



RESEARCH ARTICLE

ASSESSING THE EFFECTIVENESS OF CONTRACTUAL RISK ALLOCATION STRATEGIES IN INFRASTRUCTURE PROJECTS IN NIGERIA

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ABSTRACT

The study investigated the efficacy of contractual risk allocation strategies within Nigerian infrastructure projects, specifically focusing on those in the road, water, and power sectors executed between 2018 and 2023. The research encompassed both federal and selected state projects, thereby facilitating the identification of variations in technical complexity and institutional capacity. A mixed-method design was employed, combining documentary analysis of 20 contract files with 30 semi-structured interviews involving procurement officers, engineers, contractors, and consultants. The analysis of the findings indicated several key observations. Technical risks assigned to contractors were generally managed effectively, which may be attributable to comprehensive specifications. Conversely, financial and regulatory risks, predominantly allocated to public agencies, appeared to contribute significantly to project delays and cost deviations. Inflationary and foreign exchange risks frequently remained unallocated, which appears to have produced the most substantial cost overruns across all sectors. The shared allocation of regulatory responsibilities correlated positively with schedule performance; however, unclear variation procedures consistently often led to frequent disputes. Qualitative evidence underscored the presence of capacity constraints, an inconsistent interpretation of risk clauses, and delays related to approval processes. Therefore, the study suggests that the current risk allocation practices in Nigerian infrastructure contracts are often uneven and appear misaligned with actual capabilities and statutory requirements. Therefore, the implementation of clearer allocation matrices, structured adjustment mechanisms, and improved contract management capacity may be instrumental in supporting the attainment of more predictable project outcomes.

Keywords: Contract, risk, allocation strategies, infrastructure project

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1.0. INTRODUCTION

Infrastructure development remains a pivotal driver of economic growth and social advancement in Nigeria, yet the ambition to build robust, reliable systems continues to confront structural and institutional barriers. According to the World Bank, infrastructure gaps in Nigeria, particularly in electricity, transports, and logistics, have persistently impeded productivity and domestic market integration (World Bank). The scale of investment required is substantial: one estimate placed the financing need at a specific figure; conversely, other assessments have delineated the nation's considerable infrastructure deficit, projecting its persistence through 2025. Despite this magnitude of need, many infrastructure projects appear to be characterized by substandard outcomes. These performance shortfalls may suggest deeper governance and contractual failings, rather than solely indicating the funding constraints that are frequently cited.

One of the central governance mechanisms in infrastructure delivery is the contractual allocation of project risk among the pertinent parties. Risk allocation refers to the explicit contractual assignment of responsibility for future uncertainties to the party best positioned to manage them. In international procurement frameworks such as those mediated by the Fédération Internationale des Ingénieurs-Conseils (FIDIC), including international forms and public-private partnership (PPP) guidelines, it is widely held that efficient project outcomes hinge on allocating each risk to the stakeholder with the greatest capacity to anticipate, mitigate, and absorb the impact. When risks are misallocated, either through their offloading to a party ill-equipped for management or their retention by an entity lacking control, the incentive structures tend to distort, and project performance often deteriorates. Indeed, recent commentary on Nigerian construction emphasizes that “effective project financing and risk allocation are crucial” for large-scale infrastructure within the country (Agu et al., 2024).

In Nigeria, contract- and procurement-driven risk allocation remains inconsistent, contributing to systemic underperformance in infrastructure delivery. For example, empirical evidence from the power-sector privatization track suggests that risk was injudiciously allocated to private partners without adequate evaluation of their ability to manage it, thereby undermining project viability (Nwangwu, 2021). More broadly, infrastructure projects frequently suffer from land-acquisition delays, regulatory bottlenecks, FX volatility, inflation shocks, and unclear contractual clauses, all of which erode cost-time-quality parameters. Such issues are symptomatic of contractual risk allocation strategies that do not reflect the principle of “risk to the best-able party.” Consequently, the gap between contractual design and project reality is exposed through disputes, claims, and renegotiations. This problem is demonstrably accentuated in Nigeria, where procurement frameworks, despite notable improvements, still appear to encounter substantial enforcement and institutional capacity limitations (Emenike et al., 2025).

