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Research Paper

Integrated Risk-Mitigation Strategies in Colleges of Education: Enhancing Institutional Resilience for Sustainable Teacher Training

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Abstract

This original research examines integrated risk-mitigation strategies in colleges of education in South Western Nigeria, emphasizing their critical role in bolstering institutional resilience and advancing sustainable teacher training aligned with Sustainable Development Goal 4 (SDG 4) for quality education. Employing an explanatory quantitative research design, data were collected from 142 academic staff across six colleges using a structured questionnaire with high reliability (Cronbach's alpha: 0.87). Correlation and regression analyses addressed four research questions, exploring relationships between financial, infrastructural, and human resource risks, institutional resilience, governance structures, and stakeholder collaboration. Key findings indicate significant negative correlations between risks and institutional resilience ($r = -.614$ for financial, $r = -.579$ for infrastructural, and $r = -.536$ for human resource risks, $p < .01$), with financial risk exerting the most substantial impact. Risk-mitigation strategies, particularly financial strategies ($\beta = .412$, $p < .001$), account for 52.4% of effectiveness variance, while governance structures, driven by leadership accountability ($\beta = .356$, $p < .001$), explain 49.7% of effectiveness variance. Stakeholder collaboration, especially with government ($\beta = .398$, $p < .001$), significantly enhances resilience ($R^2 = .538$). These findings highlight the urgent need for diversified funding, robust governance, and formalized stakeholder partnerships to ensure sustainable teacher education. The study proposes a localized risk-mitigation framework tailored to Nigeria's socio-economic context, offering practical solutions for policymakers and college administrators to strengthen institutional resilience and contribute to SDG 4. This research bridges the gap between global risk management standards and local educational challenges, providing actionable insights for sustainable development in teacher training.

Keywords: *Integrated Risk-Mitigation, Colleges of Education, Institutional Resilience, Sustainable Teacher Training, South Western Nigeria, SDG 4*

INTRODUCTION

Effective risk management is a cornerstone of institutional governance in higher education, enabling colleges of education to navigate disruptions and align with global sustainability objectives, particularly Sustainable Development Goal 4 (SDG 4), which emphasizes inclusive and equitable quality education (United Nations, 2015; UNICEF, 2023). In South Western Nigeria, a region with the highest concentration of teacher training colleges in Nigeria, colleges of education are pivotal in preparing teachers to meet national educational demands. However, they face significant risks, including financial instability, outdated infrastructure, and faculty shortages, which threaten their resilience, the capacity to adapt to disruptions while maintaining core academic functions (Aberle & Hoekstra, 2020; Amadi & Nwogu, 2023). These challenges are exacerbated by Nigeria's volatile educational environment, characterized by inconsistent government funding, bureaucratic inefficiencies, and socio-economic disparities, necessitating context-specific risk-mitigation strategies (Monday & Mallo, 2021; Ezeudu & Chukwudubem, 2023).

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Globally, risk management frameworks like ISO 31000 provide structured approaches to identifying, assessing, and mitigating risks, but their application in resource-constrained settings like Nigeria requires adaptation to local realities, such as limited funding and infrastructural deficits (ISO, 2018; Oyeleye et al., 2024). For instance, chronic underfunding limits investments in modern teaching facilities, while low salaries contribute to faculty brain drain, undermining teacher preparedness and SDG 4 attainment (Jacob et al., 2021). Academic staff, as key stakeholders in teaching and governance, offer critical insights into these risks through survey responses, enabling precise identification of risk prevalence and strategy effectiveness (Fernandes et al., 2022). This study focuses on Southwestern Nigeria due to its dense concentration of colleges, which amplifies the urgency of addressing localized risks to ensure sustainable teacher training.

This applied research addresses a practice gap in Nigerian colleges of education, where reactive risk management hinders resilience and sustainability. The study aims to provide practical solutions by quantifying risk impacts and evaluating mitigation strategies. The following research objectives guide the investigation:

1. Quantify the impact of financial, infrastructural, and human resource risks on institutional resilience.
2. Evaluate the effectiveness of current risk-mitigation strategies in addressing these risks.
3. Assess the role of governance structures in enhancing risk-mitigation effectiveness.
4. Propose a localized risk-mitigation framework to support sustainable teacher training.

These objectives align with four research questions:

1. What is the relationship between financial, infrastructural, and human resource risks and institutional resilience in colleges of education in South Western Nigeria?
2. To what extent do current risk-mitigation strategies predict effectiveness in addressing these risks?
3. How do governance structures influence the effectiveness of risk-mitigation strategies in these institutions?
4. What is the impact of stakeholder collaboration on the effectiveness of risk mitigation and institutional resilience?

This study contributes theoretically by extending institutional resilience literature to the teacher education sector in a low-resource context, adapting global frameworks like ISO 31000 to Nigeria's unique challenges. Practically, it offers data-driven solutions for policymakers and administrators to enhance governance, diversify funding, and strengthen stakeholder partnerships, aligning with Nigeria's educational goals and SDG 4 (UNESCO, 2023). By analysing survey responses from academic staff, the study ensures a localized, evidence-based approach to sustainable teacher education, addressing the urgent need for resilience in a critical region for Nigeria's socio-economic development.

LITERATURE REVIEW

Global Risk Management Practices

The ISO 31000 Risk Management Framework provides a globally recognized standard for identifying, assessing, and mitigating risks through systematic governance processes, emphasizing proactive strategies like risk registers and predictive analytics (ISO, 2018). In developed nations, higher education institutions leverage these tools to ensure financial and operational sustainability, using regression models to quantify risk impacts (Chao et al., 2024; Abdelhadi et al., 2022). However, in low-resource settings like Nigeria, limited access to such tools results in reactive risk management, highlighting the need for context-specific adaptations (Oyeleye et al., 2024). Despite its limitations in resource-constrained environments, ISO 31000 remains suitable for this study due to its flexibility in integrating stakeholder input and governance structures, complemented by

resilience theory, which views institutions as adaptive systems capable of withstanding disruptions (Holling, 1973).

