization-driven cost reduction strategy on SMEs; Saman, Mahmud, and Mat Nor (2025) examined the nexus between strategic technology adoption and SMEs sustainability opined that, both transactional and operational cost are reduced as a result of strategic technology adoption leading to continuous improvement and SMEs sustainability. In the same vein, Al-Omush, *et al*., (2023) established the fact that cost reduction strategy driven by digitalization enhances SMEs sustainable competitive performance. By extension, Abdel-Aty, *et al*., (2024) investigated how inexpensive digital solutions affect industrial sustainability. The authors concluded that SMEs utilizing low-cost digital solutions are able to enhance industrial sustainability due to reduction in production lapses and waste. Based on forgoing discussion, it can be inferred that cost reduction strategy contributes immensely towards SMEs sustainability via; efficient resource utilization, improve operational efficiency, and profitability, enhances resilience to economic downturn and augments SMEs capacity to investment in innovation. To this end, this study put forward its fourth hypothesis as:

H_4; Cost control strategy has a positive effect on SMEs' sustainability

2.2.5 Moderating Role of AI Adoption on Survival Strategies and SME Sustainability

Artificial Intelligence (AI) adoption refers to the combination of machine learning, automation, analytics, and intelligent systems into business processes (Dwivedi, *et al*., 2021). The relevance of incorporating AI into business operations cannot be over emphasized due to the fact that, AI promotes the computerization of routine tasks and this allow employees focused on other complicated and mentally motivating tasks (Chan & Zary, 2019; Uford & Akpan, 2024). Brynjolfsson, *et al*. (2019), opined that, AI improves decision making process by offering data-motivated intuitions and suggestions as well as employee' productive work conduct. Relating to the moderating role of AI adoption on survival strategies and SME sustainability**,** Badghish and Soomro, (2024) investigated the role of AI adoption by SMEs in Saudi- Arabia in achieving sustainability. The duo concluded that SMEs utilization of AI tools reinforces strategic practices which directly leads to the accomplishment of sustainable business performance. Haq and Suki, (2024) examined how AI adoption moderates the relationship between competitive pressure, leadership vision, partnerships and SME performance in Pakistan. The study found out that, AI serves as a technological promoter which helps SMEs change survival strategies into quantifiable sustainability. In furtherance of this discourse, Arroyabe, (2024) studied AI adoption among European SMEs and he concluded that, AI adoption improves firm' productivity when firm digital infrastructure, human capital and firm size serve as a moderating variable. Finding from the extant literature shows that AI intensifies the sustainability effect of firm and environmental strategies via improved operational adeptness. Consequently, Mustafa, Ab Ghani, and Adam (2025) studied how AI adoption influences SMEs performance. Finding from the study shows that employee digital skill and readiness improve AI adoption which indirectly reinforces SME growth and sustainability. Based on the examined literature, AI moderates the relationship between survival strategy and SMEs sustainability through; enhancement of operational efficiency, improvement of strategic decision, reinforcement of adaptive capability and increment of SMEs resilience in turbulent business environment. To this effect, this study put forward the fifth hypothesis;

H_5; AI adoption positively moderates the relationship between survival strategies and SMEs sustainability.

3. RESEARCH METHODOLOGY

3.1 Research design

This study made use of descriptive research design while a cross-sectional survey approach was used to administer the study' survey to the participants of the study. The rationale for adopting this research design is as a result of the fact that, the design provides a snapshot of the study' population (Creswell & Creswell, 2018). In essence, the current situation of the SMEs survival strategies, AI adoption and sustainable practices is well captured. More so, this approach permit researcher to make use of standardized research instrument for the study' participants making statistical analysis much easier (Saunders, *et al*., 2019). The approach provides a superior understanding of the population attributes (Maier, *et al*., 2023), reduce bias in data collection and makes study' outcome more generalizable (Hunziker & Blankenagel, 2024; Saunders, *et al*., 2019).

