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The Contingent Effects of School Leadership and Organizational Culture on Teacher Performance in Fragile Educational Systems

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Abstract

Persistent low teacher performance remains a critical obstacle to achieving Sustainable Development Goal 4 (SDG 4) in fragile educational systems. While prior research is largely grounded in high-resource Western settings, it often overlooks the compensatory mechanisms that sustain instructional quality amid chronic resource scarcity and institutional instability. Situated within the field of educational administration in resource-scarce contexts, this study examines how transformational leadership and organizational culture influence teacher performance in rural Nigeria, with organizational trust and teacher engagement operating as parallel mediators. Survey data from 167 teachers, analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM), revealed strong direct effects of transformational leadership (β = 0.388) and organizational culture (β = 0.166) on teacher performance. Organizational trust (β = 0.161) and teacher engagement (β = 0.208) were also significant predictors. Mediation analysis showed that transformational leadership enhances performance through both trust and engagement, whereas organizational culture's influence operates primarily through trust. The model demonstrated substantial explanatory power, accounting for 63.8% (R^2 = 0.638) of the variance in teacher performance, underscoring the critical role of internal school-level resources in compensating for material scarcity. These findings extend General Systems Theory and Social Exchange Theory by demonstrating how trust-based leadership and coherent organizational cultures stabilize instructional quality in fragile systems. For policymakers, the study underscores that strengthening organizational trust and engagement constitutes a sustainable strategy to buffer systemic weaknesses and accelerate progress toward SDG 4.

Keywords: Organizational Culture, Organizational Trust, Sustainable Development Goal 4, Teacher Engagement, Teacher Performance, Transformational Leadership.

Introduction

Teacher performance is a primary driver of educational system effectiveness and the key mechanism through which curricula are transformed into measurable student learning outcomes (1). Quality education is essential to sustainable development, as it enables human capital formation, promotes social equity, and supports long-term economic advancement (2). Delivering this quality depends not only on equitable access and contextually relevant curricula but also on effective school leadership, sound organizational management, and robust instructional practices. However, persistent low levels of teacher performance continue to impede progress toward Sustainable Development Goal 4 (SDG 4), particularly in structurally fragile educational systems marked by chronic resource scarcity and diminished institutional trust (3).

Across Sub-Saharan Africa, the challenge is especially pronounced. Chronic underinvestment, protracted teacher shortages, and weak accountability mechanisms have entrenched systemic inefficiencies in the education sector. Nigeria—ranked 147th out of 167 countries in the 2025 SDG Performance Index—offers a stark example of this systemic fragility (4). Despite successive reform initiatives, the sector continues to struggle with inadequate infrastructure, overcrowded classrooms, insufficient teacher training, and eroding institutional trust. Although government policies have emphasized the recruitment of certified teachers, formal qualifications alone have not consistently translated into higher instructional quality (5, 6).

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This divergence between educational inputs (qualifications) and outputs (performance) underscores the need to focus more deeply on internal school dynamics—particularly the organizational environment and administrative climate—as critical determinants that enable or constrain teacher effectiveness amid systemic fragility.

Rural regions such as Ukwa-West in Abia State exemplify the severity of Nigeria's educational challenges, where chronic resource shortages and deteriorating working conditions undermine teacher motivation and retention (7). Pupil–teacher ratios frequently exceed 60:1 (8), reflecting a national deterioration from 25:1 to 78:1 between 2013 and 2022 (9) — a stark contrast to the OECD average of approximately 13:1 (10). This resource crisis is compounded by limited access to schooling, with nearly 20 million Nigerian children out of school, the majority in rural communities (11). Even among those enrolled, learning outcomes are alarmingly weak; World Bank evidence shows that up to 38.7% of secondary students in Katsina State cannot perform basic addition (12), highlighting a significant divergence from the inclusive and quality education envisioned under Sustainable Development Goal 4 (SDG 4).

Although the crisis in Nigeria's education sector is often attributed to macro-level policy failures and chronic resource deprivation (13, 14), such explanations overlook the equally important organizational dynamics that reinforce systemic fragility. Weak institutional capacity, inconsistent administrative practices, and managerial incoherence at the school level undermine teacher confidence and impede performance stability. Emerging research highlights that intra-school factors—particularly leadership, organizational culture, engagement, and trust—serve as critical levers of teacher performance and student learning (15-17). In contexts where external support is unreliable, internal organizational resilience—reflected in effective leadership, cohesive culture, strong engagement, and high levels of trust—becomes the central determinant of instructional quality. Advancing SDG 4 within fragile educational ecosystems therefore requires not only resource expansion but also rebuilding institutional trust, strengthening organizational coherence, and cultivating school-level processes that enable equitable learning for all.

