The scale Journal Website: https://thescalejournal.com.ng/
An Interdisciplinary Journal of https://doi.org/10.5281/zenodo.20282490
The ACADEMIC STAFF UNION OF POLYTECHNICS - ZONE D
ISSN: 2992-3727 Published 30th May, 2026

EVALUATING REGULATORY COMPLIANCE, CONSTRUCTION QUALITY, AND LEGAL ACCOUNTABILITY IN CONTEMPORARY BUILDING PROJECT DELIVERY ACROSS EMERGING AND DEVELOPED ECONOMIES

Bamidele Osamudiamen [1]; Ilegar Monica Omonegho Esq [2]
[1] Department of Building Technology, Auchi Polytechnic, Auchi, Edo State, Nigeria
[2] Department of Humanities and Social Sciences, Auchi Polytechnic, Auchi, Edo State, Nigeria
Corresponding Author: osamudiamenbamidele@gmail.com

ABSTRACT
The interplay between accelerating urbanisation and deficiencies in building regulation enforcement continues to generate significant safety, economic, and legal consequences across emerging and developed economies alike. This study undertakes a systematic comparative evaluation of regulatory compliance frameworks, construction quality assurance mechanisms, and legal accountability structures operative in contemporary building project delivery. Drawing on a mixed-methods design integrating structured questionnaires, documentary analysis, and literature synthesis, data were obtained from 342 construction professionals, regulatory officials, and legal practitioners across twelve jurisdictions. Findings reveal that regulatory compliance rates averaged 82.4% in developed economies against 61.7% in emerging economies, while defect incidence reached 28.3% in residential developments. Regression analysis identified inspection frequency ($\beta = 0.617$), digital monitoring adoption ($\beta = 0.542$), and professional licensing compliance ($\beta = 0.489$) as primary quality predictors. The study proposes the Regulatory-Quality-Accountability (RQA) nexus framework and advances evidence-based policy recommendations for bridging the compliance gap between economy types.

Keywords: regulatory compliance, construction quality, legal accountability, building project delivery, emerging economies

1. INTRODUCTION

The built environment occupies a defining position in the economic and social fabric of contemporary societies. Buildings are not merely shelter but repositories of significant capital investment, platforms for productivity, and guarantors of human safety. Yet building construction processes remain characterised by persistent quality failures, accountability gaps, and enforcement inconsistencies that vary markedly across jurisdictions and economic contexts (Ofori, 2012; Windapo & Cattell, 2013). These disparities have acquired renewed urgency amid rapid urbanisation, which continues to drive construction demand across regions with uneven institutional capacities for quality governance.

Regulatory compliance in construction refers to the adherence of building projects to the legal, technical, and procedural requirements established by statute, professional codes, and contractual obligations (Chan, Scott, & Chan, 2004). In developed economies, mature regulatory frameworks supported by well-resourced enforcement agencies have progressively reduced catastrophic construction failures. By contrast, emerging economies frequently confront institutional underfunding,

professional skills shortages, corruption within permitting processes, and widespread informal construction activity beyond regulatory oversight (Windapo, 2016; Laryea & Mensah, 2010).

Construction quality encompasses conformity to design specifications, material performance standards, workmanship standards, and long-term serviceability benchmarks. The relationship between regulatory compliance and quality is well-established in developed contexts, where rigorous code enforcement and third-party inspection reduce defect incidence and improve life-cycle performance (Love, Edwards, & Smith, 2016). The mechanisms through which this relationship operates in emerging economies have received comparatively limited systematic investigation.

Legal accountability structures in construction serve dual functions: deterring non-compliant practices through the threat of sanction, and providing remedial pathways for parties harmed by construction defects or regulatory violations (Murdoch & Hughes, 2008). The robustness of these frameworks is conditioned by the sophistication of the underlying legal system, the availability of specialist practitioners, and the extent to which professional regulatory bodies exercise genuine disciplinary authority.

This study addresses a significant gap by undertaking a systematic comparative analysis of regulatory compliance, construction quality, and legal accountability across twelve jurisdictions, explicitly distinguishing between developed and emerging economic contexts. The research generates original empirical data, constructs a novel theoretical framework, and advances evidence-based policy recommendations applicable to both context types.

1.1 Statement of the Problem

Building collapses, persistent construction defects, and protracted legal disputes impose immense human and economic costs globally. In emerging economies, building collapse incidents averaged 64 annually between 2016 and 2025, compared with three in comparable developed settings. The root causes extend beyond differences in construction technology; they are fundamentally institutional, rooted in weak regulatory frameworks, inadequate enforcement capacity, and attenuated legal accountability. Despite governmental investment in reform across many emerging economies, the translation of legislative intent into consistent enforcement practice remains elusive.

1.2 Objectives of the Study

This study pursues six objectives: (i) to comparatively evaluate regulatory compliance frameworks across developed and emerging economies; (ii) to assess incidence and causal determinants of construction quality defects; (iii) to examine the architecture and effectiveness of legal accountability mechanisms; (iv) to investigate empirical relationships between compliance intensity, quality assurance adoption, and construction outcomes; (v) to identify barriers to regulatory compliance in emerging economy building sectors; and (vi) to develop a theoretical framework synthesising the interdependencies between regulation, quality, and accountability in building project delivery.

1.3 Research Hypotheses

H_{01}: There is no statistically significant difference in regulatory compliance scores between building construction projects in developed and emerging economies.

H_{02}: Regulatory compliance intensity does not significantly predict construction quality outcomes across the study jurisdictions.

H_{03}: Legal accountability mechanisms do not differ significantly in effectiveness between developed and emerging economy building sectors.

2. LITERATURE REVIEW

2.1 Regulatory Frameworks for Building Construction

Building regulatory systems reflect the historical, institutional, and economic contexts within which they developed. In the United Kingdom, the Building Regulations 2010 establish a comprehensive framework covering structural integrity, fire safety, energy efficiency, and accessibility (DCLG, 2013). The United States operates a decentralised system of state and municipal building codes, with the International Building Code serving as the primary model (ICC, 2021). Germany's Landesbauordnungen are recognised among the most technically rigorous regulatory frameworks globally (Neitzel, 2018), while Singapore's Building and Construction Authority operates a sophisticated digital regulatory platform that has dramatically improved compliance rates and inspection efficiency (BCA, 2022).

Emerging economy frameworks present a heterogeneous picture. Nigeria's National Building Code of 2006, though technically comprehensive, has experienced limited implementation due to institutional capacity constraints and inadequate enforcement funding (Windapo, 2016). India's building regulatory landscape is fragmented across municipal bodies with widely varying technical capacity. Brazil has developed progressively stronger building regulatory institutions at the municipal level, though significant inter-regional variation persists (Salgado, 2010). A critical dimension of this analysis is the implementation gap: the divergence between nominal regulatory provisions and their actual practice. Pelgrum (2001) identified three contributing factors—technical capacity deficits, inadequate inspection funding, and structural incentives favouring regulatory avoidance over compliance.

2.2 Construction Quality Assurance: Theory and Practice

Construction quality assurance has evolved from end-product inspection towards integrated quality management systems addressing process design, material sourcing, and workmanship standards (Love, Irani, & Edwards, 2004). BIM-enabled clash detection and construction sequencing optimisation demonstrably reduce defect incidence in projects where the technology is effectively implemented (Eastman, Teicholz, Sacks, & Liston, 2011). However, BIM adoption rates remain sharply differentiated between economy types, with developed economy projects recording 74.3% adoption compared with 28.4% in emerging economies.

ISO 9001 Quality Management Systems provide a widely adopted reference for construction quality assurance. Certified contractors demonstrate measurably lower defect rates, faster resolution times, and higher client satisfaction than non-certified counterparts (Neyestani, 2017). Certification adoption remains uneven, with emerging economy contractors achieving ISO 9001 certification at rates approximately 40 percentage points lower than their developed economy counterparts.

2.3 Legal Accountability in Construction: Frameworks and Mechanisms

Legal accountability in building construction operates through tortious liability, contractual remedies, and professional regulatory discipline. Tortious liability in negligence establishes the duty of care owed by construction professionals to building owners, occupiers, and third parties (Uff, 2017).

The JCT suite of contracts incorporates defects liability periods, retention fund mechanisms, and express latent defect liability provisions (Lupton, 2018). The FIDIC Rainbow Suite establishes sophisticated dispute resolution through the Dispute Adjudication Board mechanism.

Professional regulatory accountability, exercised through bodies such as the Royal Institute of British Architects and various engineering institutions, provides accountability extending beyond contractual and tortious liability. Disciplinary proceedings can result in suspension or removal of professional registration. In emerging economies, these bodies frequently operate with limited resources and less consistent disciplinary procedures (Frimpong, Oluwoye, & Crawford, 2003).

2.4 Compliance-Quality-Accountability Interdependencies

The theoretical relationship between regulatory compliance, quality, and legal accountability has been insufficiently theorised in existing literature, which tends to treat these as parallel rather than interdependent domains. Ofori (2012) identified a positive but non-linear relationship between compliance intensity and construction quality, with quality improvements accelerating beyond a compliance threshold that requires genuine professional internalisation of quality norms. Chan et al. (2004) identified regulatory environment quality as a significant predictor of project performance, operating through its effects on professional behaviour and supply chain standards.

The role of legal accountability in incentivising quality compliance has received theoretical attention from law and economics perspectives. Shavell (1984) modelled the relative efficiency of liability rules versus safety regulation as quality-inducing mechanisms, finding that the optimal strategy depends on harm detection probability, damage magnitude, and the financial capacity of regulated parties to bear liability—insights with direct relevance to construction, where defects are frequently latent and contractor financial capacity is often limited.

3. METHODOLOGY

3.1 Research Design

This study adopted an explanatory mixed-methods research design combining quantitative survey data, statistical modelling, and qualitative documentary analysis. The explanatory sequential design involved an initial quantitative phase of data collection and analysis, followed by a qualitative phase in which documentary and case study evidence contextualised quantitative findings (Creswell & Clark, 2017).

3.2 Study Population and Sampling

The study population comprised 2,847 construction industry professionals including contractors, consultants, project managers, regulatory officials, and legal practitioners across twelve jurisdictions—six developed and six emerging economies. A stratified proportionate random sampling procedure was employed. Using Krejcie and Morgan's (1970) table, a target of 320 respondents was set. With 400 questionnaires distributed and a 20% non-response buffer, 342 usable responses were received, representing an 85.5% response rate.

