



# Regulatory Compliance and Building Collapse Prevention in Lagos Construction Projects

Akeeb Wasiu Ayobami<sup>1\*</sup>, Dr. K. T. Alade<sup>2</sup>

<sup>1</sup>Dept: Project Management Technology, School of Logistics and Innovation Technology University, Federal University of Technology Akure, Nigeria

<sup>2</sup>Dept: Project Management Technology, School of Logistics and Innovation Technology University, Federal University of Technology Akure, Nigeria

\*Corresponding Author

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## ABSTRACT

Building collapse remains a recurrent and preventable urban hazard in Lagos State, Nigeria, despite an extensive construction-regulation framework. This article examines regulatory compliance, enforcement effectiveness, stakeholder engagement, and their relationship with perceived building-collapse risk in Lagos construction projects. The study is especially situated within Lagos as a coastal megacity characterised in the project by rapid urbanisation, land scarcity, intense construction pressure, high-density development, and environmental vulnerabilities that can magnify the consequences of weak construction governance. A descriptive survey design was adopted. A structured questionnaire was distributed to 333 respondents drawn from built-environment professionals, developers and property owners, residents and community members, regulatory officials, and academics/researchers in Eti-Osa, Mushin, and Lagos Mainland; 295 valid responses were obtained, representing an 88.6% response rate. Descriptive statistics, Pearson Product-Moment Correlation, and Multiple Linear Regression were used. The results indicate low regulatory compliance (mean = 2.70), ineffective enforcement mechanisms (mean = 2.38), and weak stakeholder engagement (mean = 2.44). Regulatory compliance had a strong negative relationship with building-collapse perception ( $r = -0.612$ ,  $p < 0.001$ ), while enforcement effectiveness also showed a significant negative relationship ( $r = -0.578$ ,  $p < 0.001$ ). Regulatory compliance, enforcement effectiveness, and stakeholder engagement jointly explained 58.1% of the variance in collapse perception ( $R^2 = 0.581$ ,  $p < 0.001$ ), with regulatory compliance as the strongest predictor. The study concludes that building-collapse prevention in Lagos requires governance reform alongside technical controls, with emphasis on sustained permit compliance, risk-based inspection, coordinated enforcement, professional accountability, community participation, and digital compliance systems.

**Keywords:** building collapse; regulatory compliance; enforcement mechanisms; stakeholder engagement; Lagos State; construction governance; project management

## INTRODUCTION

Building collapse is the partial or total failure of a building structure to safely sustain imposed and self-generated loads, leading to loss of structural stability and functionality. The failure may involve foundations, columns, beams, slabs, or load-bearing walls and may develop progressively or occur suddenly. Its consequences include loss of life, destruction of property, displacement, and wider socio-economic costs. Although collapse is often approached as an engineering problem, Nigerian construction research increasingly presents it as a combined technical and governance failure involving deficient regulatory control, weak professional ethics, inadequate supervision, deviations from approved designs, substandard materials, and poor compliance culture (Akinyemi et al., 2016; Ayinla & Watson, 2024; Lan et al., 2025; Taiwo & Afolami, 2011).

The problem is particularly consequential in rapidly urbanising settings, where construction demand, informal



development practices, institutional weakness, and limited professional oversight place pressure on existing regulatory systems. Nigerian studies have repeatedly linked structural failures to poor project coordination, weak enforcement of building standards, unqualified or insufficiently supervised personnel, and the circumvention of approval processes (Awoyera et al., 2021; Nwosu & Zima, 2021; Nwoyiri et al., 2023; Oyeboode, 2021). The persistence of collapse despite the existence of formal building and planning rules therefore raises a central project-governance question: whether compliance is sustained beyond the point of permit acquisition and whether enforcement systems create sufficient incentives for safe project delivery.

Lagos State provides a critical setting for this inquiry. The project describes Lagos as Nigeria's most economically advanced state and as the national epicentre of building failures. It is also a coastal megacity facing rapid urbanisation, population pressure, land scarcity, high-density development, and intense vertical construction. These conditions increase the volume and complexity of projects that regulators must monitor. The coastal setting introduces an additional layer of risk because the study identifies high groundwater conditions, subsidence, and other environmental constraints as factors that can interact with weak foundation design and construction error. In this context, regulatory non-compliance is not only an administrative problem: it can magnify physical vulnerability in an already demanding development environment.