Transformational leadership refers to behaviours through which school leaders articulate shared purpose, inspire professional commitment, and model integrity that fosters collective motivation (18). Organizational culture denotes the shared norms, expectations, and values that shape how teachers interpret organizational signals and perform their roles. These constructs operate interactively: leadership actions reinforce cultural norms, while existing cultural patterns condition how teachers interpret and respond to leadership behaviour. Their interaction shapes the organizational climate that determines levels of teacher motivation, psychological safety, engagement, and ultimately classroom performance (19). Building on the established role of intra-school drivers, global scholarship provides a robust framework for understanding how transformatio nal leadership and organizational culture jointly enhance teacher performance through the mediating mechanisms of teacher engagement and organizational trust (20–28). Science mapping and bibliometric analyses affirm the prominence of these constructs—particularly transformational and distributed leadership—within international school administration research (29–31). In well-resourced systems such as the United States, United Kingdom, Australia, and East Asia, transformational leadership cultivates organizational trust by modelling integrity, professional support, and shared school purpose (32, 33), while concurrently strengthening teacher engagement and job satisfaction (34). Likewise, cohesive organizational culture reinforces shared norms, collaboration, and psychological safety that sustain innovation and productive professional learning communities (35, 36), thereby deepening teachers' emotional commitment to their work (23, 37). Across these stable contexts, trust and engagement function as consistent mediators linking leadership and culture to improved teacher performance and to progress toward SDG 4 (38–40).

However, this model has been validated predominantly in institutional environments where essential supports—including timely remuneration, adequate infrastructure, and coherent policy frameworks—are reliably provided (41). Under-resourced and structurally

fragile systems, such as rural Nigeria, lack these enabling conditions. Although transformational leadership and organizational culture remain relevant predictors of teacher performance (42, 43), persistent systemic weaknesses—salary delays, infrastructural decay, and regulatory inconsistency—erode trust and diminish engagement over time (44–46). This contrast exposes a critical empirical gap: global research seldom interrogates how institutional fragility reshapes the leadership–culture–engagement–trust–performance pathway, while Nigerian scholarship, though rich in documenting dysfunction, rarely applies mediation modelling to examine these underlying mechanisms (47).

To address this critical research gap, the present study employs General Systems Theory (GST) (48) and Social Exchange Theory (SET) (49) to examine how fragility reshapes the leadership–culture–engagement–trust–performance pathway in Nigeria's under-resourced schools. The proposed model tests both direct and indirect relationships operating through the parallel mediators of teacher engagement and organizational trust. Adopting this dual-lens framework, the study elucidates how organizational antecedents can moderate the effects of systemic constraints on teacher performance and foster localized resilience that buffers schools against structural deficiencies. By foregrounding these meso-level organizational mechanisms, the research contributes to a neglected area of inquiry—namely, how internal school processes sustain teacher performance within fragile educational ecosystems where external support is weakest (47).

Bridging this divide, the study advances three principal contributions. First, it empirically tests contextual contingency by examining whether the pathway Leadership/Culture → Engagement/ Trust → Performance retains its structural integrity and predictive validity within Nigeria's fragile educational ecosystem. Second, it identifies organizational leverage points through Partial Least Squares Structural Equation Modelling (PLS-SEM), determining which mediator—organizational trust or teacher engagement—exhibits greater resilience and explanatory power under systemic stress. Third, the study theorizes fragility itself, refining Western-derived leadership–culture frameworks; positioning institutional fragility as a core contextual determinant rather than a peripheral condition. By reframing fragility as an explanatory construct that actively shapes organizational behaviour and outcomes, this research advances a contingency-based theory of organizational effectiveness in education, thereby contributing both conceptually and empirically to the global pursuit of Sustainable Development Goal 4 (SDG 4) within low-capacity educational systems.

The proposed conceptual model (Figure 1) illustrates the hypothesized relationships among the study's core constructs and serves as the analytical framework for examining performance pathways under conditions of systemic fragility. Four overarching hypotheses, encompassing twelve specific predictions, are tested. It is posited that the organizational antecedents—Transformational Leadership (X_1) and Organizational Culture (X_2)—exert direct, positive effects on Teacher Performance (Y) (H_1–H_2), while also significantly influencing the mediating variables Teacher Engagement (X3) and Organizational Trust (X_4) (H_3–H_6). In turn, both organizational trust and teacher engagement are expected to directly predict teacher performance (H_7–H_8) and to mediate the relationships between leadership/culture and performance (H_9–H_{12}). Collectively, this framework delineates the complex, interdependent mechanisms through which internal organizational capacities sustain teacher performance within institutionally fragile educational systems.