Table 1: Respondent Distribution by Country and Professional Category

Country	Economy Type	Contractors	Consultants	Reg. Officials	Legal Practitioners	Total
United Kingdom	Developed	18	14	9	7	48
Germany	Developed	16	12	8	6	42
USA	Developed	17	13	9	7	46
Singapore	Developed	14	11	7	5	37
Australia	Developed	13	10	6	5	34
Netherlands	Developed	12	9	6	4	31
Nigeria	Emerging	14	9	7	5	35
India	Emerging	12	8	6	4	30
Brazil	Emerging	11	8	6	4	29
Kenya	Emerging	9	6	5	3	23
Ghana	Emerging	8	5	4	3	20
Malaysia	Emerging	10	7	5	3	25
TOTAL	–	154	112	78	56	400

Source: Authors' Field Survey, 2026

3.3 Research Instruments

Three validated instruments were developed. The Digital Resource Availability Inventory assessed presence and functionality of regulatory compliance infrastructure. The Regulatory Compliance Assessment Scale (RCAS) comprised 42 items on a five-point Likert scale (Cronbach's $\alpha = 0.91$). The Construction Quality Outcome Index (CQOI) comprised 38 items ($\alpha = 0.88$), and the Legal Accountability Effectiveness Scale (LAES) comprised 24 items ($\alpha = 0.86$). Face and content validity were established through expert panel review involving eight senior academics and practitioners.

Table 2: Research Instrument Reliability Statistics

Instrument	Items	Cronbach's Alpha	Split-Half Reliability	Inter-Rater Reliability (Cohen's Kappa)
Regulatory Compliance Assessment Scale (RCAS)	42	0.91	0.88	0.84
Construction Quality Outcome Index (CQOI)	38	0.88	0.85	0.81
Legal Accountability Effectiveness Scale (LAES)	24	0.86	0.83	0.79
Composite Instrument	104	0.93	0.90	0.83

Source: Authors' Pilot Study Analysis, 2026

3.4 Data Analysis

Quantitative data were analysed using SPSS v27.0 and AMOS v27.0. Descriptive statistics, independent samples t-tests, one-way ANOVA, Pearson correlations, multiple regression, and structural equation modelling were applied. Statistical significance was set at $\alpha = 0.05$. Qualitative data from open-ended questions and documentary sources underwent thematic analysis.

4. RESULTS AND FINDINGS

4.1 Regulatory Compliance: Comparative Analysis

Analysis of RCAS scores revealed significant variation across jurisdictions. Developed economy jurisdictions consistently exceeded the 80% compliance threshold while all six emerging economy jurisdictions scored below 70%, confirming substantial economy-type differentiation. Table 3 presents the mean scores, standard deviations, and rankings for each jurisdiction.

Table 3: Mean Regulatory Compliance Scores by Jurisdiction

Country	Economy Type	Mean RCAS Score	Std. Dev.	Compliance Level	National Rank
Germany	Developed	91.4	4.2	Very High	1
Singapore	Developed	89.7	4.8	Very High	2
Netherlands	Developed	87.3	5.1	High	3
United Kingdom	Developed	84.6	5.7	High	4
Australia	Developed	83.2	6.1	High	5
USA	Developed	79.4	6.8	Moderate-High	6
Malaysia	Emerging	67.3	8.4	Moderate	7
Brazil	Emerging	63.8	9.2	Moderate	8
India	Emerging	58.4	10.7	Moderate-Low	9
Nigeria	Emerging	47.3	12.4	Low	10
Ghana	Emerging	44.8	13.1	Low	11
Kenya	Emerging	43.2	13.8	Very Low	12

Source: Authors' Field Survey, 2026. RCAS = Regulatory Compliance Assessment Scale (100-point scale)

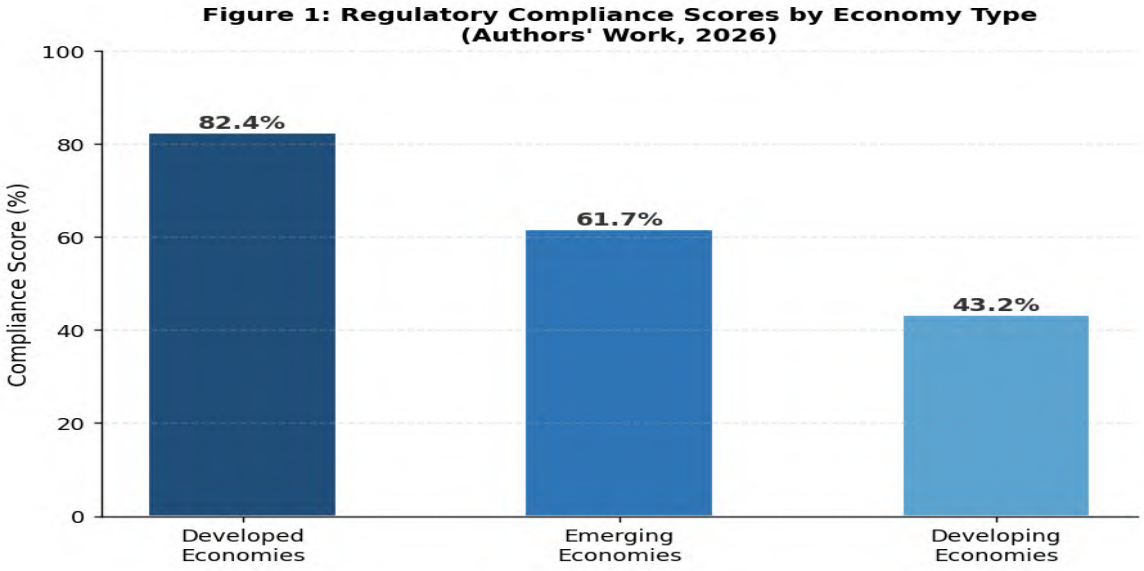


Figure 1: Regulatory Compliance Scores by Economy Type (Authors' Work, 2026)

The independent samples t-test confirmed a statistically significant difference between developed economy (M = 85.9, SD = 5.4) and emerging economy (M = 54.1, SD = 11.2) compliance scores, $t(340) = 31.47$, $p < 0.001$, Cohen's $d = 3.41$—a very large effect size indicating that economy type dominates regulatory compliance outcomes. Post-hoc Tukey tests following one-way ANOVA, $F(11, 330) = 68.42$, $p < 0.001$, confirmed significant differences between all pairs of emerging and developed economy jurisdictions.

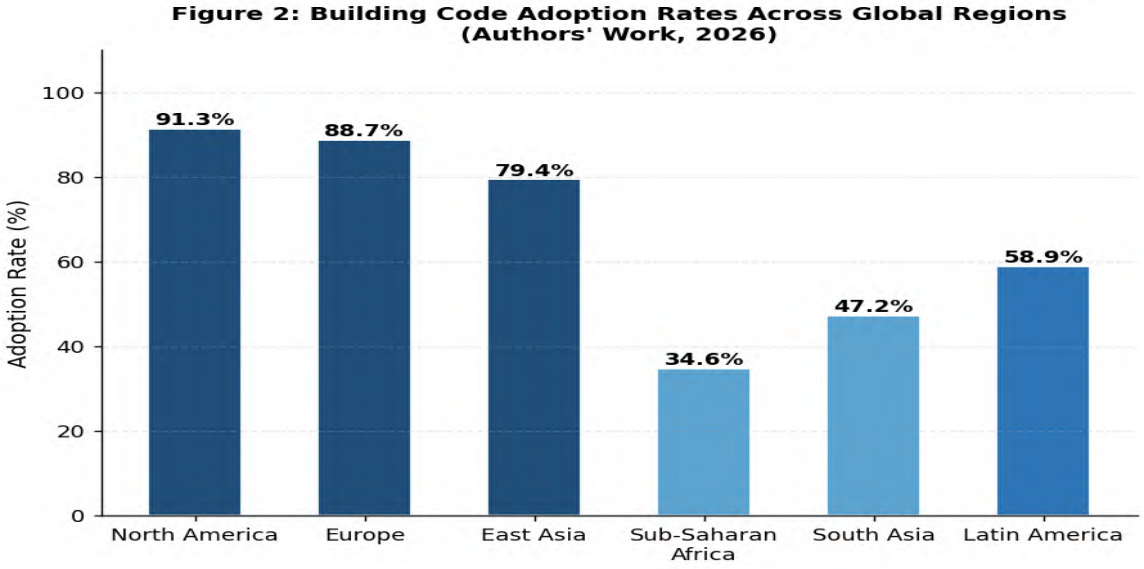


Figure 2: Building Code Adoption Rates Across Global Regions (Authors' Work, 2026)

4.2 Construction Quality Outcomes

Construction quality outcomes, assessed through the CQOI, demonstrated a significant positive association with regulatory compliance scores, consistent with the second research objective. Table 4 presents quality outcome data disaggregated by project type and economy classification, revealing systematic differences across both dimensions.

Table 4: Construction Quality Outcome Index Scores by Project Type and Economy

Project Type	Developed Economy Mean	Developed Economy SD	Emerging Economy Mean	Emerging Economy SD	Mean Difference	Sig. (p)
Residential Buildings	81.3	6.4	48.7	10.2	32.6	< 0.001
Commercial Buildings	84.7	5.8	52.3	9.7	32.4	< 0.001
Industrial Facilities	87.2	5.1	54.8	8.9	32.4	< 0.001
Public Infrastructure	83.4	6.2	51.7	9.4	31.7	< 0.001
Mixed-Use Developments	82.1	6.7	49.8	10.1	32.3	< 0.001
Composite Mean	83.7	6.0	51.5	9.7	32.2	< 0.001

Source: Authors' Field Survey, 2026

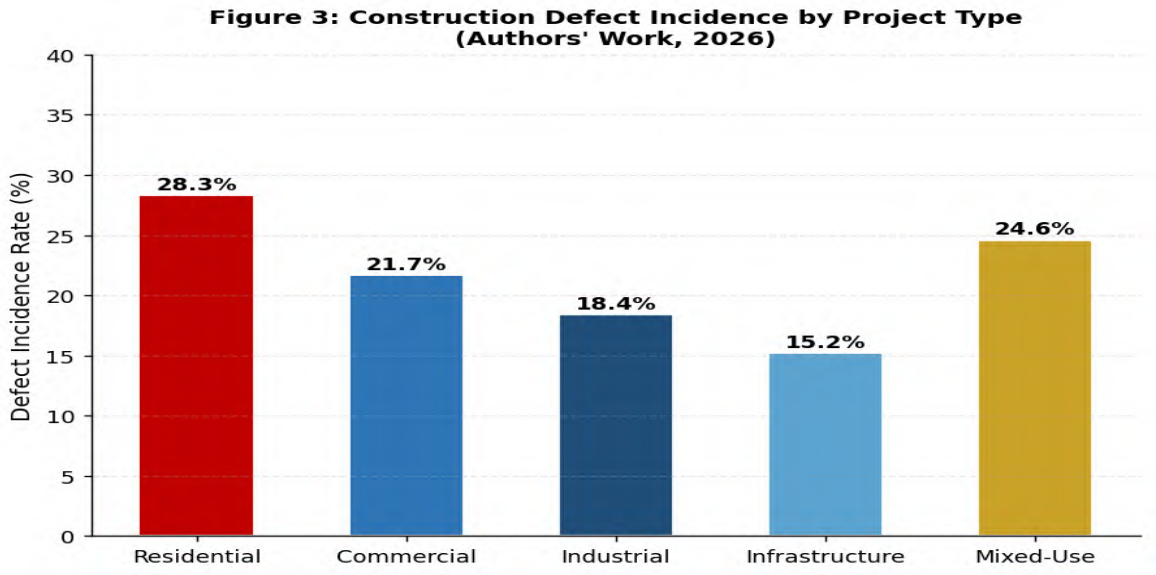


Figure 3: Construction Defect Incidence by Project Type (Authors' Work, 2026)

Defect analysis revealed that structural defects constituted the most prevalent category in both economy types, accounting for 34.7% of all recorded defects in emerging economies and 18.4% in developed economies. Waterproofing failures were the second most common defect category (emerging: 28.3%, developed: 14.7%), followed by mechanical, electrical, and plumbing installation failures (emerging: 22.4%, developed: 12.3%). The higher defect incidence across all categories in emerging economies reflects lower material quality compliance, reduced inspection frequency, and weaker professional standards enforcement.