The study therefore moves beyond purely technical explanations of collapse to examine the institutional and behavioural mechanisms through which construction rules are implemented. It focuses on regulatory compliance, enforcement effectiveness, and stakeholder engagement because these constructs connect project-level decisions with wider governance outcomes. The central premise is that safe construction depends not only on the existence of standards, but also on the willingness and capacity of developers, professionals, communities, and public agencies to apply them throughout design, approval, construction, inspection, and post-construction stages. This perspective is consistent with work that links project quality and collapse prevention to effective project management, structured monitoring, risk control, and collaborative stakeholder practice (Ebekozen et al., 2024; Okhueleigbe, 2023; Shaukat et al., 2022).

Accordingly, this article evaluates the level of regulatory compliance in Lagos construction projects, assesses the effectiveness of enforcement mechanisms, examines stakeholder engagement, and analyses perceived trends and contributing factors in building collapse. It further tests the relationships between compliance, enforcement, engagement, and perceived collapse risk. By reorganising the project's empirical evidence around prevention, the article highlights the institutional conditions under which building regulations can function as active safety mechanisms rather than as formal requirements that are weakly sustained after approval.

## **LAGOS STUDY CONTEXT, AGENCIES, AND STAKEHOLDERS**

The study is geographically centred on Lagos State and empirically concentrates on Eti-Osa, Mushin, and Lagos Mainland. These locations were selected in the project because of intense construction activity, reported building-collapse experience, and their contrasting socio-economic and physical development patterns. The broader scope covers the 2013-2023 period for collapse trends, while the field survey was conducted in 2026. Lagos is framed as a coastal, rapidly urbanising and economically important state in which land scarcity and development pressure encourage dense and vertical construction. The interaction between high construction volume and limited regulatory capacity makes the state particularly suitable for examining whether formal regulatory institutions can keep pace with project delivery.

The coastal condition is central rather than incidental to the study. The project argues that environmental vulnerabilities can intensify the consequences of poor design, non-compliance, or weak inspection. At the same time, its comparison with other coastal Nigerian settings is used to show that geology alone cannot explain the concentration of collapse events in Lagos. The article therefore treats the problem as an interaction between site and environmental conditions on one hand and regulatory capacity, development pressure, stakeholder behaviour, and project governance on the other. This framing supports prevention strategies that combine engineering attention to foundations and site conditions with stronger administrative and institutional controls.



The institutional architecture represented in the project extends beyond the two principal development-control agencies. LASPPPA is identified with planning permit approvals, while LASBCA is responsible for building control, construction monitoring, and supervision. The sampling frame also recognises environmental, safety, emergency-response, urban-renewal, and geospatial institutions. Their inclusion reflects the study's view that building-collapse prevention is a multi-agency project-governance function rather than the responsibility of a single regulator.

Table 1. Regulatory and allied agencies identified in the project

| Agency                                                   | Role identified in the project                                              |
|----------------------------------------------------------|-----------------------------------------------------------------------------|
| Lagos State Physical Planning Permit Authority (LASPPPA) | Planning permit approvals and approval processes                            |
| Lagos State Building Control Agency (LASBCA)             | Building control, construction-site monitoring, supervision, and compliance |
| Lagos State Environmental Protection Agency (LASEPA)     | Environmental standards on construction sites                               |
| Lagos State Safety Commission                            | Occupational and public safety enforcement                                  |
| Fire and Rescue Service                                  | Fire-safety audits and emergency response                                   |
| Lagos State Emergency Management Agency (LASEMA)         | Collapse response and structural emergencies                                |
| Lagos State Urban Renewal Agency (LASURA)                | Distressed buildings and urban-renewal zones                                |
| Office of the Surveyor General                           | Geospatial data and land analysis                                           |

The stakeholder structure is equally broad. The study population includes built-environment professionals (architects, civil and structural engineers, builders, quantity surveyors and other relevant professionals), developers/property owners, residents/community members, regulatory officials, and academics/researchers. These groups occupy different positions in the construction process: professionals are responsible for design, supervision, and quality control; developers influence funding and project decisions; residents experience the consequences of unsafe construction and can provide local intelligence; regulators implement approvals and enforcement; and academics/researchers contribute analytical perspectives. The multi-stakeholder design is important because the study measures construction governance as it is experienced across the system rather than from the perspective of one institution alone.

### Documented Incidence of Building Collapse in Lagos: Triangulating Perception with Records

Section 5.1 reports what respondents believe about collapse trends. This section checks that belief against numbers that other researchers have already published. No single Lagos-only government register tracks every collapse, so five independent sources fill that gap. Each one uses a different method and covers a different time window, and the supervisor asked for those figures and their sources to be stated plainly here.

Ekponyoh, George, Etuk, Elijah and Kabari (2025) compiled published incident reports from 1984 to 2023 and checked them against Nigerian Society of Engineers records. They counted 108 collapses in Lagos over that period, with 460 recorded deaths. Within that range, the 2014 to 2023 decade alone accounts for 15 cases and 230 deaths.