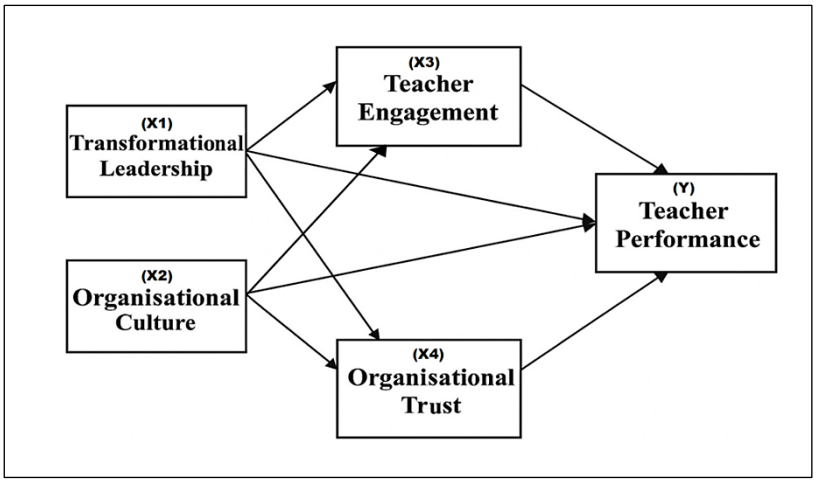

Figure 1: Conceptual Model of the Study

Methodology

Research Design

This study employed a quantitative, cross-sectional design to investigate the relationships among transformational leadership, organizational culture, and teacher performance, with organizational trust and teacher engagement serving as parallel mediators (50). Data were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM), chosen for its suitability in testing complex mediation models, robustness against non-normal data distributions, and appropriateness for moderate sample sizes (51). This analytical strategy facilitated the simultaneous assessment of both the measurement and structural models, yielding theoretical and practical insights into how organizational antecedents sustain teacher performance under conditions of systemic fragility. In total, twelve hypotheses (H_1–H_{12}) addressing both direct and mediating pathways were empirically examined.

Population and Sampling

The empirical setting for this study comprised nine public secondary schools in Ukwa-West, Abia State, Nigeria—an area marked by chronic resource scarcity, infrastructural deficits, and high pupil–teacher ratios. This context reflects the systemic fragility evident across Nigeria and much of Sub-Saharan Africa (52). The target population consisted of currently employed secondary school teachers. Ukwa-West was purposively selected because its educational challenges closely mirror those prevalent within Nigeria's public education sector. Accordingly, the findings capture mechanisms within this subregional context and are not intended for direct national generalization. A stratified purposive sampling strategy was adopted to ensure proportional representation across schools. This approach was deemed appropriate given the weak institutional infrastructure and limited availability of reliable population data, which rendered purely random sampling impractical. Stratified purposive sampling enabled adequate subgroup representation while maintaining feasibility within a fragile research environment.

The final sample comprised 167 teachers, yielding a 58.4% response rate, which exceeds the minimum threshold recommended for models of comparable structural complexity in variance-based Partial Least Squares Structural Equation Modelling (PLS-SEM) (50, 51). The study adhered to the ethical principles of the Declaration of Helsinki, ensuring informed consent, voluntary participation, and full anonymity (53).

Instruments

Data were collected using a structured questionnaire anchored on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). All constructs were measured with items adapted from previously validated instruments and underwent a rigorous cross-cultural adaptation process to ensure contextual relevance for Nigerian secondary schools (54). For instance, "organizational consistency" was localized as "consistency in school management decisions." Face and content validity were confirmed through expert review by three educational management scholars and a pilot test involving 30 teachers,

which verified clarity and prompted minor wording revisions.

Transformational Leadership was measured using the Multifactor Leadership Questionnaire (MLQ-5X) (55), encompassing four dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. A sample item reads: "My school leader articulates a compelling vision of the school's future."

Organizational Culture was assessed using a 24-item instrument adapted from the Competing Values Framework (CVF) (56). The scale measured six cultural dimensions: innovation and risk-taking, team orientation, people development, behavioral consistency, results orientation, and attention to detail. These dimensions collectively align with four overarching culture types: Clan (collaboration), Adhocracy (innovation), Market (competition), and Hierarchy (control). A sample item for team orientation is: "Our school is a very personal place, like an extended family."