Despite a growing body of research on risk allocation in Nigerian infrastructure, several important gaps appear to remain. Many studies focus on building projects or housing-type PPPs rather than major transport, power, or water infrastructure. For instance, (Arijeloye et al., 2025) (2025) provide a fuzzy decision model for risk allocation in mass-housing PPPs in Nigeria. While this adds value, there remains limited empirical evidence linking specific contractual risk-allocation strategies to measurable performance outcomes (cost overrun percentage, schedule variance, quality metrics) across sectors. Moreover, Nigerian literature often treats risk allocation qualitatively or at the



preference level, without detailing how clauses are drafted or how the allocation actually correlates with outcomes. Nwangwu's (2021) examination of the power-sector privatization prominently highlighted the misalignment of capacity and risk assignment; however, its scope was explicitly delimited to that singular sector. Consequently, a more comprehensive cross-infrastructure-sector analysis appears warranted, one that would entail the systematic examination of contract documentation, the extraction of specific risk allocation patterns, and the empirical testing of their demonstrable effects on project delivery (2025). Such an undertaking would concurrently advance both theoretical constructs and practical applications by effectively bridging the identified contract design-performance disparity within Nigeria's infrastructure milieu.

Given these observations, this paper aims to identify of contractual risk-allocation strategies employed in Nigerian infrastructure projects, the assessment of their alignment with global best-practice principles (specifically, the principle of allocating risk to the party possessing the greatest capacity for its management), and the evaluation of their influence on project outcomes, specifically regarding cost, time, and quality performance. By focusing on infrastructure projects executed between 2018 and 2023 across various sectors (roads, water, and power), the study seeks to provide an empirical basis for a risk allocation doctrine in Nigeria's procurement and contracting ecosystem.

2.0. RELATED LITERATURE

Infrastructure delivery in many emerging economies is repeatedly hindered by a constellation of risks that erode project outcomes in cost and time consistently and in quality. Among the most prominent categories of risk are technical, financial, macroeconomic, regulatory, political, environmental, and contractual dimensions. For instance, Flyvbjerg contends that megaprojects worldwide routinely underestimate costs and overestimate benefits because technical and psychological factors combine to produce systemic bias in forecasting (Flyvbjerg, 2014). In developing-country infrastructure contexts, the (2025) report suggests that volatile currency regimes, weak institutional capacity, and regulatory unpredictability amplify risk exposure in large-scale projects.

Recent work in Nigeria suggests that construction projects remain vulnerable to intertwined physical, financial, and governance risks; for example, (Enyinna et al., 2024) (2024) and Enyinna (2024) developed a risk-management support framework for Nigerian construction projects and observed the consistent dominance of these risks within project risk profiles. These findings underscore the imperative of effective contractual risk allocation—assigning responsibility for each risk to the party best able to manage it, as a mechanism for the enhancement of project performance.

The principle of optimal risk allocation is central to modern procurement and contract-management theory. Standard forms of contract, such as those promulgated by the ABA (2022), mandate the allocation of risk to the entity possessing the preponderant capacity for control over, or influence upon, risk outcomes. Multilateral guidance, such as the Global Infrastructure Hub PPP Risk Allocation Tool (2019), underscores the centrality of risk allocation within every public-private partnership (PPP) transaction. It posits that its misapplication may undermine both value for money and financial viability (Global Infrastructure Hub & Allen & Overy, 2020). Empirical research in PPP markets suggests that the imposition of excessive risks upon private partners, in the absence of commensurate capacity, tends to engender elevated project costs, potentially manifesting as cost premiums, contested contracts, and subsequent renegotiations (Nur et al., 2023).



Effective contract design, therefore, necessitates the deliberate allocation of risks—specifically construction risk, demand risk, regulatory risk, and inflation/foreign exchange (FX) risk—to those entities exhibiting the greatest capacity for their effective management; conversely, other risks may be retained by the public sector or be subject to shared responsibility.

