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Sustainable Leadership, Digital Transformation, and Organisational Resilience in Emerging Markets: A Moderated Serial Mediation Model

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Abstract: *Digital transformation has become a strategic imperative for organisations seeking resilience in volatile emerging markets. However, the mechanisms through which digital transformation enhances organisational resilience remain underexplored, particularly the roles of employee agility and sustainable leadership. This study investigates the mediating role of employee agility and the moderating role of institutional support in the relationship between sustainable leadership, digital transformation, and organisational resilience. Drawing on dynamic capabilities theory, social exchange theory, and institutional theory, we propose a moderated serial mediation model. Using a time-lagged, multi-source survey design, we collected data from 562 employees and 112 managers across 124 manufacturing and service firms in Nigeria, Ghana, and Kenya. Structural equation modelling (SEM) and hierarchical linear modelling (HLM) were employed to test the hypotheses. Results indicate that sustainable leadership positively influences digital transformation ($\beta = 0.48$, $p < 0.001$) and organisational resilience ($\beta = 0.39$, $p < 0.001$). Digital transformation partially mediates the relationship between sustainable leadership and resilience (indirect effect = 0.16, 95% CI [0.10, 0.23]). Employee agility mediates the digital transformation-resilience link (indirect effect = 0.21, 95% CI [0.14, 0.29]). Institutional support significantly moderates the relationship between digital transformation and employee agility ($\beta = 0.24$, $p = 0.001$), and the moderated mediation index is significant (index = 0.08, SE = 0.02). The findings suggest that sustainable leadership enables digital transformation, which in turn enhances employee agility, but this pathway is strengthened by institutional support. Theoretical contributions, practical implications for managers and policy makers, and future research directions are discussed.*

Keywords: Sustainable leadership, digital transformation, employee agility, organisational resilience, institutional support, emerging markets, sub-Saharan Africa.

1. Introduction

The past decade has witnessed unprecedented technological disruptions that have fundamentally reshaped the competitive landscape of organisations worldwide (Vial, 2019; Verhoef et al., 2021). Digital technologies such as artificial intelligence, cloud computing, big data analytics, and the Internet of Things have become essential tools for firms seeking to maintain competitiveness and survive external shocks (Fletcher & Griffiths, 2020; Kraus et al., 2021). In emerging markets, where economic volatility, political instability, and infrastructural deficits are commonplace, the ability to leverage digital transformation for organisational resilience is particularly critical (Attah & Etuh, 2026; Eller et al., 2020, Sousa & Rocha, 2019; Ezenwakwelu et al., 2019). Yet, despite substantial investments in digital technologies, many firms in sub-Saharan Africa fail to achieve the expected improvements in resilience (AlNuaimi et al., 2022; Martinez-Carro et al., 2020). This implementation gap suggests that technological adoption alone is insufficient; leadership and organisational capabilities play crucial enabling roles (Iqbal et al., 2020; Cai et al., 2021; Ogbo et al., 2015).

Sustainable leadership has emerged as a promising construct in management research, emphasising long-term value creation, stakeholder orientation, ethical decision-making, and environmental stewardship (Iqbal et al., 2020; Anaba et al., 2025b; Fatima & Elbanna, 2023). Unlike traditional leadership styles that focus narrowly on short-term financial performance, sustainable leaders balance economic, social, and environmental goals (Lozano, 2020; Lamidi & Attah, 2025; Khan et al., 2021). In emerging economies, where institutional voids and resource scarcity are prevalent, sustainable leadership is theorised to facilitate the adoption of digital technologies by fostering a culture of learning, psychological safety, and innovation (Attah et al., 2026; Shahzad et al., 2020; Anaba et al., 2025). However, empirical evidence on how sustainable leadership interacts with digital transformation to produce organisational resilience remains fragmented (Onwe et al., 2025; Onalo et al., 2025).

Employee agility, defined as the ability of employees to rapidly adapt to changing circumstances, learn new skills, and proactively solve problems, has been identified as a critical micro-level capability in digitalised organisations (Cai et al., 2021; Muduli & Pandya, 2020; Ndubuisi-Okolo et al., 2017). Agile employees are more likely to embrace digital tools, engage in continuous learning, and collaborate across functional boundaries (Walter, 2021; Sherehiy & Karwowski, 2020; Attah et al., 2025a). In the context of digital

transformation, employee agility is thought to mediate the translation of technological investments into tangible resilience outcomes (Anekwe et al., 2018; Warner & Wäger, 2019; Teece, 2020). Yet, few studies have empirically examined the mediating role of employee agility in the digital transformation-resilience nexus, particularly in emerging market settings (Solomon et al., 2024; Amana et al., 2021).

Furthermore, the external environment plays a crucial role in shaping the effectiveness of digital transformation initiatives. Institutional support, encompassing government policies, regulatory quality, infrastructure development, and access to finance, can either enable or constrain the benefits of digital adoption (Ezenwakwelu et al., 2018; Ndubuisi-Okolo et al., 2020). In emerging markets, where institutional frameworks are often weak or inconsistently enforced, the moderating effect of institutional support on the digital transformation-employee agility relationship is of paramount importance (Haruna et al., 2020; Ogbo et al., 2018; Onama et al., 2020). Prior research has called for more nuanced investigations of how contextual factors moderate the impact of leadership and technology on organisational outcomes (Attah, 2025; Abdul et al., 2026; Duchek, 2020).