3.2 Population and Sample size

The population for the study consists of employees of government registered, food and beverage manufacturing SMEs situated in Lagos State and also adopt low-cost AI applications (chatbots, Facebook/Instragram AI analystics, AI enable delivery platform, etc) in business operations. The study considered only ten notable food and beverage manufacturing SMEs in Lagos State as shown in table 3.1. The rationale for choosing these firms is that most of the firms are listed among the top ten leading food and beverage manufacturing SMEs in Lagos State. These firms have a good online presence which aid questionnaire administration. Also, the selected firms operate within the FMCG food manufacturing and are mostly locally owned.

Table 1 **Selected Food and Beverage Manufacturing SMEs**

S/N	Firm	Staff strength	Proportion (%)	Sample
1	Ayoola Foods Nigeria Ltd	200	15	46
2.	Consecrates Foods	60	5	15
3.	Foodpro Nigeria	150	12	37
4.	Ifgreen foods	80	6	18
5.	Invex Foods Processing Company Limited	60	5	15
6.	Reelfruit	200	15	46
7.	Tingo foods	200	15	46
8	Tropical sun foods Nigeria	200	15	46
9..	Tummy Tummy foods	50	4	12
10.	Vita processing unit	100	8	24
	Total	**1300**	**100**	**305**

Sources; MAN, (2024)

The sample size for the study was determined through Yamene, (1967) sample size formula

$$n = \frac{N}{1 + N(e)^2} = \frac{1{,}300}{1 + 1{,}300(0.05)^2} = 305$$

Where; N = Population Size = 1,150, e = Significant level of error (0.05), n = firm Sample Size

Therefore, the sample is approximately 305 respondents. In order cater for attrition which may arose a result of participants lack of motivation in the research, not filling questionnaire properly, etc. A 20% attrition proposed by Fewtrell, *et al.*, (2008), increased the sample size to 366.

3. 3 Sampling technique

This study adopts a proportionate stratified sampling procedure, which was used to select respondents each of the 10 listed firms in table 1., in proportion of the population. The rationale for this technique is that researcher's sampling bias will be reduced. More so, there would be an increase representativeness and greater statistical accuracy (Creswell & Creswell, 2018). In addition, the technique is appropriate for statistical appraisal and inferential analysis (Saunders, *et al.,* 2019). Therefore, the study assumes that the estimations calculated via the proportionate stratified sampling procedure in this study are both generalizable and balanced.

3.4 Procedure and scale of measurement

This study made use of psychometric research scales for the study instrument considering the variables of interest (survival strategies, AI adoption and SMEs sustainability) of this study. Survival strategies measured by four constructs; strategic networking, diversification, innovation and cost control strategy respectively. For strategic networking, the study adopted scale from Kickul and Gundry, (2002). The duo proposed an 8-item scale for measuring networking with a Cronbach's alpha value of 0.86 which is an indication of high level of reliability. However, the 8-items items were reduced to 5-items scale to suit the study. The scale for diversification is derived from two sources; Hitt, *et al.,* (1997) and Li and Wong (2003). Both scale measured product –market diversification having 6 and 7 items with Cronbach values of 0.82 and 0,84 respectively. Two items were extracted from Hitt, *et al.,* and three items three items from Li and Wong. This brings the total number items for measuring diversification in this study to 5. For innovation strategy, this study extracted 5 items from Wang and Ahmed (2004) organizational innovativeness scale of 10 items having Cronbach values of 0.82. Hence, 5 items were used to measure innovation strategy in this study

On the other hand, cost control strategy scale of 5- items for this study was extracted from Ward, Bickford and Leong (1996) cost-efficient manufacturing strategy scale with Cronbach value 0.84. Meanwhile, AI adoption scale was derived from two authors; Maroufkhani *et al*. (2020), 6 –items scale measuring AI adoption readiness and usage in SMEs and Olanrewaju et al. (2023), 5- items scale which measured AI technology use in SMEs. The 6 - items scale was reduced to 4 while the 5- item scale was reduced 3 to suite the purpose of this study. Both scales had Cronbach Alpha value of 0.88 and 0.85 respectively. In conclusion, SME sustainability measures were derived from three sources; Ahmad, *et al*. (2016) 10 items, Cronbach value 0.90

measured sustainability performance of SMEs, Kraus *et al.* (2020), 9 items with Cronbach value 0.86 measured economic, environmental and social sustainability while Olanrewaju *et al*. (2023), 8 items with Cronbach value 0.88 focused on SME survival, resilience and long-term performance. Five items were extracted from each of the scale making a total of 15 items used to measure SME sustainability in the course of this study, All these measures were compiled to form a single questionnaire which was administer to study's participants using an online method with the aid of Google form.