In Nigeria, the procurement and PPP governance framework provides formal instruments to structure risk allocation and facilitates infrastructure delivery. The Public Procurement Act 2007 established the Bureau of Public Procurement (BPP) and instigated standardization in public contracting (Public Procurement Act 2007). Recent research indicates that the PPA has improved oversight, but implementation gaps persist (Emenike et al., 2024). Emenike found that although procurement actors recognize (2024) the framework, corruption, weak monitoring, and contract splitting remain significant impediments. Although these formal frameworks prescribe improved contractual risk management, scholarship suggests that practical alignment between policy and contract practice is weak in Nigeria.

Empirical studies in the Nigerian infrastructure and construction sectors demonstrate the divergence between contract risk allocation theory and its practical application. (Leo-Olagbaye & Odeyinka, 2020) explored risk factors impeding highway construction in Nigeria and observed that land acquisition delays, funding constraints, subcontractor performance, and regulatory lag were dominant risk drivers. Although they identified risk factors, the study offered limited insight into how these risks were contractually allocated. Their more recent study (Oyekunle, 2024) examined risk-management practices in the Nigerian construction industry and showed that risk identification, assessment, mitigation, and monitoring all positively correlated with cost-performance improvements; however, the study did not primarily encompass the intricacies of contractual risk allocation itself.

(Ajayi, 2022) investigated the criticality of risk management in Nigerian construction, revealing contractors' perceptions of regulatory and political risks as significant; nonetheless, numerous contracts evidenced a deficiency in the transference of responsibility or the provision of escalation mechanisms. These studies suggest that while risk-management practices undergo evolution, contractual risk allocation, however, remains under-examined.

Much of the Nigerian literature concentrates on risk identification, general risk-management practices, and broad Public-Private Partnership (PPP) and privatization issues rather than analyzing how risks are allocated within actual contract documents or undertakings. Furthermore, a paucity of empirical research connects contractual risk-allocation strategies directly to measurable project outcomes, including, but not limited to, cost overruns, schedule adherence, or quality indicators. Existing studies tend to be sector-specific, primarily focusing on building projects and thereby yielding limited multi-sector evidence for roads, power, and water infrastructure.

Moreover, the intricate relationship between Nigeria's procurement and Public-Private Partnership frameworks and the actual assignment of risks in practice constitutes an insufficiently examined modality. Addressing these identified lacunae; therefore, necessitates a comprehensive study that evaluates contractual risk-allocation strategies across diverse infrastructure sectors and elucidates their influence on project performance, thereby offering both theoretical contributions and actionable insights for enhancement within Nigerian procurement and contract management.



3.0. METHODOLOGY

3.1. Materials

The study employed a methodological framework integrating project documentation, regulatory instruments, and analytical tools. Core project materials were procured from federal and state procurement agencies, encompassing contract agreements, bidding documents, bills of engineering measurements and evaluation, contractor submissions, and project completion reports. These documents furnished the requisite contractual clauses and performance data for assessing risk allocation. Regulatory materials, comprising various guidance documents, served as benchmarks for the evaluation of contractual allocation alignment. These materials demonstrated familiarity with Nigerian procurement requirements. Analytical tools consisted of Microsoft Excel for descriptive statistics, NVivo for qualitative coding, and SPSS for correlation analysis. A structured risk-allocation matrix was developed to classify risks and compare allocation patterns across projects. Table 3.1 delineates the materials employed and their respective purposes.