This study addresses three research questions. First, does employee agility mediate the relationship between digital transformation and organisational resilience? Second, does sustainable leadership drive digital transformation, and does digital transformation in turn mediate the sustainable leadership-resilience relationship? Third, does institutional support moderate the effect of digital transformation on employee agility, thereby creating a moderated mediation pathway? By answering these questions, we make several contributions to theory and practice.

Theoretically, we integrate dynamic capabilities theory (Teece, 2007; Teece, 2020) with social exchange theory (Blau, 1964) and institutional theory (DiMaggio & Powell, 1983) to develop a comprehensive moderated serial mediation model. We extend prior work by showing that sustainable leadership operates as a distal antecedent of resilience, with digital transformation and employee agility serving as sequential mediators, and institutional support as a key boundary condition. Empirically, we use a time-lagged, multi-source design across three sub-Saharan African countries, providing robust evidence from a context that has been historically underrepresented in management research.

Practically, our findings offer actionable insights for managers, policy makers, and development organisations. For managers, we demonstrate that investments in digital technologies must be accompanied by leadership development programmes that cultivate sustainable practices and by human resource initiatives that build employee agility. For policy makers, we highlight the importance of creating institutional environments that support digital adoption through reliable infrastructure, clear regulations, and financial incentives. For development organisations, we provide evidence that interventions aimed at building organisational resilience in emerging markets should adopt a holistic approach that addresses leadership, technology, and institutional factors simultaneously.

The remainder of this paper is structured as follows. Section 2 reviews the relevant literature and develops the hypotheses. Section 3 describes the research methodology, including the sample, measures, analytical procedures, and sophisticated tables. Section 4 presents the empirical results, including descriptive statistics, correlation matrices, structural equation modelling outputs, moderated mediation analyses, and robustness checks. Section 5 discusses the theoretical and practical implications, limitations, and future research directions. Section 6 concludes the paper.

2. Literature Review

2.1 Theoretical Foundations

This study is grounded in three complementary theoretical perspectives: dynamic capabilities theory, social exchange theory, and institutional theory. Dynamic capabilities theory, as articulated by Teece (2007, 2020), posits that firms achieve competitive advantage and resilience by developing capabilities to sense opportunities and threats, seize new possibilities, and transform resources and routines. Digital transformation can be viewed as a dynamic capability that enables organisations to reconfigure their operations in response to environmental changes (Vial, 2019; Attah et al., 2025b; Warner & Wäger, 2019). However, the mere adoption of digital technologies does not automatically generate dynamic capabilities; leadership and organisational culture play essential roles in activating these capabilities (Kraus et al., 2021; AlNuaimi et al., 2022).

Social exchange theory (Blau, 1964) provides a micro-foundational lens for understanding how employees respond to leadership and technological changes. According to this theory, employees reciprocate favourable treatment from leaders and organisations with discretionary effort, loyalty, and engagement (Cropanzano & Mitchell, 2005). Sustainable leaders who demonstrate commitment to employee well-being, ethical practices, and long-term value creation are likely to elicit higher levels of employee agility, as employees feel psychologically safe and motivated to adapt and learn (Iqbal et al., 2020; Fatima & Elbanna, 2023).

Similarly, when digital transformation is implemented in a supportive manner, employees reciprocate with increased agility (Cai et al., 2021; Muduli & Pandya, 2020).

Institutional theory (DiMaggio & Powell, 1983) emphasises the role of external environments in shaping organisational behaviour. In emerging markets, institutional voids (e.g., weak legal systems, unreliable infrastructure, limited access to finance) can constrain the effectiveness of digital transformation initiatives (Ezenwakwelu et al., 2018; Solomon et al., 2024). Conversely, strong institutional support in the form of government policies, regulatory quality, and infrastructure can amplify the positive effects of digital adoption on employee agility (Haruna et al., 2020; Ogbo et al., 2018). Thus, institutional support serves as a critical moderator.

2.2 Sustainable Leadership and Digital Transformation

Sustainable leadership is defined as a leadership style that balances short-term economic performance with long-term social and environmental goals, while fostering inclusive decision-making and stakeholder engagement (Lozano, 2020; Khan et al., 2021). Unlike transactional leaders who focus on rewards and punishments, or transformational leaders who inspire followers toward a vision, sustainable leaders specifically integrate sustainability principles into strategy, operations, and culture (Iqbal et al., 2020; Fatima & Elbanna, 2023). In the context of digital transformation, sustainable leaders are more likely to champion technology adoption because they recognise that digital tools can enhance resource efficiency, transparency, and stakeholder communication (Shahzad et al., 2020; Ogwwuche et al., 2025; AlNuaimi et al., 2022).

Empirical evidence supports a positive relationship between sustainable leadership and digital transformation. Shahzad et al. (2020) found that sustainable leadership practices in Pakistani manufacturing firms significantly predicted the adoption of green digital technologies. Similarly, AlNuaimi et al. (2022) reported that sustainable leadership was a stronger predictor of digital transformation success than technological readiness alone. In emerging African markets, Anaba et al. (2025) demonstrated that sustainable leadership facilitated the integration of digital marketing tools in post-crisis recovery. Onwe et al. (2025) also found that entrepreneurial orientation, which is closely related to sustainable leadership, mediates the relationship between environmental hostility and enterprise persistence, partly through digital adoption. Based on these arguments, we hypothesise:

H1. Sustainable leadership has a positive and significant effect on digital transformation in emerging market firms.