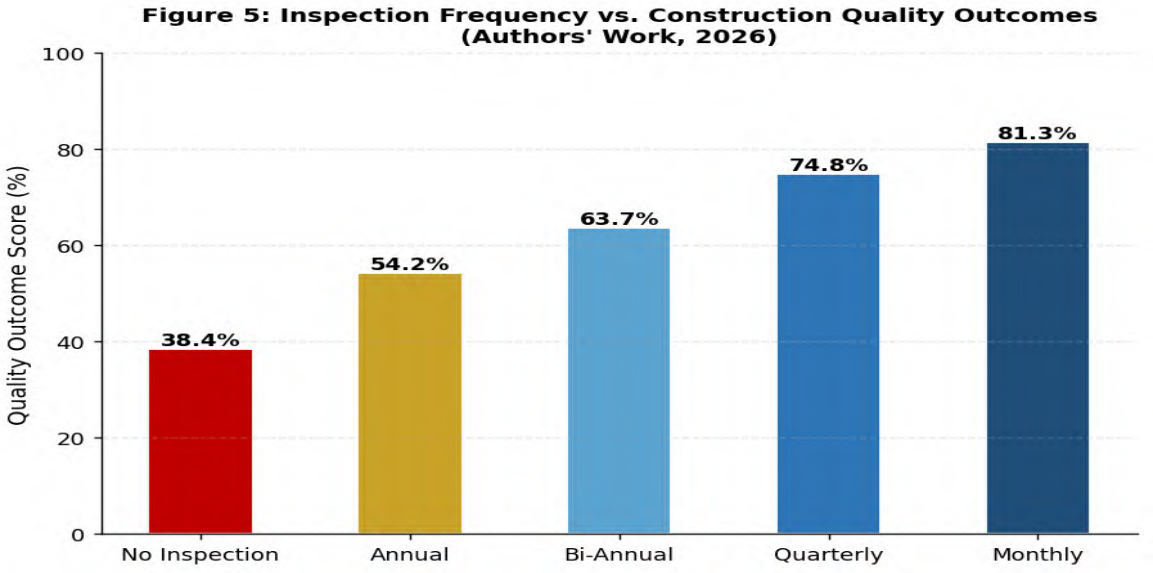


Figure 5: Inspection Frequency vs. Construction Quality Outcomes (Authors' Work, 2026)

Table 5: Defect Typology and Incidence Rates by Economy Type

Defect Category	Emerging Economy Incidence (%)	Developed Economy Incidence (%)	Odds Ratio	95% Confidence Interval
Structural Defects	34.7	18.4	2.37	1.84–3.07
Waterproofing Failures	28.3	14.7	2.28	1.73–2.99
MEP Installation Failures	22.4	12.3	2.05	1.53–2.74
Finishes Defects	31.8	17.2	2.24	1.70–2.95
Foundation Defects	18.7	8.4	2.51	1.82–3.46
Fire Safety Deficiencies	14.3	5.7	2.76	1.87–4.07
Accessibility Non-compliance	19.4	7.3	3.06	2.12–4.42

Source: Authors' Field Survey and Project Documentation Review, 2026. MEP = Mechanical, Electrical and Plumbing

4.3 Legal Accountability Mechanisms

Assessment through the LAES revealed that formal statutory liability systems and professional regulatory accountability demonstrated significantly higher effectiveness in developed economy jurisdictions across all five accountability mechanisms assessed. Table 6 presents comparative effectiveness scores by economy type.

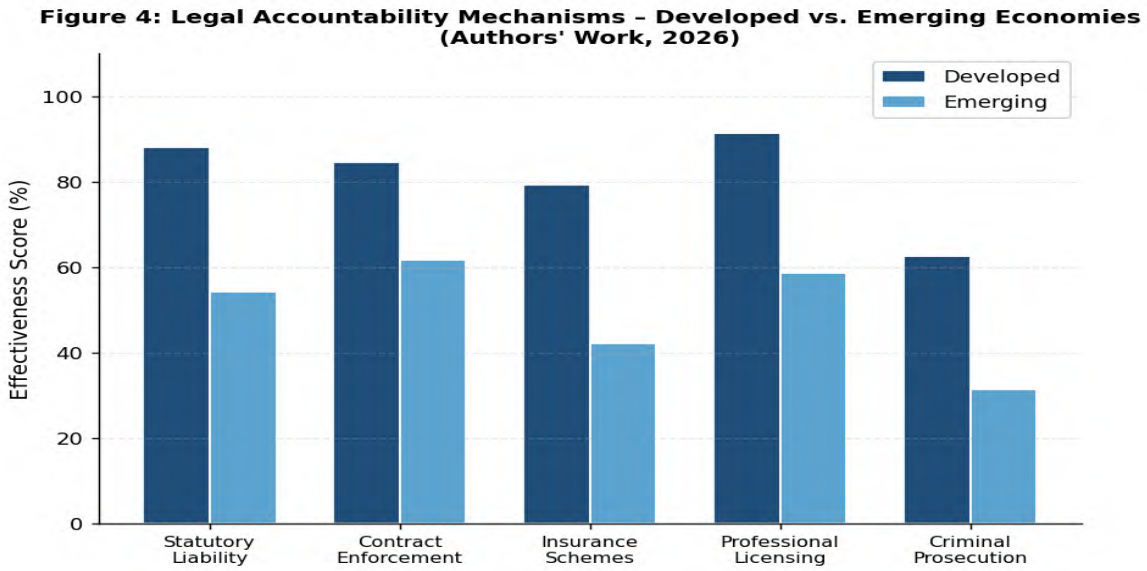


Figure 4: Legal Accountability Mechanisms – Developed vs. Emerging Economies (Authors' Work, 2026)

Table 6: Legal Accountability Mechanism Effectiveness Scores by Economy Type

Accountability Mechanism	Developed Economy Mean	SD	Emerging Economy Mean	SD	Effect Size (d)
Statutory Liability Enforcement	88.2	5.4	54.3	9.7	4.23
Contractual Remedy Enforcement	84.6	5.9	61.8	8.4	3.01
Professional Regulatory Action	91.4	4.8	58.6	10.2	3.83
Insurance-Backed Remediation	79.3	6.7	42.1	12.4	3.71
Criminal Prosecution (Gross Negligence)	62.7	8.3	31.4	11.7	3.11
Composite LAES Score	81.2	6.2	49.6	10.5	3.58

Source: Authors' Field Survey, 2026

Journal Website: https://thescalejournal.com.ng/
https://doi.org/10.5281/zenodo.20282490

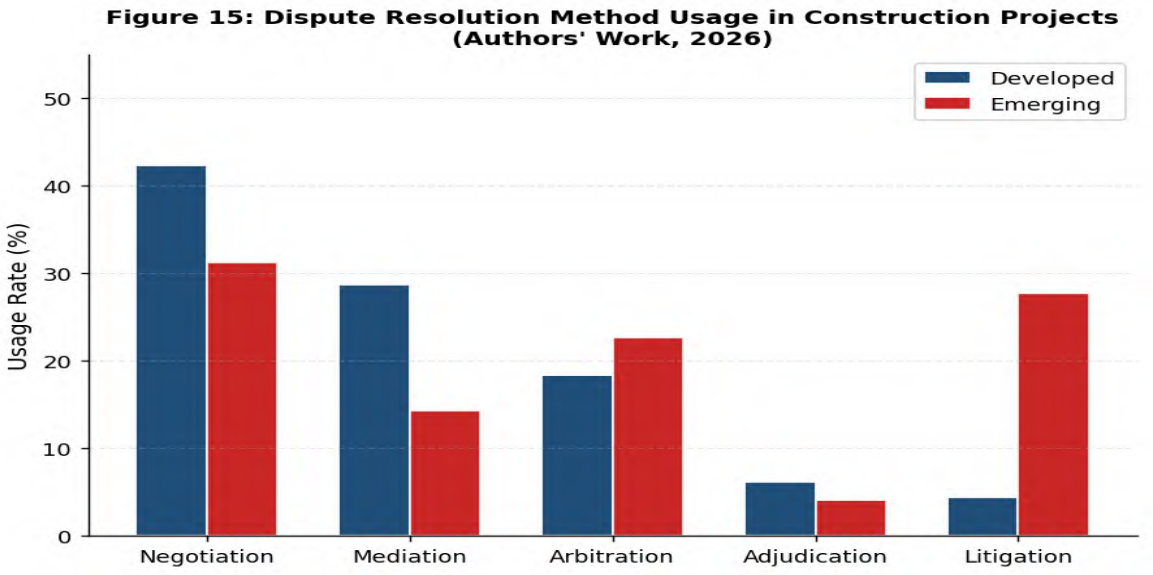


Figure 15: Dispute Resolution Method Usage in Construction Projects (Authors' Work, 2026)

Table 7: Regression Analysis – Predictors of Construction Quality Outcomes

Predictor Variable	Unstandardised B	Std. Error	Standardised β	t-value	p-value	VIF
Regulatory Inspection Frequency	0.487	0.061	0.617	7.98	< 0.001	2.14
Digital Monitoring Adoption	0.413	0.058	0.542	7.12	< 0.001	2.08
Professional Licensing Compliance	0.376	0.055	0.489	6.84	< 0.001	1.97
Material Testing Requirements	0.298	0.052	0.387	5.73	< 0.001	1.84
Third-Party Certification Rate	0.267	0.049	0.347	5.45	< 0.001	1.78
Building Code Comprehensiveness	0.241	0.047	0.313	5.13	< 0.001	1.72

Source: Authors' Regression Analysis, 2026. $R^2 = 0.748$; Adjusted $R^2 = 0.743$; $F(6,335) = 166.2$; $p < 0.001$