Table 3.1: Materials Used in the Study and their Analytical Role

Material Type	Specific Materials	Purpose in Study
Contractual Documents	Contract agreements, conditions of contract, BoQ/BEME, variation records	Extraction of risk clauses and allocation patterns
Regulatory Documents	PPA 2007, BPP SBDs, PPP guidelines	Benchmarking against statutory expectations
Performance Records	Progress reports, cost data, and schedules	Generation of outcome indicators
Analytical Tools	Excel, NVivo, SPSS	Coding, modelling and testing

3.2. Study Area

The investigation encompassed infrastructure projects in Nigeria executed during the period 2018 to 2023. Data were extracted from road, water, and power projects undertaken under the purview of the Federal Ministry of Works, Federal Ministry of Water Resources, and select state infrastructure agencies. The selection of these sectors was based on their representation of major capital investment categories and the frequent occurrence of substantial technical and financial risks.

3.3. Data Collection

The process of data collection encompassed a comprehensive documentary review alongside the administration of semi-structured interviews. Twenty project files were accessed via formal solicitations to the pertinent procuring entities. Each file inherently comprised contractual documentation, procurement records, and project performance reports. Thirty interviews were conducted with procurement officers, engineers, contractors, and consultants, all of whom had participated directly in either contract formation or project supervision. The interviews primarily focused on elucidating the practical rationale underpinning risk allocation determinations and identifying associated implementation challenges.

3.4. Sampling

Cases were selected via purposive sampling. Inclusion criteria were: (1) Execution of the project occurred between 2018 and 2023; (2) Availability of comprehensive contract documentation; (3) Inclusion of the project within the road, water, or power sectors. The final sample comprised twenty projects: eight road, seven water, and five power projects, respectively. Interview sampling also



followed purposive selection, which ostensibly ensured that all respondents possessed direct technical responsibility.

3.5. Analysis Techniques

Analysis followed a mixed-method design. Qualitative content analysis was applied to contractual documents using NVivo. The coding of contract clauses served to classify risk types and their concomitant allocation patterns, guided by a predefined coding scheme. Subsequently, thematic analysis of interview transcripts aimed to delineate recurring patterns pertinent to capacity, negotiation, and implementation constraints.

Quantitative analysis, specifically, comprised descriptive statistics and correlation testing. Cost overruns, schedule variance, and quality assessment data were extracted from project records. Moreover, the schedule variance formula demonstrably supported the interpretation of schedule performance, as follows: $SV = EV - PV$ where

SV denotes schedule variance, EV represents earned value, and PV signifies planned value. Subsequently, Table 3.2 provides a summary of the analytical techniques and their expected outputs.

Table 3.2: Analytical Techniques and Expected Outputs

Technique	Data Source	Output
Content analysis	Contract documents	Risk types and allocation patterns
Thematic analysis	Interviews	Stakeholder perspectives
Descriptive statistics	Cost, schedule, quality data	Performance indicators
Correlation analysis	Risk allocations and performance metrics	Association patterns

The methodological structure ensured logical alignment between the research aim, data sources, and analytical procedures while maintaining conciseness commensurate with an eight-page conference paper.

4.0. PRESENTATION OF RESULTS AND DISCUSSION

4.1. PRESENTATION OF RESULTS

4.2. Overview of Project Characteristics

The analysis was based on 20 infrastructure projects implemented between 2018 and 2023, encompassing the road, water, and power sectors. Road projects, which constituted the predominant investment domain within national capital expenditure, consequently comprised the largest proportion of the analytical sample. Contract values ranged from medium-scale works to extensive multi-year investments; Procurement was predominantly conducted through national competitive bidding and selective contracting methodologies. Table 4.1 delineates the characteristics of these sampled projects.



Table 4.1: Summary of Project Characteristics

Sector	No. of Projects	Contract Value Range (₦ Billion)	Average Duration (Months)	Procurement Method
Roads	8	12–68	26	National Bidding
Water	7	4–22	20	Selective/NCB
Power	5	9–35	24	EPC and Design Build
Total	20	—	—	—

Source: Authors’ Analysis (2026).

The sample provided appears to be a sufficient representation of major public infrastructure categories in Nigeria and exhibits variations in both technical complexity and inherent risk exposure.