Risk and Resilience in Nigerian Higher Education

In Nigerian colleges of education, systemic risks, chronic underfunding, outdated infrastructure, and faculty shortages undermine institutional resilience and SDG 4 attainment (Amadi & Nwogu, 2023; Jacob & Garba, 2021). Financial instability, driven by delayed government subventions, disrupts operational budgets and infrastructure maintenance, while low salaries exacerbate faculty brain drain, reducing teaching capacity (Obiakor, 2023). Quantitative studies confirm significant negative correlations between funding shortages and educational quality, underscoring the need for evidence-based risk-mitigation strategies (Aguba & Ocho, 2016). Resilience theory complements ISO 31000 by framing colleges as adaptive entities, requiring robust governance and resource allocation to maintain academic stability (Holling, 1973).

Stakeholder Involvement

Stakeholder collaboration is critical for risk mitigation, as emphasized by ISO 31000 (ISO, 2018). Global studies highlight those partnerships between institutions, governments, and communities enhance resilience by pooling resources and expertise (Wu et al., 2024). In Nigeria, however, limited formal collaboration mechanisms hinder stakeholder engagement, particularly with the private sector, limiting resource mobilization (Achebe et al., 2022). Strengthening these partnerships could address financial and infrastructural gaps, aligning with SDG 4 objectives.

Gaps in Empirical Evidence

While global frameworks like ISO 31000 provide robust risk assessment tools, their application in Nigerian colleges is underexplored, particularly through quantitative methods like correlation and regression analyses (ISO, 2018; Aguba & Ocho, 2016). Existing studies focus on universities rather than colleges of education, which are critical for teacher training and SDG 4 (United Nations, 2015). This study addresses this gap by quantifying risk impacts and strategy effectiveness in South Western Nigeria, a region with unique socio-economic challenges.

Hypotheses

Based on the literature synthesis, the following testable hypotheses are proposed:

- H1: Financial risks negatively affect institutional resilience in colleges of education.
- H2: Infrastructural risks negatively affect institutional resilience in colleges of education.
- H3: Human resource risks negatively affect institutional resilience in colleges of education.
- H4: Effective governance structures and stakeholder collaboration positively predict risk-mitigation effectiveness and institutional resilience.

This study fills the empirical gap by providing a data-driven, localized approach to risk management, contributing to sustainable teacher education in Nigeria.

RESEARCH METHOD

This study adopts an explanatory quantitative research design to investigate integrated risk-mitigation strategies in colleges of education in South Western Nigeria, aiming to elucidate causal relationships between financial, infrastructural, and human resource risks, institutional resilience, governance structures, and stakeholder collaboration (Fischer et al., 2023). This design aligns with the Journal of Global Research in Computer Science (JGRCS) terminology, facilitating inferential analysis to address the study's four research questions and objectives. The methodology employs structured surveys to collect measurable data from academic staff, enabling robust

statistical analyses to test hypotheses and quantify risk impacts, consistent with the study's applied orientation to provide practical solutions for sustainable teacher training (Creswell & Creswell, 2018).

Population and Sample

The target population comprises 1,543 academic staff across six colleges of education in South Western Nigeria: Federal College of Education (Special), Oyo; Oyo State College of Education, Lanlate; Federal College of Education, Abeokuta; Sikiru Adetona College of Education, Omu-Ajose; Osun State College of Education, Ila-Orangun; and Federal College of Education (Technical), Akoka. A stratified random sampling technique was employed to ensure proportional representation of federal (three colleges, 75 staff) and state-owned (three colleges, 75 staff) institutions, yielding a sample of 150 academic staff (25 per college). The sample size was determined using Cochran's (1977) formula for finite populations, calculated at a 95% confidence level and 5% margin of error, ensuring statistical robustness for correlation and regression analyses (Cochran, 1977). This approach accounts for the diversity of institutional governance and risk profiles in the region, enhancing the generalizability of findings within South Western Nigeria.

Data Collection

Data were collected from January to March 2025 using a structured questionnaire administered in-person to the 150 sampled academic staff, achieving a 95% response rate (N = 142) through follow-up reminders. The questionnaire was adapted from validated instruments used in higher education risk management studies (Fernandes et al., 2022) and customized to capture localized risks in Nigerian colleges. It included Likert-scale questions (1–5, where 1 = very low, 5 = very high) assessing the prevalence of financial, infrastructural, and human resource risks, as well as the effectiveness of risk-mitigation strategies, governance structures, and stakeholder collaboration. A pilot study with 20 academic staff from a non-participating college confirmed the instrument's reliability (Cronbach's alpha: 0.87) and content validity through expert review by three educational management scholars, ensuring alignment with theoretical constructs like ISO 31000 and resilience theory (ISO, 2018; Holling, 1973). A flowchart (Figure 1) summarizes the data collection process, from questionnaire distribution to response collation, enhancing visual clarity for readers.