Teacher Engagement was measured using the nine-item Utrecht Work Engagement Scale (UWES-9), which captures three core dimensions: vigour, dedication, and absorption (57). A sample item reads: "I am enthusiastic about my work as a teacher."

Organizational Trust was evaluated using a 26-item scale adapted from one past study (58), grounded in the framework of Tschannen-Moran and Hoy. The scale captures five facets of trust—integrity, loyalty, competence, transparency, and behavioural consistency—in the context of teachers' trust in school management, colleagues, and institutional practices. A sample item is: "Teachers can rely on school management to act in their best interest."

Teacher Performance was assessed using an 18-item multidimensional scale developed in the past research (59), covering task, contextual, and adaptive performance domains. A sample item reads*:* "I spontaneously help colleagues who have work-related problems." All scales were adapted to reflect school-specific contexts while preserving construct validity.

Reliability and validity were assessed using SmartPLS 4.0. All constructs demonstrated strong psychometric properties, meeting established thresholds: indicator reliability (outer loadings > 0.70), internal consistency (composite reliability > 0.70; Cronbach's α ranging from 0.85 to 0.92), and convergent validity (average variance extracted [AVE] > 0.50). Discriminant validity was confirmed using the Fornell–Larcker criterion and by ensuring that all heterotrait–monotrait (HTMT) ratios remained below the conservative threshold of 0.90.

Data Analysis

Data analysis followed a two-step approach in SmartPLS 4.0, beginning with the evaluation of the measurement (outer) model, followed by the assessment of the structural (inner) model. Prior to PLS-SEM estimation, preliminary data screening was undertaken in SPSS 28.0 (60), including data cleaning, treatment of missing values, and detection of both univariate and multivariate outliers (61). Descriptive statistics (means and standard deviations) and Pearson correlation coefficients were computed to examine bivariate associations among the five constructs. Multicollinearity diagnostics indicated no significant issues, with all variance inflation factors (VIFs) well below the conservative threshold of 5 (range: 1.844–2.704).

The structural model tested both the direct effects of transformational leadership and organizational culture on teacher performance and their indirect effects through teacher engagement and organizational trust as parallel mediators. Path coefficients (β) and significance levels were estimated using a bootstrapping procedure with 5,000 subsamples. Statistical significance was determined through two-tailed *t*-tests (critical value > 1.96, $p < 0.05$) and bias-corrected and accelerated (BCa) 95% confidence intervals.

Model evaluation incorporated key fit indices, including the standardized root mean square residual (SRMR < 0.08) and normed fit index (NFI ≥ 0.80), to assess approximate model fit. The model's explanatory and predictive power were further examined using coefficients of determination (R^2), effect sizes (f^2), and cross-validated redundancy (Q^2) obtained via the blindfolding procedure. Collectively, these results confirmed the model's robustness, explanatory strength, and predictive relevance within the fragile educational context of Nigerian public secondary schools.

Ethical Considerations

This study received ethical approval from the Institutional Ethical Committee of the Institute of Advanced Medical Research and Training

(IAMRAT), College of Medicine, University of Ibadan, Nigeria (Protocol No. UI/EC/25/0508). All research procedures adhered to the principles outlined in the World Medical Association's Declaration of Helsinki (53).

Before data collection, written informed consent was obtained from all participants following a comprehensive explanation of the study's purpose, procedures, potential risks, and anticipated benefits. Participation was entirely voluntary, and respondents were informed of their right to withdraw from the study at any stage without penalty or adverse consequence.

The authors affirm that this research complies with the ethical and reporting standards applicable to quantitative social science research, ensuring full respect for participant autonomy, confidentiality, and data integrity.

Results

The hypothesized relationships outlined in the conceptual model (Figure 1) were tested using Partial Least Squares Structural Equation Modelling (PLS-SEM) through a two-step procedure, which involved first validating the measurement model and subsequently assessing the structural model.

Descriptive statistics revealed generally high mean scores across all constructs, with transformational leadership and teacher performance exhibiting the strongest values, as shown in Table 1.