3.5 Data analysis technique

Structural equation model (SEM) analysis was used to appraise, the indicators, observed and latent variables of survival strategies and SMEs sustainability, along the moderating path of AI intelligence. Furthermore, SMART PLS SEM version 4.5 was used to evaluate relationship among the latent constructs so as to discover if study' data contains high level multicollinearity (Ringle, *et al.,* 2023). SMART PLS SEM also allows for the establishment of hypothetical relationship existing among the theoretical paradigms and the association existing between the variables of interest and their perceived indicators (Hair & Alamer, 2022).

4. RESULTS AD DATA ANALYSIS

This study employed SMART PLS SEM version 4 for model validation and hypotheses testing based on the model fit recommendation indices (Hair, *et al*., 2022). In order to determine the reliability and validity fit indices for assessing survival strategies, SMEs sustainability and adoption of AI, convergent validity and composite reliability test was conducted as presented on table 2. The indicator loading, Croanbalch Alpha and most of composite reliability coefficients respectively (rho_A) were ≥ 0.70 and Average variance extracted (AVE) ≥ 0.50 confirms convergent validity and composite reliability. This outcome reveals the fitness of our model and confirms the validity and reliability of study' research instrument. Discriminant validity is indicated by Table 3. The outcome of table 3 is a measure of the fitness and appropriateness of a design to measure what is intended to measure. AVE for each of the constructs were highlighted and the square root of the AVE across the inter correlation matrix diagonals are higher than the correlations values of other constructs in the model (Hair & Alame, 2022).

Table 2. Reliability/validity fit indices for assessing survival strategies, SMEs sustainability and Adoption of AI (convergent validity and composite reliability)

Constructs	Indicators	X	*A*	AVE	rho_A
Survival Strategies					
Strategic networking			0.854	**0.738**	**0.854**
	STR_NET1	0.855			
	STR_NET2	0.799			
	STR_NET3	0.771			
	STR_NET4	0.778			
	STR_NET5	0.791			
Diversification			**0.848**	**0.760**	0.847
	DIV_TIN1	0.818			
	DIV_TIN2	0.814			
	DIV_TIN3	0.798			
	DIV_TIN4	0.805			
	DIV_TIN5	0.810			
Innovation			0.803	0.719	0.802
	INN_T0N1	0.843			
	INN_T0N2	0.767			
	INN_T0N3	0.773			
	INN_T0N4	0.780			
	INN_T0N5	0.770			
Cost control			0.755	0.738	0.754
	COS_TRL1	0.843			
	COS_TRL2	0.794			
	COS_TRL3	0.797			

	COS_TRL4	0.774			
	COS_TRL5	0.787			
Adoption of AI			0.832	0.746	0.831
	Adp_AI1	0.867			
	Adp_AI2	0.874			
	Adp_AI3	0.855			
	Adp_AI4	0.887			
	Adp_AI5	0.829			
Sustainability dimensions					
Economic sustainability			0.818	0.790	0.818
	Eco_Sy1	0.824			
	Eco_Sy2	0.827			
	Eco_Sy3	0.813			
	Eco_Sy4	0.811			
	Eco_Sy5	0.821			
Social sustainability			0.805	0.773	0.804
	Soc_Sy1	0.810			
	Soc_Sy2	0.806			
	Soc_Sy3	0.802			
	Soc_Sy4	0.811			
	Soc_Sy5	0.814			
Environmental sustainability					
	Env_sy1	0.651	0.754	0.666	0.752
	Env_sy2	0.652			
	Env_sy3	0.670			
	Env_sy4	0.683			
	Env_sy5	0.663			