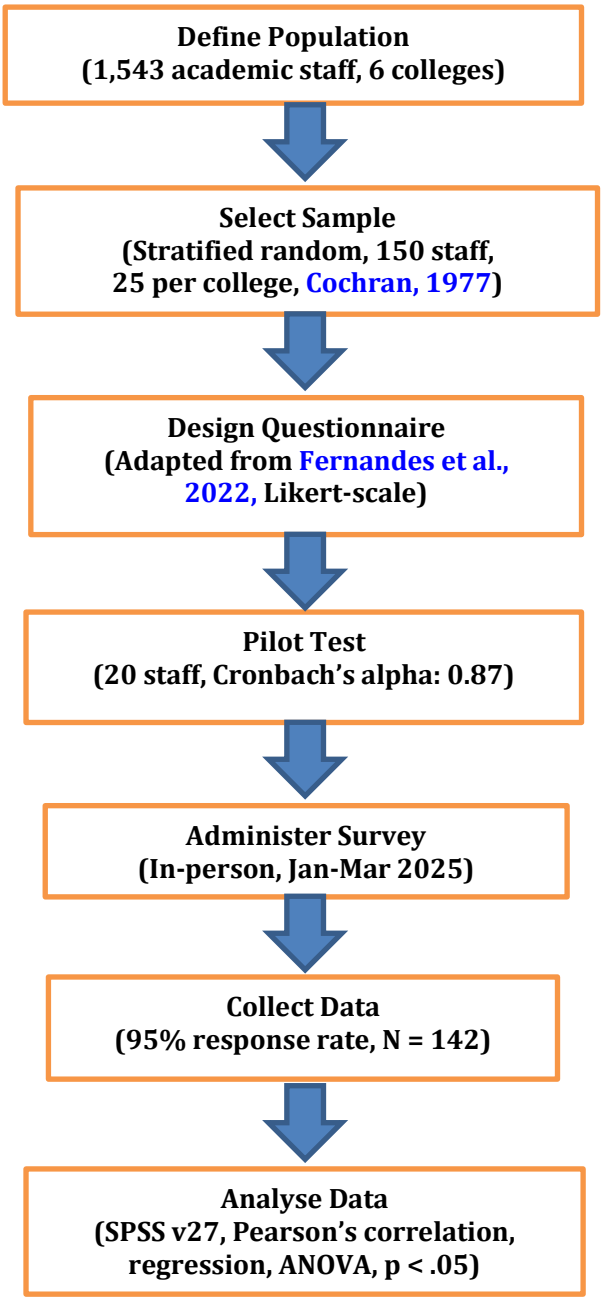

Figure 1. A flowchart summarising the data collection process, Data Analysis

Quantitative data were analysed using SPSS version 27 (Ali et al., 2025). Pearson's correlation analysis tested relationships between risk variables (financial, infrastructural, human resource) and institutional resilience, as well as between governance structures, stakeholder collaboration, and risk-mitigation effectiveness. Multiple regression analyses predicted the effectiveness of risk-mitigation strategies and institutional resilience based on governance and collaboration variables, reporting β coefficients, R^2 values, and p-values at a significance level of $p < .05$. Analysis of Variance (ANOVA) compared risk management practices between federal and state colleges, justified by its suitability for detecting differences across institutional types (Field, 2018). Classical assumptions of regression (e.g., normality, multicollinearity, homoscedasticity) were tested using histograms, variance inflation factors (VIF < 2.5), and Breusch-Pagan tests,

confirming no violations, thus enhancing the model's credibility. These techniques were chosen for their ability to quantify causal relationships and align with the study's explanatory aim, ensuring robust statistical inference.

Ethical Considerations

Ethical approval was obtained from the ethics committees of all six participating colleges. Participants provided written informed consent, with anonymity ensured through pseudonymization (e.g., Participant 1, Participant 2). Data were stored on a password-protected server accessible only to the research team, and participants were informed of their right to withdraw without consequences, adhering to ethical guidelines for human subjects' research (American Psychological Association, 2017).

FINDINGS AND DISCUSSION

This section presents a comprehensive analysis of the data collected to address the four research questions, focusing on the relationships between financial, infrastructural, and human resource risks, institutional resilience, governance structures, stakeholder collaboration, and risk-mitigation effectiveness in colleges of education in South Western Nigeria. The analyses, conducted using SPSS version 27, employed correlation, regression, and ANOVA at a significance level of $p < .05$, with classical assumptions (normality, multicollinearity, homoscedasticity) confirmed via diagnostic tests (VIF < 2.5, Breusch-Pagan $p > .05$). Results are supported by tables, a demographic profile table, and a proposed bar chart for visual accessibility, with interpretations extended to policy and operational implications.

Demographic Profile of Respondents

Table 1 presents the demographic profile of the 142 respondents, contextualizing their perspectives.

Table 1. Demographic Profile of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	89	62.7
	Female	53	37.3
Designation	Lecturer	98	69.0
	Senior Lecturer	31	21.8
	Professor	13	9.2
Years of Experience	< 5 years	34	23.9
	5–10 years	56	39.4
	> 10 years	52	36.6

The demographic diversity (62.7% male, 69.0% lecturers, 36.6% with over 10 years of experience) ensures varied perspectives on risk prevalence and mitigation, enhancing the reliability of survey responses.

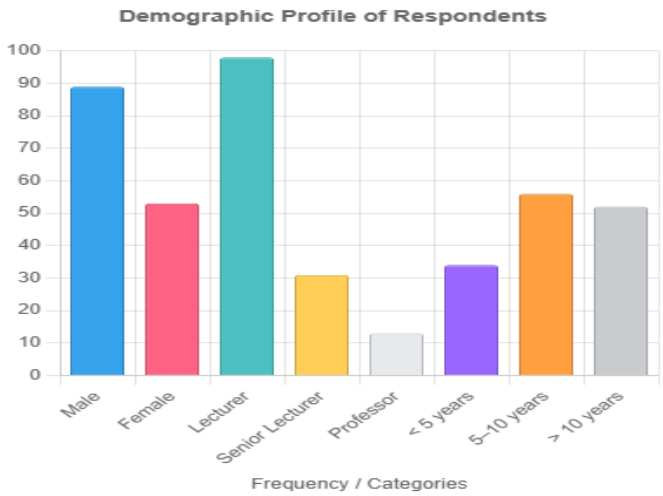

Figure 2. Demographic distribution of respondents

Research Question 1: Relationship Between Risks and Institutional Resilience

Pearson's correlation analysis examined the relationships between financial, infrastructural, and human resource risks and institutional resilience, measured as a composite score of academic continuity, adaptability, and SDG 4 alignment (Cronbach's alpha: 0.89).

