

# Identification and Impact Assessment of Factors Influencing Cost Performance of Construction Project Delivery in Nigeria

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## ABSTRACT

This study examined identification and impact assessment of factors influencing cost performance of construction project delivery in Nigeria. The study is guided by two objectives, two research questions and two null hypotheses tested at a 0.05 level of significance. A descriptive survey research design was adopted for the study. The study population comprised 800 construction professionals, including quantity surveyors, architects, engineers, builders, and project managers, with a sample size of 421 respondents. A multi stage sampling technique involving stratified and simple random sampling was used to ensure fair representation. Data were collected using a structured questionnaire designed in sections to address the study variables. Face and content validation of the instrument was carried out by experts in construction management and related fields. The reliability of the instrument was determined using the Cronbach Alpha method through a pilot study, yielding an acceptable coefficient above 0.70. The collected data were analyzed using factor analysis, mean and standard deviation, to answer the research questions, and inferential statistics, one way analysis of variance, to test the null hypotheses at a 0.05 level of significance. Findings revealed that economic and financial-related factors such as unstable economic conditions, economic recession, material price fluctuations, high land acquisition costs, and payment delays as major determinants of cost performance across Rivers, Imo, and Abia States, and these factors had a strong effect on budget adherence and project success. The study further revealed that there were no significant differences in the views of respondents. Based on the findings, recommends that construction stakeholders in Rivers, Imo, and Abia States should adopt effective project planning, realistic budgeting, and strong risk and cost management practices to reduce the impact of economic, managerial, technical, and institutional factors affecting construction cost performance.

**Keywords:** Cost performance, Cost overruns, Budget adherence, Construction project delivery, Nigeria.

## INTRODUCTION

The successful delivery of construction projects enhances efficiency and effectiveness, enabling professionals to meet project deadlines (Kelechi, Amadi, & Chinemerem, 2025). In construction project delivery, cost is a key indicator used to evaluate project success (Olukyode, 2015), as it serves as both a foundation and a driving force throughout the construction process. Cost performance refers to the extent to which a project's actual expenditure aligns with its planned budget over its lifecycle, from project inception to completion (Ashworth & Perera, 2018). Globally, cost overruns remain a persistent challenge affecting both developed and developing countries. In Nigeria, the construction sector plays a critical role in socio-economic development through infrastructure provision, industrial growth, and employment generation (Ojo & Oladokun, 2020; Adejumo & Olayemi, 2023). Despite its importance, the sector continues to experience poor cost performance, with many projects exceeding

their initial budgets. This challenge is driven by several internal factors, including inaccurate cost estimation, inflation, fluctuating material prices, inadequate project planning, procurement delays, and inefficient project management practices (Ugwu & Haupt, 2024). Additionally, weak risk management strategies, poor budgeting, and a lack of transparency often result in resource misallocation and financial inefficiencies (Alabi, 2018).

At the global level, key drivers of cost underperformance include design changes, inflationary pressures, inaccurate estimates, weak cost control mechanisms, and delays in decision-making. External factors such as currency devaluation, unpredictable government policies, and economic instability further exacerbate the problem (Olawale & Sun, 2015; Okeke & Onyema, 2024). Technological inefficiencies and shortages of skilled labor also constrain the ability of construction firms to deliver projects within budget and on schedule (Osemenam, 2020; Zhou, 2020). Within the African context, studies indicate that construction projects frequently experience cost overruns ranging from 20% to 60%. These are largely attributed to corruption, skill shortages, poor project planning, and unreliable supply chains (Ofori, 2015). Furthermore, dependence on imported building materials makes project costs highly sensitive to currency fluctuations and rising shipping costs. In Nigeria, particularly in Rivers State—an oil-rich economic hub with Port Harcourt as its capital—the construction industry plays a vital role in infrastructure development and economic growth. However, it faces persistent challenges such as political instability, cost overruns, and delivery inefficiencies (Kelechi & Chinemerem, 2025). High material and labor costs, driven by port congestion, inflation linked to oil sector volatility, and security concerns in parts of the Niger Delta, further exacerbate these challenges. Additionally, urban congestion and poor traffic management delay material delivery and increase project costs. Similarly, Imo State, characterized by a mix of public infrastructure and private real estate developments, experiences cost performance issues due to frequent scope changes associated with political transitions, inadequate rural transportation infrastructure, and seasonal price fluctuations of building materials (Okoye et al., 2016). In Abia State, particularly in Aba—a major commercial center—the construction sector faces high transportation costs due to its landlocked nature, unstable informal material supply chains, and unreliable power supply, which increases reliance on generators and raises project costs (Eze & Ugwu, 2020). Given these conditions, analyzing the factors influencing cost performance in Rivers, Imo, and Abia States is essential for understanding how location-specific economic, political, and infrastructural conditions shape construction project outcomes in Nigeria.

Globally, digital construction technologies—such as Building Information Modeling (BIM), artificial intelligence (AI)-driven cost forecasting, blockchain-enabled procurement, and digital estimation tools—have demonstrated significant potential in improving cost accuracy, reducing waste, and enhancing budget compliance (Eze & Ifeanyi, 2023; Patrick, Henry, & Ezeokolie, 2024). However, the adoption of these technologies in Rivers, Imo, and Abia States remains low due to limited awareness, high implementation costs, resistance from stakeholders, inadequate digital skills, and poor technological infrastructure.

Moreover, there is a lack of localized studies examining how digital tools can be effectively leveraged to address cost performance challenges in these states. This gap constrains the development of targeted strategies for improving cost efficiency. Accordingly, this study focuses on identifying and assessing the impact of factors influencing cost performance in construction project delivery in Nigeria. Specifically, it aims to identify key factors affecting cost performance across various sectors and evaluate their impact on budget adherence and overall project success. The study also tests relevant null hypotheses at a 0.05 level of significance in relation to the stated objectives.

## **Cost in Construction**

Cost in construction refers to the total monetary expenditure incurred throughout a project's lifecycle, from initial planning to final completion. It encompasses all expenses related to labor, materials, equipment, overheads, and contingency provisions for unforeseen circumstances. The construction industry is one of the fastest-growing sectors in Nigeria, contributing significantly to economic development. It accounts for approximately 50% of domestic fixed capital formation and about 6.83% of the Gross Domestic Product (GDP) as of the second quarter of 2020 (Olanipekun & Saka, 2019). The sector also plays a crucial role in infrastructural development and serves as a major source of sustainable employment (Guardian Nigeria, 2022).

Construction activities in Nigeria are driven by both government and private sector participation. The government is primarily responsible for providing critical infrastructure such as roads, bridges, waterways, ports, and railways through various financing mechanisms, including direct public funding, public-private partnerships (PPPs), multilateral development banks (MDBs), and bilateral financing arrangements (Eshofonie, 2008). However, rising infrastructure costs and declining government revenues have increased reliance on PPPs as an alternative financing strategy for projects that cannot be solely funded through public resources. According to Hussein (2014), the housing sector is projected to account for approximately 11% of total infrastructure investment, while transportation is expected to represent about 25%. Overall, the construction industry contributes substantially to the accumulation of fixed capital in the Nigerian economy. Despite its importance, the sector continues to face significant challenges in achieving effective cost performance. One of the most critical issues is cost overrun, which occurs when the actual project cost exceeds the initial budget estimate.