Notes: χ Factor loading; *a* Cronbach's alpha; AVE average variance extracted; rho_A composite reliability
Source: Authors' computation from field Survey, 2026

Table 3. Inter-correlation items matrix and discriminant validity

Constructs	SNG	DIV	INN	CCL	AAI	ECSY	SSY	ESY
SNG	0.738							
DIV	0.514**	0.700						
INN	0.613*	0.501**	0.719					
CCL	0.318	0.456	0.584*	0.739				
AAI	0.751**	0.607**	0.682*	0.518**	0.743			
ECSY	0.645**	0.587*	0.568*	0.528**	0.554*	0.790		
SSY	0.450	0.525**	0.409	0.412	0.527**	0.584**	0.773	
ESY	0.548**	0.582**	0.437	0.471*	0.457	0.442	0.474*	0.660
Mean	4.2	4.4	4.3	3.9	4.2	4.2	4.3	4.5
SD	0.63	0.68	0.65	0.71	0.67	0.68	0.64	0.61

Notes; significant ** 0.05, *0.1, SD = Standard deviation; SNG = Strategic networking; DIV= Diversification; INN= Innovation; CCL= Cost control; AAI= Adoption of artificial Intelligence; SSS= survival strategies; ECSY= Economic sustainability; SSY= Social sustainability; ESY = Environmental sustainability.
Source: Authors' analysis own work, 2026

4. 1 Study interpretations

Table 4 and fig1, summaries the outcome for the hypotheses testing (H_1 to H_5) which showcases the relevant interaction and relationship existing among the investigated constructs. H_1 portrayed an indication that, strategic networking positively influences SMEs sustainability in an AI driven work environment. This result is supported by the regression value of (B =0.100, p = 0.000) which pinpoints the fact that hypothesis (H_1) is significant at P< 0.05. The implication of this outcome is that, haven control for the adoption of AI in our model, strategic networking strategy still enhances the SMEs sustainability. In a related version, H_2 shows that diversification strategy significantly influences sustainability with a regression value of (B

=0.114, p = 0.000 < 0.05). This follows that, for every unit change in diversification strategy, there would be 11.4-unit changes in SMEs sustainability after controlling for AI Adoption. Similarly, the third hypotheses H_3 (B =0.165, p = 0.000 < 0.05) regression coefficient values indicate that both innovation strategy significantly influence SMEs sustainability. This outcome shows the important role of technological capability in achieving sustainability. In the same vein, the fourth hypothesis H_4 produced regression coefficients (B =0.154, p = 0.000 < 0.05). This means cost control strategy positively and significantly influence SMEs sustainability. This is an indication that improvement cost control strategy will result to a better SMEs sustainability. Based on fig 1., all the survival strategies measures examined in the cause of this study effectively enhanced the three facet of SMEs sustainability (economic, social and environment) which shows survival strategies is an enabler of sustainability.