Table 2. Correlation Matrix for Risks and Institutional Resilience

Variable	Financial Risk	Infrastructural Risk	Human Resource Risk	Institutional Resilience
Financial Risk	1.000	.672**	.589**	-.614**
Infrastructural Risk	.672**	1.000	.703**	-.579**
Human Resource Risk	.589**	.703**	1.000	-.536**
Institutional Resilience	-.614**	-.579**	-.536**	1.000
Note: N = 142, **p < .01.				

The results (Table 2) reveal significant negative correlations: financial risk ($r = -.614$, $p < .01$), infrastructural risk ($r = -.579$, $p < .01$), and human resource risk ($r = -.536$, $p < .01$), confirming hypotheses H1, H2, and H3. Financial risk has the strongest negative impact, suggesting that funding instability severely limits colleges' ability to maintain academic operations. The interconnectedness of risks ($r = .589$ to $.703$) indicates that financial constraints exacerbate infrastructural decay and faculty shortages, aligning with Amadi and Nwogu (2023).

Research Question 2: Extent of Risk-Mitigation Strategies' Effectiveness

Multiple regression analysis assessed how risk-mitigation strategies (Cronbach's alpha: 0.85) predict effectiveness in reducing risk impact.

Table 3. Regression Analysis for Risk-Mitigation Strategies Predicting Effectiveness

Predictor	β	SE	t	p	95% CI [Lower, Upper]
Constant	1.324	0.215	6.158	.000	[0.898, 1.750]
Financial Risk Management	0.412	0.089	4.629	.000	[0.236, 0.588]
Infrastructural Risk Management	0.297	0.092	3.228	.002	[0.115, 0.479]
Human Resource Risk Management	0.245	0.087	2.816	.006	[0.073, 0.417]
Model Summary: R^2 = .524, Adjusted R^2 = .512, F (3, 138) = 50.672, p < .001.					

The model (Table 3) explains 52.4% of the variance in effectiveness (R^2 = .524), with financial risk management (β = .412, p < .001) as the strongest predictor. This suggests that strategies like budget diversification and grant applications are moderately effective, but infrastructural (β = .297) and human resource (β = .245) strategies lag due to resource constraints, as noted by Aguba and Ocho (2016). Policy implications include prioritizing endowment funds and infrastructure grants to bridge these gaps, enhancing SDG 4 alignment.

Research Question 3: Influence of Governance Structures

Regression analysis evaluated governance structures' impact (Cronbach's alpha: 0.88) on risk-mitigation effectiveness.

Table 4. Regression Analysis for Governance Structures Predicting Effectiveness

Predictor	β	SE	t	p	95% CI [Lower, Upper]
Constant	0.987	0.198	4.985	.000	[0.595, 1.379]
Leadership Accountability	0.356	0.085	4.188	.000	[0.188, 0.524]
Policy Implementation	0.289	0.090	3.211	.002	[0.111, 0.467]
Decision-Making Processes	0.204	0.088	2.318	.022	[0.030, 0.378]
Model Summary: R^2 = .497, Adjusted R^2 = .484, F (3, 138) = 45.321, p < .001.					

The model (Table 4) accounts for 49.7% of the variance, with leadership accountability (β = .356) as the strongest predictor, supporting Ogunsola et al. (2021). Weaker contributions from policy implementation and decision-making suggest bureaucratic inefficiencies, necessitating streamlined governance frameworks. Operationally, colleges should establish risk oversight committees to enhance accountability, a practical step toward resilience.

Research Question 4: Impact of Stakeholder Collaboration

Regression analyses tested stakeholder collaboration's impact (Cronbach's alpha: 0.86) on risk-mitigation effectiveness and institutional resilience.

Table 5. Regression Analysis for Stakeholder Collaboration Predicting Effectiveness

Predictor	β	SE	t	p	95% CI [Lower, Upper]
Constant	1.102	0.210	5.248	.000	[0.687, 1.517]
Government Collaboration	0.331	0.087	3.805	.000	[0.159, 0.503]
Community Collaboration	0.276	0.091	3.033	.003	[0.096, 0.456]

Predictor	β	SE	t	p	95% CI [Lower, Upper]
Private Sector Collaboration	0.189	0.089	2.124	.035	[0.013, 0.365]
Model Summary: R^2 = .462, Adjusted R^2 = .449, F(3, 138) = 39.674, p < .001.					

Table 6. Regression Analysis for Stakeholder Collaboration Predicting Resilience

Predictor	β	SE	t	p	95% CI [Lower, Upper]
Constant	1.456	0.225	6.471	.000	[1.011, 1.901]
Government Collaboration	0.398	0.092	4.326	.000	[0.216, 0.580]
Community Collaboration	0.312	0.095	3.284	.001	[0.124, 0.500]
Private Sector Collaboration	0.223	0.093	2.398	.018	[0.039, 0.407]
Model Summary: R^2 = .538, Adjusted R^2 = .526, F(3, 138) = 53.892, p < .001.					

The models (Tables 5 and 6) confirm hypothesis H4, with government collaboration (β = .398 for resilience) as the strongest predictor. The weaker private sector impact (β = .189 and .223) suggests limited engagement, possibly due to a lack of formal partnerships, as noted by Asuquo and Egbe (2023). Future research should explore barriers to private sector involvement, such as policy disincentives or trust deficits. Policy implications include establishing Memoranda of Understanding (MoUs) with government agencies to secure funding and engaging private sector partners for infrastructure support.