### The Impact of Cost on Project Performance

Cost performance is a critical determinant of overall project success. Projects delivered within budget are more likely to achieve their time and quality objectives, thereby enhancing stakeholder satisfaction. In contrast, cost overruns often result in delays, reduced profitability, and strained stakeholder relationships. In Nigeria, such overruns have contributed to the abandonment of numerous public infrastructure projects, leading to significant economic losses (Oyewobi, 2016). Effective cost management is therefore central to construction project delivery. However, the Nigerian construction industry faces persistent challenges, including economic instability, resource constraints, and regulatory inefficiencies, all of which adversely affect cost performance. Addressing these challenges requires the adoption of robust cost planning, continuous monitoring, and proactive risk management strategies. A comprehensive understanding of the factors influencing project costs is essential for developing context-specific solutions that enhance cost performance and support the sustainable growth of the construction sector (Aigbavboa, Oke, & Tyali, 2020).

**Table 2.1 Factors Influencing Cost Performance of Construction Project Delivery Across Various Sectors in Nigeria**

S/N	FACTORS	SOURCES
i.	Material Price Fluctuations	Olatunji, O. A., & Oke, A. E. (2023), Annor-Asubonteng et al. (2018), Eze, E. C., & Idiake, J. E. (2021), Aigbavboa, C., & Thwala, W. (2021).
ii.	Unstable Economic Conditions	Zhao et al. (2017), Ogunsemi, D. R., & Awodele, O. A. (2022), Okoye, P. U., & Ngwu, C. (2021), Adenuga, O. A., & Ajayi, O. M. (2023).
iii.	Inadequate Planning	Meeampol & Ogunlan (2006), Fagbenle et al. (2018), Olawumi, T. O., & Chan, D. W. M. (2020). Akinsola, A. O., & Olusanya, O. (2022). Ebekozen, A. (2021).
iv.	Design Changes	Olawale & Sun (2010), Obi et al. (2017). Akinmoladun, O. I., & Olatunji, S. O. (2021). Oke, A. E., Aigbavboa, C., & Thwala, W. (2022). Ogunsemi, D. R., & Ojo, O. (2020).
v.	Payment delays	Zakariyau et al. (2022), Aje, I. O., & Ogunsemi, D. R. (2021), Eze, E. C., & Awodele, O. A. (2022).
vi.	Poor Leadership and Coordination	Fagbenle et al. (2018), Iyer & Jha (2005). Bamidele, O., & Aigbavboa, C. (2020), Olawale, Y. A., & Sun, M. (2021).
vii.	Fraudulent Practices	Annor-Asubonteng et al. (2018), Zakariyau et al. (2022), Ogunsemi, D. R., & Aigbavboa, C. (2021). Adebayo, A. A., & Ibrahim, Y. M. (2022).
viii.	Labor Shortages	Emmanuel & Anjiba (2020), Meeampol & Ogunlan (2006), Akinmoladun, O. I., & Oloyede, S. A. (2022). Fasogbon, O., & Oke, A. E. (2021).

ix.	Material Shortages	Chigara et al. (2013), Meeampol & Ogunlan (2006), Akinmoladun, F., & Oloyede, S. (2022), Olufemi, J., & Fasogbon, O. (2023).
x.	Weather and Climate Conditions	Zhao et al. (2017), Zakariyau et al. (2022), Olufemi, J., & Fasogbon, O. (2023), Akinmoladun, F., & Oloyede, S. (2022).
xi.	Project Complexity	Zhao et al. (2017), Fagbenle et al. (2018), Ogunsemi, D., & Olorunfemi, A. (2023).
xii.	Contract Variations	Chigara et al. (2013), Olawale & Sun (2010), Ogunsemi, D., & Olorunfemi, A. (2023), Zakariyau, A. (2022).
xiii.	Insufficient Risk Management	Ikediashi et al. (2014), Adeyemi, O., & Oloke, D. (2022), Ogunsemi, D., & Olorunfemi, A. (2023).
xiv.	Inadequate Budgeting	Peeters & Madauss (2008), Duru, J., & Olorunfemi, A. (2023). Fayek, A., & Sargious, M. (2022), Ajayi, O., & Adebayo, T. (2023).
xv.	Technology Deficiency	EduPristine (2015), Obi et al. (2017). Barrett, P., & Gichoya, D. (2022) Cochran, R., & Cook, J. (2021). Ibrahim, H., & Usman, L. (2020).
xvi.	Lack of Stakeholder Coordination	Obi et al. (2017), Zhao et al. (2017). Khan, R., & Ali, S. (2022), Mohammad, A., & Kamara, J. (2021).
xvii.	Weak Regulatory Oversight	Zakariyau et al. (2022), Zhang, X., & Li, H. (2021), Williams, R., & Smith, J. (2020).
xviii.	Insufficient Training	Zhao et al. (2017), Meeampol & Ogunlan (2006), Bertschek, I., & Kaiser, U. (2020).
xix.	High Land Acquisition Costs	Zakariyau et al. (2022), Kissi et al. (2016), Olubayo, O., & Lawal, T. (2020). Adegbite, O. (2019).
xx.	Economic Recession	Zhao et al. (2017), Zakariyau et al. (2022), Agyekum, K., & Enyew, B. (2022), Hillebrand, L. (2021).
xxi.	Cultural and Political Interference	Chigara et al. (2013), Zakariyau et al. (2022), Michell, D., & Shashidharan, K. (2021).
xxii.	Procurement Delays	Obi et al. (2017), Laryea, S., & Hughes, W. (2019), Ogunlana, S., & Fellows, R. (2020).
xxiii.	Inadequate Feasibility Studies	Peeters & Madauss (2008), Meeampol & Ogunlan (2006), Akintoye, A., & MacLeod, M. (2020).
xxiv.	Inappropriate Contract Types	Annor-Asubonteng et al. (2018), Zakariyau et al. (2022), Muller, R., & Turner, R. (2020), Barker, K., & Adamson, J. (2019). Schultze, T., & Duncanson, J. (2021).
xxv.	Inefficient Cost Control Systems	Kissi et al. (2016), EduPristine (2015), Nnadi & Najjobyo, 2025).
xxvi.	Inefficient Labor Management	Meeampol & Ogunlan (2006), Obi et al. (2017), Park & Han (2020), Kim & Lee (2019)
xxvii.	Unrealistic Project Timelines	Divakar & Jebin (2018), Zakariyau et al. (2022), Swei & Barakat (2020)
xxviii.	Limited Availability of Local Expertise	Emmanuel & Anjiba (2020), Chigara et al. (2013), Chinwe and Olayiwola (2021).
xxix.	On-Site Theft	Fagbenle et al. (2018), Zakariyau et al. (2022), Lee & Hong (2023), Zhao & Wang (2021)
xxx.	Waste of Construction Materials	Akinsola et al. (1997), Meeampol & Ogunlan (2006), Yao & Wu (2022)
xxxi.	Inadequate Communication Channels	Obi et al. (2017), Zhao et al. (2017).

xxxii.	High Cost of Imported Materials	Emmanuel & Anjiba (2020), Zakariyau et al. (2022), Smith & Thomas (2023)
xxiii.	Lack of Contingency Plans	Meeampol & Ogunlan (2006), Peeters & Madauss (2008), Zhao & Li (2023)