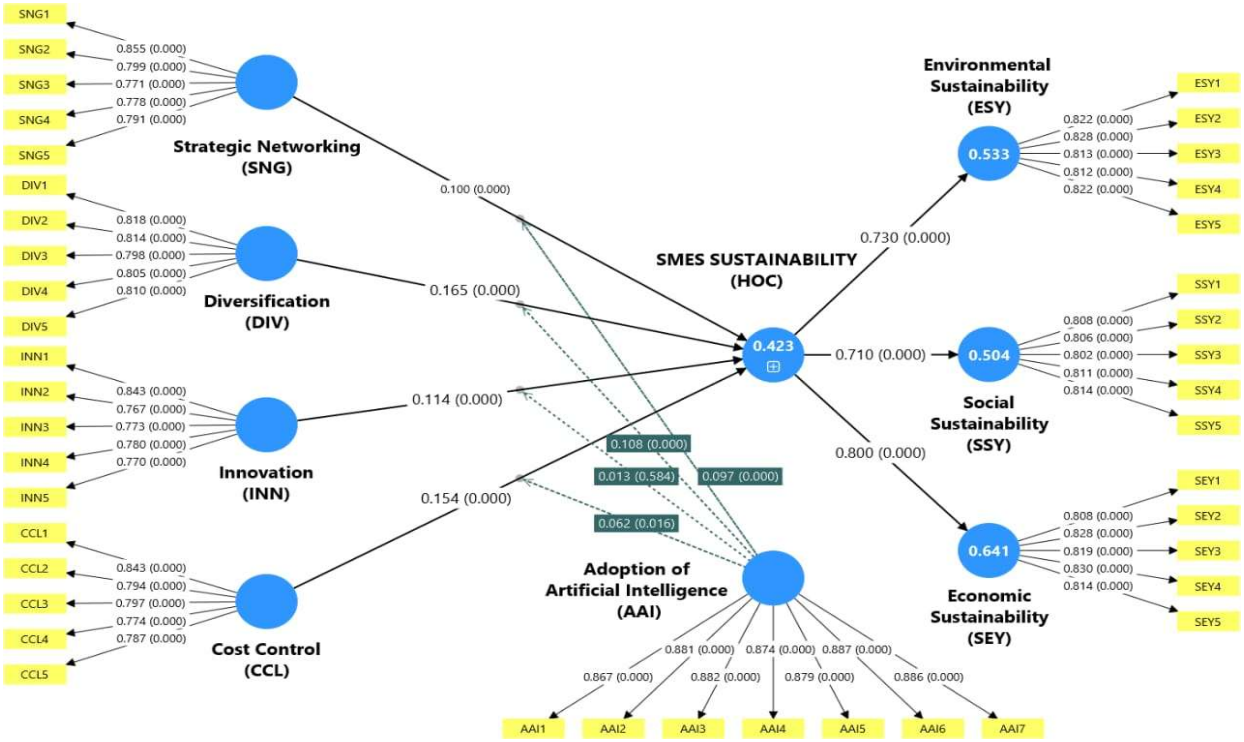
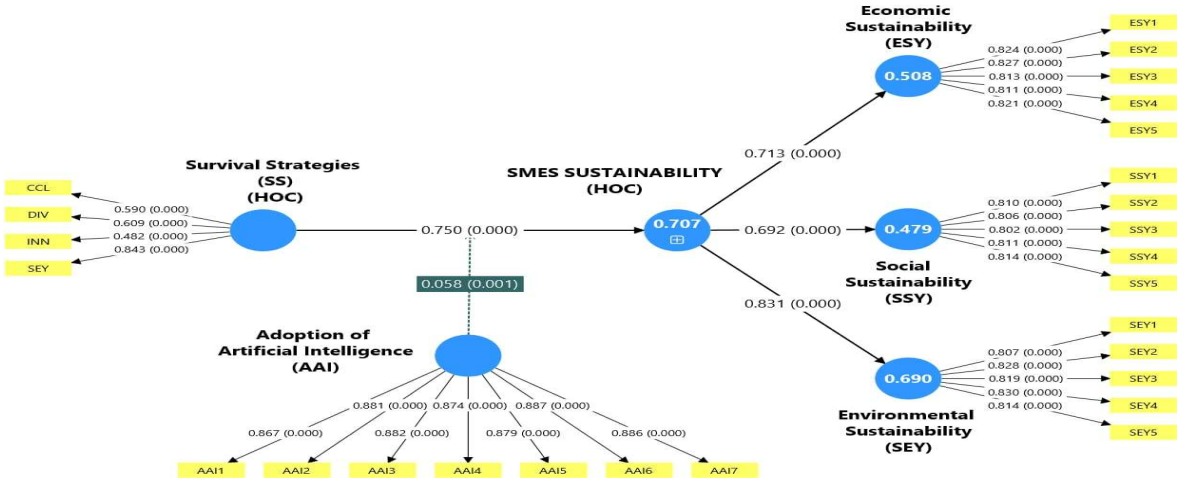