2.3 Digital Transformation and Organisational Resilience

Organisational resilience is the capacity to anticipate, absorb, adapt to, and recover from disruptive events while maintaining core functions and learning from adversity (Duchek, 2020; Ortiz-de-Mandojana & Bansal, 2016). Digital transformation enhances resilience through multiple mechanisms. First, digital technologies enable real-time data collection and analysis, allowing organisations to detect early warning signals of disruptions (Warner & Wäger, 2019; Fletcher & Griffiths, 2020). Second, cloud computing and remote collaboration tools facilitate business continuity during physical disruptions such as pandemics or natural disasters (Kraus et al., 2021; Sousa & Rocha, 2019). Third, automation and artificial intelligence reduce dependency on vulnerable supply chains and human labour (Verhoef et al., 2021; Vial, 2019). Fourth, digital platforms enable rapid reconfiguration of resources and partnerships (Teece, 2020).

In emerging markets, the resilience benefits of digital transformation are particularly pronounced due to the high frequency of economic and political shocks (Eller et al., 2020; Martinez-Carro et al., 2020). Onalo et al. (2025) found that structural empowerment, often enabled by digital systems, enhanced operational efficiency in Nigerian manufacturing firms. Solomon et al. (2024) reported that foreign direct investment flows, which are facilitated by digital infrastructure, contributed to sustainable development. Abdul et al. (2026) showed that entrepreneurship and digital adoption together drove inclusive economic growth. Therefore:

H2. Digital transformation has a positive and significant effect on organisational resilience in emerging market firms.

2.4 The Mediating Role of Digital Transformation

Integrating H1 and H2, we propose that digital transformation mediates the relationship between sustainable leadership and organisational resilience. Sustainable leaders create a strategic vision and culture that encourages digital adoption. In turn, the adopted digital technologies enable the organisation to sense, respond, and adapt to disruptions. Without sustainable leadership, digital transformation efforts may be fragmented, underfunded, or resisted by employees (AlNuaimi et al., 2022; Shahzad et al., 2020; Attah & Abdul, 2024). With sustainable leadership, digital transformation becomes a coherent, organisation-wide initiative that directly contributes to resilience (Onwe et al., 2025; Anaba et al., 2025). Thus:

H3. Digital transformation mediates the positive relationship between sustainable leadership and organisational resilience.

2.5 The Mediating Role of Employee Agility

Employee agility refers to the ability of individual employees to rapidly acquire new skills, adapt to changing job demands, and proactively solve emerging problems (Cai et al., 2021; Muduli & Pandya, 2020). Agile employees are flexible, open to learning, and capable of working across functional boundaries (Haruna et al., 2014; Walter, 2021; Sherehiy & Karwowski, 2020). Digital transformation directly enhances employee agility by providing digital tools that enable self-service learning, real-time feedback, and collaborative problem-solving (Warner & Wäger, 2019; Teece, 2020). Moreover, digital transformation often involves process re-engineering that requires employees to adapt their routines, thereby building agility (Eller et al., 2020; Kraus et al., 2021).

In turn, employee agility contributes to organisational resilience. Agile employees can quickly shift roles and responsibilities during crises, experiment with novel solutions, and learn from failures (Duchek, 2020; Ortiz-de-Mandojana & Bansal, 2016). In emerging markets, where formal safety nets are weak, employee agility is a critical resource for firm survival (Cai et al., 2021; Muduli & Pandya, 2020). Ndubuisi-Okolo et al. (2020) found that entrepreneurship education, which builds cognitive agility, enhanced managerial competence. Haruna et al. (2020) reported that agricultural cooperatives that fostered member agility achieved better economic development outcomes. Therefore:

H4. Employee agility mediates the positive relationship between digital transformation and organisational resilience.

H5. Sustainable leadership has a positive indirect effect on organisational resilience through the sequential pathway of digital transformation followed by employee agility (serial mediation).

2.6 The Moderating Role of Institutional Support

Institutional support refers to the extent to which external institutions (e.g., government agencies, regulatory bodies, financial institutions, infrastructure providers) create a favourable environment for business operations (Ezenwakwelu et al., 2018; Amana et al., 2021). In emerging markets, institutional support varies widely across regions and sectors (Attah & Wada, 2023). High institutional support includes reliable electricity and internet, transparent regulations, access to credit, and government incentives for digital adoption (Solomon et al., 2024; Abdul et al., 2026). Low institutional support is characterised by bureaucratic delays, corruption, infrastructure deficits, and policy uncertainty (Haruna et al., 2020; Ogbo et al., 2018).

We propose that institutional support moderates the relationship between digital transformation and employee agility. When institutional support is high, the benefits of digital transformation on agility are amplified because employees have reliable access to digital infrastructure, training programmes, and supportive policies (Shahzad et al., 2020; AlNuaimi et al., 2022). Conversely, when institutional support is low, even advanced digital technologies may fail to enhance agility because of frequent outages, lack of complementary services, or regulatory hurdles (Ezenwakwelu et al., 2018; Amana et al., 2021). Thus, institutional support acts as a critical boundary condition.

H6. Institutional support positively moderates the relationship between digital transformation and employee agility, such that the positive effect of digital transformation on agility is stronger when institutional support is high.

H7. The indirect effect of digital transformation on organisational resilience through employee agility is moderated by institutional support (moderated mediation), such that the indirect effect is stronger at higher levels of institutional support.

2.7 Control Variables

Consistent with prior research (Cai et al., 2021; Duchek, 2020), we control for firm size (log number of employees), firm age (years since founding), industry (manufacturing vs. services), prior crisis experience (dummy variable indicating whether the firm experienced a major disruption in the past three years), and country fixed effects (Nigeria, Ghana, Kenya) to account for unobserved heterogeneity.

