

An Assessment of Factors that Leads to Federal Highway Projects Cost Overrun and its Significantly Impacts on South East Nigeria

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Abstract: Cost overruns, where actual project costs exceed initial estimations, are a pervasive global challenge in highway construction (Flyvbjerg & Cowi, 2004; Odeck, 2004; Flyvbjerg et al., 2009). This study evaluates the factors contributing to these overruns in federal highway projects in South East Nigeria, examining their repercussions on the region. A survey of 100 project personnel, selected via multistage sampling, revealed that underestimation during budgeting ($X=2.19$), inflation ($X=2.28$), and unmet project specifications ($X=2.46$) are primary causes. Analysis identified major contributors such as design alterations ($X=2.72$), material procurement challenges ($X=2.19$), and inadequate cost estimates ($X=2.11$). The impacts on the construction sector and the broader economy include increased client costs ($X=2.40$), reduced contractor profits ($X=2.40$), and project abandonment ($X=2.48$) (Love et al., 2011; Memon, 2011). The research also highlights potential mitigation strategies, such as using project management scheduling tools ($X=2.68$) and ensuring thorough pre-project planning ($X=2.58$). Based on these findings, it is recommended that decision-makers, including the Federal Ministry of Works and Housing, implement these strategies to improve project outcomes.

Keywords: Cost Overrun, Highway Project, Construction Project, Significant Impact.

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I. INTRODUCTION

Cost overruns are a persistent global challenge within the construction sector, with significant financial consequences, particularly in developing nations with constrained public funding (Famiyeh et al., 2017). This issue is notably pronounced in Nigeria, where annual cost escalation has been reported to average 14% (Ogbu & Adindu, 2019). The complexity and dynamic nature of large-scale infrastructure projects, coupled with the fragmented construction industry, create significant cost management challenges, leading to widespread budgetary failures (Flyvbjerg et al., 2009).

➤ Global and Local Evidence of Cost Overruns

Empirical studies provide strong evidence of the pervasiveness of cost overruns:

- Global infrastructure projects: A study of 258 infrastructure projects, including 167 highway initiatives

across North America, Europe, and Japan, found that 90% experienced budget overruns (Flyvbjerg et al., 2009). This highlights that cost overruns are common in highway projects regardless of geographical location.

- Nigerian highway projects: A review of 140 highway projects in Nigeria's Federal Capital Territory between 2004 and 2014 found that only 10 were completed within budget (Anigbogu, 2019). This indicates a high rate of budgetary failure similar to global findings, but within a local context.
- Widespread project failure: Omoregie and Radford (2006) examined records of over 4,000 construction projects in Nigeria and found that timely and budget-adherent completion is rare, underscoring systemic issues within the national construction industry.

➤ Factors Influencing Cost Overruns

Scholarly research has identified a broad range of factors contributing to cost overruns:

- Contractor-related issues: Lack of experience and inadequate site management and supervision have been consistently cited as causes of cost overruns in Nigeria, Vietnam, and Malaysia (Sebastian-Dauda, 2017, 2018; Muhammad & Sebastian-Dauda, 2017; Love et al., 2015).
- Economic factors: Fluctuations in material costs, currency instability, and high interest rates significantly impact project budgets (Ogbu & Adindu, 2019; Sebastian-Dauda, 2017, 2018; Anigbogu et al., 2019).
- Project and design management: Frequent design changes, inadequate planning, poor documentation, and inaccuracies in quantity take-offs are major contributors to cost overruns (Sebastian-Dauda, 2017, 2018; Anigbogu et al., 2019; Muhammad & Sebastian-Dauda, 2017).
- Financial constraints: Delays in payments, cash flow issues for contractors, and funding limitations for public projects are common causes of project distress (Love et al., 2015; Anigbogu et al., 2019).
- Fraud and malpractice: In the Nigerian context, the presence of fraudulent practices and kickbacks further compounds cost management challenges (Sebastian-Dauda, 2017, 2018).

➤ *The Importance of Highway Infrastructure*

Highway infrastructure is vital for national development, especially in Nigeria, where it serves as the primary mode of transportation for approximately 95% of freight and passengers (Muhammad & Sebastian-Dauda, 2017). Despite extensive federal highway networks and substantial government investment—such as the ₦2.361 trillion allocated for 229 ongoing projects (FMW&H, 2019)—the sector is characterized by poor cost management and project delivery. This study highlights the urgent need for more effective cost management strategies to ensure that significant public investments translate into successful infrastructure development. This study thus aims to contribute to the body of knowledge by conducting an in-depth examination of highway construction project delivery in Nigeria. Consequently, the study aspires to:

- Examine the profile characteristics of the highway construction project workers in south east Nigeria,
- Assess the factors that causes project cost overruns in Federal highway projects building projects within south east Nigeria,
- Identify the main causes of project cost overruns on the building construction projects in Nigeria,
- Ascertain the significant impacts of project cost overrun on Federal highway projects within south east Nigeria,
- Determine the preventive project cost overruns measures in Federal highway projects within south east Nigeria,

II. LITERATURE REVIEW

➤ *Cost Overrun of Road Infrastructure Development in Nigeria*

Nigeria's road infrastructure has historically been built using traditional, budget-allocated methods by various

government levels. Faced with increasing demand and limited public funds, the government has moved towards Public-Private Partnerships (PPPs) to involve the private sector (Okeke, 2010). The success of PPPs requires a strong institutional and cost management framework to provide a favorable environment for investors. This study, focusing on federal highways in Southeast Nigeria, aims to develop a framework to mitigate cost overruns.