Figure 1. *Survival strategies, SMEs sustainability and adoption of AI relationship path diagram analysis*



Source: Authors' analysis own work, 2026

Figure 2. Moderation path diagram analysis

Table 4. Test of hypotheses – PLS structural equation model (SEM) path analysis

Hypo	Path analysis	Estimate (*b*)	SE	T-value	p-value	Significance/decision
H_1	SNG → SY	0.100	0.048	2.048	*****	Significance/accepted
H_2	DIV → SY	0.114	0.058	1.960	*****	Significance/accepted
H_3	INN → SY	0.165	0.034	4.852	*****	Significance/accepted
H_4	CCL → SY	0.154	0.040	3.850	*****	Significance/accepted

Authors' analysis own work, 2026

Table 5. Moderation Analysis results -bootstrapping

Hypotheses	Path analysis	B	SE	t-value	p-value	Result/decision
H_5	SS x AAI → SY	0.058	0.0312	1.858	0.001	Supported/accepted

Authors' analysis own work, 2026

Finally, Fig2 and table 5 present the outcome of the moderating role of AI adoption (H_8) in the relationship between survival strategies and SMEs sustainability. Based on fig 2, AI adoption produced the strongest measurement quality when compared to other constructs in this study. This is an indication of the extent of readiness of SMEs to adopt artificial intelligence to enable their existing strategies work effectively in attaining sustainability. Supportively, the interaction effect of AI adoption in the relationship between survival strategies and SMEs sustainability as revealed in table 5 shows regression coefficient value (B =0.058, p = 0.000 < 0.05). This outcome shows a positive and significant effect occurred when AI adoption moderates the relationship between the two variables of interest. By implication, AI adoption strengthens the efficiency and effectiveness of survival strategies hereby making them more impactful on sustainability. It also follows that, SMEs with higher rate of AI adoption stand a better chance of gaining greater returns from their strategic actions that has resulted to an enhanced level of sustainability.

5. DISCUSSION

This study established the fact that strategic networking positively and significantly improves SMEs sustainability. The result shows relational capital is an essential factor for SMEs survival and sustainability in a turbulent business environment. It also shows the need for SMEs to form formidable link with other stakeholders like; suppliers, customers, financial institutions etc. so as to again resilience and sustained performance stability. However, this outcome is in tandem with existing literature; Bindeeba, *et al*., (2026) and Capoani, *et al. (*2026) who demonstrated that various forms of strategic social networks; relationship networking, collaborative networking, combination of network capital and digital association improves SMEs sustainability. This submission shows the need for integration of technological input like AI into strategic networking initiative. Furthermore, from the resource-based view perspective, strategic networking is an intangible asset which provides SMEs with access to resources, knowledge, financial and technological opportunities which they may not literally achieve when they are alone. Thereby, enabling them respond quickly to environmental volatility.

Similarly, the study also confirmed the fact that diversification strategy significantly improves SMEs sustainability. SMEs that are able to diversify their products, income, markets, etc., adapt well and are more immune from environmental shocks. The act of diversification ensures continual existence of business especially during economic disruption by helping SMEs managers spread business risk across multiple streams of income. Examining the relationship between diversification and sustainability has given rise to eco-friendly products and the discovery of new market segment. The outcome is in a symmetrical position with several existing studies; Khudaykulov, (2022) claimed diversification promotes effective resource reallocation while Wang, (2025) demonstrated that modification of strategies across diverse institutional environments also lead to sustainability. More specifically, product diversification in eco-friendly product lines result to social and environmental sustainability while creation of multiple streams of income leads to economic sustainability (Salsabil, 2024). Succinctly, the need for SMEs to embrace diversification strategy as survival strategy is becoming crucial because the incessant economic disruptions, changing customer preference, inflationary pressure, just to mention a few.