**Author’s compilation, 2026.**

**Factors Influencing Cost Performance of Construction Project Delivery**

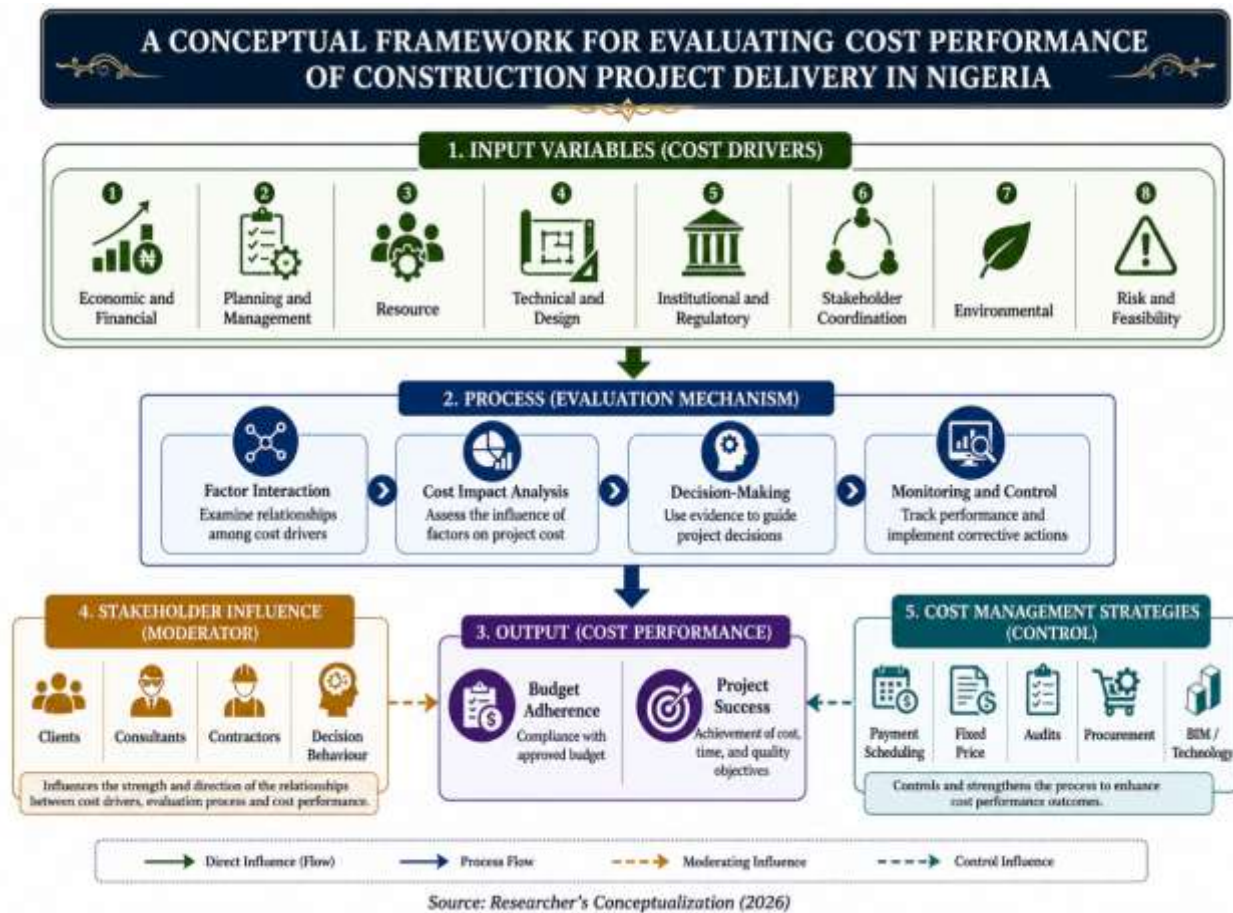
Material price fluctuations remain one of the most critical factors influencing cost performance in construction project delivery in Nigeria. The construction industry is highly material-intensive, with materials accounting for approximately 50% to 70% of total project costs. Consequently, instability in material prices directly affects project budgets, cost estimates, and contractor profitability. In Nigeria, this challenge is driven by inflation, exchange rate volatility, rising energy costs, and supply chain inefficiencies, all of which create an unpredictable pricing environment (Olatunji & Oke, 2023). Eze and Idiake (2021) further note that such fluctuations reduce the reliability of initial cost estimates, thereby increasing the likelihood of cost overruns, particularly in developing economies where economic instability complicates cost forecasting. Closely related to this is the issue of macroeconomic instability. The Nigerian construction industry depends on a stable economic environment for effective planning and execution. However, persistent challenges such as inflation, exchange rate fluctuations, and inconsistent fiscal policies introduce significant uncertainty into project financing and cost control. Ogunsemi and Awodele (2022) observe that construction projects are particularly vulnerable to such instability due to their reliance on steady cash flow and predictable pricing. As a result, economic instability leads to procurement difficulties, increased project costs, and reduced overall performance.

Inadequate planning is another major factor affecting cost performance. Construction projects require effective coordination of resources, schedules, and finances; poor planning often results in delays, cost overruns, and resource wastage. This may arise from weak feasibility studies, inaccurate cost estimation, ineffective scheduling, and insufficient risk analysis. Olawumi and Chan (2020) emphasize that proper planning is essential for achieving project objectives within time and cost constraints, while its absence exposes projects to uncertainty and operational inefficiencies. Design changes also significantly influence construction costs. Since design guides all construction activities, any modification during execution can lead to cost increases and delays. In Nigeria, frequent design changes—often arising from client demands, consultant revisions, or unforeseen site conditions—are common. Although some changes may improve project outcomes, uncontrolled or repeated modifications typically result in cost escalation, particularly when driven by unclear project briefs or evolving client preferences (Akinmoladun & Olatunji, 2021).

Payment delays further contribute to poor cost performance. Construction projects rely on continuous cash flow for material procurement, labour payments, and equipment maintenance. Delays disrupt these processes, reduce productivity, and increase project costs. In Nigeria, such delays are prevalent in both public and private sector projects. Aje and Ogunsemi (2021) identify payment delays as a major financial risk, as they affect contractors’ liquidity and hinder smooth project execution. Additionally, poor leadership and coordination among project stakeholders can lead to inefficiencies that negatively affect cost performance. Construction projects involve multiple participants whose activities must be effectively managed. Weak leadership often results in poor decision-making, ineffective communication, and lack of coordination, all of which contribute to delays and cost escalation (Bamidele & Aigbavboa, 2020). Strong leadership is therefore essential for efficient resource utilization and successful project delivery.

Fraudulent practices also pose significant challenges within the Nigerian construction industry. Weak institutional frameworks and limited transparency create opportunities for unethical practices such as bribery and financial mismanagement, which distort project cost structures. Ogunsemi and Aigbavboa (2021) note that such practices often lead to inflated contract values and reduced cost efficiency, thereby undermining overall project performance. Furthermore, labour shortages have emerged as a critical factor affecting cost performance. The construction industry depends heavily on both skilled and unskilled labour; however, Nigeria often experiences shortages of skilled workers. This leads to increased labour costs, reduced productivity, and project

delays. Emmanuel and Anjiba (2020) attribute this shortage partly to declining interest in construction-related trades, which continues to affect workforce availability and project efficiency.