4.3. Contractual Risk Allocation Patterns

Content analysis of the 20 contract documents identified four major categories of risk: technical, financial, regulatory, and environmental. Risk allocation patterns varied significantly across sectors. Road projects appeared to demonstrate a distinct allocation of technical and environmental risks to contracting entities, while financial and regulatory risks were primarily allocated to the client. Water and power projects often exhibited more shared allocation structures, particularly when anticipating regulatory approvals and utility relocations.

A notable finding pertained to the apparent presence of unallocated risks within several contracts, specifically encompassing inflation risk, foreign exchange exposure, and delays, arising from inter-agency coordination. These omissions appear to have contributed to contractual disputes or an increased incidence of variation requests. Table 4.2 presents the overall distribution of risk allocation.

Table 4.2: Distribution of Contractual Risk Allocation across Projects.

Risk Type	Client (%)	Contractor (%)	Shared (%)	Unallocated (%)
Technical	15	65	20	0
Financial	55	20	10	15
Regulatory	60	10	20	10
Environmental	25	60	10	5
Inflation/FX	30	0	10	60

Source: Authors’ Analysis (2026).

Sector comparison suggests that road projects exhibited the least addressed inflation and foreign exchange (FX) risks; water projects had evinced the highest incidence of shared environmental risk; and power projects demonstrated the most structured treatment of regulatory approvals.

4.4. Performance Outcomes

Performance outcomes were assessed using cost deviation, schedule variance, and quality ratings derived from project reports. Nigeria’s inflationary pressures and foreign exchange volatility during the 2018–2023 period appeared to exert significant cost pressures across all sectors. Consequently, average cost overruns were most pronounced in road projects, attributable to material price escalation and protracted payment schedules.



Schedule performance consistently experienced delays in projects characterized by ambiguous risk responsibilities or the absence of risk allocation. Quality ratings tended to be moderate to high in projects characterized by more explicit risk allocation matrices.

Schedule variance was computed according to the following formula: $SV = EV - PV$

Where SV represents schedule variance, EV is earned value, and PV is planned value. Table 4.3 provides a summary of the earned value (EV) performance statistics.

Table 4.3: Performance Indicators across Sampled Projects

Indicator	Roads (n=8)	Water (n=7)	Power (n=5)	Overall Mean
Cost Overrun (%)	22	14	11	16
Average SV (₦ Million)	-185	-90	-60	-112
Quality Rating (1-5)	3.6	4.0	4.2	3.9

Source: Authors' Analysis (2026).

The observed negative SV values suggest a general deceleration in project advancement, with road projects exhibiting the most substantial deviations from their planned schedules.

4.5. Relationship between Risk Allocation and Performance

Correlation analysis indicated significant associations, and thus a potential confirmation, between risk allocation structures and project outcomes. Projects involving a substantial assignment of technical risks to contractors did not invariably result in diminished performance; conversely, such projects often demonstrated enhanced quality indices, suggesting that contractors were more inclined to assume technical responsibilities when delineations were explicit.

However, financial and regulatory risks allocated predominantly to the client appear to have a strong correlation with schedule delays and cost overruns. Projects with a high proportion of unallocated inflation or FX risk exhibited the highest foreign cost deviation. Shared risk arrangements, conversely, appear associated with enhanced performance concerning both risk mitigation and scheduling, particularly within the context of water projects. The correlation findings pertaining to these particularities are summarized in Table 4.4.

Table 4.4: Correlation Summary Between Risk Allocation and Performance

Variable Pair	Correlation (r)	Interpretation
Contractor Technical Risk vs Quality	0.62	Strong positive relationship
Unallocated Inflation Risk vs Cost Overrun	0.71	High unallocated risk is strongly associated with overruns
Shared Regulatory Risk vs SV	0.46	Shared risk linked to improved schedule performance
Client-Heavy Financial Risk vs SV	-0.53	Allocation to the client correlated with greater delays

Source: Authors' Analysis (2026).

These results tentatively suggest that the implementation of unclear or absent allocation frameworks tended to produce adverse outcomes, whereas balanced or capability-aligned allocations may contribute to enhanced performance.