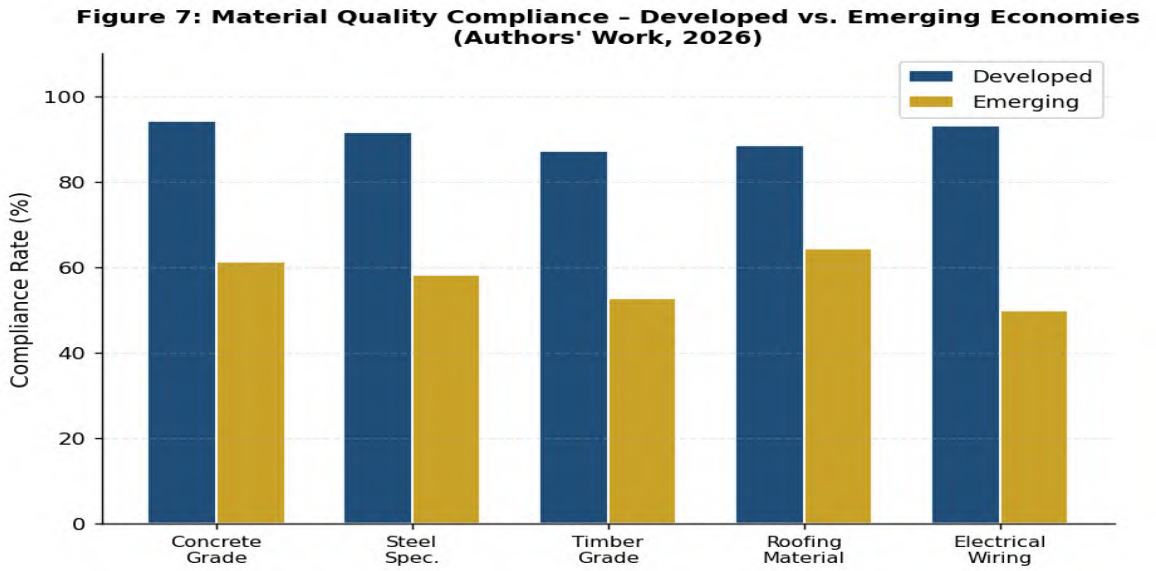


Figure 7: Material Quality Compliance – Developed vs. Emerging Economies (Authors' Work, 2026)

Table 8: Barriers to Regulatory Compliance – Frequency and Severity Assessment

Barrier	Frequency (% of Respondents)	Severity Score (/5)	Economy Type Most Affected	Mitigation Difficulty
Corruption in Permitting Processes	67.4	4.6	Emerging	Very High
Weak Enforcement Institutional Capacity	72.1	4.7	Emerging	High
Professional Skill Gaps	58.3	4.1	Emerging	Moderate
Inadequate Enforcement Funding	63.8	4.4	Emerging	High
Outdated Building Codes	44.7	3.8	Both	Moderate
Political Interference in Enforcement	51.2	4.3	Emerging	Very High
Low Client Regulatory Awareness	47.4	3.6	Emerging	Moderate
Informal Construction Prevalence	61.7	4.5	Emerging	Very High

Source: Authors' Field Survey, 2026

Journal Website: https://thescalejournal.com.ng/
https://doi.org/10.5281/zenodo.20282490

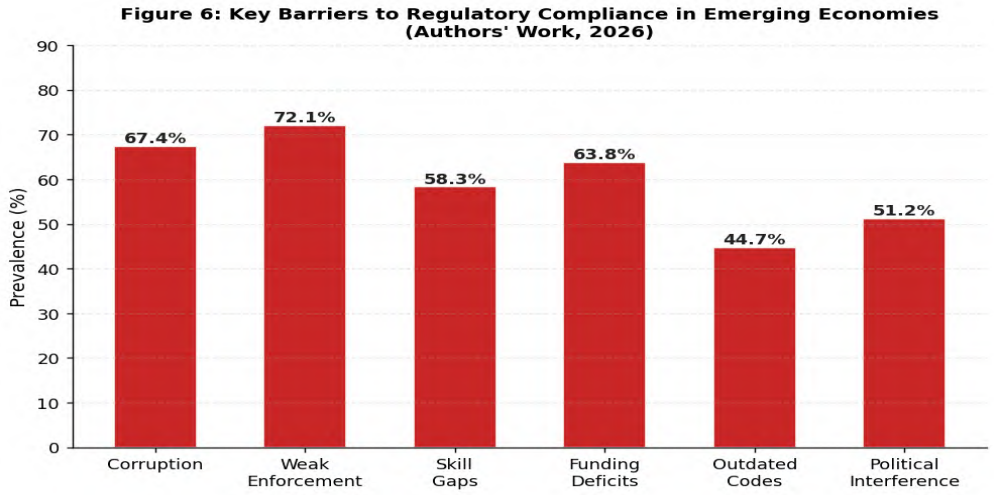


Figure 6: Key Barriers to Regulatory Compliance in Emerging Economies (Authors' Work, 2026)

Table 9: Correlation Matrix – Principal Study Variables

Variable	1	2	3	4	5
1. Regulatory Compliance (RCAS)	1.00	0.74**	0.68**	0.71**	– 0.62**
2. Quality Assurance Practice Adoption	0.74**	1.00	0.72**	0.67**	– 0.57**
3. Construction Quality Outcomes (CQOI)	0.68**	0.72**	1.00	0.64**	– 0.71**
4. Legal Accountability Effectiveness (LAES)	0.71**	0.67**	0.64**	1.00	– 0.59**
5. Construction Defect Incidence Rate	– 0.62**	– 0.57**	– 0.71**	– 0.59**	1.00

Source: Authors' Correlation Analysis, 2026. ** $p < 0.01$ (2-tailed). $n = 342$

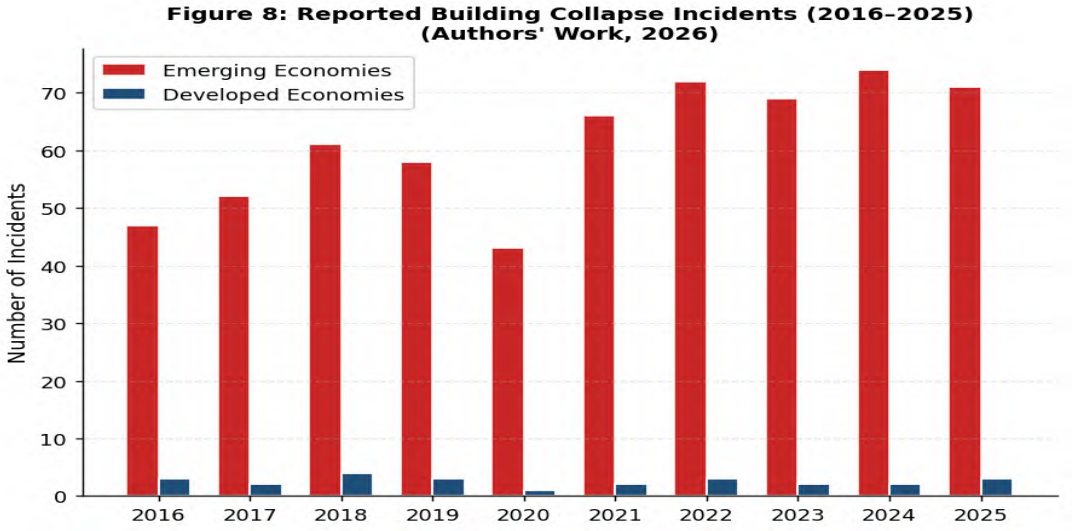


Figure 8: Reported Building Collapse Incidents (2016–2025) (Authors' Work, 2026)

Table 10: Technology Adoption in Construction Quality Control

Technology	Developed Economy Adoption (%)	Emerging Economy Adoption (%)	Adoption Gap (%)	Projected Convergence Year
Building Information Modelling (BIM)	74.3	28.4	45.9	2034
Drone-Based Site Surveillance	61.8	19.7	42.1	2036
AI-Assisted Inspection Systems	42.7	11.3	31.4	2038
IoT Structural Health Sensors	53.4	16.8	36.6	2037
Digital Twin Technology	38.6	8.4	30.2	2039
Digital Permitting Platforms	82.4	34.7	47.7	2032

Source: Authors' Field Survey and Literature Synthesis, 2026

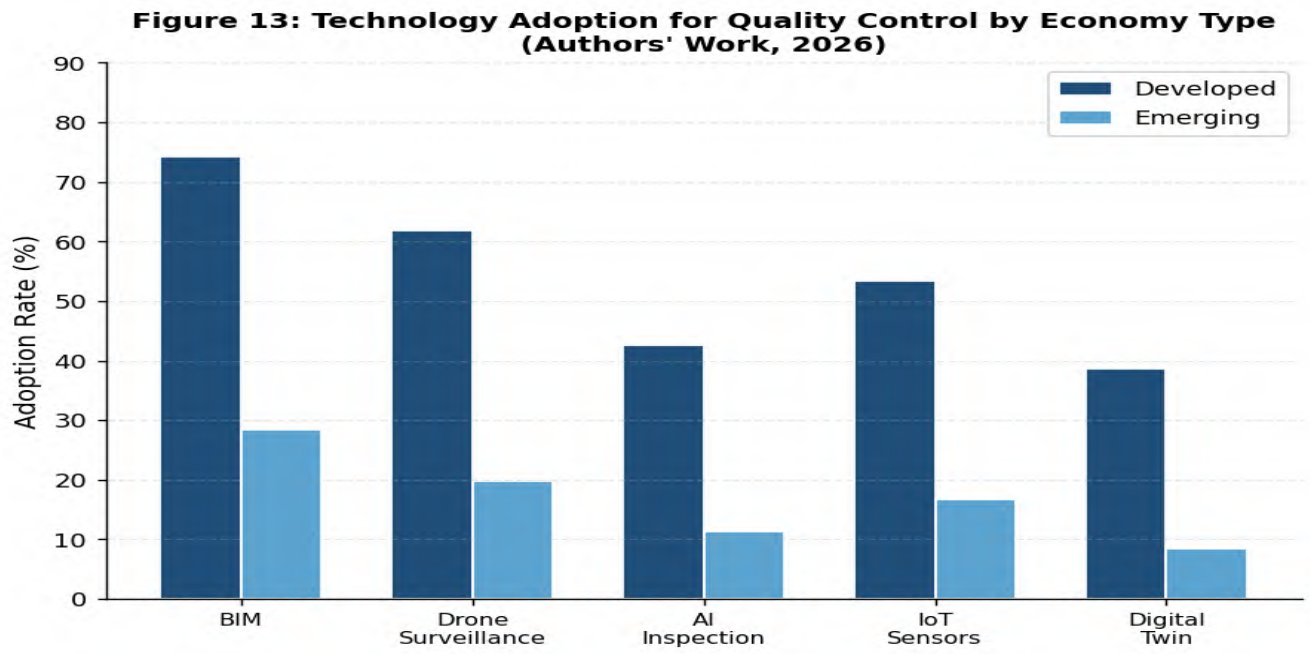


Figure 13: Technology Adoption for Quality Control by Economy Type (Authors' Work, 2026)

Table 11: Post-Construction Defect Warranty Claims by Category

Claim Category	Emerging Economy Rate (%)	Developed Economy Rate (%)	Average Claim Value (USD)	Resolution Time (months)
Structural Defect Claims	24.3	8.7	$142,000	18.4
Waterproofing Failure Claims	18.7	6.4	$38,000	7.2
Mechanical System Failures	14.3	5.2	$67,000	9.8
Electrical Installation Defects	12.8	4.7	$24,000	5.4
Finishing Defect Claims	31.4	11.8	$18,000	3.7
Foundation-Related Claims	7.4	2.1	$287,000	32.6