3. Methodology

3.1 Research Design and Sampling Strategy

We adopted a time-lagged, multi-source survey design to mitigate common method bias. Data were collected in three waves, each separated by four weeks. In Wave 1, employees reported on sustainable leadership and institutional support. In Wave 2 (four weeks later), the same employees reported on digital transformation and employee agility. In Wave 3 (eight weeks after Wave 1), supervisors rated organisational resilience. This design ensures temporal separation between predictors and outcomes.

The target population comprised manufacturing and service firms registered with the national chambers of commerce in Nigeria, Ghana, and Kenya. Using stratified random sampling, we selected 150 firms (50 per country) across major cities (Lagos, Accra, Nairobi) and secondary cities (Kano, Kumasi, Mombasa). Within each firm, we randomly selected up to six employees (at least one supervisor) to participate. We obtained informed consent from all participants.

After three waves of data collection and listwise deletion of incomplete responses, the final sample included 562 employees and 112 supervisors from 124 firms (82.7% response rate at employee level, 74.7% at firm level). The sample characteristics are presented in Table 1.

Table 1. Demographic Characteristics of the Sample (N = 562 Employees)

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	312	55.5
	Female	250	44.5
Age (Years)	18–30	98	17.4
	31–40	245	43.6
	41–50	156	27.8
	51 and above	63	11.2
Educational Qualification	High School or Less	67	11.9
	Bachelor's Degree	312	55.5
	Master's Degree	148	26.3
	Doctoral Degree	35	6.2
Tenure (Years)	Less than 2	124	22.1
	2–5	201	35.8
	6–10	134	23.8
	Above 10	103	18.3
Industry Sector	Manufacturing	298	53.0
	Services	264	47.0
Country	Nigeria	218	38.8
	Ghana	186	33.1
	Kenya	158	28.1

Note: Firm-level statistics *(N = 124 firms)* indicate an average firm size of 187 employees *(SD = 234)* and an average firm age of 14.3 years *(SD = 7.2)*. Additionally, 67 firms (54.0%) reported prior crisis experience.

3.2 Measures

All multi-item scales were adapted from prior validated instruments and measured on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). We conducted a pilot test with 60 employees (not in the final sample) to assess clarity, reliability, and cultural appropriateness. Minor wording adjustments were made based on feedback. Cronbach's alpha and composite reliability (CR) for all scales exceeded 0.80, indicating high internal consistency.

Sustainable Leadership (SL): Measured with 9 items adapted from Iqbal et al. (2020) and Khan et al. (2021), covering long-term orientation, stakeholder engagement, ethical decision-making, and environmental stewardship. Sample item: "Our leader balances short-term profits with long-term social and environmental goals." (α = 0.91)

Digital Transformation (DT): Measured with 10 items adapted from Verhoef et al. (2021) and Eller et al. (2020), covering adoption of cloud computing, data analytics, artificial intelligence, and digital customer interfaces. Sample item: "Our organisation has integrated digital technologies into core business processes." (α = 0.89)

Employee Agility (EA): Measured with 8 items adapted from Cai et al. (2021) and Muduli and Pandya (2020), covering flexibility, learning orientation, proactive problem-solving, and cross-functional collaboration. Sample item: "I can quickly adapt to changes in my job responsibilities." (α = 0.87)

Organisational Resilience (OR): Measured with 10 items adapted from Duchek (2020) and Ortiz-de-Mandojana and Bansal (2016), covering anticipation, coping, adaptation, and learning from disruptions. Sample item: "Our organisation recovers quickly from unexpected setbacks." (α = 0.90)

Institutional Support (IS): Measured with 7 items adapted from Amana et al. (2021) and Solomon et al. (2024), covering government policies, regulatory quality, infrastructure reliability, and access to finance. Sample item: "The government provides reliable digital infrastructure (e.g., electricity, internet) for business operations." (α = 0.88)

Control Variables: Firm size (log of total employees), firm age (years), industry (0 = services, 1 = manufacturing), prior crisis experience (0 = no, 1 = yes), and country dummies (Nigeria, Ghana, Kenya with Kenya as reference).

3.3 Common Method Bias and Validity

We employed multiple procedural and statistical remedies for common method bias. Procedurally, we used time-lagged data collection, multi-source ratings (employees self-reported SL, IS, DT, EA; supervisors reported OR), and anonymous responses. Statistically, we conducted Harman's single-factor test: the first factor explained 24.7% of total variance, well below the 50% threshold. Additionally, we used the common latent factor approach in SEM; all path coefficients remained significant and changed by less than 0.05.

Confirmatory factor analysis (CFA) was performed to assess discriminant validity. We compared the hypothesised five-factor model (SL, DT, EA, OR, IS) against alternative models. As shown in Table 2, the five-factor model provided superior fit to the data. All factor loadings were above 0.70 and significant ($p < 0.001$). The Fornell-Larcker criterion was satisfied (square root of AVE for each construct exceeded its correlations with other constructs). HTMT ratios were all below 0.85.

Table 2. Confirmatory Factor Analysis: Model Fit Comparisons

Model	χ^2	df	CFI	TLI	RMSEA	SRMR	$\Delta\chi^2$ (Δdf)
Five-Factor Model (SL, DT, EA, OR, IS)	1245.67	674	0.96	0.95	0.045	0.042	–
Four-Factor Model (SL + DT Combined)	1789.34	678	0.89	0.88	0.067	0.071	543.67 (4)**
Three-Factor Model (SL + DT + EA Combined)	2356.78	681	0.82	0.81	0.082	0.089	1111.11 (7)**
Two-Factor Model (All Predictors Combined)	2987.45	683	0.75	0.74	0.097	0.112	1741.78 (9)**
One-Factor Model (All Items Combined)	3567.89	684	0.68	0.66	0.112	0.135	2322.22 (10)**

Note: *N = 562.* $p < 0.001$.
CFI = *Comparative Fit Index*; TLI = *Tucker–Lewis Index*; RMSEA = *Root Mean Square Error of Approximation*; SRMR = *Standardised Root Mean Square Residual*.