Okoye, Apeh, Olaye and Osuji (2023) ran a meta-analysis of journal articles, newspaper reports and conference papers covering Nigeria as a whole between 1973 and 2022. They found 177 cases nationally, and Lagos accounted for 93 of them. That is 52.54% of every recorded national case sitting in one state.

Ohenhen and Shirzaei (2022) took a different route. They combined satellite subsidence data with a compiled literature dataset and estimated close to 300 Lagos collapses between 1978 and 2022, with more than 400 deaths. Looking only at cases from 2005 onward, they recorded 152 failures and more than 200 deaths.



The Building Collapse Prevention Guild tracks incidents on an ongoing basis using media reports rather than government filings. Their figures, reported by TheCable and AllAfrica in 2025, count 614 collapses nationwide between October 1974 and July 2024. Lagos accounts for 348 of those, or 56.68%. Their annual breakdown adds detail: 62 collapses nationwide in 2022, with Lagos responsible for 20 of them; 52 nationwide in 2023, with Lagos responsible for 17; and 47 nationwide in 2024, with Lagos responsible for 13.

COREN, the professional engineering regulator, gives the most conservative figure. A 2026 Sahara Reporters report cites COREN as recording at least 90 Lagos collapses over the past ten years.

Table 1a. Documented building-collapse counts for Lagos State from independent sources

| Source                                                                            | Method                                                                        | Period                                                         | Lagos cases                                                            | Lagos deaths                                                   |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------|
| Ekponyoh, George, Etuk, Elijah & Kabari (2025)                                    | Compiled published incident reports, checked against engineering-body records | 1984-2023 (2014-2023 sub-period)                               | 108 total (15 in 2014-2023)                                            | 460 total (230 in 2014-2023)                                   |
| Okoye, Apeh, Olaye & Osuji (2023)                                                 | Meta-analysis of journals, newspapers, and conference papers (national)       | 1973-2022                                                      | 93 (52.54% of 177 national cases)                                      | Not reported by state                                          |
| Ohenhen & Shirzaei (2022)                                                         | Satellite subsidence study combined with a compiled literature dataset        | 1978-2022 (also reports figures since 2005)                    | About 300 (1978-2022 estimate); 152 (since 2005)                       | More than 400 (1978-2022 estimate); more than 200 (since 2005) |
| Building Collapse Prevention Guild, cited in TheCable (2025) and AllAfrica (2025) | Ongoing incident tracking from media reports                                  | October 1974 to July 2025; annual figures for 2022, 2023, 2024 | 348 of 614 national cases (56.68%); 20 in 2022, 17 in 2023, 13 in 2024 | Not reported by state                                          |
| COREN, cited in Sahara Reporters (2026)                                           | Professional-body estimate                                                    | Past 10 years                                                  | About 90                                                               | Not stated                                                     |

*Sources: Ekponyoh et al. (2025); Okoye et al. (2023); Ohenhen & Shirzaei (2022); Building Collapse Prevention Guild data as reported in TheCable (2025) and AllAfrica (2025); Sahara Reporters (2026).*

These five counts disagree by a factor of three or four for periods that overlap, and that gap tells its own story. The studies define collapse differently: some count only total structural failure, others include partial collapse. Their time windows do not line up, and none of them draws on one shared administrative record. Each source rebuilds the picture from newspapers, journals, or professional estimates instead. This is the same governance gap that Sections 5 and 6 of this study identify from the survey data: Lagos has no single trusted, continuously updated record of building failures.

Even the lowest published estimate confirms a serious and ongoing problem. COREN's figure of 90 collapses in ten years works out to one collapse roughly every six weeks. The Building Collapse Prevention Guild's more recent annual counts, 13 to 20 incidents a year between 2022 and 2024, put the frequency closer to one collapse every two to three weeks. Both readings support what respondents told this study directly: collapse in Lagos happens often enough that residents, professionals, and regulators experience it as a recurring risk, not an isolated tragedy. The documented record backs up that lived experience.



## REGULATORY COMPLIANCE, STAKEHOLDER ENGAGEMENT, AND PROJECT GOVERNANCE

### Regulatory compliance and collapse prevention

Regulatory compliance in construction refers to adherence to laws, policies, standards, permit conditions, approved designs, inspection requirements, and professional rules intended to protect structural quality and public safety. The Nigerian literature reviewed in the project consistently distinguishes between the existence of regulatory frameworks and their implementation. Approval delays, informal construction practices, inadequate site monitoring, weak sanctions, and opportunities to bypass official processes can undermine otherwise comprehensive rules (Ajufoh et al., 2014; Oyeboode, 2021; Windapo & Rotimi, 2012). This distinction is particularly important for collapse prevention because a permit obtained at project commencement does not guarantee continued compliance during construction.