Table 1: Descriptive Statistics of Composite Scores for Latent Variables

Construct	N	Mean	Std. Dev.	Min	Median	Max
Transformational Leadership	167	120.0	14.9	82	128	140
Organizational Culture	167	115.0	10.9	78	117	135
Teacher Engagement	167	114.0	13.2	75	115	135
Organizational Trust	167	107.0	12.3	77	109	125
Teacher Performance	167	120.0	13.2	86	122	140

Note: N = Number of respondents; Std. Dev. = Standard deviation

Table 2: Pearson Correlation Matrix of Latent Constructs

Variables	X1: TL	X2: OC	X3: TE	X4: OT	Y: TP
X1. Transformational Leadership (TL)	1.000				
X2. Organizational Culture (OC)	0.676	1.000			
X3. Teacher Engagement (TE)	0.687	0.563	1.000		
X4. Organizational Trust (OT)	0.656	0.578	0.605	1.000	
Y. Teacher Performance (TP)	0.749	0.639	0.666	0.638	1.000

Note: TL = Transformational Leadership; OC = Organisational Culture; TE = Teacher Engagement; OT = Organisational Trust; TP = Teacher Performance

Table 3: Measurement (outer) Model Evaluation Results

Constructs	Indicator Loadings Range	Cronbach's Alpha	CR	AVE	Discriminant Validity ($\sqrt{AVE}$)
Transformational Leadership (X1)	0.77 – 0.83	0.86	0.89	0.63	0.79
Organizational Culture (X2)	0.74 – 0.80	0.84	0.88	0.61	0.78
Teacher Engagement (X3)	0.78 – 0.84	0.85	0.89	0.66	0.81
Organizational Trust (X4)	0.75 – 0.81	0.82	0.87	0.60	0.77
Teacher Performance (Y)	0.77 – 0.83	0.86	0.90	0.65	0.81

Note: CR = Composite Reliability; AVE = Average Variance Extracted

Correlation analysis indicated that all constructs were significantly and positively associated (Table 2). The strongest relationship was observed between transformational leadership and teacher performance ($r = 0.749$, $p < 0.001$), consistent with the theoretical foundations of the study. These correlations provided the empirical basis for examining the hypothesized pathways among leadership, culture, trust, engagement, and performance.

The measurement model demonstrated satisfactory psychometric properties (Table 3). All

constructs exceeded the recommended thresholds for reliability (Cronbach's alpha and composite reliability > 0.82) and convergent validity (average variance extracted > 0.50). Discriminant validity was also established, confirming that each construct was empirically distinct.

Structural model results (Table 4) showed that transformational leadership (β = 0.388, p < .001) and organizational culture (β = 0.166, p = .011) significantly predicted teacher performance, thereby supporting H1 and H2. Both constructs also exerted significant positive effects on organizational trust and teacher engagement, confirming hypotheses H3–H8.

Table 4: Direct Effects of Structural Path Analysis Among Study Constructs

Hypothesis (H)	Path	Coefficient (β)	t-value	p-value	Significance
H1	TL→ TP	0.388	5.373	0.000	Significant
H2	OC→ TP	0.166	2.542	0.011	Significant
H3	TL→ OT	0.490	5.720	0.000	Significant
H4	OC→ OT	0.246	3.355	0.001	Significant
H5	TL→ TE	0.564	7.837	0.000	Significant
H6	OC→ TE	0.181	2.106	0.036	Significant
H7	TE→ TP	0.208	3.402	0.001	Significant
H8	OT → TP	0.161	2.717	0.007	Significant

Table 5: Indirect and Total Effects (Mediation Analysis)

H	Path	Indirect Effect(β)	Total Effect(β)	t-value	95% CI (Lower–Upper)	Significance
H9	TL → TE → TP	0.117**	0.584***	3.08	0.051 – 0.200	Significant
H10	OC →TE → TP	0.038(*ns*)	0.244*	1.58	-0.001 – 0.091	Not Significant (*indirec*t)
H11	TL →OT → TP	0.079*	0.584***	2.31	0.010 – 0.149	Significant
H12	OC →OT → TP	0.040*	0.244*	1.94	0.004 – 0.083	Significant

Note: β = original path coefficient; ns = not significant CI = confidence interval. * p < 0.05; ** p < 0.01; *** p < 0.001 (Two-tailed)

Mediation findings (Table 5) further revealed that transformational leadership exerted a strong total effect on teacher performance (β = 0.584), transmitted through both teacher engagement and organisational trust. In contrast, organisational culture demonstrated a smaller total effect (β = 0.244), mediated primarily through organisational trust, while the indirect pathway via engagement was not significant.

Finally, the model exhibited high explanatory and predictive power (Table 6). Teacher performance was substantially explained (R^2 = 0.638; Q^2 = 0.612), with an excellent overall fit (SRMR = 0.052). Among the predictors, transformational leadership had the largest effect size (f^2 = 0.154), whereas organisational culture made a comparatively smaller contribution.