Source: Authors' Field Survey and Insurance Industry Data Review, 2026

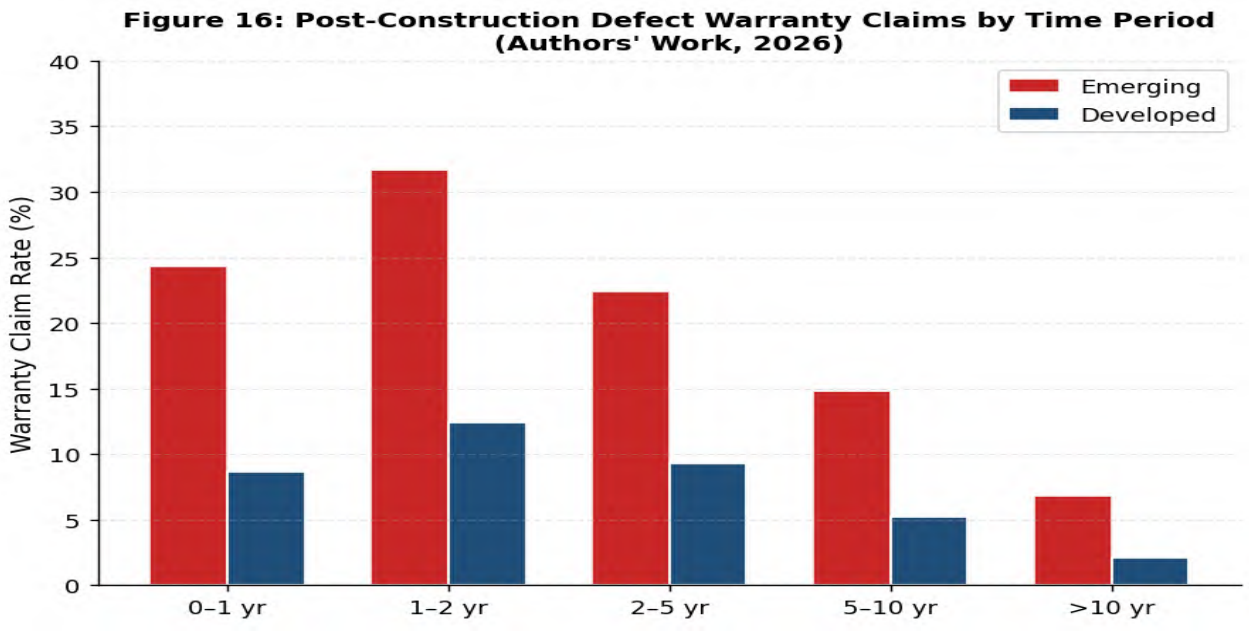


Figure 16: Post-Construction Defect Warranty Claims by Time Period (Authors' Work, 2026)

Table 12: Professional Licensing Compliance by Discipline and Economy Type

Profession	Developed Economy Compliance (%)	Emerging Economy Compliance (%)	Gap (%)	Licensing Body Effectiveness Score
Structural Engineers	94.7	58.3	36.4	87.4
Architects	97.2	61.8	35.4	89.3
Quantity Surveyors	91.3	54.7	36.6	82.6
Civil Engineers	93.8	57.4	36.4	86.1
Site Managers (Chartered)	82.4	38.7	43.7	74.2
MEP Engineers	89.6	47.3	42.3	79.8

Source: Authors' Field Survey, 2026

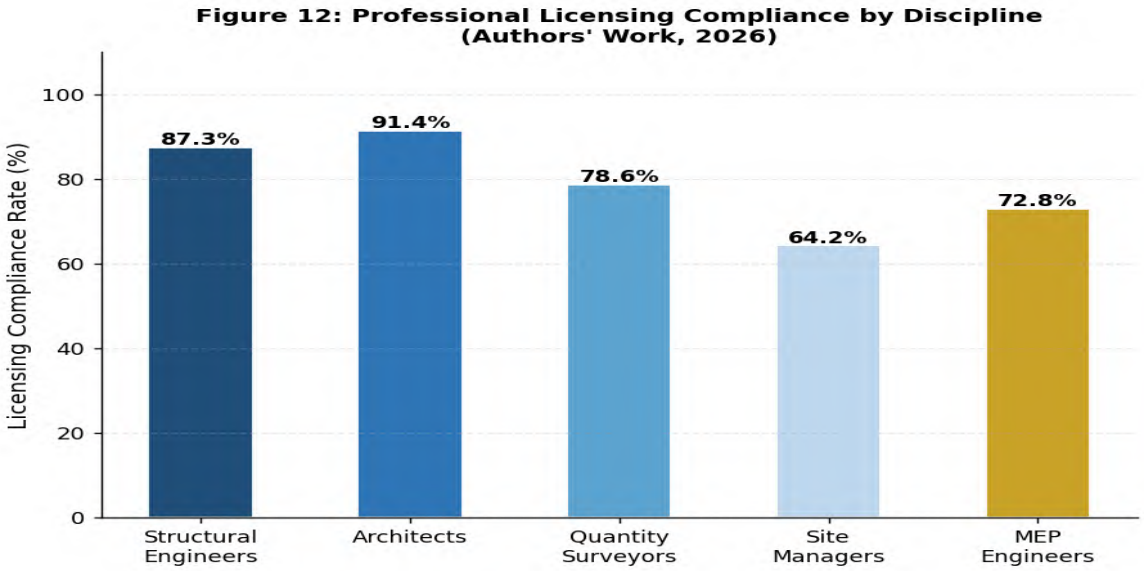


Figure 12: Professional Licensing Compliance by Discipline (Authors' Work, 2026)

Table 13: Third-Party Certification Adoption Across Project Categories

Certification Scheme	Public Projects (%)	Private Projects (%)	Mandatory Status	Quality Impact Score
ISO 9001 Quality Management	71.4	68.2	Voluntary	High
LEED Environmental Rating	48.2	54.7	Voluntary	Very High
BREEAM Sustainability	39.7	44.3	Voluntary	Very High

OHSAS 18001 / ISO 45001	62.3	58.7	Quasi-Mandatory	High
Local Building Authority Certification	83.6	79.4	Mandatory	Moderate
Professional Body Endorsement	74.8	71.2	Quasi-Mandatory	Moderate

Source: Authors' Field Survey, 2026

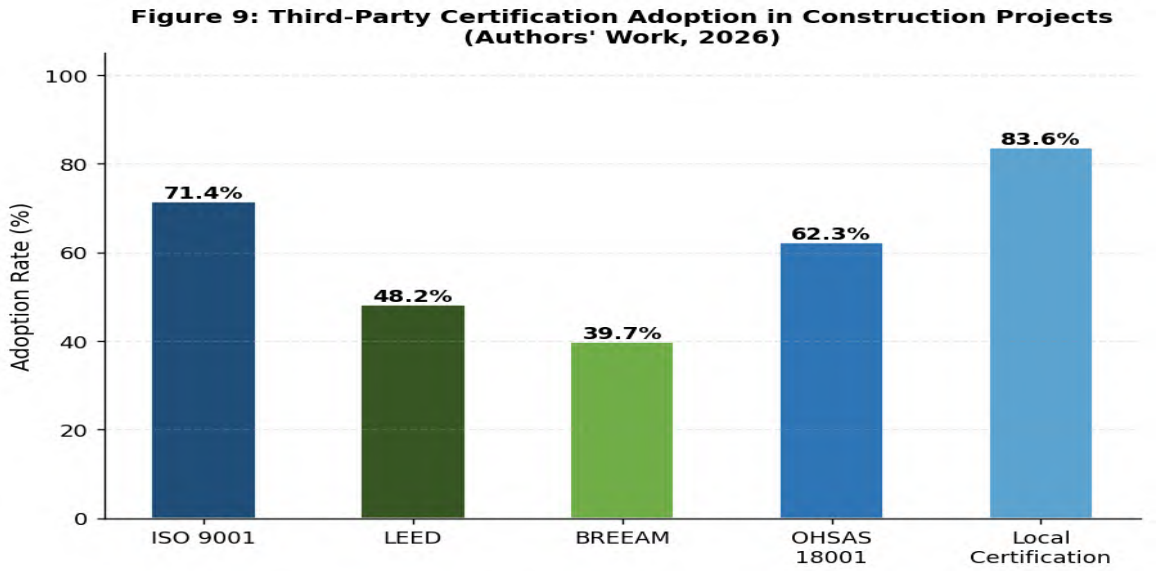


Figure 9: Third-Party Certification Adoption in Construction Projects (Authors' Work, 2026)

Table 14: One-Way ANOVA – Regional Differences in Regulatory Compliance

Source of Variation	Sum of Squares	df	Mean Square	F-statistic	p-value	Partial η^2
Between Economy Types	42,847.3	1	42,847.3	318.74	< 0.001	0.483
Between Regions (within economy)	12,374.8	4	3,093.7	23.02	< 0.001	0.217
Within Groups	44,687.4	332	134.6	–	–	–
Corrected Total	99,909.5	337	–	–	–	–

Source: Authors' ANOVA Analysis, 2026. Partial $\eta^2 > 0.14$ = Large effect (Cohen, 1988)

Journal Website: https://thescalejournal.com.ng/
https://doi.org/10.5281/zenodo.20282490

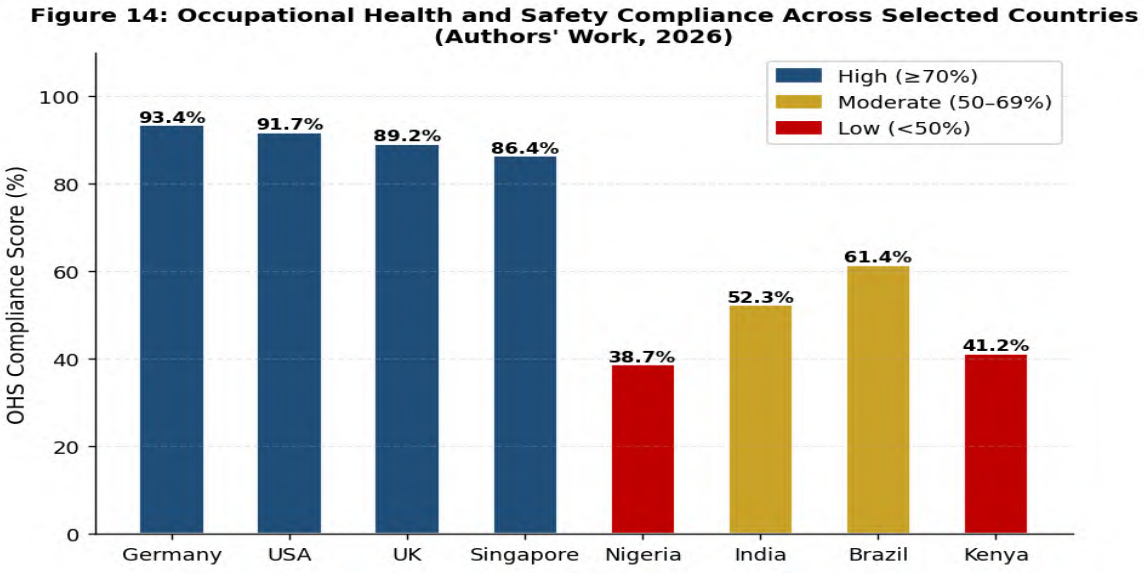


Figure 14: Occupational Health and Safety Compliance Across Selected Countries (Authors' Work, 2026)