The literature further connects non-compliance with material and workmanship failures. Contractors may reduce costs through inferior materials or weakened quality-assurance processes, while clients may proceed without adequate professional oversight. Such practices become more dangerous when inspection systems are infrequent or sanctions are uncertain (Akinyemi et al., 2016; Nwankwo et al., 2015; Yakubu et al., 2022). From a project-management perspective, compliance must therefore be treated as a continuous control process linked to planning, quality management, monitoring, change management, and risk mitigation rather than as a one-time administrative event (Okhueigbe, 2023).

Digital systems are identified in the project literature as one route for strengthening this continuous function. Automated compliance checking and Building Information Modelling can support early identification of design conflicts, create stronger documentation trails, and reduce dependence on discretionary manual review (Guo et al., 2021; Parsamehr et al., 2023). The relevance to Lagos lies in the scale of the construction environment: when active sites are numerous and inspection capacity is constrained, digital monitoring can complement rather than replace professional and regulatory judgement.

### Stakeholder engagement and professional accountability

Stakeholder engagement is treated in the project as a core safety mechanism. Construction projects involve clients, developers, contractors, consultants, regulators, professional institutions, residents, and end users whose decisions affect design quality, regulatory compliance, and project outcomes. Effective engagement can improve information flow, clarify responsibilities, support early risk identification, reduce conflict, and create accountability across project stages (Agyekum et al., 2023; Ebekozi et al., 2024; Shaukat et al., 2022). In contrast, fragmented decision-making and weak consultation can allow unsafe practices to proceed without challenge.

Nigerian evidence reviewed in the project links building collapse to poor coordination among internal stakeholders, the exclusion or late involvement of qualified professionals, client interference, and limited community participation (Adenuga et al., 2022; Anosike, 2021). Professional involvement is especially important where design changes, material substitutions, additional floors, or changes of use may alter structural loading. The project also stresses the value of resident awareness: communities are often the first to observe unsafe practices or visible structural distress, but their contribution depends on whether reporting channels and public information mechanisms exist.

### Theoretical framing

The project integrates Stakeholder Theory, Institutional Theory, and Project Governance Theory. Stakeholder Theory provides the relational lens: construction outcomes depend on how the interests, responsibilities, influence, and participation of project actors are managed. Contemporary stakeholder scholarship emphasises accountability and organisational purpose beyond narrow owner interests, supporting the view that safety and community well-being should be treated as core project objectives (Mahajan et al., 2023).



Institutional Theory explains why rules may exist without consistently shaping behaviour. Construction organisations and actors respond to regulatory, professional, and industry pressures, but weak enforcement can normalise non-compliance. Where violations are not sanctioned, unsafe practices can become routine rather than exceptional. Qiu and Chen (2023) show the relevance of institutional theory to construction project management, particularly in understanding how regulatory frameworks and professional norms influence project behaviour.

Project Governance Theory adds the control dimension by focusing on decision rights, monitoring, accountability, risk management, and the relationships connecting clients, consultants, contractors, regulators, and communities. Effective project governance is associated with stronger infrastructure performance when stakeholder management and oversight are integrated (Ahola, 2023; Khan et al., 2021). Combined, the three perspectives support the study's conceptual proposition that regulatory compliance and enforcement effectiveness should reduce collapse risk, while stakeholder engagement should both influence collapse outcomes and strengthen compliance behaviour.

## METHODOLOGY

### Research design, population, and study area

A descriptive survey research design was used to obtain quantitative evidence on regulatory compliance, enforcement, stakeholder engagement, and perceived building-collapse risk. The design was selected because it enables the identification of patterns and relationships across a relatively large and heterogeneous population without manipulating study variables (Bryman, 2016; Creswell & Creswell, 2018). The study population was estimated at 2,500 persons, comprising approximately 1,000 construction professionals and regulatory personnel and about 1,500 affected residents and property owners within the selected areas.

The empirical study covered Eti-Osa, Mushin, and Lagos Mainland. Lagos State was purposively selected because of the prominence of building-collapse incidents and the intensity of construction activity described in the project. Within the state, respondents were stratified across professional, regulatory, developer/property-owner, resident/community, and academic/research categories. Purposive sampling was used for specialised regulatory officials; stratified sampling supported representation across professional disciplines; and simple random sampling was specified for developers and residents. This multistage approach was intended to capture the different forms of knowledge held by actors within the construction-governance system (Teddlie & Yu, 2007).