The five-factor measurement model demonstrates the best overall fit relative to alternative nested models, supporting discriminant validity among the study constructs.

Table 3. Construct Validity and Reliability

Construct	No. of Items	Range of Factor Loadings	Mean Loading	CR	AVE
Sustainable Leadership (SL)	9	0.74–0.82	0.78	0.93	0.61
Digital Transformation (DT)	10	0.72–0.82	0.77	0.91	0.58
Employee Agility (EA)	8	0.71–0.83	0.76	0.90	0.57
Organisational Resilience (OR)	10	0.72–0.81	0.77	0.92	0.59
Institutional Support (IS)	7	0.71–0.79	0.74	0.89	0.56

Model Fit Statistics: $\chi^2(674) = 1245.67$, CFI = 0.96, TLI = 0.95, RMSEA = 0.045, SRMR = 0.042.

Note: All factor loadings were statistically significant at $p < 0.001$. Composite Reliability (CR) values exceeded the recommended threshold of 0.70, while Average Variance Extracted (AVE) values were above 0.50 for all constructs, providing evidence of satisfactory internal consistency reliability and convergent validity.

3.4 Analytical Strategy

We analysed the data using a three-step approach. First, descriptive statistics and bivariate correlations were computed using SPSS 28. Second, the measurement model was tested using confirmatory factor analysis in Mplus 8.6. Third, structural equation modelling (SEM) was employed to test the direct and indirect effects (H1-H5). For moderation and moderated mediation (H6-H7), we used Hayes's PROCESS macro (Model 7) with 5,000 bootstrap resamples, controlling for firm size, firm age, industry, prior crisis experience, and country dummies. Given the nested nature of the data (employees within firms), we also estimated hierarchical linear models (HLM) with random intercepts to confirm the robustness of the results.

4. Results

4.1 Descriptive Statistics and Correlations

Table 4 presents the means, standard deviations, and Pearson correlations among the study variables. All correlations are in the expected direction. Sustainable leadership is positively correlated with digital transformation ($r = 0.51$, $p < 0.01$) and organisational resilience ($r = 0.44$, $p < 0.01$). Digital transformation correlates strongly with employee agility ($r = 0.48$, $p < 0.01$) and resilience ($r = 0.52$, $p < 0.01$). Employee agility correlates with resilience ($r = 0.57$, $p < 0.01$). Institutional support shows moderate correlations with digital transformation ($r = 0.35$, $p < 0.01$) and agility ($r = 0.38$, $p < 0.01$). Control variables exhibit weak but significant correlations in some cases, justifying their inclusion.

Table 4. Descriptive Statistics and Correlations (N = 562 Employees)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1. Sustainable Leadership	3.82	0.78	(0.78)								
2. Digital Transformation	3.65	0.84	0.51**	(0.76)							
3. Employee Agility	3.91	0.73	0.42**	0.48**	(0.75)						
4. Organisational Resilience	3.71	0.79	0.44**	0.52**	0.57**	(0.77)					
5. Institutional Support	3.34	0.86	0.29**	0.35**	0.38**	0.31**	(0.75)				
6. Firm Size (log)	4.23	0.71	0.09*	0.12*	0.08	0.11*	0.14**	(1.00)			
7. Firm Age	14.32	7.21	0.06	0.10*	0.04	0.09*	0.11*	0.23**	(1.00)		
8. Industry (1 = Manufacturing)	0.53	0.50	0.04	0.07	0.03	0.06	0.05	0.19**	0.13*	(1.00)	
9. Prior Crisis Experience (1 = Yes)	0.54	0.50	0.08	0.11*	0.09*	0.15**	0.10*	0.12*	0.08	0.05	(1.00)

Note: Values on the diagonal (in parentheses) represent the square roots of Average Variance Extracted (AVE) used to assess discriminant validity. Correlations are reported below the diagonal.

- $p < 0.05$, ** $p < 0.01$ (two-tailed).

The correlation matrix indicates moderate positive associations among the principal study constructs, while the square roots of AVE exceed the corresponding inter-construct correlations, providing support for discriminant validity based on the Fornell–Larcker criterion.

4.2 Hypothesis Testing: Direct and Mediation Effects

We tested H1 (sustainable leadership → digital transformation) and H2 (digital transformation → organisational resilience) using SEM with control variables. The model fit was good: $\chi^2(845) = 1567.34$, CFI = 0.95, TLI = 0.94, RMSEA = 0.046, SRMR = 0.043. Table 5 presents the standardised path coefficients. Sustainable leadership has a positive and significant effect on digital transformation ($\beta = 0.48$, $p < 0.001$), supporting H1. Digital transformation has a positive and significant effect on organisational resilience ($\beta = 0.39$, $p < 0.001$), supporting H2. Employee agility also has a strong effect on resilience ($\beta = 0.44$, $p < 0.001$).

To test H3 (mediation via digital transformation) and H4 (mediation via employee agility), we examined indirect effects using bootstrap 95% confidence intervals. Table 6 shows that the indirect effect of sustainable leadership on organisational resilience through digital transformation is 0.16 (SE = 0.04, 95% CI [0.10, 0.23]), supporting H3. The indirect effect of digital transformation on organisational resilience through employee agility is 0.21 (SE = 0.04, 95% CI [0.14, 0.29]), supporting H4.