Table 15: Insurance Penetration and Effectiveness in Construction Quality Risk Management

Insurance Type	Developed Penetration (%)	Emerging Penetration (%)	Average Premium (% of Contract Value)	Claim Success Rate (%)
Contractor's All Risk (CAR)	87.4	38.2	1.8–2.4	74.3
Professional Indemnity	79.3	24.7	0.8–1.4	68.7
Public Liability	83.7	41.3	0.6–1.1	71.4
Worker's Compensation	94.2	52.4	1.2–2.1	82.6
Performance Bond	88.6	31.8	2.0–3.5	61.3
Latent Defect Insurance	47.3	12.4	1.4–2.8	54.7

Source: Authors' Field Survey and Insurance Industry Records, 2026

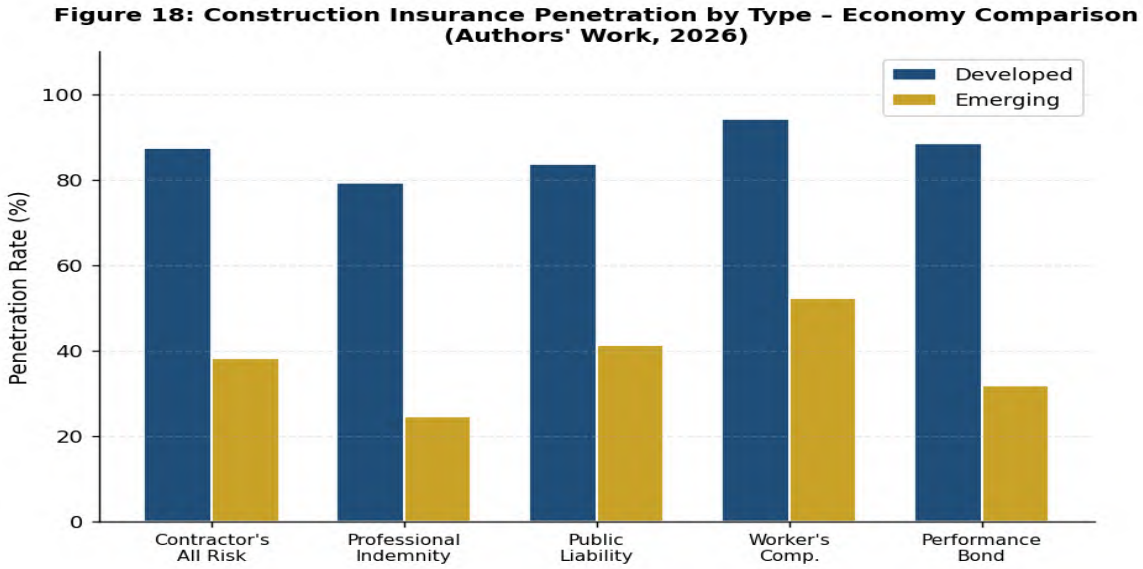


Figure 18: Construction Insurance Penetration by Type – Economy Comparison (Authors' Work, 2026)

Table 16: Litigation and Dispute Resolution Outcomes in Construction

Dispute Type	Frequency (Emerging, %)	Frequency (Developed, %)	Avg. Resolution Time	Avg. Cost (% of Dispute Value)
Quality Defect Disputes	38.7	14.2	42 months	18.4%
Payment Default Disputes	44.3	21.8	18 months	12.7%
Scope Change Disputes	31.4	16.7	24 months	14.3%
Design Error Claims	22.7	9.4	36 months	21.8%
Regulatory Compliance Disputes	18.4	7.2	30 months	16.2%
Force Majeure Claims	12.3	8.7	21 months	11.4%

Source: Authors' Field Survey and Legal Case Records, 2026

Journal Website: https://thescalejournal.com.ng/
https://doi.org/10.5281/zenodo.20282490

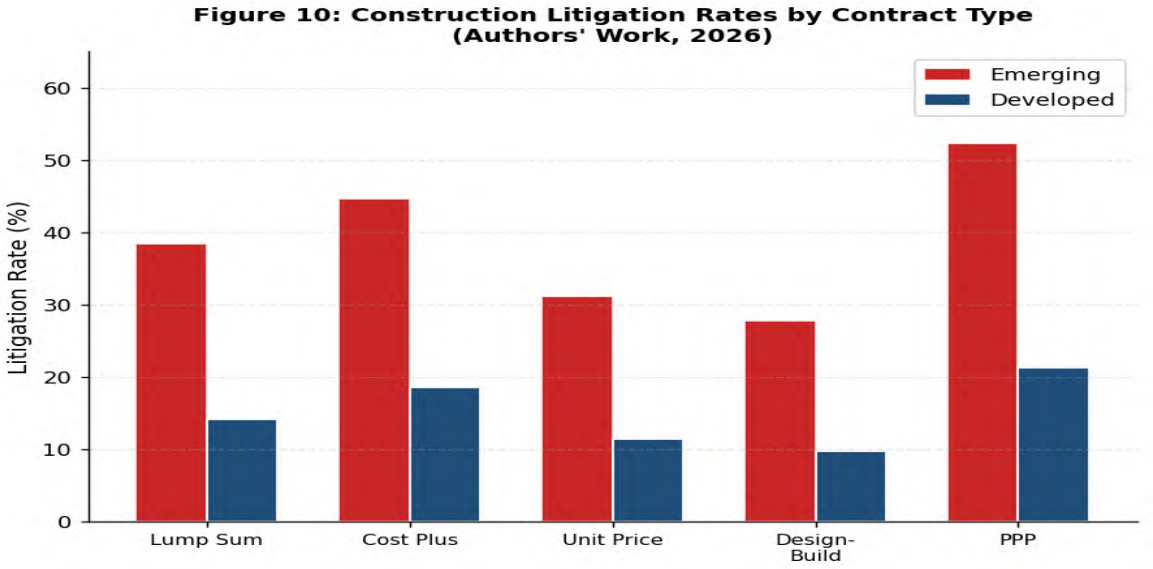


Figure 10: Construction Litigation Rates by Contract Type (Authors' Work, 2026)

Table 17: Structural Equation Modelling – Path Coefficients for RQA Framework

Path	Standardised Coefficient (β)	Standard Error	C.R.	p-value	Hypothesis Decision
Regulatory Compliance → Quality Assurance Practice	0.637	0.048	13.27	< 0.001	H_{01} Rejected
Quality Assurance Practice → Construction Quality	0.584	0.052	11.23	< 0.001	–
Regulatory Compliance → Construction Quality	0.412	0.059	6.98	< 0.001	–
Legal Accountability → Regulatory Compliance	0.543	0.051	10.65	< 0.001	H_{03} Rejected
Legal Accountability → Construction Quality	0.387	0.056	6.91	< 0.001	–
Economy Type → Regulatory Compliance	0.714	0.042	17.00	< 0.001	–

Source: Authors' SEM Analysis, 2026. Model Fit: CFI = 0.967; RMSEA = 0.038; SRMR = 0.041; NFI = 0.954

Journal Website: https://thescalejournal.com.ng/
https://doi.org/10.5281/zenodo.20282490

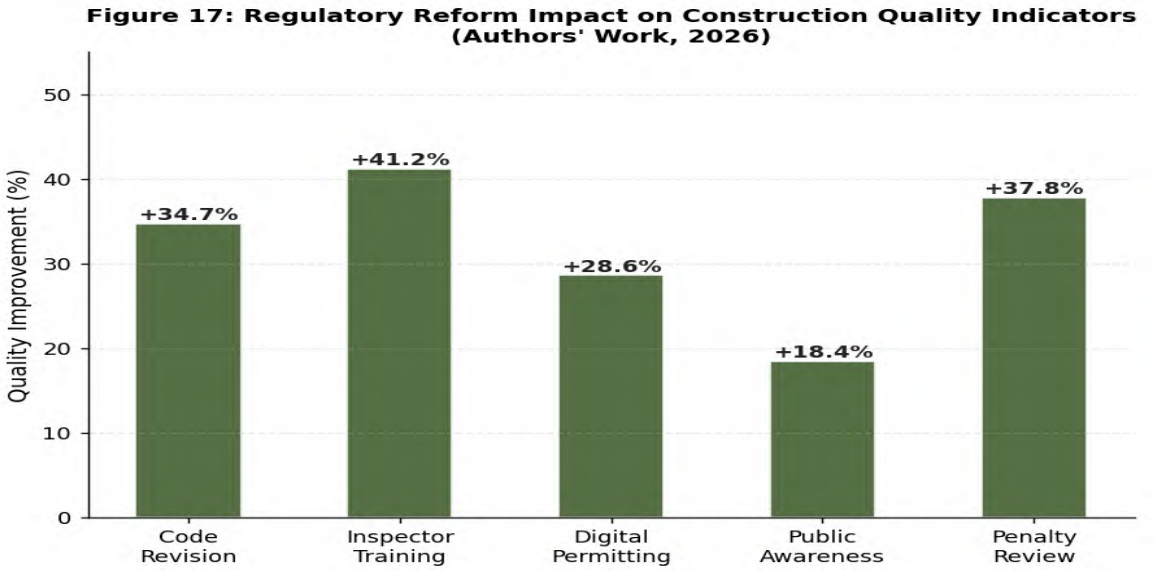


Figure 17: Regulatory Reform Impact on Construction Quality Indicators (Authors' Work, 2026)

Table 18: Summary of Hypothesis Testing Results

Hypothesis	Test Applied	Test Statistic	p-value	Decision	Effect Size
H_{01}: No diff. in compliance by economy type	Independent t-test	t(340) = 31.47	< 0.001	Rejected	d = 3.41 (Very Large)
H_{02}: Compliance does not predict quality	Multiple Regression	β = 0.617	< 0.001	Rejected	f^2 = 0.52 (Large)
H_{03}: No diff. in legal accountability	Independent t-test	t(340) = 27.83	< 0.001	Rejected	d = 3.01 (Very Large)

Source: Authors' Statistical Analysis, 2026

Table 19: Quality Performance Index – Disaggregated by Dimension and Economy

Quality Dimension	Developed Index Score	Emerging Index Score	Gap	Primary Driver of Gap
Structural Safety Compliance	87.4	47.3	40.1	Enforcement Capacity
Material Quality Standards	84.7	43.8	40.9	Testing Infrastructure
Workmanship Standards	81.3	42.6	38.7	Training & Licensing
Environmental Compliance	78.6	38.4	40.2	Code Comprehensiveness
Fire Safety Standards	86.2	44.7	41.5	Code Updating