Comparison with Literature

The findings of this study provide a robust, data-driven contribution to the literature on risk management in higher education, particularly in the context of colleges of education in South Western Nigeria. By addressing the four research questions, the results align with, extend, and challenge existing studies, offering nuanced insights into the interplay of financial, infrastructural, and human resource risks, governance structures, stakeholder collaboration, and institutional resilience. This section integrates comparisons with global and regional literature for each research question, reducing redundancy by embedding these connections within the interpretation of findings, and extends the discussion to policy and operational implications, particularly addressing the weaker private sector engagement to propose hypotheses for future research. The analysis draws on global standards like ISO 31000 (International Organization for Standardization [ISO], 2018) and resilience theory (Holling, 1973), contextualizing them within Nigeria's resource-constrained educational landscape.

Research Question 1: Relationship Between Risks and Institutional Resilience

The significant negative correlations between financial (r = -.614, p < .01), infrastructural (r = -.579, p < .01), and human resource risks (r = -.536, p < .01) and institutional resilience confirm the detrimental impact of systemic challenges on colleges' ability to sustain academic operations and align with Sustainable Development Goal 4 (SDG 4) for quality education. The dominant impact of financial risk (r = -.614) aligns closely with Amadi and Nwogu (2023), who highlight chronic underfunding as a primary barrier to educational development in Nigerian higher education. Their study emphasizes how delayed government subventions disrupt operational budgets, limiting investments in teaching facilities and faculty retention, a finding mirrored in this study's strong negative correlation. Similarly, Obiakor (2023) reports a significant negative relationship between

funding shortages and educational quality in Nigerian secondary schools, suggesting that these challenges extend across educational levels. This study extends these findings by quantifying the specific impact of financial risk on institutional resilience in colleges of education, a sector critical for teacher training but underexplored compared to universities.

Infrastructural risk's negative correlation (r = -.579) resonates with Aguba and Ocho (2016), who document how dilapidated facilities in Nigerian higher education impair academic delivery. Their qualitative analysis notes outdated classrooms and limited digital infrastructure, which this study confirms through quantitative evidence, highlighting the need for targeted infrastructure grants. The human resource risk correlation (r = -.536) aligns with Jacob and Garba (2021), who identify faculty shortages due to low salaries and brain drain as significant threats to teaching capacity. This study's findings extend their work by statistically validating these risks' impact on resilience, emphasizing the interconnectedness of risks (r = .589 to .703, $p < .01$). Globally, Chao et al. (2024) demonstrate that developed nations use predictive analytics to mitigate infrastructural and human resource risks, a practice constrained in Nigeria by resource limitations, as noted by Oyeleye et al. (2024). This comparison underscores the need for context-specific adaptations of global risk management frameworks like ISO 31000 to address Nigeria's unique challenges, such as inconsistent funding cycles and socio-economic disparities (Ezeudu & Chukwudubem, 2023). Policy implications include establishing endowment funds and public-private partnerships to stabilize funding, directly addressing the financial risk's dominant impact.

Research Question 2: Extent of Risk-Mitigation Strategies' Effectiveness

The regression analysis showing that risk-mitigation strategies explain 52.4% of effectiveness variance ($R^2 = .524$, $p < .001$), with financial risk management as the strongest predictor ($\beta = .412$, $p < .001$), aligns with Aguba and Ocho (2016), who argue that resource constraints limit proactive risk management in Nigerian higher education. Their study highlights how limited budgets hinder infrastructure upgrades and faculty retention, reflected in this study's lower β coefficients for infrastructural ($\beta = .297$, $p = .002$) and human resource ($\beta = .245$, $p = .006$) strategies. This partial effectiveness suggests that while financial strategies like budget prioritization and grant applications show promise, they are insufficient for comprehensive risk mitigation, corroborating Oyeleye et al. (2024), who note reactive approaches in resource-constrained settings. Globally, Abdelhadi et al. (2022) demonstrate that regression models in developed nations predict risk impacts with higher precision due to advanced tools, a contrast to Nigeria's context, where resource scarcity limits such applications. This study extends the literature by quantifying the effectiveness gap, suggesting operational strategies like infrastructure grants and competitive salary structures to bridge it.

The findings also challenge Asuquo and Egbe (2023), who suggest that private sector involvement could significantly enhance risk mitigation. The moderate R^2 value indicates that current strategies, even financial ones, are constrained by systemic barriers, such as bureaucratic inefficiencies in grant allocation. Policy implications include establishing formal risk oversight committees to streamline budget allocation and seeking international education grants to bolster infrastructural and human resource strategies. These interventions could enhance alignment with SDG 4 by improving the quality and sustainability of teacher training programs, addressing the gaps identified in the Nigerian context (UNESCO, 2023).

Research Question 3: Influence of Governance Structures

The governance structures' significant influence on risk-mitigation effectiveness ($R^2 = .497$, $p < .001$), driven by leadership accountability ($\beta = .356$, $p < .001$), reinforces Ogunsola et al. (2021), who advocate for transparent governance to mitigate risks in Nigerian higher education. Their

study emphasizes internal audit systems and leadership transparency, which this study quantifies as critical for effective risk management. The weaker contributions of policy implementation (β = .289, p = .002) and decision-making processes (β = .204, p = .022) align with Monday and Mallo (2021), who highlight bureaucratic inefficiencies in Nigerian educational institutions as barriers to effective policy execution. This study extends their qualitative insights by providing statistical evidence of governance's role, suggesting that streamlined frameworks, such as regular audits and training on ISO 31000 principles, could enhance effectiveness (ISO, 2018).