Table 6: Model Predictive Power and Explanatory Metrics (R^2, Q^2, f^2)
Note: R^2 = Coefficient of determination; Q^2 = Predictive relevance; f^2 = Effect size

Construct	R^2	Adjusted R^2	Q^2	f^2 (X1:TL)	f^2 (X2: OC)	Interpretation
Organizational Trust (X4)	0.464	0.457	0.451	0.242 (Large)	0.061 (Small)	Moderately explained; high predictive relevance
Teacher Engagement (X3)	0.489	0.483	0.467	0.338 (Large)	0.035 (Small)	Moderately explained; high predictive relevance
Teacher Performance (Y)	0.638	0.630	0.612	0.154 (Moderate)	0.038 (Small)	Substantially explained; very high predictive accuracy

Discussion

Operating within the framework of the conceptual model (Figure 1), this study is anchored in the global mandate of Sustainable Development Goal 4 (SDG 4), which seeks to ensure inclusive and equitable quality education, particularly within contexts of systemic fragility such as under-resourced Nigerian secondary schools. Grounded in General Systems Theory (GST) (46) and Social Exchange Theory (SET) (47), the research examines how school-level organizational antecedents—transformational leadership and organizational culture—collectively shape teacher performance through two interdependent mediating mechanisms: teacher engagement, representing the behavioural–psychological pathway, and organizational trust, representing the relational–institutional pathway. Using Partial Least Squares Structural Equation Modelling (PLS-SEM) (49), the analysis demonstrates that both leadership and culture significantly influence teacher performance directly and indirectly through engagement and trust. These findings refine existing global leadership–culture frameworks by confirming their theoretical validity and practical relevance within fragile educational systems across Sub-Saharan Africa. Beyond empirical validation, the framework contributes to the literature by identifying context-sensitive pathways for strengthening institutional resilience and human capital in education systems aligned with SDG 4. Furthermore, the model offers a transferable analytical tool suitable for cross-national comparison, advancing understanding of how leadership, culture, engagement, and trust interact to sustain teacher performance in fragile educational systems worldwide.

Fragility in the present study refers to chronic resource constraints, intermittent policy implementation, and eroded institutional trust. Ukwa-West in Abia State exemplifies such fragility through extreme pupil–teacher ratios, delayed remunerations, and infrastructural decay, which together constrain teacher motivation and the feasibility of pedagogical innovation.

The analysis confirmed robust direct pathways, consolidating and extending prior research (41, 62-65). Transformational leadership emerged as a particularly influential antecedent, exerting strong direct effects on teacher engagement ($\beta = 0.505$, $p < 0.001$), organizational trust ($\beta = 0.490$, $p < 0.001$), and teacher performance ($\beta = 0.388$, $p < 0.001$) (Table 4). These results provide compelling empirical support for the compensatory mechanism hypothesis derived from General Systems Theory (GST) (48). Under conditions of acute resource scarcity, transformational leaders activate relational and psychological reserves that sustain teacher morale and commitment, effectively buffering schools against systemic fragility. This dual theoretical framing underscores leadership's role as both a systemic stabilizer (as posited by GST) and a performance catalyst (as articulated by Social Exchange Theory) (49), reinforcing its central importance within fragile educational contexts.

Transformational leadership is likely to mitigate the deleterious effects of fragility because it builds relational resources—trust, shared purpose, and teacher efficacy (33, 35, 66)—that buffer against material shortages. By contrast, authoritarian leadership can exacerbate distrust and demotivation when formal rewards and oversight are weak; laissez-faire leadership often leaves teachers without necessary coordination and support during crises. Thus, leadership philosophies shape both access to relational capital and teachers' capacity to adapt under stress (20, 21).

Organisational culture also exerted a significant direct effect on teacher performance ($\beta = 0.166$, $p = 0.011$; (63, 66). Empirically validating the General Systems Theory (GST) proposition (48) that institutional effectiveness emerges from cultural coherence, a cohesive cultural infrastructure was found to sustain performance stability by reinforcing professional standards and predictable behavioural norms (67). This stabilizing scaffolding effect ensures continuity of instructional quality, reduces variability in teacher conduct (68), and strengthens professional accountability (69). Collectively, these findings suggest that culture functions less as a direct motivational driver and more as an organizational anchor—one that secures consistent performance outcomes through trust-based institutionalization within fragile educational contexts.

In fragile settings, organizational culture is shaped by enduring scarcity, irregular external support, and fluctuating authority. Cultures that emphasize collaboration, transparency, and mutual support

(clan-like cultures) tend to preserve collegial networks and sustain routine instructional practices (23, 56). Conversely, highly hierarchical or competitive cultures may amplify power asymmetries and reduce information-sharing, undermining collective problem-solving when resources are scarce (36).