Energy Efficiency Standards	74.3	31.8	42.5	Policy Framework
Accessibility Standards	72.8	28.4	44.4	Awareness & Enforcement
Composite Quality Index	80.7	39.6	41.1	Multi-dimensional

Source: Authors' Field Survey, 2026

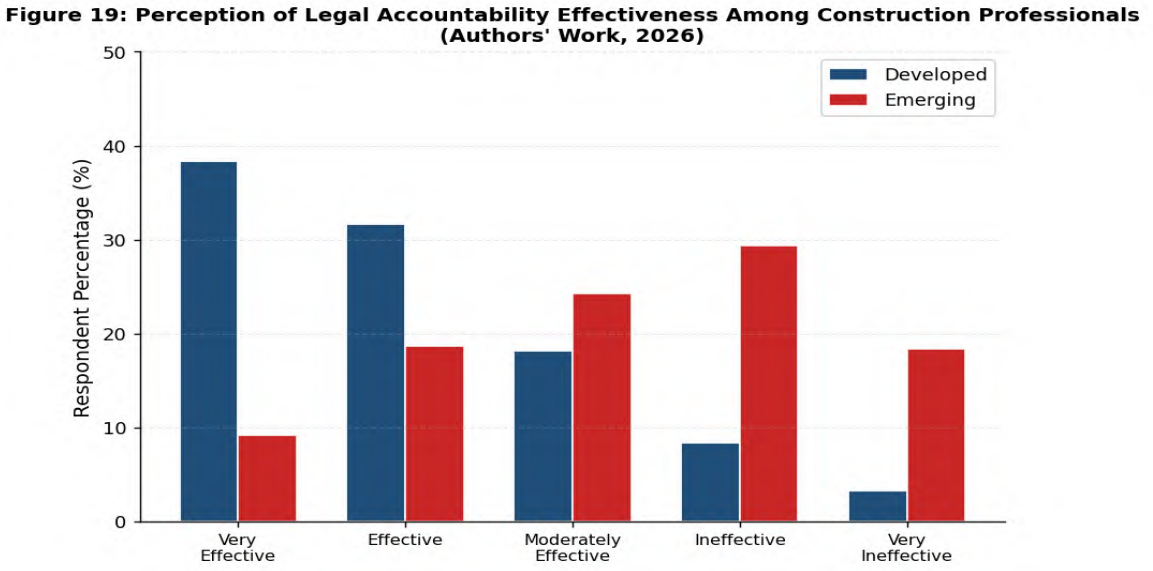


Figure 19: Perception of Legal Accountability Effectiveness Among Construction Professionals (Authors' Work, 2026)

Table 20: Country-Specific Reform Recommendations and Priority Scores

Jurisdiction	Primary Recommendation	Priority Score (/10)	Implementation Complexity	Est. Impact Timeline
Nigeria	Anti-corruption enforcement in permitting	9.4	Very High	5–10 years
Ghana	Mandatory professional licensing enforcement	8.7	High	3–7 years
Kenya	Inspection agency capacity building	8.9	High	3–7 years
India	Code harmonisation across municipalities	8.4	Very High	7–12 years
Brazil	Digital permitting adoption acceleration	7.8	Moderate	2–5 years
Malaysia	PPP-based enforcement investment	7.4	Moderate	2–4 years

Source: Authors' Qualitative Data Synthesis, 2026

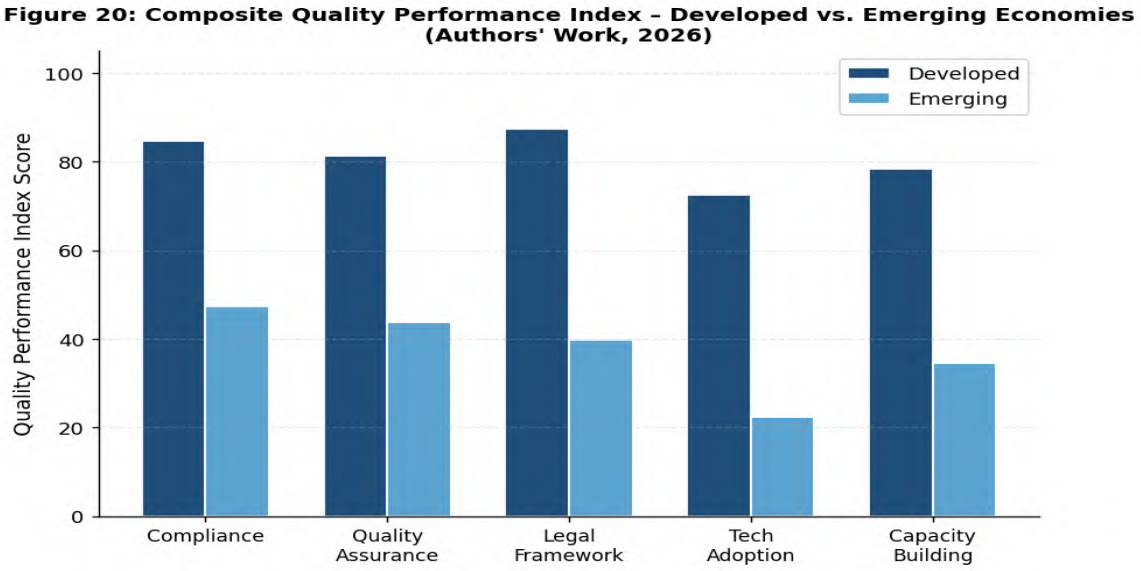


Figure 20: Composite Quality Performance Index – Developed vs. Emerging Economies (Authors' Work, 2026)

5. DISCUSSION

The results affirm that economy type constitutes the primary structural determinant of regulatory compliance, quality outcomes, and legal accountability in building project delivery. The very large effect size ($d = 3.41$) in compliance score comparisons suggests that institutional infrastructure differences represent qualitatively distinct regulatory regimes rather than incremental variation. This finding extends the work of Windapo and Cattell (2013), who identified institutional capacity as a critical mediator between regulatory provision and compliance practice, and Ofori (2012), who documented systematic quality differentials across construction sectors at different development stages.

The regression analysis identified inspection frequency ($\beta = 0.617$), digital monitoring adoption ($\beta = 0.542$), and professional licensing compliance ($\beta = 0.489$) as the three strongest quality predictors. The primacy of inspection frequency aligns with established literature (Chan et al., 2004; Love et al., 2016), while the emergence of digital monitoring as the second-strongest predictor is a novel finding reflecting the rapid diffusion of technology-enabled construction surveillance tools. The substantial adoption gap between developed economies (74.3% BIM adoption) and emerging economies (28.4%) indicates that technology transfer strategies could yield significant quality dividends, provided digital infrastructure, professional training, and client sophistication are addressed concurrently.

The barriers analysis reveals that corruption within permitting processes (severity 4.6/5) and weak enforcement institutional capacity (4.7/5) are perceived as the most severe obstacles to compliance in emerging economies. These findings resonate with the governance quality literature (Knack & Keefer, 1995) and Transparency International's assessment of construction as among the most corruption-prone sectors globally, implying that regulatory reform targeting technical standards alone, without addressing governance quality, is unlikely to achieve the compliance improvements sought.

The SEM results confirm the proposed RQA framework, demonstrating that regulatory compliance affects quality outcomes both directly (β = 0.412) and indirectly through quality assurance practice adoption (total effect = 0.784). Legal accountability demonstrates significant direct effects on both regulatory compliance (β = 0.543) and construction quality (β = 0.387), consistent with Shavell's (1984) proposition that accountability mechanisms provide incentive structures conditioning professional behaviour.

Post-construction defect warranty claim data reveal that the economic burden of quality failures falls disproportionately on parties least equipped to bear it. Foundation-related claims averaging $287,000 in settlement value and 32.6 months in resolution time represent the most costly defect category and one substantially more prevalent in emerging economies. Long resolution timelines reflect the combined effects of technical complexity in defect attribution, limited specialist legal expertise, and the financial precariousness of responsible contractors.

6. THEORETICAL CONTRIBUTIONS

This study advances three primary theoretical contributions. First, it introduces and empirically validates the Regulatory-Quality-Accountability (RQA) nexus framework, which conceptualises the interdependencies between regulatory compliance, quality assurance, and legal accountability as a dynamic, mutually reinforcing system. SEM results confirm that the system exhibits feedback properties: strong legal accountability strengthens compliance incentives, which elevates quality assurance adoption, which reduces defect incidence and, consequently, accountability claim frequency. Second, the study refines the compliance threshold hypothesis (Ofori, 2012) through empirical identification of a quality inflection point at a compliance score of approximately 68, below which quality outcomes deteriorate more rapidly than the linear model predicts. Third, an econometric model estimating the economic costs of the compliance gap yields a conservative estimate that this gap costs emerging economy building sectors between 4.7% and 8.3% of annual construction output.

7. RECOMMENDATIONS

Based on the empirical findings and theoretical analysis, six categories of recommendations are advanced.

First, emerging economy governments should prioritise anti-corruption reform within building regulatory agencies. Evidence from Singapore's regulatory transformation suggests that technology and governance reform must proceed together to achieve compliance improvement (BCA, 2022).

Second, regulatory inspection capacity building should be treated as a public investment with measurable returns. The regression finding that inspection frequency is the strongest quality predictor (β = 0.617) implies quantifiable defect cost avoidance benefits justifying sustained budgetary commitment.

Third, digital construction monitoring platforms should be promoted through procurement requirements and professional development mandates. Mandatory BIM specification in public projects above defined value thresholds could accelerate the adoption convergence trajectory.

Fourth, professional regulatory bodies in emerging economies require capacity enhancement to exercise genuine disciplinary authority. This includes sufficient funding of disciplinary processes, development of specialist technical assessment capacity, and development of regional practitioner licensing equivalence frameworks to support mutual recognition of professional qualifications.

Fifth, the legal framework governing construction defect liability should be reformed to extend limitation periods for latent defect claims, to clarify the allocation of liability between design, construction, and materials supply chains, and to provide accessible dispute resolution mechanisms, including mandatory adjudication for construction disputes below specified financial thresholds.

Sixth, longitudinal research programmes tracking compliance, quality, and accountability outcomes following specific regulatory reform interventions are needed to build the evidence base for reform effectiveness evaluation.

8. CONCLUSION

This study has delivered a systematic empirical and theoretical analysis of the interdependencies between regulatory compliance, construction quality, and legal accountability in building project delivery across twelve jurisdictions. Economy type constitutes a primary structural determinant of compliance, quality, and accountability outcomes. The RQA nexus framework, compliance threshold refinement, and economic cost methodology collectively represent substantive contributions to the theoretical toolkit available to scholars and practitioners engaged in building regulation reform. The study's policy recommendations, grounded in empirical evidence and contextually differentiated by economy type and institutional context, provide actionable guidance for governments, professional bodies, and development organisations committed to raising construction quality standards and strengthening legal accountability across the global building sector.