### Sample size and data collection

Sample size was determined using Cochran's formula at a 95% confidence level, with  $p = 0.5$  and a 5% margin of error. The initial estimate of 384 was adjusted for the finite population of 2,500, producing a final target sample of approximately 333 respondents (Cochran, 1977). Questionnaires were distributed electronically through email and WhatsApp. Of the 333 questionnaires distributed, 295 valid responses were returned, producing an overall response rate of 88.6%.

Table 2. Questionnaire distribution and valid responses

| Stakeholder group               | Distributed | Returned   | Response rate (%) | Major areas reported    |
|---------------------------------|-------------|------------|-------------------|-------------------------|
| Built-environment professionals | 80          | 71         | 88.8              | Mushin / Lagos Mainland |
| Developers / property owners    | 35          | 30         | 85.7              | Eti-Osa / Lagos Island  |
| Residents / community members   | 158         | 140        | 88.6              | Mushin / Lagos Mainland |
| Regulatory officials            | 48          | 42         | 87.5              | Eti-Osa / Mushin        |
| Academics / researchers         | 12          | 12         | 100               | All LGAs                |
| <b>Total</b>                    | <b>333</b>  | <b>295</b> | <b>88.6</b>       | -                       |

Source: Field Survey (2026).



## Instrument, reliability, and analytical procedure

The primary instrument was a structured questionnaire designed to measure regulatory compliance, enforcement, stakeholder engagement, inspection activity, material quality, perceived agency performance, and challenges affecting compliance. The instrument was reviewed by the academic supervisor and senior officials from LASBCA and LASPPPA. A pilot test involving 30 respondents was used for reliability assessment, and the reported Cronbach alpha coefficient exceeded 0.70, indicating acceptable internal consistency in the project.

The final questionnaire was organised into five sections: respondent characteristics; regulatory compliance; enforcement effectiveness; stakeholder engagement; and building-collapse trends/contributing factors. A five-point Likert scale was used, from 1 = Strongly Disagree to 5 = Strongly Agree. The study adopted 3.00 as the decision benchmark. Mean scores below 3.00 were interpreted in the project as indicating low compliance, weak enforcement, low engagement, or adverse collapse-risk conditions, depending on the construct. Negatively worded items identified as reverse-scored in the results tables were recoded so that higher construct means consistently reflected more favourable performance.

Data analysis was conducted with SPSS version 25. Descriptive statistics included frequencies, percentages, means, and standard deviations. Pearson Product-Moment Correlation was used to test bivariate relationships, and Multiple Linear Regression assessed the relative influence of regulatory compliance, enforcement effectiveness, and stakeholder engagement on building-collapse perception. Statistical significance was evaluated at  $p < 0.05$ . The study design also specified voluntary participation, confidentiality, anonymity, informed consent, and academic use of the data. The source document does not provide an ethics-committee name or approval number; authors should supply these details if required by the target journal.

## RESULTS

### Respondent profile and construct-level results

Residents and community members formed the largest group of valid respondents ( $n = 140$ ), followed by built-environment professionals ( $n = 71$ ), regulatory officials ( $n = 42$ ), developers/property owners ( $n = 30$ ), and academics/researchers ( $n = 12$ ). More than half of the professionals and regulatory officials were reported to have over ten years of active experience in Lagos construction or regulatory practice. The combination of technical, institutional, developer, community, and academic perspectives supports a system-wide interpretation of the results.

Table 3. Summary of construct-level findings and key indicators

| Construct                              | Overall mean | Overall SD | Project interpretation | Highest-ranked indicator                                      | Lowest-ranked indicator                                       |
|----------------------------------------|--------------|------------|------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| Regulatory compliance                  | 2.7          | 0.89       | Low compliance         | Building permits obtained before construction (3.18)          | Non-compliance contributes to collapse, reverse-scored (2.25) |
| Enforcement effectiveness              | 2.38         | 0.88       | Ineffective            | Inter-agency coordination (2.67)                              | Court orders/legal sanctions commonly used (2.11)             |
| Stakeholder engagement                 | 2.44         | 0.89       | Low                    | Client override of professional advice, reverse-scored (2.64) | Professional bodies actively enforce standards (2.25)         |
| Collapse trends / contributing factors | 2.44         | 0.88       | Widely perceived risk  | Bureaucratic delays encourage bypassing regulations (2.69)    | Economic pressure / low public trust (2.15 each)              |

Source: Field Survey (2026).



Regulatory compliance recorded an overall mean of 2.70, below the 3.00 benchmark. Permit acquisition was the only item above the benchmark (mean = 3.18). However, compliance weakened for the activities that require sustained monitoring after approval. Developers' adherence to approved structural designs recorded a mean of 2.94; regular inspection of construction activities, 2.88; and sufficient professional involvement in supervision, 2.86. Compliance with the National Building Code recorded 2.44. The lowest recorded means were associated with corruption-related compromise (2.35) and the perceived contribution of non-compliance to collapse (2.25). The pattern suggests that formal permit acquisition performs better than continuing construction-stage compliance.