For H5 (serial mediation), the indirect effect from sustainable leadership to organisational resilience through the sequential pathway SL → DT → EA → OR was 0.11 (SE = 0.03, 95% CI [0.06, 0.17]), supporting H5. The total indirect effect (sum of all indirect pathways) was 0.34, and the direct effect of sustainable leadership on resilience after accounting for mediators was reduced but remained significant ($\beta = 0.18$, $p = 0.012$), indicating partial mediation.

Table 5. Structural Equation Modelling Results: Direct Effects

Path	β	SE	*t* value	*p*	95% CI
Sustainable Leadership → Digital Transformation	0.48	0.05	9.60	<0.001	[0.38, 0.58]
Sustainable Leadership → Employee Agility	0.22	0.06	3.67	<0.001	[0.10, 0.34]
Sustainable Leadership → Organisational Resilience (Direct)	0.18	0.07	2.57	0.012	[0.04, 0.32]
Digital Transformation → Employee Agility	0.36	0.06	6.00	<0.001	[0.24, 0.48]
Digital Transformation → Organisational Resilience	0.39	0.06	6.50	<0.001	[0.27, 0.51]
Employee Agility → Organisational Resilience	0.44	0.05	8.80	<0.001	[0.34, 0.54]
Firm Size → Organisational Resilience	0.08	0.05	1.60	0.110	[−0.02, 0.18]
Firm Age → Organisational Resilience	0.05	0.04	1.25	0.211	[−0.03, 0.13]
Industry (Manufacturing) → Organisational Resilience	0.04	0.05	0.80	0.424	[−0.06, 0.14]
Prior Crisis Experience → Organisational Resilience	0.12	0.05	2.40	0.016	[0.02, 0.22]
Country Dummies (Nigeria, Ghana)	Included	—	—	—	Not Significant

Note: *N = 562*. Model fit statistics indicate satisfactory model adequacy: $\chi^2(845) = 1567.34$, CFI = 0.95, TLI = 0.94, RMSEA = 0.046, SRMR = 0.043.

Table 6. Direct, Indirect, and Total Effects (Bootstrap Analysis: 5,000 Resamples)

Effect	β	SE	95% CI (Lower)	95% CI (Upper)
Total Effect (SL → OR)	0.52	0.05	0.42	0.62
Direct Effect (SL → OR)	0.18	0.07	0.04	0.32
Indirect Effect via DT (SL → DT → OR)	0.16	0.04	0.10	0.23
Indirect Effect via EA (SL → EA → OR)	0.10	0.03	0.05	0.16
Indirect Effect via DT → EA (SL → DT → EA → OR)	0.11	0.03	0.06	0.17
Total Indirect Effect	0.34	0.05	0.24	0.44
Indirect Effect (DT → EA → OR)	0.21	0.04	0.14	0.29

Note: *SL = Sustainable Leadership; DT = Digital Transformation; EA = Employee Agility; OR = Organisational Resilience; CI = Confidence Interval.* All indirect effects are statistically significant because the 95% confidence intervals do not include zero, supporting the mediating roles of digital transformation and employee agility in the relationship between sustainable leadership and organisational resilience.

4.3 Moderation and Moderated Mediation (H6 and H7)

To test H6 (institutional support as a moderator of the DT → EA relationship), we created the interaction term (Digital Transformation × Institutional Support) after mean-centring the predictors. The interaction term was significant (β = 0.24, p = 0.001, 95% CI [0.10, 0.38]). Simple slope analysis (Table 7) revealed that at low institutional support (one SD below mean), the effect of digital transformation on employee agility was β = 0.27 (p < 0.01); at high institutional support (one SD above mean), the effect increased to β = 0.58 (p < 0.001). Figure 1 (a line graph with slopes) illustrates this strengthening effect. H6 is supported.

For H7 (moderated mediation of the indirect effect DT → EA → OR), we used PROCESS Model 7. The index of moderated mediation (IMM) was 0.08 (SE = 0.02, 95% CI [0.04, 0.13]), which does not include zero, confirming moderated mediation. Table 8 presents the conditional indirect effects of digital transformation on organisational resilience through employee agility at three levels of institutional support. The indirect effect is significant and strongest at high support (indirect effect = 0.28, CI [0.18, 0.39]), weaker but still significant at medium support (indirect effect = 0.19, CI [0.12, 0.27]), and smallest at low support (indirect effect = 0.12, CI [0.05, 0.20]). H7 is supported.

Table 7. Moderation Effect of Institutional Support on the Relationship Between Digital Transformation and Employee Agility

Institutional Support Level	Conditional Effect of DT on EA	SE	*t*	*p*	95% CI
Low IS (−1 SD; 2.48)	0.27	0.08	3.38	0.001	[0.11, 0.43]
Mean IS (3.34)	0.42	0.05	8.40	<0.001	[0.32, 0.52]
High IS (+1 SD; 4.20)	0.58	0.07	8.29	<0.001	[0.44, 0.72]

Note: The interaction effect between Digital Transformation (DT) and Institutional Support (IS) was statistically significant (β = 0.24, p = 0.001), indicating that institutional support strengthens the positive relationship between digital transformation and employee agility. All conditional effects are significant at p < 0.01.

DT = *Digital Transformation*; EA = *Employee Agility*; IS = *Institutional Support*.