The diagram above represents an integrated conceptual framework for evaluating factors influencing cost performance of construction project delivery in Nigeria. The framework adopts an enhanced Input–Process–Output (IPO) structure, incorporating moderating and control components to provide a comprehensive understanding of how construction project costs are influenced, managed, and optimized. At the first level, the framework identifies input variables (cost drivers), which represent the fundamental factors influencing project cost performance. These include economic and financial conditions, planning and management practices, resource availability, technical and design considerations, institutional and regulatory environment, stakeholder coordination, environmental factors, as well as risk and feasibility conditions. These variables collectively define the initial conditions under which construction projects are conceived and executed, and they directly shape cost expectations and potential outcomes. The second component of the framework is the process (evaluation mechanism), which serves as the analytical core of the model. Within this stage, the interaction among cost drivers is examined through factor interaction analysis, followed by cost impact analysis to determine the magnitude and significance of each factor on project cost. The process further involves evidence-based decision-making and continuous monitoring and control to ensure that cost-related issues are identified and addressed promptly throughout the project lifecycle. The third component represents the output (cost performance), which reflects the measurable outcomes of the construction project. In this framework, cost performance is evaluated using key indicators such as budget adherence and overall project success, which encompasses the achievement of cost, time, and quality objectives. These outputs provide a basis for assessing the effectiveness of cost management practices within the project. In addition, the framework incorporates stakeholder influence as a moderating variable, recognizing that the actions and decisions of key project participants—clients, consultants, and contractors—can significantly influence the relationship between cost drivers, evaluation processes, and project outcomes. Stakeholder decision behaviour plays a critical role in shaping project priorities, resolving conflicts, and ensuring alignment with project goals. Finally, the framework integrates cost management strategies as a control mechanism, which function to regulate and improve cost performance outcomes. These strategies include payment scheduling, adoption of fixed-price contracts, cost auditing practices, procurement methods, and the application of modern technologies such as Building Information Modelling (BIM). These

control measures provide feedback into the system, strengthening the evaluation process and enhancing the likelihood of achieving desired cost outcomes.

### **The Impact of Identified Factors On Budget Adherence and Overall Project Success in the Nigerian Construction Industry**

Material price fluctuations significantly influence budget adherence and overall project success in Nigeria. The volatility of material costs—driven by inflation, exchange rate instability, and global market trends—directly affects project delivery (Olatunji, Orundami, & Ogundare, 2018). Prices of key materials such as cement, steel, and timber frequently fluctuate due to import dependency and local market instability, often resulting in unexpected cost increases and the need for budget revisions or additional funding (Nnadi & Najjoby, 2025). Macroeconomic instability also plays a critical role in shaping construction cost performance. Inflation, exchange rate volatility, economic recessions, and inconsistent government policies create uncertainty in project financing and execution (Ogundipe & Akinlabi, 2022). Inflation, in particular, increases the cost of materials, labour, and other inputs, making it difficult to maintain initial budget estimates and often leading to cost overruns. Inadequate planning further contributes to poor budget adherence by creating unclear project scopes and limiting the accuracy of cost estimation. This often results in financial mismanagement and cost overruns (Adegboyega & Olufemi, 2021). It also increases the likelihood of scope changes, which require adjustments in resources and further escalate project costs (Akinsola & Adedeji, 2022).

Design changes remain one of the most common causes of cost overruns and delays. These changes may arise from client demands, unforeseen site conditions, regulatory requirements, or material substitutions (Akinmoladun & Olugbenga, 2021). Such modifications often necessitate alternative materials or processes, which may be more expensive and require new procurement arrangements, thereby increasing overall costs. Payment delays also have a significant impact on budget performance. Delays among clients, contractors, subcontractors, and suppliers disrupt the cash flow required for smooth project execution (Ogunsemi & Akinmoladun, 2021). This can lead to liquidity challenges, work stoppages, and reliance on high-interest financing, all of which increase project costs. In addition, delayed payments to subcontractors can slow project progress and compound both financial and scheduling challenges. Poor leadership and coordination further contribute to budget inefficiencies. Weak management results in poor decision-making, resource misallocation, and operational inefficiencies (Bamidele & Olufemi, 2020). This often leads to material wastage, idle equipment, and labour imbalances, ultimately increasing costs and delaying project completion.

Fraudulent practices also negatively affect budget adherence. Weak regulatory oversight enables unethical activities such as inflated pricing, overbilling, and financial misrepresentation (Adebayo & Alabi, 2021). These practices distort project budgets, reduce cost efficiency, and undermine overall project performance. Finally, labour shortages significantly impact construction costs and timelines. Limited availability of skilled workers increases competition for labour, driving up wages and overall project costs (Akinmoladun & Oloyede, 2022). Contractors may resort to overtime work or employ less-skilled labour, leading to reduced productivity, increased supervision costs, and potential rework. Labour shortages can also delay project schedules, resulting in additional overhead costs such as extended equipment rentals and prolonged site management expenses.

### **Method of the study**

This study examined identification and impact assessment of factors influencing cost performance of construction project delivery in Nigeria. The study is guided by two objectives, two research questions and two null hypotheses tested at a 0.05 level of significance. A descriptive survey research design was adopted for the study. This study employed both primary and secondary data sources. The study population comprised 800 construction professionals, including quantity surveyors, architects, engineers, builders, and project managers, with a sample size of 421 respondents. A multi stage sampling technique involving stratified and simple random sampling was used to ensure fair representation. Data were collected using a structured questionnaire designed in sections using five point likert scales to address the study variables. Face and content validation of the instrument was carried out by experts in construction management and related fields. The reliability of the instrument was determined using the Cronbach Alpha method through a pilot study, yielding an acceptable coefficient above 0.70. The collected data were analyzed using factor analysis, mean and standard deviation, to

answer the research questions, and inferential statistics, one way analysis of variance, to test the null hypotheses at a 0.05 level of significance. Findings revealed that economic and financial-related factors such as unstable economic conditions, economic recession, material price fluctuations, high land acquisition costs, and payment delays as major determinants of cost performance across Rivers, Imo, and Abia States, and these factors had a strong effect on budget adherence and project success. The study further revealed that there were no significant differences in the views of respondents. Based on the findings, recommends that construction stakeholders in Rivers, Imo, and Abia States should adopt effective project planning, realistic budgeting, and strong risk and cost management practices to reduce the impact of economic, managerial, technical, and institutional factors affecting construction cost performance.

## Results and Discussion of findings

**Table 4.1: Questionnaire distribution and responses by State and professional groups**

State	Respondent Category	Distributed	Retrieved (Valid)	Percentage Retrieved (%)
Rivers State	Quantity Surveyors, Architects, Project Managers, Builders , Engineers	350	210	60.00
Imo State	Quantity Surveyors, Architects, Project Managers, Builders, , Engineers	250	102	40.80
Abia State	Quantity Surveyors, Architects, Project Managers, Builders , Engineers	200	109	54.50
Total	-	800	421	52.63

**Source: Field Data 2026.**

The table 4.1 shows that a total of 800 questionnaires were distributed across Rivers, Imo, and Abia States to construction professionals including quantity surveyors, architects, engineers, builders, and project managers. Out of these, 421 questionnaires were retrieved and found valid for analysis, representing an overall response rate of 52.63%. Rivers State recorded the highest number of responses with 210 valid questionnaires, followed by Abia State with 109 responses, while Imo State recorded 102 responses. The variation in responses across the states may be attributed to differences in accessibility and willingness of respondents to participate in the study.