Furthermore, the findings from this study established the fact that innovation strategy significantly improves SMEs sustainability and this supports extensive innovation performance literature. SMEs making use of innovation strategy (especially product and process) experienced enhanced operational efficiency and customer satisfaction. The strategy enables SMEs create value while still adjusting to changing market conditions. SMEs utilizing this strategy gain more resilience in the face of economic disruptions by adjusting their business models and processes. Meanwhile, this study' outcome is in agreement with previous empirical studies; Olaleye, *et al*., (2024) affirmed the fact that innovation capabilities of the Nigerian SMEs influence it business sustainability based on how SMEs overcome the dynamism of its business environment. More so, Zhang, et al., (2022) posits that the triple-bottom-line sustainability is significantly influenced by innovation activities such as enhanced production process and product redesign. In summary, the adaptive capacity of SMEs operating in turbulent business environment is further enhanced as stipulated by the dynamic capabilities' theory in the sense that, adoption of innovation strategy will help SMEs managers identify opportunities, annex resources and reconfigure capabilities to achieve long-term sustainability.

Parallel to this, this study demonstrated that cost reduction strategy positively influenced SMEs sustainability. Cost reduction strategy is a crucial mechanism for SMEs sustainability because of the constraints of limited financial resources usually faced small firms. SMEs employing cost reduction strategy especially in areas like; waste minimization, resources optimization and efficiency in business operations usually achieve the triple bottom line of sustainability and remains resilience in volatile business environment. This outcome is not in isolation, it supported existing empirical studies; Fadjarenie *et al.,* (2024) who investigated cost reduction strategy and firm sustainability in Indonesia asserted that, cost reduction strategy positively influenced operational efficiency and firm sustainability. While Shaik *et al*. (2024) opine that, efficient cost control produces environmental and economic sustainability

The moderation analysis conducted in the course of this study shows that, AI adoption significantly reinforces the relationship between survival strategies and SMEs sustainability. This finding is an indication that the effectiveness of survival strategies (which enables SMEs cope in a volatile business environment) is dependent on the degree to which the manufacturing food and beverage SMEs adopt and integrate AI-driven technologies into their business operations. Meanwhile, the positive moderating effect is an indication that SMEs with greater levels of AI adoption will derive better sustainability benefits compared to others with low level of AI utilization. In order words, SMEs with greater level of digital enthusiasm and AI absorptive capacity will efficiently and effectively make use of survival strategies. This assertion aligns with the submission of extant literature (Rialti, *et al.,* 2019; Awan, *et al*., 2022) who opined that, the performance results of a strategic initiative taken by a firm, is contingent on digital and AI capabilities condition of the firm. Finally, the interaction effect in the moderation analysis is a pointer to the fact that, survival strategies might not be adequate enough to guarantee long term sustainability in a turbulence business environment like Nigeria. Therefore, if SMEs do not adopt AI in their business processes, the mentioned survival strategies might just produce short term benefits. Therefore, the outcome of the moderation analysis shows that AI adoption serves as a complementary technological tool that improves the strategic significance of survival strategies.

6. CONCLUSION AND RECOMMENDATIONS

This study established the fact that all the examined survival strategies (strategic networking, diversification, innovation and cost control strategy respectively) improved SMEs sustainability to some extent. Consequently, AI adoption acts as a major catalyst for improving the effectiveness of survival strategies in producing result-oriented sustainability outcomes. Based on the established fact, this study concluded that, survival strategies might not be adequate enough produce long term sustainability outcomes, except if such strategies are aligned with AI tools. In line with conclusions made in this study, this study recommends; SMEs managers should ensure their processes; products, designs, market intelligence, etc. are AI-enabled. Doing

this will help SMEs enjoy the benefits of survival strategies being driven by AI. For example, AI driven cost reduction strategy might result to waste reduction while strategic networking strategy align with AI can result to optimization of supply chain coordination. SMEs should improve digital and enabling capabilities of his employees by investing more in employee training and management up skilling with the aim enhancing AI enthusiasm and strategic adoption. Furthermore, government should provide a supporting environment for AI adoption such that creates room for digital infrastructural development, engenders regulatory support for SMEs and encourages public private partnership that can make AI infrastructures easily available SMEs.

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