Evidence from post-conflict and disaster-affected education systems reinforces this pattern. Studies from South Sudan in East Africa, Sierra Leone in West Africa, and post-tsunami Aceh in Southeast Asia consistently demonstrate that when formal institutional structures weaken, it is trust-building leadership and collaborative school cultures that restore instructional continuity, stabilize teacher morale, and facilitate school recovery under extreme instability. This trend aligns with broader analyses, including a systematic review of West African school leadership which conceptualizes leadership in fragile environments as fundamentally relational in nature (70). The findings are further corroborated by empirical studies from Aceh quantifying the recovery effects of strong, trust-based local institutions (71). Collectively, these cross-contextual insights confirm that transformational leadership and cohesive organizational cultures serve as critical stabilizers within fragile educational systems.

The mediating roles of trust and engagement revealed critical distinctions, representing the study's most novel contribution. Both organizational trust ($\beta = 0.161$, $p = 0.007$) and teacher engagement ($\beta = 0.208$, $p = 0.001$) emerged as significant direct predictors of teacher performance (Table 4), providing robust empirical support for Social Exchange Theory (SET) (49), which posits that high-quality social exchanges underpin organizational effectiveness (25). Notably, the mediation analysis (Table 5) highlighted a key divergence: whereas transformational leadership operated through both mediators, organizational culture influenced teacher performance primarily through trust ($\beta = 0.040$, $p = 0.052$) and not through engagement.

This asymmetry underscores a key insight for fragile educational contexts: trust constitutes a more foundational and durable mediator than engagement. While organizational culture can foster a coherent and predictable environment that cultivates trust, it may not fully generate the deep affective enthusiasm associated with engagement (57), which is easily eroded by persistent systemic stressors such as salary delays and material shortages. By contrast, trust functions as a relational ballast, stabilizing professional relationships and providing psychological security, thereby enabling teachers to sustain performance even when intrinsic motivation falters (72). Accordingly, trust is not merely a mediating construct but the structural condition upon which sustained engagement and performance depend—a universal mechanism of organizational resilience in institutionally fragile educational systems.

Leadership and culture influence teacher behaviour through several proximal mechanisms (49). Psychological safety (17)—teachers' sense that they can take pedagogical risks without penalty—supports experimentation and peer learning. Motivation (both intrinsic and extrinsic) determines effort allocation and persistence under strain. Trust development (38) operates as a relational lubricant that reduces uncertainty, facilitates coordination, and supports reciprocal exchanges between leaders and teachers (25). These mechanisms explain how leadership and culture translate into sustained teacher practice in fragile contexts.

Beyond theoretical refinement, this study offers three substantive contributions to the literature. First, it extends Social Exchange Theory (SET) (49) by empirically positioning organizational trust as a central, buffering mediator of teacher performance in fragile educational systems, emphasizing the protective role of relational capital in mitigating systemic deficiencies (73). Second, it reinforces the applicability of General Systems Theory (GST) (48) by demonstrating that alignment across internal subsystems—leadership, culture, and trust—drives organizational effectiveness with substantial explanatory power (Table 6; $R^2 = 0.638$), thereby providing rare empirical validation of systemic interdependence within fragile educational contexts. Third, the study advances methodological rigour in African educational management research: the model exhibits strong predictive relevance (Table 6; $Q^2 > 0.40$), and the dominant role of transformational leadership is corroborated through effect size analysis (f^2 values up to 0.338), offering robust evidence of its pivotal influence.

Taken together, the results demonstrate that leadership and culture interact dynamically with

relational (trust) and motivational (engagement) mediators to sustain teacher performance under conditions of systemic fragility. Within rural Nigerian schools, transformational leadership and a cohesive organizational culture function as internal levers of resilience, partially compensating for institutional and resource deficiencies (23, 74). The Contingency-Based Organisational Model advanced in this study thus provides a transferable framework for educational systems characterized by resource scarcity and low institutional trust, particularly across Sub-Saharan Africa and developing regions of Southeast and East Asia (9, 46, 52, 75), where similar structural vulnerabilities persist.

For educational administrators operating in structurally fragile contexts, the evidence underscores the strategic importance of cultivating transformational leadership rooted in vision, integrity, and trust-building. The pathway to educational quality in fragile educational systems depends less on external aid or large-scale infrastructure and more on developing trust-based, coherent organizational structures that foster teacher engagement and collective efficacy. The universality of trust as a core relational anchor further emphasizes the need for policies that institutionalize transparency, fairness, and consistency in administrative practices (38). Such policies can yield substantial returns across diverse cultural contexts, providing a transferable framework for cross-national collaboration and the benchmarking of organizational health within educational systems. Theoretically, this study positions fragility as a key contextual moderator within models of educational effectiveness, advancing a contingency-based understanding of how leadership and culture sustain teacher performance under constraint, thereby informing the global imperative to achieve quality education (SDG 4) in low-capacity systems.