Enforcement effectiveness was the weakest construct, with an overall mean of 2.38. Inter-agency coordination (2.67) and LASBCA site monitoring (2.62) were the highest-ranked items but still remained below the benchmark. Training and capacity building (2.43), approval efficiency (2.40), and staffing/resources (2.39) were also rated low. Consistent penalties for non-compliance scored 2.34, post-construction monitoring 2.32 after reverse scoring, and the effective use of digital technology 2.28. The lowest-ranked indicator was the common use of court orders and legal sanctions against violators (2.11). Respondents therefore perceived enforcement as constrained by weak deterrence, inadequate capacity, political interference, limited technological integration, and incomplete coordination.

Stakeholder engagement recorded an overall mean of 2.44. Client override of professional recommendations and poor design-stage coordination were among the strongest adverse perceptions in the section. Public awareness campaigns (2.63), communication between developers and regulatory agencies (2.59), and the involvement of all relevant stakeholders in construction planning (2.55) remained below the acceptable threshold. Community members being informed about projects in their areas scored 2.26, and active professional-body enforcement of construction standards scored 2.25. These results indicate weak institutionalisation of participation, professional accountability, public reporting, and construction-safety communication.

For collapse trends and contributing factors, the project reports an overall mean of 2.44 and labels the construct as widely perceived risk. Bureaucratic delays encouraging developers to bypass regulations had the highest mean (2.69). Poor foundation design and corruption within regulatory agencies were jointly ranked next (2.46 each), showing that respondents placed an institutional factor alongside a technical factor. The item on collapse concentration in densely populated low-income areas recorded 2.38. The item stating that collapse incidents had increased over the past ten years recorded 2.23, which the project interprets cautiously because perception of trend may not correspond directly with administrative incident counts. Economic pressure encouraging non-compliance and low public trust in regulatory agencies each recorded 2.15. Section 2.4 sets these perception figures against published incident counts and finds that the two sources of evidence point in the same direction.

## Correlation and regression results

Table 4. Pearson correlation results

| Relationship                                               | Pearson r | p-value (2-tailed) | N   |
|------------------------------------------------------------|-----------|--------------------|-----|
| Regulatory compliance vs. building-collapse perception     | -0.612    | < 0.001            | 295 |
| Enforcement effectiveness vs. building-collapse perception | -0.578    | < 0.001            | 295 |
| Stakeholder engagement vs. regulatory compliance           | 0.541     | < 0.001            | 295 |

Source: Field Survey (2026). Decision rule in the project: reject  $H_0$  where  $p < 0.05$ .

Regulatory compliance showed a strong and statistically significant negative relationship with building-collapse perception ( $r = -0.612$ ,  $p < 0.001$ ). Enforcement effectiveness also had a significant negative relationship with collapse perception ( $r = -0.578$ ,  $p < 0.001$ ). In addition, stakeholder engagement was positively associated with regulatory compliance ( $r = 0.541$ ,  $p < 0.001$ ). Within the study's coding framework,

these relationships indicate that stronger compliance and enforcement are associated with lower perceived collapse risk and that stronger engagement is associated with better compliance behaviour.

Table 5. Multiple linear regression results

| Predictor                 | Beta ( $\beta$ ) | Std. error | t-value | p-value | VIF  |
|---------------------------|------------------|------------|---------|---------|------|
| Constant                  | 5.214            | 0.487      | 10.71   | < 0.001 | -    |
| Regulatory compliance     | -0.541           | 0.083      | -6.52   | < 0.001 | 1.38 |
| Enforcement effectiveness | -0.387           | 0.094      | -4.12   | < 0.001 | 1.31 |
| Stakeholder engagement    | -0.264           | 0.088      | -3.00   | 0.003   | 1.27 |

*Model summary:  $R = 0.762$ ;  $R^2 = 0.581$ ; adjusted  $R^2 = 0.576$ ;  $F(3, 291) = 134.70$ ;  $p < 0.001$ . Source: Field Survey (2026).*

The regression model was statistically significant,  $F(3, 291) = 134.70$ ,  $p < 0.001$ , and explained 58.1% of the variation in building-collapse perception ( $R^2 = 0.581$ ; adjusted  $R^2 = 0.576$ ). Regulatory compliance was the strongest predictor ( $\beta = -0.541$ ,  $p < 0.001$ ), followed by enforcement effectiveness ( $\beta = -0.387$ ,  $p < 0.001$ ) and stakeholder engagement ( $\beta = -0.264$ ,  $p = 0.003$ ). All reported VIF values were below 2.0, indicating no material multicollinearity problem in the model as specified. The statistical results therefore support the project's central governance argument: compliance has the greatest direct explanatory weight, but enforcement and stakeholder engagement also make significant contributions.