**Table 4.2 KMO and Bartlett’s Tests**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.657
Bartlett's Test of Sphericity	Approx. Chi-Square	1643.020
	Df	253
	Sig.	.000

Twenty-three (23) factors influencing the cost performance of construction project delivery in Nigeria were analyzed using principal component analysis (PCA) with IBM SPSS Statistics version 25.0. Prior to the analysis, the suitability of the dataset was evaluated. Examination of the correlation matrix indicated that many of the coefficients were 0.5 and above, confirming adequate relationships among variables. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.657, exceeding the recommended minimum threshold of 0.6, thereby indicating that the data were appropriate for factor analysis. Furthermore, Bartlett’s Test of Sphericity yielded a value of 1643.020 with a significance level of 0.000, confirming that the correlation matrix was not an identity matrix and that factor analysis was suitable. In addition, a Cronbach’s alpha value of 0.844 was obtained, indicating a high level of internal consistency and reliability of the measurement scale.

**Table 4.3 Key factors influencing cost performance of construction projects delivery across various sectors in Nigeria**

<b>Communalities</b>		
	Initial	Extraction
Material Price Fluctuations	1.000	.817
Design Changes	1.000	.879
Inadequate Planning	1.000	.831
Unstable Economic Conditions	1.000	.894
Payment delays	1.000	.822
Poor Leadership and Coordination	1.000	.891
Fraudulent Practices	1.000	.772
Labor Shortages	1.000	.717
Material Shortages	1.000	.664
Weather and Climate Conditions	1.000	.592
Project Complexity	1.000	.783
Contract Variations	1.000	.733
Insufficient Risk Management	1.000	.915
Inadequate Budgeting	1.000	.690
Technology Deficiency	1.000	.605
Lack of Stakeholder Coordination	1.000	.618
Weak Regulatory Oversight	1.000	.769
Insufficient Training	1.000	.778
High Land Acquisition Costs	1.000	.839
Economic Recession	1.000	.788
Cultural and Political Interference	1.000	.814
Procurement Delays	1.000	.813
Inadequate Feasibility Studies	1.000	.870
Extraction Method: Principal Component Analysis.		

From table 4.3 presented, the average communality after extraction was 0.778, indicating a strong proportion of variance in the variables explained by the extracted factors. This result confirms the appropriateness of factor analysis for the dataset. Furthermore, it was observed that no variable recorded an extracted eigenvalue below the 0.50 threshold. This implies that all the variables met the required criterion and are therefore suitable for further analysis.

**Table 4.4 Extraction Method: Principal Component Analysis.**

<b>Total Variance Explained</b>									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.528	19.689	19.689	4.528	19.689	19.689	3.490	15.174	15.174
2	3.036	13.199	32.888	3.036	13.199	32.888	2.590	11.260	26.435
3	2.737	11.898	44.787	2.737	11.898	44.787	2.312	10.050	36.485

4	1.956	8.505	53.291	1.956	8.505	53.291	2.310	10.043	46.528
5	1.706	7.419	60.710	1.706	7.419	60.710	2.275	9.893	56.420
6	1.390	6.042	66.752	1.390	6.042	66.752	2.136	9.289	65.709
7	1.307	5.684	72.435	1.307	5.684	72.435	1.411	6.134	71.843
8	1.133	4.927	77.363	1.133	4.927	77.363	1.269	5.519	77.363
9	.907	3.944	81.306						
10	.832	3.618	84.925						
11	.657	2.857	87.782						
12	.472	2.054	89.836						
13	.433	1.884	91.719						
14	.402	1.746	93.465						
15	.336	1.459	94.924						
16	.321	1.394	96.319						
17	.258	1.120	97.438						
18	.184	.798	98.237						
19	.143	.623	98.859						
20	.085	.371	99.230						
21	.081	.352	99.582						
22	.064	.277	99.860						
23	.032	.140	100.000						

**Extraction Method: Principal Component Analysis.**

From the result presented in the table above, an eight-factor solution was extracted, which collectively accounted for 77.363% of the total variance. The first component explained 19.689% of the variance, the second accounted for 13.199%, while the third contributed 11.898%. The eighth and final component explained 4.927% of the variance. This total variance explained exceeds the minimum acceptable threshold of 50%, indicating a strong explanatory power of the model.

The eight components were named based on the variables with the highest loadings within each factor cluster. These are further discussed in detail in the discussion section. In addition, the scree plot for the factor analysis is presented in Table 4.3

**Table 4.5 Component matrix<sup>a</sup>**

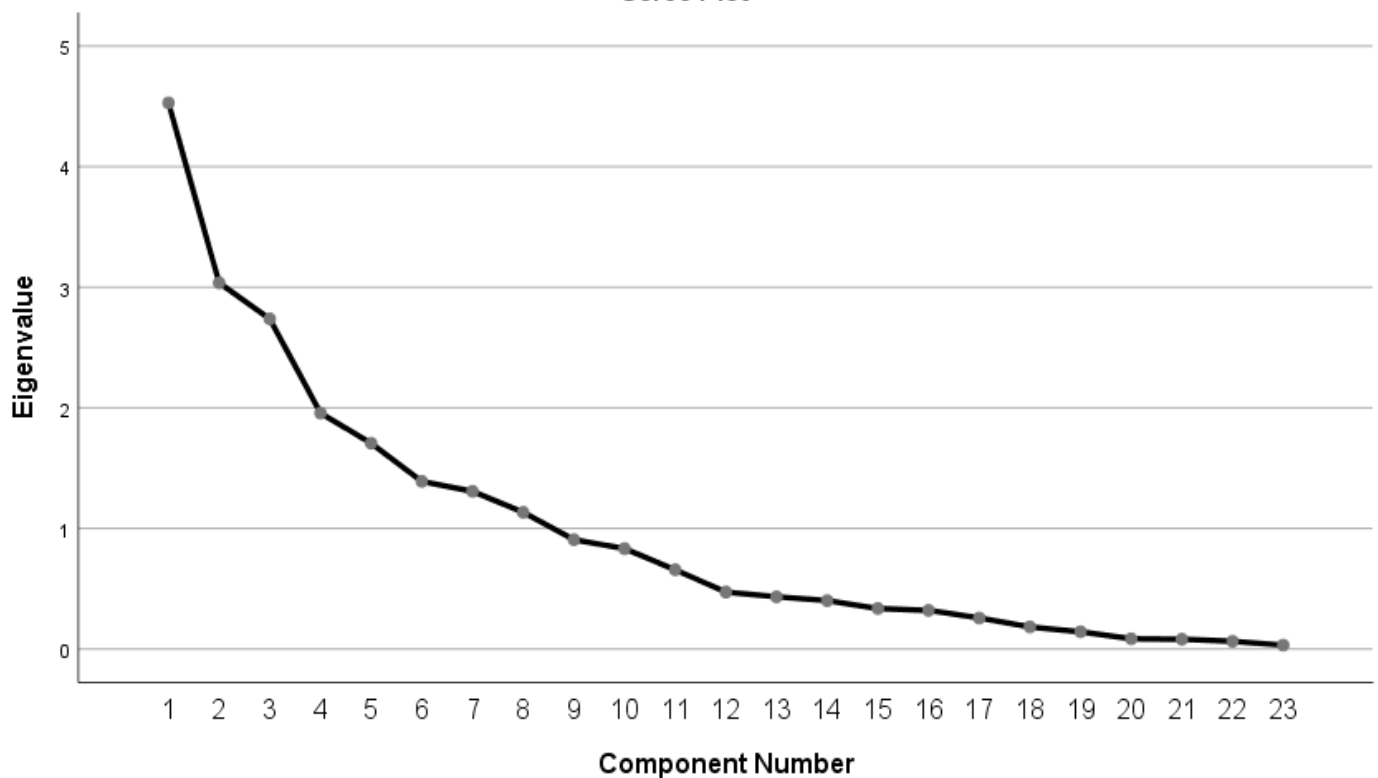
	Component							
	1	2	3	4	5	6	7	8
Design changes	.820							
High Land Acquisition Costs	.795							
Labor Shortages	.758							
Contract Variations	.712							
Project Complexity	.650							
Inadequate Budgeting	.643							
Material Shortages	.566							
Unstable Economic Conditions	.549							
Cultural and Political Interference	.539							
Inadequate Planning		.671						
Economic Recession		.658						
Insufficient Training			.719					