4.6. Qualitative Insights

Interview analysis with thirty stakeholders provided a deeper interpretation of the quantitative results. Respondents identified four dominant themes that influence risk allocation and performance in Nigeria.

Table 4.5: Thematic Insights from Stakeholder Interviews

Theme	Summary of Stakeholder Insights
Capacity Constraints	A significant proportion of procuring entities, it appears, may lack adequate specialized capacity for contract management, leading to generic risk clauses and limited insights, and diminished negotiation leverage.
Inflation and FX Exposure	Contractors prefer shared or adjustable mechanisms due to material cost volatility, but many contracts lacked clear adjustment formulas.
Variation Clause Interpretation	Contractors and clients frequently reported a high incidence of misinterpretation regarding variation procedures, a circumstance that appears to precipitate disputes and subsequent project delays.
Approval Processes	Regulatory approvals frequently involve a multiplicity of agencies, a condition that demonstrably creates delays when the responsibility for inter-agency coordination remains unclarified.

Source: Authors’ Analysis (2026).

These qualitative findings, therefore, appear to corroborate structural weaknesses previously observed during the documentary analysis.

4.7. Interpretation of Findings

The results appear to suggest that risk allocation effectiveness in Nigerian infrastructure projects is closely tied to clarity, balance, and alignment with stakeholder capacity. Technical risks allocated to contractors did not present significant difficulties when contract documents provided adequate definitions and specifications. However, financial, regulatory, and inflation-related risks that were either assigned solely to clients or left unallocated appeared to engender the greatest incidence of cost and schedule overruns. Shared risk structures tended to moderate improvements, which suggests that the collaborative allocation of risk facilitates better planning and execution.

Compared with international frameworks such as FIDIC and standard PPP guidance, Nigerian contracts frequently lacked systematic risk allocation matrices and adequate treatment of inflation, FX exposure, and multi-agency regulatory dependencies. Factors unique to Nigeria, including approval bottlenecks, unstable exchange rates, payment delays, and limited preliminary site investigations, may have contributed to the observed performance outcomes.

5.0. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The study examined contractual risk-allocation practices in Nigerian road, water, and power infrastructure projects and undertook an analysis of their influence on project performance. The results suggested that the management of technical risks, when assigned to contractors, generally demonstrated efficacy, especially when supported by clear specifications. Financial and regulatory risks allocated predominantly to clients produced significant delays and cost deviations, while



inflation and foreign exchange risks, left unallocated, generated the highest overruns. Sectoral differences became discernible with power projects demonstrating more structured regulatory risk provisions and road projects exhibiting the weakest treatment of evident inflation-related risks. Schedule variance results indicated that unclear responsibilities contributed to substantial delays, particularly where inter-agency approvals or payment processes were not explicitly assigned. Interview insights confirmed capacity constraints in public agencies and difficulties interpreting complex variation clauses.

The study endeavored to address the identified research gaps by providing empirical evidence that established a linkage between specific contractual allocation patterns and measurable project outcomes in Nigeria. The findings suggest the imperative for the development of more balanced, capability-driven, and transparent allocation frameworks. Improved contractual clarity and consistent alignment with procurement norms will strengthen performance and may lead to more predictable infrastructure delivery across key sectors.

5.2. RECOMMENDATIONS

1. Public procurement entities may consider the embedding of structured risk allocation matrices in all contracts to ensure clear assignment of technical and financial responsibilities. Such mechanisms serve to delineate regulatory responsibilities.
2. Contractors and agencies might consider the adoption of explicit inflation and foreign exchange adjustment mechanisms to mitigate escalation-related disputes and performance deviations.
3. Procuring authorities might prioritize the strengthening of contract management capacity through targeted training focused on the identification and allocation of risk, in conjunction with the accurate interpretation of variation clauses.
4. Policymakers may consider the harmonization of inter-agency approval workflows to mitigate regulatory delays and facilitating the expeditious execution of infrastructure projects.

Conflict of Interest

The authors declare that no conflict of interest exist in this manuscript.

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