Actionable policy and practice recommendations derived from these findings are essential for strengthening educational systems under systemic fragility. Specifically, it is crucial to prioritize trust-building in leadership training curricula, emphasizing transparency, consistent communication, and fairness. Furthermore, promoting collaborative cultural practices, such as professional learning communities, is necessary to leverage peer support under resource constraints. To sustain teacher motivation, implementing low-cost engagement interventions like mentoring and recognition schemes is advised. Finally, policymakers must align emergency and development programming to institutionalize routines that protect instructional time and teacher welfare.

Notwithstanding its contributions, several limitations warrant consideration. First, the cross-sectional design constrains causal inference; longitudinal or experimental studies are required to trace how organizational dynamics and performance mechanisms develop over time (50). Second, reliance on self-reported data introduces the risk of common method bias, as all variables were derived from a single instrument and source. This limitation, which may artificially inflate observed relationships, could be mitigated in future research through triangulation using principal evaluations, administrative records, or classroom observations. Third, the use of PLS-SEM emphasizes predictive capability over model fit; although predictive power was strong ($R^2 = 0.638$), the absence of approximate fit indices necessitates confirmatory testing with covariance-based SEM (51). Fourth, the rural Nigerian context limits generalizability, highlighting the need for comparative studies across varied fragile systems. Fifth, the unexplained 36.2% of variance suggests the influence of unmeasured factors such as workload, resource availability, student behaviour, and policy environments. Finally, future research should move beyond prediction to uncover the contextual mechanisms underpinning teacher performance in fragile systems. Longitudinal, comparative, and mixed-methods designs are particularly well-suited to capture both lived experience and structural dynamics, thereby advancing a more comprehensive and context-sensitive framework for understanding teacher performance in institutionally fragile educational environments.

Conclusion

This study advances leadership–culture–performance frameworks by demonstrating their validity within fragile, under-resourced educational systems, specifically rural Nigerian secondary schools. Aligned with General Systems Theory (GST), the findings show that alignment among leadership, culture, and trust strengthens organizational functioning despite resource

scarcity. From a Social Exchange Theory (SET) perspective, systemic fragility alters exchange dynamics, making trust a central mechanism for sustaining performance. Transformational leadership and organizational culture both directly enhance teacher performance and do so indirectly through teacher engagement and organizational trust. Notably, trust emerges as the more durable mediator—providing relational stability that maintains performance even when motivation is undermined by structural stressors. Engagement remains important, but it is more susceptible to fragility effects. Together, these pathways illustrate how internal organizational capital can generate resilience and partially compensate for material deficits. For policymakers in low-capacity systems, the results underscore actionable priorities: invest in trust-centered leadership development, institutionalize coherent cultural norms, and adopt context-sensitive approaches to enhancing engagement. These strategies align with SDG 4 targets on quality learning and qualified teachers, offering scalable and cost-effective interventions where external support is limited. Future research should employ longitudinal or experimental approaches to confirm causal dynamics and incorporate multi-source data to reduce method bias, thereby advancing a more robust contingency-based theory of organizational effectiveness in fragile education ecosystems.

Abbreviations

GST: General Systems Theory, OC: Organisational Culture, OT: Organisational Trust, PLS-SEM: Partial Least Squares Structural Equation Modelling, SDG 4: Sustainable Development Goal 4, SDG: Sustainable Development Goal, SET: Social Exchange Theory, TE: Teacher Engagement, TL: Transformational Leadership, TP: Teacher Performance.

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Author Contributions

Emmanuel Chinedu Elele: conceptualization, methodology, data collection, preparation of the original draft, I Made Yudana: supervision, validated the results, critically reviewed the manuscript, I Wayan Lasmawan: resource provision, data curation, validation, manuscript editing, Kadek Rihendra Dantes: formal data analysis, visualized the results, managed the overall project administration. All authors have read and approved the final version of the manuscript.

Conflict of Interest

The authors have no conflicts of interest to declare.

Declaration of Artificial Intelligence (AI) Assistance

The authors declare no use of artificial intelligence (AI) for the write-up of the manuscript.

Ethics Approval

This study received ethical approval from the Institutional Ethical Committee of the Institute of Advanced Medical Research and Training (IAMRAT), College of Medicine, University of Ibadan, Nigeria (Protocol No. UI/EC/25/0508). Written informed consent was obtained from all participants prior to data collection.

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