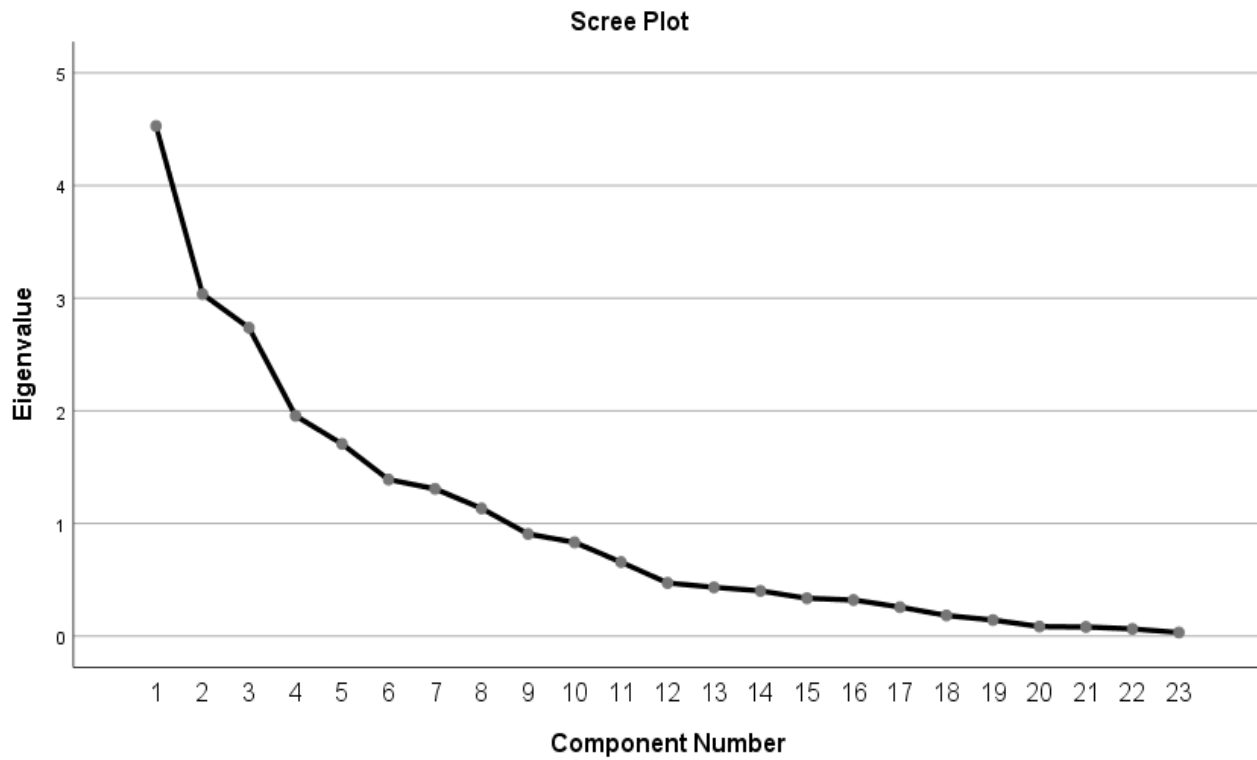
Material Price Fluctuations			.631					
Poor Leadership and Coordination				.587				
Inadequate Feasibility Studies					.745			
Lack of Stakeholder Coordination					.702			
Weather and Climate Conditions						.578		
Procurement Delays						.507		
Payment delays							.619	
Technology Deficiency							.599	
Weak Regulatory Oversight							.562	
Fraudulent Practices								.672
Insufficient Risk Management								.652
Extraction Method: Principal Component Analysis.								
a. 8 components extracted.								

The findings from the results presented in table 4.5 above, indicate that the 23 identified factors can be reduced into eight decision components explaining the key factors influencing cost performance of construction project delivery in Nigeria. However, eight principal components were ultimately extracted for further analysis. In the first component, nine factors loaded positively and strongly, indicating a dominant cluster of related variables. The second component recorded two strongly loading factors, while the third component also had two factors with strong positive loadings. The fourth component had one factor loading significantly. Furthermore, the fifth, sixth, seventh, and eighth components recorded two, two, three, and two strongly loading factors respectively.

Based on these results, the extracted components represent the dominant underlying dimensions of factors influencing cost performance of construction project delivery in Nigeria.

**Scree Plot**





It is also important to examine the scree plot presented in the report. The key feature to observe is the point of inflection or “elbow” in the curve, where a noticeable change in slope occurs. Components that appear before this point are typically retained for further interpretation.

In this case, there is a clear break between the first, second, third, and fourth components, with Component 1 accounting for a substantially larger proportion of the variance compared to the remaining components. The point at which the curve begins to level off indicates the appropriate number of factors to retain in the analysis.

Based on the scree plot, it is therefore recommended that eight components be extracted for further analysis and interpretation.

**Table 4.6: Summary of mean and standard deviation on the impact of the identified factors on budget adherence and overall project success in the Nigerian construction industry**

S/N	Items	Rivers State (n=210)			Imo State (n=102)			Abia State (n=109)			Aggregate (n=421)		
		Mean	SD	RMK	Mean	SD	RMK	Mean	SD	RMK	Mean	SD	RMK
1	Material Price Fluctuations.	3.94	0.98	A	3.90	1.00	A	3.63	1.05	A	3.85	1.01	A
2	Unstable Economic Conditions.	3.87	1.06	A	3.75	1.05	A	3.94	0.89	A	3.86	1.01	A
3	Inadequate Planning.	3.83	1.03	A	3.89	1.06	A	3.83	1.10	A	3.85	1.05	A
4	Design Changes.	3.83	1.00	A	3.98	1.03	A	4.18	0.94	SA	3.96	1.00	A
5	Payment delays.	4.06	0.95	SA	3.99	0.96	A	3.78	0.99	A	3.97	0.97	A
6	Poor Leadership	3.85	0.98	A	3.85	1.05	A	3.99	1.00	A	3.89	1.00	A

	and Coordination.												
7	Fraudulent Practices.	3.83	1.00	A	3.80	0.90	A	4.00	1.01	SA	3.87	0.98	A
8	Labor Shortages.	3.99	0.97	A	3.77	1.07	A	4.06	0.96	SA	3.95	0.99	A
9	Material Shortages.	3.86	0.98	A	3.81	1.11	A	3.82	0.97	A	3.84	1.01	A
10	Weather and Climate Conditions.	3.86	1.06	A	4.06	1.00	SA	3.87	1.01	A	3.91	1.03	A
	<b>Grand mean</b>	<b>3.89</b>	<b>0.32</b>	<b>A</b>	<b>3.88</b>	<b>0.34</b>	<b>A</b>	<b>3.91</b>	<b>0.29</b>	<b>A</b>	<b>3.89</b>	<b>0.32</b>	<b>A</b>