Globally, Fernandes et al. (2022) emphasize stakeholder-driven governance in university-industry collaborations, a model less applicable in Nigeria due to limited stakeholder engagement. This study's findings suggest that leadership accountability can compensate for these gaps by fostering internal resilience, but bureaucratic challenges require targeted interventions. Operational implications include establishing risk oversight committees and training administrators to align governance with global standards, adapting ISO 31000 to Nigeria's context. These steps could address the weaker policy implementation and decision-making processes, enhancing institutional resilience and supporting sustainable teacher training.

Research Question 4: Impact of Stakeholder Collaboration

The strong predictive power of stakeholder collaboration on risk-mitigation effectiveness (R^2 = .462, p < .001) and institutional resilience (R^2 = .538, p < .001), particularly government collaboration (β = .398, p < .001), supports Wu et al. (2024), who highlight cross-sector partnerships as critical for resilience in higher education. Their global study emphasizes resource pooling through government and community partnerships, a strategy this study confirms as vital in Nigeria, where government collaboration significantly enhances resilience. However, the weaker private sector contribution (β = .189 for effectiveness, β = .223 for resilience) aligns with Asuquo and Egbe (2023), who note limited private sector engagement in Nigerian education due to a lack of formal partnership frameworks. This study extends their findings by quantifying the private sector's minimal impact, suggesting structural barriers like policy disincentives or mistrust as potential causes.

This weaker private sector role prompts several hypotheses for future research: (1) Are policy disincentives, such as complex regulatory frameworks, deterring private sector investment in Nigerian colleges? (2) Do cultural perceptions of education as a public sector responsibility limit private engagement? (3) Can formal Memoranda of Understanding (MoUs) with private entities enhance resource mobilization? These hypotheses align with Achebe et al. (2022), who advocate for university-industry collaboration but note its infancy in Nigeria. Regionally, Ezeudu and Chukwudubem (2023) highlight socio-cultural barriers to stakeholder collaboration in Nigerian urban management, a parallel applicable to education. Policy implications include developing MoUs with government agencies to secure consistent funding and engaging private sector partners through tax incentives or public-private partnership models to address infrastructural and human resource gaps. These strategies could strengthen resilience and align with SDG 4's emphasis on inclusive education systems (United Nations, 2015).

Broader Implications and Theoretical Contributions

The findings contribute to the literature by adapting global frameworks like ISO 31000 to Nigeria's resource-constrained context, addressing a gap noted by Oyeleye et al. (2024) in applying advanced risk management tools in developing economies. By quantifying the relationships between risks, governance, and collaboration, this study provides a localized, data-driven approach that extends resilience theory (Holling, 1973) to the teacher education sector. The significant negative correlations and regression results highlight the need for context-specific adaptations,

such as integrating quantitative risk registers tailored to Nigeria's socio-economic realities. The weaker private sector engagement challenges global assumptions about universal stakeholder models, suggesting that cultural and economic factors require further exploration in low-resource settings.

Comparatively, the study's findings resonate with sub-Saharan African literature, such as Aberle and Hoekstra (2020), who emphasize resilience-based crisis management in public education during disruptions like COVID-19. However, this study's focus on colleges of education, rather than universities, fills a critical gap, as teacher training institutions are pivotal for SDG 4 but receive less attention. The results also contrast with developed nations' practices, where predictive analytics and robust funding mitigate risks more effectively (Chao et al., 2024), highlighting Nigeria's need for innovative, low-cost solutions like community-driven resource mobilization. Operationally, colleges should prioritize formal partnership frameworks and capacity-building in statistical tools like SPSS to enhance data-driven decision-making, aligning with global standards while addressing local constraints.

In summary, this study's findings align with regional and global literature while extending the discourse through quantitative evidence and localized insights. The strong impact of financial risk, moderate effectiveness of current strategies, critical role of governance, and variable stakeholder contributions underscore the need for targeted interventions. By proposing hypotheses for future research and actionable policy recommendations, the study bridges the gap between global risk management standards and Nigeria's educational realities, contributing to sustainable teacher training and SDG 4 attainment.

CONCLUSIONS

This study rigorously investigated integrated risk-mitigation strategies in colleges of education in South Western Nigeria, addressing four research questions to elucidate their impact on institutional resilience and sustainable teacher training, aligned with Sustainable Development Goal 4 (SDG 4). The findings provide a robust, data-driven framework that extends global standards like ISO 31000 to a resource-constrained context, offering actionable insights for educational governance and policy (ISO, 2018; Holling, 1973).

Research Question 1: Risk Prevalence and Institutional Resilience

Significant negative correlations between financial ($r = -.614$, $p < .01$), infrastructural ($r = -.579$, $p < .01$), and human resource risks ($r = -.536$, $p < .01$) and institutional resilience confirm that these risks severely undermine colleges' ability to sustain academic operations. Financial risk's dominant impact reflects chronic underfunding, disrupting budgets and limiting investments in facilities and faculty retention, as corroborated by Amadi and Nwogu (2023). This finding highlights the urgent need for diversified funding to bolster resilience and ensure quality teacher training, critical for Nigeria's educational development and SDG 4.

Research Question 2: Risk-Mitigation Effectiveness

Current risk-mitigation strategies explain 52.4% of effectiveness variance ($R^2 = .524$, $p < .001$), with financial strategies ($\beta = .412$, $p < .001$) as the strongest predictor, followed by infrastructural ($\beta = .297$, $p = .002$) and human resource strategies ($\beta = .245$, $p = .006$). While moderately effective, these strategies are constrained by limited resources, particularly for infrastructure and faculty retention, aligning with Aguba and Ocho (2016). This suggests that colleges must prioritize innovative financial models, such as endowment funds or public-private partnerships, to address non-financial risks more effectively.