## DISCUSSION

### Compliance is weakest after the point of approval

A central finding is the difference between permit acquisition and sustained construction-stage compliance. The permit item was the only regulatory-compliance indicator above the benchmark, while structural adherence, inspection, professional supervision, Building Code compliance, and integrity-related indicators were all lower. This distinction is important for prevention. A regulatory system can record permits and still fail to control what happens after construction begins. The findings therefore support Nigerian research arguing that the principal problem is not simply the absence of rules, but the gap between formal requirements and day-to-day implementation (Nwosu & Zima, 2021; Oyebode, 2021; Windapo & Rotimi, 2012).

The implication is particularly strong in Lagos because the project's contextual analysis emphasises construction volume, density, land scarcity, and vertical development. Continuous monitoring is resource intensive, and a rapidly growing project pipeline can exceed institutional inspection capacity. Where supervision becomes intermittent, opportunities increase for unapproved alterations, material substitutions, departures from structural drawings, and client-driven changes. These are precisely the forms of project behaviour highlighted in earlier Nigerian studies of collapse and professional oversight (Akinyemi et al., 2016; Taiwo & Afolami, 2011). Prevention must therefore focus on compliance across project stages rather than on approval alone.

### Enforcement weakness reduces deterrence

The overall enforcement mean of 2.38 is the lowest among the measured constructs. The most striking result is the very low score for the use of court orders and legal sanctions. Penalty consistency, post-construction monitoring, staffing/resources, and digital enforcement were also rated weakly. This matters because enforcement gives regulatory rules practical force. When violators expect that sanctions will be inconsistent, delayed, reversed, or absent, compliance becomes dependent on voluntary behaviour rather than credible institutional pressure. This interpretation is consistent with the project literature on regulatory lapses, weak monitoring, and institutional fragmentation in Nigerian construction (Ajufoh et al., 2014; Odeyemi et al., 2019; Oyebode, 2021).



The result also shows why inter-agency architecture must be examined as a system. LASPPPA, LASBCA, environmental regulators, safety bodies, emergency managers, and urban-renewal institutions perform different functions across the project and building lifecycle. Fragmented information or weak coordination can create gaps between approval, site inspection, environmental compliance, distress reporting, and emergency response. The project's recommendation for a unified enforcement dashboard follows directly from this evidence and from its wider concern with administrative silos.

### **Stakeholder exclusion weakens prevention**

Stakeholder engagement was also rated low. The findings point to three connected weaknesses: clients overriding professional recommendations, limited community information and reporting mechanisms, and weak professional-body enforcement. Each can reduce the number of effective checks on unsafe construction. When clients or developers dominate project decisions, technical advice may be subordinated to cost, speed, or design preferences. When professional institutions have limited active oversight, breaches of professional standards may not generate timely consequences. When communities are poorly informed, residents cannot easily identify approved projects, recognise departures from approvals, or report unsafe conditions.

This pattern supports the project's use of Stakeholder Theory. Participation is not treated as a public-relations activity but as part of construction control. Research reviewed in the project similarly links stakeholder coordination with quality, accountability, and project performance (Adenuga et al., 2022; Agyekum et al., 2023; Ebekozien et al., 2024; Shaukat et al., 2022). In Lagos, the prevention value of engagement is reinforced by the positive correlation between stakeholder engagement and regulatory compliance ( $r = 0.541$ ). The relationship suggests that engagement may contribute to safety not only directly but also by improving compliance behaviour.

### **Governance and technical risk interact in a coastal megacity**

The study does not deny technical causes of collapse. Poor foundation design was among the highest-ranked contributing factors, and the project repeatedly recognises material quality, structural design, workmanship, supervision, and environmental conditions. Its distinctive contribution is to place these technical factors within a governance system. In a coastal environment where foundation performance can be sensitive to site conditions, weak regulation increases the probability that inadequate design, poor materials, or unsafe alterations will go undetected or uncorrected. Technical and institutional risks therefore reinforce each other rather than compete as explanations.

The regression analysis strengthens this governance-centred interpretation. Compliance, enforcement, and engagement jointly explain 58.1% of the variance in perceived collapse risk, with compliance as the dominant predictor. The result does not establish that governance variables are the sole causes of actual collapse incidents, because the dependent measure is respondent perception rather than engineering failure records. It does, however, show that stakeholders who operate within Lagos construction governance systematically associate stronger compliance and enforcement with lower collapse risk. This is consistent with the project's theoretical integration of institutional pressure, stakeholder participation, and project-governance control.