**Key:** SA = Strongly Agreed, A = Agreed, N = Neutral, D = Disagreed, and SD =Strongly Disagreed.

**Source:** Researcher’s Fieldwork (2026).

The results from Table 4.6 show the summary of mean and standard deviation of the impact of the identified factors on budget adherence and overall project success in the Nigerian construction industry. The grand mean on the impact of the identified factors was found to be 3.89, SD = 0.32 for Rivers State, whereas 3.88, SD = 0.34 for Imo State, and then 3.91, SD = 0.29 for Abia State. The aggregate mean score was 3.89, SD = 0.32 indicates that, on average, respondents agreed that the identified factors have significant impacts on budget adherence and overall project success. The relatively low standard deviation (0.32) implies consistency in respondents’ views. The item with the highest aggregate mean is Item 5 (Mean = 3.97, SD = 0.97), which states that payment delays impact budget adherence and project success. Respondents in Rivers (Mean = 4.06) strongly agreed, while Imo (Mean = 3.99) and Abia (Mean = 3.78) agreed, indicating strong consensus. Closely following are Item 4 (Mean = 3.96, SD = 1.00) and Item 8 (Mean = 3.95, SD = 0.99). Item 4 shows agreement that design changes significantly affect project success, with Abia (Mean = 4.18) strongly agreeing. Item 8 indicates agreement that labour shortages impact project outcomes, with Abia (Mean = 4.06) strongly agreeing.

Item 10 (Mean = 3.91, SD = 1.03) also reflects agreement that weather and climate conditions affect project success, with Imo (Mean = 4.06) strongly agreeing. Item 6 (Mean = 3.89, SD = 1.00) shows agreement that poor leadership and coordination impact project success. Items 7 (Mean = 3.87, SD = 0.98) and 2 (Mean = 3.86, SD = 1.01) indicate agreement that fraudulent practices and unstable economic conditions influence budget adherence. Items 1 and 3 (Mean = 3.85 each) reflect agreement that material price fluctuations and inadequate planning impact project outcomes. The item with the lowest aggregate mean is Item 9 (Mean = 3.84, SD = 1.01), though it still indicates agreement that material shortages affect project success. Comparatively, responses across the three states show strong agreement across all items. This suggests that all identified factors significantly influence budget adherence and project success. The most significant impact identified is payment delays, while the least emphasized, though still agreed upon, is material shortages.

### Testing of Research Hypotheses

**H01:** There is no significant difference in the key factors influencing cost performance of construction projects delivery across various sectors in Nigeria based on their location.

**Table 4.7: Summary of One-Way ANOVA on the difference in the key factors influencing cost performance of construction projects delivery across various sectors in Nigeria based on their location.**

Sources	Sum of Squares	Df	Mean Square	F	p-value	Decision
Between Groups	0.011	2	0.005			
				0.068	0.934	Retained
Within Groups	33.477	418	0.080			
Total	33.488	420				

**H0<sub>1</sub>:** The result from Table 4.7 shows the summary of one-way ANOVA on the difference in mean responses regarding the key factors influencing cost performance of construction projects delivery across various sectors in Nigeria based on their location. The result further shows that there is no significant difference in mean responses on the key factors influencing cost performance of construction projects delivery in Nigeria based on their location ( $F=0.068$ ,  $p\text{-value}=0.934$ ). The null hypothesis one was retained at the .05 level of significance.

**H0<sub>2</sub>:** There is no significant difference in the impact of identified factors on budget adherence and overall project success in the Nigerian construction industry based on location.

**Table 4.8: Summary of One-Way ANOVA on the difference in the impact of identified factors on budget adherence and overall project success in the Nigerian construction industry based on location.**

Sources	Sum of Squares	Df	Mean Square	F	p-value	Decision
Between Groups	0.050	2	0.025			
				0.248	0.780	Retained
Within Groups	41.739	418	0.100			
Total	41.789	420				

**H0<sub>2</sub>:** The result from Table 4.8 shows the summary of one-way ANOVA on the difference in mean responses regarding the impact of identified factors on budget adherence and overall project success in the Nigerian construction industry based on location. The result further shows that there is no significant difference in mean responses on the impact of identified factors on budget adherence and overall project success in Nigeria based on their location ( $F=0.248$ ,  $p\text{-value}=0.780$ ). The null hypothesis two was retained at the .05 level of significance.

## DISCUSSION OF FINDINGS

The results of the study revealed that twenty-three (23) variables influencing cost performance of construction project delivery were reduced through principal component analysis into eight (8) principal components, which collectively explained 77.363% of the total variance. This indicates a strong underlying structure of cost performance determinants in construction projects in Nigeria. The Kaiser-Meyer-Olkin (KMO) value of 0.657 and Bartlett's Test of Sphericity ( $\chi^2 = 1643.020$ ,  $p = 0.000$ ) confirmed the adequacy of the data for factor analysis, while Cronbach's alpha of 0.844 indicated strong internal consistency of the measurement scale. The communalities ranged from 0.592 to 0.915, confirming that all variables contributed meaningfully to the factor structure.

The findings indicate that economic and financial-related factors such as unstable economic conditions, economic recession, material price fluctuations, high land acquisition costs, and payment delays are major determinants of cost performance across Rivers, Imo, and Abia States. This finding is consistent with recent empirical studies which show that material price volatility and delayed payments significantly affect construction cost performance in Nigeria (Nnadi & Najjobyo, 2025). Similarly, Ajaelu and Maduka (2025) found that economic instability and inflationary pressures are major contributors to cost overruns in construction projects across South-East Nigeria. These findings suggest that projects in the study area are highly sensitive to macroeconomic conditions, particularly inflation and currency fluctuations, which directly impact material procurement and project financing.

Internationally, similar findings have been reported. In South Africa, Odeyinka et al. (2021) observed that inflation and exchange rate volatility significantly affect construction cost performance, particularly in public infrastructure projects. In India, Sharma and Gupta (2020) also identified material price fluctuations and economic instability as major drivers of cost overruns. Likewise, studies in the United Kingdom suggest that although economic fluctuations exist, strong financial forecasting systems and stable monetary policies help reduce their impact on construction costs. This indicates that while economic factors are universal, their effects are more severe in developing economies such as Nigeria due to weaker financial systems and higher import dependence.

Furthermore, project planning and management-related factors such as inadequate planning, inadequate budgeting, poor leadership and coordination, inadequate feasibility studies, and insufficient risk management were identified as significant contributors to cost performance challenges in the selected states. This aligns with recent studies which emphasize that weak planning and poor cost control mechanisms are major causes of cost overruns in Nigerian construction projects (Alu et al., 2024). It also supports the findings of Ikwueze and Nnadi (2024), who reported that ineffective project management practices significantly influence both cost and time overruns in construction projects in Nigeria.