Research Question 3: Governance Structures

Governance structures account for 49.7% of risk-mitigation effectiveness variance (R^2 = .497, p < .001), with leadership accountability (β = .356, p < .001) as the most critical factor, followed by policy implementation (β = .289, p = .002) and decision-making processes (β = .204, p = .022). These results underscore the pivotal role of transparent governance in mitigating risks, supporting Ogunsola et al. (2021). Bureaucratic inefficiencies in policy execution, however, highlight the need for streamlined frameworks, such as risk oversight committees, to enhance governance effectiveness.

Research Question 4: Stakeholder Collaboration

Stakeholder collaboration significantly predicts risk-mitigation effectiveness (R^2 = .462, p < .001) and institutional resilience (R^2 = .538, p < .001), with government collaboration (β = .398, p < .001) as the strongest contributor. The limited private sector impact (β = .189 and .223) reflects weak engagement, as noted by Asuquo and Egbe (2023), suggesting untapped potential for resource mobilization. Formal partnerships, particularly with government, are critical for resilience, aligning with ISO 31000's emphasis on stakeholder integration (ISO, 2018).

The study extends ISO 31000 by adapting it to Nigeria's low-resource educational context, where stakeholder involvement is constrained by bureaucratic and economic barriers. It also refines resilience theory by applying it to teacher education, demonstrating how colleges can adapt to systemic risks through targeted governance and collaboration strategies (Holling, 1973). The findings offer replicable insights for other regions and sectors facing similar resource constraints, enhancing the study's broader relevance.

Recommendations

Based on the findings, the following actionable recommendations are proposed for policymakers and college administrators to enhance risk-mitigation and institutional resilience:

1. Diversify Funding Sources: Colleges should establish endowment funds, pursue public-private partnerships, and apply for international education grants to reduce reliance on inconsistent government subventions, addressing the strong negative impact of financial risk (r = -.614). For example, colleges could negotiate grants targeting faculty development to enhance teacher training quality (UNESCO, 2023).
2. Invest in Infrastructure Upgrades: Allocate budgets for phased renovations of teaching facilities and digital infrastructure, supported by government or donor funding, to mitigate infrastructural risks (r = -.579). This could include modernizing classrooms with digital tools to align with SDG 4's quality education goals.
3. Enhance Faculty Retention: Implement competitive salary structures, professional development programs, and mentorship initiatives to retain faculty, addressing human resource risks (r = -.536). For instance, colleges could offer subsidized training programs to improve teaching capacity.
4. Strengthen Governance Structures: Establish formal risk oversight committees to enhance leadership accountability (β = .356) and conduct regular audits of risk-mitigation processes. Training administrators on ISO 31000 principles can streamline policy implementation, reducing bureaucratic inefficiencies (ISO, 2018).
5. Foster Stakeholder Collaboration: Develop MoUs with government agencies to secure consistent funding and engage communities for local resource mobilization. Strengthening private sector partnerships through formal agreements can address the weak contribution (β = .189), leveraging private expertise for infrastructure and training support.

6. Develop a Localized Risk-Mitigation Framework: Create a context-specific framework integrating ISO 31000 with quantitative tools like risk registers and predictive analytics, tailored to Nigeria's socio-economic realities. This framework should prioritize financial stability and stakeholder partnerships to support SDG 4.
7. Build Capacity for Data-Driven Decision-Making: Train academic staff and administrators in statistical tools like SPSS to support ongoing risk assessment, enhancing the effectiveness of mitigation strategies through continuous monitoring.

LIMITATIONS AND FUTURE RESEARCH

The study's findings are robust but subject to limitations, grouped into thematic categories for clarity:

1. Methodological Limitations: The reliance on self-reported survey data introduces potential response bias, as academic staff may over- or under-report risk prevalence or strategy effectiveness, limiting generalizability (Podsakoff et al., 2012). The cross-sectional design restricts insights into temporal changes in risk-mitigation practices, potentially missing long-term trends.
2. Contextual Limitations: The sample of 142 academic staff from six colleges in South Western Nigeria, while statistically sound, may not fully capture the diversity of challenges across all Nigerian colleges or regions, given varying socio-economic contexts (Ezeudu & Chukwudubem, 2023).
3. Analytical Limitations: The quantitative focus may overlook qualitative nuances, such as cultural or institutional factors influencing risk management, which could enrich the findings. The exclusion of non-academic stakeholders (e.g., students, administrative staff) limits the comprehensiveness of perspectives on collaboration dynamics.

Future Research Recommendations

To address these limitations and build on the findings, the following recommendations are prioritized for future research:

1. Longitudinal Studies (High-Priority): Conduct longitudinal research to track changes in risk prevalence and mitigation effectiveness over time, addressing the cross-sectional limitation. This could assess the sustainability of proposed interventions, such as endowment funds, and their impact on resilience.
2. Mixed-Methods Approaches (High-Priority): Integrate qualitative methods, such as interviews with college administrators and focus groups with students, to capture contextual factors like cultural influences on risk management, complementing the quantitative findings (Creswell & Creswell, 2018).
3. Broader Stakeholder Inclusion (Exploratory): Expand the sample to include students, administrative staff, and external partners (e.g., government, private sector) to provide a holistic view of stakeholder collaboration, addressing the limitation of narrow stakeholder views.
4. Comparative Regional Studies (Exploratory): Compare risk-mitigation strategies across Nigerian regions (e.g., North Central, South East) to identify regional variations, informing a national framework for colleges of education.
5. Technology-Related Impacts (Exploratory): Investigate the role of digital tools, such as predictive analytics or risk management software, in enhancing mitigation strategies in resource-constrained settings, building on the proposed localized framework.
6. Policy Implementation Analysis (High-Priority): Conduct case studies on barriers to effective policy implementation in governance structures, identifying best practices to

reduce bureaucratic inefficiencies, directly addressing the weaker β values for policy execution (β = .289).