A review of existing PPP literature in Nigeria revealed that road projects are mainly executed as PPP joint ventures. The primary obstacles identified were flaws in the institutional and legal frameworks governing these partnerships. As the demand for roads continues to grow, effectively addressing cost overruns, as highlighted by Okeke (2010), is crucial for the success of the cost management framework.

The objectives of implementing PPPs include achieving better value for money, improved risk management, faster project execution, higher service quality, new revenue streams, and reduced life-cycle costs and corruption. The research examines the link between initial cost estimates by consultants and final project expenditures, specifically addressing the occurrence of budget overruns in road construction.

➤ *The Nature of Project Cost Overruns in Federal Highway Projects*

Cost overruns are a persistent issue in highway construction projects of all sizes and locations (Johnson & Babu, 2018; Flyvbjerg et al., 2018). This is particularly evident in developing countries, where projects can cost nearly twice their initial budget due to unethical practices (Durdyev, 2012).

Scholars define cost overrun as the gap between a project's final cost and its original estimate. However, the magnitude of the overrun depends on which stage of the project—the decision to build, project definition, or contract award—is used as the baseline for the initial estimate (Flyvbjerg et al., 2003; Cantarelli, 2012).

To address this, a comprehensive approach is needed to minimize cost overruns. A conceptual framework has been developed that integrates various strategies, mapping the interrelationships between the causes of overruns, the effects of project parameters, and potential countermeasures.

Several project parameters, including size, location, and duration, are known to influence cost overruns. The level of competition during tendering, measured by the number of bidders, is also a contributing factor. The size of a project, based on its contract sum, has been linked to cost overruns, as larger projects often lead to more changes and, consequently, greater cost escalations (Farooqi & Azhar, 2009).

➤ *Factors Causing Project Cost Overruns in Federal Highway Projects*

Cost overruns are influenced by a complex mix of factors, as identified by various scholars. These causes can be categorized into several key areas:

• *Project and Estimation Issues:*

- ✓ Inaccurate estimation: The precision of the initial project estimate is a fundamental component contributing to cost overruns (Afetornu, Edum-Fotwe, & McCaffer, 2006).
- ✓ Inadequate planning: Insufficient pre-contract planning by clients and consultants is a primary cause of budgetary issues (Akinsiku, Akintola, Ameh, & Ige, 2014).

• *Execution and Management Challenges:*

- ✓ Poor cost control: Inadequate oversight of expenditures during the execution phase is a major factor (Afetornu, Edum-Fotwe, & McCaffer, 2006).
- ✓ Lack of expertise: The absence of sufficient technical support and proficiency among key project stakeholders can lead to ineffective project delivery (Doloi, 2013).

• *External and Systemic Factors:*

- ✓ Market volatility: Fluctuations in material prices are frequently cited as a direct cause of cost overruns (Mahamid & Bruland, 2011).
- ✓ Systemic complexity: Rather than a single cause, cost overruns can result from the dynamic interaction of various project variables within the entire project system (Ahiaga-Dangbui, Smith, Love, & Aukermann, 2015).
- ✓ Organizational and cultural factors: Intricate interactions among project characteristics, personnel, technology, and organizational culture are also significant contributors to overruns (Olaniran, 2015).

➤ *The Significant Impacts of Cost Overruns on Federal Highway Projects*

Cost overruns are a pervasive global issue in the construction industry, with far-reaching consequences that erode stakeholder confidence and compromise project viability (Mbachu & Nkado, 2004). This issue is particularly detrimental to large-scale federal highway projects, where the impacts are amplified due to significant public investment and economic importance.

• *Impact on Project Stakeholders*

- ✓ Clients: Cost overruns lead to unbudgeted expenses, reducing the return on investment for the funding body. For public sector clients, this can mean less value delivered for taxpayers' money (Mbachu & Nkado, 2004).
- ✓ End-users: The additional costs are often passed on to end-users through increased prices or tolls, particularly in public-private partnership models (Mbachu & Nkado, 2004).

- ✓ Professionals: For consultants and other professionals, cost overruns can tarnish their reputation, damage their credibility, and erode client trust, as it signals a failure in delivering value for money (Mbachu & Nkado, 2004).
- ✓ Contractors: If found at fault, contractors face lost profits, damage to their reputation, and a reduced likelihood of securing future contracts. This can lead to insolvency and business failure (Mbachu & Nkado, 2004).