Comparatively, international studies show similar patterns. In China, Zhang et al. (2022) found that poor planning and weak coordination among project stakeholders significantly increase construction costs. However, they also noted that the use of advanced project management systems helps to mitigate these effects. In Australia, Love et al. (2020) reported that strong planning and risk management practices significantly improve cost performance and reduce overruns. These comparisons suggest that while planning-related challenges are globally common, their severity is higher in Nigeria due to weaker institutional enforcement and limited adoption of advanced project management systems.

The study also revealed that resource-related factors such as labour shortages, material shortages, insufficient training, and technology deficiency significantly influence cost performance. This is consistent with Obianyo et al. (2022), who identified labour shortages and poor resource management as key drivers of cost overruns in Nigerian construction projects. The finding also reflects the situation in the study area, where limited access to skilled labour and inadequate technological adoption often result in reduced productivity and increased project costs.

Internationally, similar issues have been reported. In Saudi Arabia, Alotaibi and Mubarak (2021) found that shortages of skilled labour significantly increase construction costs and reduce productivity. In Malaysia, Rahman et al. (2019) also reported that labour inefficiency and material supply constraints are major contributors to cost overruns. This indicates that while resource-related challenges are global, they are more pronounced in developing countries due to weaker training systems and supply chain inefficiencies.

Design and technical factors including design changes, contract variations, and project complexity were found to significantly affect cost performance. This is in agreement with recent studies which show that design modifications and variation orders are major contributors to cost escalation due to rework and scope adjustments. Recent Nigerian studies also confirm that inaccuracies in design documentation and frequent changes in project scope significantly affect cost performance outcomes.

Similarly, Chan and Kumaraswamy (2020) in Hong Kong found that design changes are one of the most significant causes of cost overruns in construction projects. In the United States, Gao et al. (2021) also reported that late design changes significantly increase project costs and delay completion. This confirms that design-related issues are universal in construction projects but vary in severity depending on project governance systems.

Institutional and regulatory factors such as fraudulent practices, weak regulatory oversight, procurement delays, and cultural and political interference were also identified as significant. This supports recent findings which highlight corruption, weak governance, and procurement inefficiencies as major constraints to effective cost control in Nigeria (Alu et al., 2024).

In comparison, studies in Ghana (Owusu-Manu et al., 2020) and Pakistan (Khan et al., 2019) also report that corruption and procurement inefficiencies significantly increase construction costs. However, in developed countries such as Germany and the United Kingdom, strict procurement regulations and digital monitoring systems greatly reduce the influence of such factors, leading to improved cost performance.

The study further identified lack of stakeholder coordination as a significant factor influencing cost performance. This aligns with recent studies which emphasize that poor communication and coordination among stakeholders often lead to delays and increased project costs (Obianyo et al., 2022).

Internationally, Eriksson et al. (2019) in Sweden found that poor stakeholder integration increases project inefficiencies, although collaborative contracting models significantly improve coordination and reduce cost overruns.

Environmental factors such as weather and climate conditions were also found to influence cost performance. This is consistent with recent literature which shows that adverse weather conditions disrupt construction activities, reduce productivity, and increase project costs, particularly in tropical regions such as Southern Nigeria.

Similarly, studies in Brazil (Silva et al., 2020) and Indonesia (Putri & Hadi, 2021) confirm that extreme weather conditions significantly affect construction productivity and increase costs, especially in outdoor infrastructure projects.

Finally, a one-way ANOVA test on differences in mean responses based on location produced an F-value of 0.068 and a p-value of 0.934. Since the p-value exceeds 0.05, the null hypothesis was retained. This outcome means there was no meaningful difference in how respondents viewed the factors, regardless of location. The agreement therefore holds steady across the sampled groups. Other research using similar statistical approaches in Nigerian construction contexts has reported comparable findings of limited variation in perceptions of cost-related issues (Mangvwat et al., 2020). Overall, the results confirm that the identified factors are recognized as important to cost performance.

The findings from the study indicate that respondents agreed on average that the identified factors have notable impacts on budget adherence and overall project success in the Nigerian construction industry. The overall mean score stood at 3.89, with a standard deviation of 0.32, reflecting consistent responses. Payment delays received the highest aggregate mean score of 3.97, showing its strong influence on project outcomes. Design changes and labour shortages also recorded high mean scores of 3.96 and 3.95 respectively. Material shortages recorded the lowest mean of 3.84, though still within the agreement range.

International studies also support these findings. Flyvbjerg (2018) and Love et al. (2020) similarly identified payment delays, design changes, and resource constraints as major contributors to cost overruns globally. However, their severity is generally lower in developed economies due to stronger financial systems and contractual enforcement mechanisms.

In addition, the ANOVA results confirmed no significant differences in perceptions across locations ( $F = 0.248$ ,  $p = 0.780$ ), indicating a strong consensus among respondents. This aligns with Mangvwat et al. (2020), who reported similar uniformity in perceptions of cost-related issues in Nigerian construction contexts.

## CONCLUSION

The study reveals that cost performance in construction projects is influenced by multiple factors that are widely recognized by industry stakeholders. Economic and financial factors—such as unstable economic conditions, economic recession, material price fluctuations, high land acquisition costs, and payment delays—were identified as major determinants of cost performance across Rivers, Imo, and Abia States. In addition, project planning and management factors, including inadequate planning, poor budgeting, weak leadership and coordination, insufficient feasibility studies, and ineffective risk management, were found to significantly contribute to cost performance challenges in the selected states. The consistency of responses indicates a shared understanding among stakeholders regarding the primary causes of cost-related issues. Furthermore, the findings demonstrate that these factors have a substantial impact on budget adherence and overall project success, suggesting that effective management of these areas can significantly improve project delivery outcomes. The results of the hypothesis testing indicate no significant differences in the perceptions of respondents across the groups studied, implying a general consensus across different locations. Overall, the study concludes that cost performance in construction projects is shaped by well-defined and commonly acknowledged factors. Although various improvement strategies exist, there remains a need for more effective and consistent implementation to enhance project cost performance.

However, this study is not without limitations. The research was restricted to selected states—Rivers, Imo, and Abia—which may limit the generalizability of the findings to other regions with different economic and institutional conditions. In addition, the study relied primarily on questionnaire-based responses, which are subject to respondent bias and may not fully capture the complexity of real-life project cost dynamics. Time and resource constraints also limited the sample size and depth of data collection. Furthermore, the study focused mainly on selected economic and management-related factors, while other potential influences—such as technological adoption and environmental factors—were not extensively explored. Despite these limitations, the study provides valuable insights into the key factors affecting cost performance in construction projects and highlights the need for improved planning, financial management, and policy stability. Future research could expand the scope to include more regions, incorporate longitudinal data, and examine the role of emerging technologies in enhancing cost performance in the construction industry.

## RECOMMENDATIONS

The following recommendations were made based on the findings of the study:

1. Construction stakeholders in Rivers, Imo, and Abia States should adopt effective project planning, realistic budgeting, and strong risk and cost management practices to reduce the impact of economic, managerial, technical, and institutional factors affecting construction cost performance.
2. Project managers should control design changes and improve workforce planning to reduce disruptions.
3. Relevant regulatory bodies should enforce stricter monitoring and transparency in procurement and contract execution to reduce fraudulent practices.
4. There is the need for the adoption of modern digital construction tools such as Building Information Modelling (BIM) and digital cost management systems should be encouraged to improve accuracy, coordination, and cost control.

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