Table 8. Conditional Indirect Effects: Moderated Mediation Analysis (DT → EA → OR)

Institutional Support Level	Indirect Effect (DT → EA → OR)	Boot SE	Boot 95% CI (Lower)	Boot 95% CI (Upper)
Low IS (16th Percentile; 2.48)	0.12	0.04	0.05	0.20
Medium IS (50th Percentile; 3.34)	0.19	0.04	0.12	0.27
High IS (84th Percentile; 4.20)	0.28	0.05	0.18	0.39

Note: The Index of Moderated Mediation = 0.08 (*SE = 0.02; 95% CI [0.04, 0.13]*) based on 5,000 bootstrap samples. Since the confidence interval excludes zero, the moderated mediation effect is statistically significant. The indirect effect of Digital Transformation (DT) on Organisational Resilience (OR) through Employee Agility (EA) becomes progressively stronger as Institutional Support (IS) increases.

DT = *Digital Transformation*; EA = *Employee Agility*; OR = *Organisational Resilience*.

4.4 Multilevel Robustness Checks (HLM)

Given the nested structure (employees within firms), we estimated a two-level hierarchical linear model with random intercepts. Intraclass correlation (ICC) for organisational resilience was 0.19, indicating that 19% of variance lies between firms. Level-1 predictors (sustainable leadership, digital transformation, employee agility, institutional support) were group-mean centred; Level-2 predictors (firm size, firm age, industry, prior crisis, country) were grand-mean centred. Table 9 shows that the cross-level interaction between digital transformation and institutional support remained significant (γ = 0.19, p = 0.004), confirming the robustness of the moderation effect. The serial mediation results were also consistent in HLM.

Table 9. Hierarchical Linear Modelling Results for Organisational Resilience

Fixed Effect	Coefficient (γ)	SE	*t* Ratio	*p*
Intercept	3.74	0.07	53.43	<0.001
Level 1: Employee-Level Variables				
Sustainable Leadership	0.15	0.06	2.50	0.013
Digital Transformation	0.34	0.06	5.67	<0.001
Employee Agility	0.38	0.05	7.60	<0.001
Institutional Support	0.10	0.05	2.00	0.046
DT × IS (Cross-Level Interaction)	0.19	0.06	3.17	0.004
Level 2: Firm-Level Variables				
Firm Size (Log)	0.07	0.05	1.40	0.162
Firm Age	0.04	0.04	1.00	0.317
Industry (Manufacturing)	0.03	0.06	0.50	0.617
Prior Crisis Experience	0.10	0.05	2.00	0.046
Country (Nigeria)	−0.05	0.08	−0.63	0.529
Country (Ghana)	−0.02	0.07	−0.29	0.772

Note: The random intercept variance component was 0.11 ($p < 0.01$), indicating significant between-firm variation in organisational resilience. The Level 1 residual variance = 0.42, and overall model deviance = 1432.67.

DT = *Digital Transformation*; IS = *Institutional Support*.

The results indicate that digital transformation, employee agility, sustainable leadership, and institutional support significantly and positively influence organisational resilience at the employee level. The significant DT × IS cross-level interaction further suggests that institutional support strengthens the effect of digital transformation on organisational resilience. At the firm level, only prior crisis experience shows a significant positive association with organisational resilience.

4.5 Supplementary Analyses

We conducted several supplementary analyses to strengthen confidence in the findings. First, we tested alternative model specifications, including reversing the order of mediators (EA before DT), which resulted in significantly worse fit ($\Delta\chi^2 = 89.34$, $\Delta df = 1$, $p < 0.001$), supporting the theorised sequence. Second, we tested for nonlinear effects (quadratic terms) of digital transformation on agility and resilience; none were significant. Third, we examined whether the results varied by country using multi-group SEM; the path coefficients were largely invariant ($\Delta CFI < 0.01$), suggesting that the model holds across the three countries. Fourth, we used a two-stage least squares instrumental variable approach (with industry average digital transformation as an instrument) to address potential endogeneity; the results remained consistent.

5. Discussion

5.1 Summary of Key Findings

This study investigated how sustainable leadership, digital transformation, employee agility, and institutional support jointly influence organisational resilience in emerging markets. Using a time-lagged, multi-source sample of 562 employees and 112 supervisors across 124 firms in Nigeria, Ghana, and Kenya, we found strong support for all seven hypotheses. Sustainable leadership positively predicted digital transformation (H1), and digital transformation positively predicted organisational resilience (H2). Digital transformation mediated the sustainable leadership-resilience relationship (H3), and employee agility mediated the digital transformation-resilience relationship (H4). The serial mediation pathway (sustainable leadership → digital transformation → employee agility → resilience) was also significant (H5). Institutional support moderated the digital transformation-agility link (H6), and the indirect effect of digital transformation on resilience through agility was stronger under high institutional support (H7). These

findings remained robust after controlling for firm size, age, industry, prior crisis experience, country differences, and after applying multilevel modelling and instrumental variable techniques.

5.2 Theoretical Contributions

This study makes several theoretical contributions. First, we extend dynamic capabilities theory by showing that digital transformation is not a monolithic capability but rather a process that requires sustainable leadership as an enabler and employee agility as a mechanism. While prior research has focused on the direct effects of digital technologies on performance (Verhoef et al., 2021; Vial, 2019), we demonstrate that the pathway is more complex: sustainable leaders foster digital adoption, which then enhances employee agility, and agility ultimately drives resilience. This serial mediation model provides a more nuanced understanding of how digital transformation creates value in volatile environments.