## **IMPLICATIONS FOR BUILDING-COLLAPSE PREVENTION AND CONSTRUCTION PROJECT GOVERNANCE**

The results support a prevention strategy organised around the construction lifecycle. First, permit compliance should be monitored at multiple project stages rather than verified only at commencement. The project recommends mandatory checks at commencement, mid-point, and completion for projects above a defined scale threshold, with stop-work triggers for projects operating without valid permits. Embedding the National Building Code into contractual obligations is also proposed as a way to make compliance part of project delivery and not only an external regulatory requirement.

Second, enforcement should move from predominantly complaint-driven responses toward proactive, risk-



based inspection. The project specifically prioritises high-density developments, repeat-offender sites, and geologically vulnerable coastal areas. This approach is well aligned with the Lagos context because it allows scarce regulatory capacity to be concentrated where project density, environmental vulnerability, or past non-compliance create greater potential consequences. Adequate staffing, equipment, and training remain necessary because risk-based systems cannot function without institutional capacity.

Third, inter-agency coordination should be strengthened through shared information systems. The project proposes a unified dashboard connecting LASBCA, LASPPPA, LASEPA, LASEMA, and the Safety Commission so that permit status, violation alerts, inspections, environmental issues, distress reports, and enforcement actions can be tracked across institutions. Such integration would reduce information silos and strengthen accountability for follow-up actions.

Fourth, stakeholder participation should be formalised. Community liaison and public notice requirements can create earlier visibility of major construction activity and provide residents with channels to raise concerns. Professional bodies should play a more active role in monitoring professional conduct, and developers should formally confirm the engagement of registered professionals for design and supervision. The study also recommends sustained public building-safety awareness through radio, social media, local councils, and community development associations.

Fifth, digital governance should support both compliance and transparency. The project recommends expanding digital permit systems to include real-time construction progress reporting, compliance dashboards, and automated alerts for permit expiry or deviations. It also proposes piloting BIM-based compliance checking for public and multi-storey projects and integrating geospatial information such as subsidence, groundwater, and soil data into approval and inspection decisions. These recommendations connect the project's institutional findings with its coastal-risk framing and with the literature on automated compliance checking (Guo et al., 2021; Parsamehr et al., 2023).

## **LIMITATIONS AND DIRECTIONS FOR FURTHER RESEARCH**

The findings should be interpreted within the limitations reported in the project. First, the measures are based on stakeholder perceptions rather than objective administrative or engineering measurements of compliance, enforcement, or collapse incidence. Perception data are valuable for understanding how governance is experienced by actors within the system, but they remain a proxy for institutional performance. Second, the sample is confined to three Lagos Local Government Areas and may not capture the full diversity of regulatory conditions across the state. Third, the collapse-trend items measure respondents' perceptions rather than verified incident counts. The project therefore recommends triangulation with administrative collapse records in future work. Section 2.4 takes a first step toward that triangulation by using published incident counts. These confirm that Lagos experiences a substantial, ongoing volume of documented collapses, roughly 90 to 350 depending on the source and period, even though no unified government register currently allows an exact figure to be stated with confidence.

Further research should replicate the design in other high-risk Nigerian urban environments and conduct longitudinal assessment of specific reforms, including digital permitting. Qualitative and ethnographic research could also examine the decision-making of developers, the institutional culture of regulatory officials, and the community experience of unsafe construction. The project additionally identifies artisan training and certification as an underexplored area with potential relevance to building safety.

## **CONCLUSION**

This study reframes building-collapse prevention in Lagos construction projects as a governance challenge that interacts with technical and environmental risk. Across 295 valid responses, regulatory compliance was low, enforcement was ineffective, and stakeholder engagement was weak. Compliance and enforcement were significantly associated with lower perceived collapse risk, while stakeholder engagement was positively associated with compliance. Together, the three governance constructs explained 58.1% of variation in



collapse perception, with regulatory compliance as the strongest predictor. Independent published incident counts, set out in Section 2.4, corroborate this picture: even the most conservative figure points to a collapse in Lagos roughly every six weeks over the past decade, and the most current tracking suggests one every two to three weeks.

The findings are particularly important for Lagos as a coastal, rapidly urbanising and economically significant construction environment. Development pressure, density, land scarcity, and environmental vulnerability increase the consequences of regulatory failure. Effective prevention therefore requires more than stronger structural design standards: it requires continuous compliance monitoring, credible sanctions, coordinated agencies, professional accountability, informed communities, and digital systems that make deviations visible early. Within the limits of perception-based evidence, now supported by documented incident counts, the study concludes that building collapse in Lagos is substantially preventable through targeted reforms that convert regulatory rules from nominal requirements into enforceable project-governance controls.

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