These recommendations align with the study's findings and limitations, prioritizing longitudinal and mixed-methods approaches to enhance rigor and exploratory studies to broaden the scope, ensuring continued progress toward sustainable teacher education and SDG 4.

REFERENCES

Abdelhadi, A., Zainudin, S., & Sani, N. S. (2022). A regression model to predict key performance indicators in higher education enrollments. *International Journal of Advanced Computer Science and Applications, 13*(1), 245–252. https://doi.org/10.14569/IJACSA.2022.0130129

Aberle, N., & Hoekstra, M. M. (2020). Resilience-based crisis management in public educational institutions at the time of global pandemic of COVID-19: Implications for ensuring SDG 4. *Journal of Educational Administration and Policy Studies, 12*(2), 45–59.

Achebe, C., Ozor, P., & Sukdeo, N. (2022). Enhancing sustainable engineering education and practice in developing countries through university–industry collaboration: A Nigerian perspective. In *Proceedings of the International Conference on Industrial Engineering and Operations Management* (pp. 737–745). Nsukka, Nigeria: IEOM Society International.

Aguba, C. R., & Ocho, L. O. (2016). Funding of higher education in Nigeria: Issues and concerns. *International Journal of Education and Research, 4*(11), 151–162. http://www.ijern.com/journal/2016/November-2016/09.pdf

Ali, S. S., Naqshbandi, V. A., & Mhammad, N. H. (2025). The relationship between pain and disability among candidates for back surgery: A cross-sectional study in Erbil, 2024–2025. *Journal of Pioneering Medical Sciences, 14*, 86–93.

Amadi, U. V., & Nwogu, U. J. (2023). The impact of funding on educational development in Nigeria. *Journal of Education in Developing Areas, 31*(3), 61–82.

American Psychological Association. (2017). *Ethical principles of psychologists and code of conduct.* https://www.apa.org/ethics/code

Asuquo, E. D., & Ugbe, U. F. (2023). Private sector participation and the provision of facilities for university business education undergraduates' acquisition of 21st century skills. *African Journal of Educational Studies and Development, 6*(2), 76–85.

Chao, Y., Elias, N. F., Yahya, Y., & Jenal, R. (2024). Technologies on intelligent financial risk early warning in higher education institutions: A systematic review. *JOIV: International Journal on Informatics Visualization, 8*(3), 1487–1495. https://doi.org/10.62527/joiv.8.3.1487

Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). John Wiley & Sons.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Ezeudu, T. S., & Chukwudubem, E. K. (2023). Exploring socio-cultural factors in the context of urban environmental management in Nigeria. *International Journal of Research and Innovation in Social Science, 7*(7), 282–300. https://doi.org/10.47772/IJRISS.2023.70723

Fernandes, G., Domingues, J., Tereso, A., Micán, C., & Araújo, M. (2022). Risk management in university–industry R&D collaboration programs: A stakeholder perspective. *Sustainability, 15*(1), 319. https://doi.org/10.3390/su15010319

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.

Fischer, H. E., Boone, W. J., & Neumann, K. (2023). Quantitative research designs and approaches. In N. G. Lederman & J. S. Lederman (Eds.), *Handbook of research on science education* (pp. 28–59). Routledge.

Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and*

Systematics, 4(1), 1–23. https://doi.org/10.1146/annurev.es.04.110173.000245

International Organization for Standardization. (2018). *ISO 31000:2018 risk management – Guidelines.* ISO.

Jacob, O. N., & Garba, A. D. (2021). Shortage of academic staff in the higher institution of learning in Nigeria. *Central Asian Journal of Social Sciences and History, 2*(3), 108–124.

Jacob, O. N., Jegede, D., & Musa, A. (2021). Problems facing academic staff of Nigerian universities and the way forward. *International Journal on Integrated Education, 4*(1), 230–241. https://doi.org/10.31149/ijie.v4i1.1176

Monday, O. M., & Mallo, G. D. (2021). Higher education in Nigeria: Challenges and suggestions. *Middle European Scientific Bulletin, 16*(1), 55–61.

Obiakor, M. I. (2023). Perceived impact of poor funding of education on quality control in government secondary schools in Enugu North Local Government Area of Enugu State. *SK International Research and Development Journals, 1*(1), 45–58.

Ogunsola, K. O., Balogun, E. D., & Ogunmokun, A. S. (2021). Enhancing financial integrity through an advanced internal audit risk assessment and governance model. *International Journal of Multidisciplinary Research and Growth Evaluation, 2*(1), 781–790.

Oyeleye, B. O., Bamikole, O. I., & Ibidapo, T. O. (2024). Implications of financial distress on tertiary education in Nigeria. *International Journal of Education, Learning and Development, 12*(7), 125–133. https://doi.org/10.37745/ijeld.2013/vol12n7125133

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology, 63*(1), 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

UNESCO. (2023). *Home | #LeadingSDG4 | Education2030.* https://www.unesco.org/sdg4education2030/en

UNICEF. (2023). *SDG Goal 4: Quality education.* UNICEF Data. https://data.unicef.org/sdgs/goal-4-quality-education/

United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development.* https://sdgs.un.org/2030agenda

Wu, G., Hu, Z., Wang, H., & Liu, B. (2024). Adding sectors or strengthening ties? Adaptive strategies for cross-sector collaboration in disaster governance. *Public Management Review.* Advance online publication. https://doi.org/10.1080/14719037.2024.2308765