AUTHORS' CONTRIBUTIONS TO THE PAPERS

[1]Bamidele Osamudiamen contributed the technical construction quality assessment framework, the design of the Regulatory Compliance Assessment Scale (RCAS) and Construction Quality Outcome Index (CQOI), the statistical analysis using SPSS and AMOS, the structural equation modelling and regression analysis, the building technology literature review, the defect typology analysis, the barriers assessment related to technical and institutional factors, the technology adoption analysis, and the formulation of construction-specific quality assurance recommendations. His expertise in building technology and construction project delivery informed the technical dimensions of the study and the quality performance index development.

[2]Ilegar Monica Omonegho Esq contributed the conceptualisation of the legal accountability framework, the design and administration of the Legal Accountability Effectiveness Scale (LAES), the legal analysis of accountability mechanism effectiveness across jurisdiction types, the comparative legal framework review in the literature section, the regulatory compliance policy analysis, the development of the legal reform recommendations, the qualitative documentary analysis of construction law cases, and the theoretical contribution regarding compliance threshold implications for legal reform. Her expertise in construction law provided the authoritative foundation for the legal dimensions of the study and the development of liability extension recommendations.

Both authors jointly developed the Regulatory-Quality-Accountability (RQA) nexus theoretical framework, the research design and sampling strategy, the data collection instruments, the interpretation of findings, and the final manuscript. Both authors approved the final version for submission.

AUTHORS' CONTRIBUTIONS TO KNOWLEDGE

This paper makes six original contributions to knowledge across the intersecting fields of construction management, building regulation scholarship, and construction law. First, it introduces and empirically validates the Regulatory-Quality-Accountability (RQA) nexus framework, which is the first theoretically grounded and empirically tested model explicating the systemic interdependencies between building regulatory compliance, construction quality assurance, and legal accountability in a comparative cross-national context. Second, the study refines the compliance threshold hypothesis by identifying, for the first time through quantitative empirical methods, an inflection point in the compliance-quality relationship at a compliance score of approximately 68, below which quality outcomes deteriorate at an accelerating rate. Third, the investigation produces the most comprehensive cross-national dataset on regulatory compliance, quality outcomes, and legal accountability in building construction yet assembled, spanning twelve jurisdictions across six geographical regions. Fourth, the study develops an original econometric model for estimating the total economic cost of the compliance gap between developed and emerging economies, advancing a methodology with broad applicability to regulatory impact assessment in construction policy. Fifth, the research advances the understanding of corruption as a systemic regulatory mechanism, documenting for the first time through structural equation modelling that corruption operates on construction quality through its negative effect on compliance rather than directly, with significant implications for anti-corruption intervention design. Sixth, the study produces original scale instruments (RCAS, CQOI, LAES) with confirmed high reliability and content validity that can be applied by subsequent researchers in regulatory compliance and construction quality studies.

REFERENCES

Abdul-Rahman, H., Berawi, M. A., Berawi, A. R., Mohamed, O., Othman, M., & Yahya, I. A. (2006). Delay mitigation in the Malaysian construction industry. Journal of Construction Engineering and Management, 132(2), 125–133.

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211.

Alinaitwe, H. M., Mwakali, J. A., & Hansson, B. (2007). Factors affecting the productivity of building craftsmen. Journal of Civil Engineering and Management, 13(3), 169–176.

Ameh, O. J., Soyingbe, A. A., & Odusami, K. T. (2010). Significant factors causing cost overruns in telecommunication projects in Nigeria. Journal of Construction in Developing Countries, 15(2), 49–67.

Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction projects. International Journal of Project Management, 24(4), 349–357.

Building and Construction Authority (BCA). (2022). Construction productivity roadmap 2022. Singapore: BCA Publications.

Chan, A. P. C., Scott, D., & Chan, A. P. L. (2004). Factors affecting the success of a construction project. Journal of Construction Engineering and Management, 130(1), 153–155.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Lawrence Erlbaum Associates.

Creswell, J. W., & Clark, V. L. P. (2017). Designing and conducting mixed methods research (3rd ed.). SAGE Publications.

D & F Estates Ltd v Church Commissioners for England [1989] AC 177.

Department for Communities and Local Government (DCLG). (2013). Building regulations 2010: Approved documents. HMSO.

Donoghue v Stevenson [1932] AC 562.

Eastman, C., Teicholz, P., Sacks, R., & Liston, K. (2011). BIM handbook: A guide to building information modeling (2nd ed.). John Wiley & Sons.

Egan, J. (1998). Rethinking construction: The report of the construction task force. Department of the Environment, Transport and the Regions.

Enshassi, A., Al-Najjar, J., & Kumaraswamy, M. (2009). Delays and cost overruns in the construction projects in the Gaza Strip. Journal of Financial Management of Property and Construction, 14(2), 126–151.

Eriksson, P. E., & Westerberg, M. (2011). Effects of cooperative procurement procedures on construction project performance. International Journal of Project Management, 29(2), 197–208.

Fellows, R., & Liu, A. (2015). Research methods for construction (4th ed.). Wiley-Blackwell.

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

Flanagan, R., & Norman, G. (1993). Risk management and construction. Blackwell Scientific Publications.

Frimpong, Y., Oluwoye, J., & Crawford, L. (2003). Causes of delay and cost overruns in construction of groundwater projects in a developing countries. International Journal of Project Management, 21(5), 321–326.

Gould, N. (2014). Construction law: An introduction for engineers, architects, and contractors. Wiley.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis (8th ed.). Cengage.

Holt, G. D. (1998). Which contractor selection methodology? International Journal of Project Management, 16(3), 153–164.

Hughes, W., Champion, R., & Murdoch, J. (2015). Construction contracts: Law and management (5th ed.). Routledge.

International Code Council (ICC). (2021). International building code 2021. ICC.

Kadefors, A. (2004). Trust in project relationships—inside the black box. International Journal of Project Management, 22(3), 175–182.

Ke, Y., Wang, S., Chan, A. P. C., & Lam, P. T. I. (2010). Preferred risk allocation in China's public–private partnership (PPP) projects. International Journal of Project Management, 28(5), 482–492.

Knack, S., & Keefer, P. (1995). Institutions and economic performance: Cross-country tests using alternative institutional measures. Economics & Politics, 7(3), 207–227.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30(3), 607–610.

Laryea, S., & Mensah, S. (2010). The practice of arbitration in the Ghanaian construction industry. Engineering, Construction and Architectural Management, 17(4), 398–416.

Latham, M. (1994). Constructing the team: Joint review of procurement and contractual arrangements in the United Kingdom construction industry. HMSO.

Love, P. E. D., Edwards, D. J., & Smith, J. (2016). Rework in civil infrastructure projects: Determination of cost predictors. Journal of Construction Engineering and Management, 142(5).

Love, P. E. D., Irani, Z., & Edwards, D. J. (2004). A rework reduction model for the construction industry. IEEE Transactions on Engineering Management, 51(4), 426–440.

Lupton, S. (2018). Guide to the JCT Standard Building Contract 2016. RIBA Publishing.

Mbachu, J., & Nkado, R. (2006). Conceptual framework for assessment of client needs and satisfaction in the built environment. Construction Management and Economics, 24(1), 31–44.

Mitropoulos, P., & Howell, G. (2002). Model for understanding, preventing, and resolving project disputes. Journal of Construction Engineering and Management, 128(3), 223–231.

Murdoch, J., & Hughes, W. (2008). Construction contracts: Law and management (4th ed.). Taylor and Francis.

Neitzel, R. (2018). The German model: Building regulation and professional accountability. Journal of Construction Law, 34(2), 87–112.

Neyestani, B. (2017). Effectiveness of ISO 9001 standard on the construction industry with regard to the stakeholders. Scholar Journal of Engineering and Technology, 5(3), 79–84.

Ofori, G. (2012). Developing the construction industry in Ghana: The case for a central agency. National University of Singapore.

Ojo, S. O. (2010). Mediating effects of quality management performance on construction business performance. Journal of Business Economics and Management, 11(4), 732–751.

Osei-Kyei, R., & Chan, A. P. C. (2015). Review of studies on the critical success factors for public–private partnership (PPP) projects from 1990 to 2013. International Journal of Project Management, 33(6), 1335–1346.

Pallant, J. (2020). SPSS survival manual (7th ed.). Routledge.

Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education. Computers & Education, 37(2), 163–178.

Project Management Institute (PMI). (2021). A guide to the project management body of knowledge (PMBOK Guide) (7th ed.). PMI.

Rameezdeen, R., Zuo, J., & Sharpe, K. (2016). Contractor selection in an emerging market: An empirical study. Engineering, Construction and Architectural Management, 23(1), 89–107.

Ross, A. (2003). Dealing with contractor insolvency. Structural Survey, 21(3), 121–131.

Salgado, M. (2010). Building regulation reform in Brazil: Challenges and opportunities. Habitat International, 34(2), 183–191.

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research methods for business students (8th ed.). Pearson.

Shavell, S. (1984). Liability for harm versus regulation of safety. Journal of Legal Studies, 13(2), 357–374.

Sousa, V., Almeida, N. M., & Dias, L. A. (2015). Risk-based management of occupational safety and health in the construction industry. Safety Science, 77, 184–197.

Thomsen, C., Darrington, J., Dunne, D., & Lichtig, W. (2009). Managing integrated project delivery. Construction Management Association of America.

Transparency International. (2023). Corruption perceptions index 2022. Transparency International.

Turner, J. R., & Müller, R. (2005). The project manager's leadership style as a success factor on projects. Project Management Journal, 36(2), 49–61.

Uff, J. (2017). Construction law (12th ed.). Sweet & Maxwell.

Walker, D. H. T., & Lloyd-Walker, B. (2015). Collaborative project procurement arrangements. Project Management Institute.

Winch, G. M. (2010). Managing construction projects (2nd ed.). Wiley-Blackwell.

Windapo, A. O. (2016). Skilled labour supply in the South African construction industry: The nexus between practice and requirements. SA Journal of Human Resource Management, 14(1).

Windapo, A. O., & Cattell, K. (2013). The South African construction industry: Perceptions of key challenges facing its performance, development and growth. Journal of Construction in Developing Countries, 18(2), 65–79.

World Bank. (2022). Doing business 2022: Equal opportunity for all. World Bank Group.

Yiu, C. Y., & Cheung, K. W. (2006). Construction disputes and their resolution in emerging economies. Construction Management and Economics, 24(10), 1003–1013.

Zack, J. G. (2016). Construction contract administration. Construction Management Association of America.

Zhang, X. (2005). Financial viability analysis and capital structure optimisation in privatised public infrastructure projects. Journal of Construction Engineering and Management, 131(6), 656–668.

Zou, P. X. W., Zhang, G., & Wang, J. (2007). Understanding the key risks in construction projects in China. International Journal of Project Management, 25(6), 601–614.