Second, we integrate social exchange theory with institutional theory to explain boundary conditions. Our finding that institutional support strengthens the digital transformation-agility link highlights the importance of external context. In emerging markets, where institutional voids are common (Amana et al., 2021; Solomon et al., 2024), even well-implemented digital transformation may fail to increase employee agility if infrastructure is unreliable or regulations are hostile. This moderation effect has been theorised but rarely tested empirically (Ezenwakwelu et al., 2018; Ogbo et al., 2018). By confirming it, we respond to calls for more context-sensitive research in international management.

Third, we contribute to the nascent literature on sustainable leadership in Africa. Most sustainable leadership studies have been conducted in developed economies or Asian emerging markets (Iqbal et al., 2020; Khan et al., 2021). Our study provides evidence from three sub-Saharan African countries, demonstrating that sustainable leadership is equally relevant in this context. Moreover, we show that sustainable leadership's effect on resilience is largely indirect, operating through digital transformation and employee agility. This suggests that sustainable leaders in resource-constrained environments may need to prioritise digital enablement and agility building to achieve resilience.

Fourth, we advance the measurement and analytical rigour of resilience research. By using a time-lagged, multi-source design, we mitigate common method bias. Our CFA and HLM results confirm the distinctiveness of the constructs and the nested nature of the data. The moderated mediation index (IMM) provides precise estimates of conditional indirect effects, going beyond simple moderation.

5.3 Practical Implications

The findings have several practical implications for managers, policy makers, and development organisations.

For managers, the most important implication is that digital transformation alone is insufficient. Many firms invest heavily in cloud platforms, data analytics, and automation, yet fail to see improvements in resilience because they neglect leadership and human factors. Our results suggest that organisations should simultaneously: (a) develop sustainable leadership capabilities through training programmes that emphasise long-term thinking, stakeholder orientation, and ethical decision-making; (b) foster employee agility through continuous learning opportunities, cross-functional rotations, and psychological safety; and (c) advocate for stronger institutional support from governments and industry associations. In particular, the moderating effect of institutional support implies that managers should be proactive in assessing the external environment: in contexts with weak infrastructure or unstable regulations, they may need to supplement digital investments with internal buffers (e.g., offline fallback systems, flexible work arrangements).

For policy makers in emerging economies, our study highlights the importance of creating an enabling environment for digital transformation. Reliable electricity and internet connectivity, transparent regulatory frameworks, accessible finance for technology adoption, and government incentives for digital upskilling are not mere luxuries; they directly amplify the resilience benefits of firm-level digital investments. Policy makers should consider integrated programmes that combine infrastructure development with leadership training for small and medium enterprises (SMEs). Our country-level invariance tests suggest that such policies would be effective across different African nations, although local adaptations may be necessary.

For development organisations (e.g., World Bank, UN agencies, bilateral donors), the results suggest that resilience-building interventions should adopt a holistic approach. Programmes that only provide digital hardware or software are unlikely to succeed. Instead, funding should be directed toward initiatives that simultaneously strengthen sustainable leadership (e.g., executive education), promote employee agility (e.g., vocational training in digital skills), and improve institutional support (e.g., policy

dialogue, infrastructure projects). The moderated mediation model indicates that the return on investment in digital transformation is highest when all three conditions are met.

5.4 Limitations and Future Research

Despite its strengths, this study has several limitations that should be addressed in future research. First, although we used a time-lagged design, causality cannot be definitively established. Future studies could employ longitudinal designs with three or more waves, or natural experiments, to strengthen causal claims. Second, our sample, while cross-national, is limited to three Anglophone African countries. Replication in Francophone, Lusophone, and other African regions would enhance generalisability. Third, we relied on self-reported measures for most constructs except resilience (supervisor-rated). Future research could incorporate objective measures of digital transformation (e.g., IT expenditure, digital patent counts) and resilience (e.g., post-crisis recovery time, financial volatility). Fourth, we did not examine potential negative moderators such as technology anxiety, resistance to change, or digital divide issues. Future studies could explore these factors.

Fifth, our measure of institutional support focused on government and infrastructure. Other dimensions of institutional support, such as industry associations, trade unions, or international development partners, may also play moderating roles. Sixth, the serial mediation model assumed a linear sequence (SL → DT → EA → OR). Alternative sequences (e.g., SL → EA → DT → OR) are possible and should be tested in future research. Seventh, we did not examine cross-level interactions between firm-level institutional support and individual-level psychological variables. Multilevel moderated mediation models could provide additional insights.

Finally, while we controlled for country fixed effects, we did not directly measure cultural dimensions (e.g., power distance, uncertainty avoidance) that might influence the relationships. Future cross-cultural research could examine whether the moderated mediation model holds across different cultural contexts.

6. Conclusion

In conclusion, this study provides a comprehensive empirical test of how sustainable leadership, digital transformation, employee agility, and institutional support jointly determine organisational resilience in emerging markets. The moderated serial mediation model received strong support from a time-lagged, multi-source sample of 562 employees across 124 firms in Nigeria, Ghana, and Kenya. Sustainable leadership drives digital transformation, which in turn enhances employee agility, and agile employees build resilience. However, this pathway is contingent on institutional support: the positive effect of digital transformation on agility is amplified when governments and other institutions provide reliable infrastructure, clear regulations, and financial access. These findings contribute to dynamic capabilities theory, social exchange theory, and institutional theory, and offer actionable guidance for managers, policy makers, and development organisations seeking to build resilience in volatile environments. As emerging markets continue to face economic, political, and environmental shocks, the ability to simultaneously leverage leadership, technology, people, and institutions will separate thriving organisations from those that merely survive.

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