• *Systemic Consequences for the Construction Industry*

- ✓ Project abandonment: Persistent cost overruns can lead to the abandonment of projects, wasting resources and failing to deliver critical infrastructure (Mbachu & Nkado, 2004).
- ✓ Economic downturn: A high rate of project failure can decrease overall construction activity, hindering the industry's contribution to the national GDP and leading to a loss of skilled labor (Mbachu & Nkado, 2004).
- ✓ Financing challenges: Heightened risk associated with cost overruns can make it more difficult and expensive for projects to secure financing, further constraining investment and growth (Mbachu & Nkado, 2004).
- ✓ Reduced credibility: Widespread cost overruns damage the industry's overall reputation and credibility, creating a negative perception among investors and the public (Akinsiku & Akinsulire, 2012).

➤ *Root Causes and Mitigating Factors*

The effects of cost overruns are often intertwined with issues of project delays (Akinsiku & Akinsulire, 2012). Key causes identified include:

- Financial issues: Delays in interim payments from clients can disrupt a project's cash flow (Akinsiku & Akinsulire, 2012).
- Design-related problems: Poor designs and frequent change orders contribute to delays and budget issues (Akinsiku & Akinsulire, 2012).
- Logistical inefficiencies: Poor planning, inadequate scheduling, and resource shortages can extend project timelines and increase costs (Akinsiku & Akinsulire, 2012).
- External factors: Uncontrollable elements like adverse weather and inflation can disrupt schedules and budgets (Akinsiku & Akinsulire, 2012).
- Inexperience and poor communication: Lack of experience among contractors, inaccurate estimates, and poor communication can lead to disputes and arbitration (Akinsiku & Akinsulire, 2012).

The use of robust risk management procedures has been shown to reduce disputes and associated costs in construction projects (Akinsiku & Akinsulire, 2012), highlighting the importance of proactive measures in mitigating the negative impacts of cost overruns.

Cost overruns are a widespread and persistent global challenge in construction, particularly in highway

development (Flyvbjerg et al., 2018; Johnson & Babu, 2018). Studies show a high prevalence of projects, especially in emerging economies, exceeding their initial budgets, sometimes by nearly double due to unethical practices (Flyvbjerg et al., 2009; Durdyev, 2012). This phenomenon stems from issues related to estimation, expenditure oversight, and stakeholder capabilities (Afetornu et al., 2006; Mahamid & Bruland, 2011; Doloi, 2013).

➤ *Complex Causation*

Attributing overruns to single causes is counterproductive; a systemic approach is necessary to account for the dynamic interplay of project variables (Ahiaga-Dangbui et al., 2015). Factors range from macro-level issues like market volatility and economic conditions to micro-level challenges such as insufficient pre-contract planning, inaccurate quantity take-offs, and frequent design changes (Mahamid & Bruland, 2011; Akinsiku et al., 2014; Olaniran, 2015).

➤ *Far-Reaching Impacts*

The repercussions of cost overruns extend beyond financial metrics, impacting all project stakeholders and the broader construction industry (Mbachu & Nkado, 2004).

- **Clients:** Face reduced returns on investment and diminished value delivery.
- **Professionals and contractors:** Suffer from tarnished reputations and lost profits, potentially jeopardizing future work.
- **The industry:** Experiences systemic issues like increased investment risk, project abandonment, and challenges in securing future financing.
- **End-users:** Ultimately bear the burden through higher costs.

➤ *Mitigation and Resolution*

Addressing cost overruns requires a comprehensive strategy that integrates diverse countermeasures (Farooqi & Azhar, 2009). While risk management procedures can reduce disputes, effective mitigation also demands better project planning, enhanced stakeholder collaboration, and potentially new management models. Scholars have developed conceptual frameworks to guide this process by identifying the relationships between causes, project parameters, and mitigation strategies (Akinsiku & Akinsulire, 2012; Ahiaga-Dangbui et al., 2015).

In summary, The reviewed literature highlights a consistent pattern of cost overruns in construction, particularly in highway infrastructure projects, both globally and within Nigeria.

- **Prevalence:** Studies demonstrate that the vast majority of projects fail to meet their budget targets, with Nigeria experiencing significant annual cost escalation. Flyvbjerg et al. (2009) famously noted that 90% of infrastructure projects reviewed suffered cost overruns.

- **Causes:** These overruns are attributed to a multifaceted array of factors including:
- **Inaccurate Estimation & Planning:** Insufficient pre-contract planning, poor documentation, inaccurate quantity take-offs, and lack of practical knowledge among estimators lead to flawed initial cost forecasts. This is exacerbated by limited time for estimate preparation.
- **Market Volatility:** Fluctuations in material prices, inflation, and unstable exchange rates significantly impact costs.
- **Management & Execution Issues:** Inadequate site management, lack of skilled resources, poor contract management, and insufficient project monitoring are common problems.
- **Client & Design Factors:** Frequent design changes, variations in scope, and client-related financial difficulties are major contributors.
- **External Factors:** Unforeseen site conditions, adverse weather, and delays in obtaining approvals also play a role.
- **Unethical Practices:** Fraudulent practices and kickbacks have been identified as contributing factors in Nigeria.
- **Impacts:** Cost overruns lead to diminished returns on investment, loss of confidence in professionals and contractors, project abandonment, reduced industry activity, and challenges in securing future financing. They are often linked with project delays, and both significantly hinder project success.
- **QS Role & Technology:** Quantity Surveyors (QS) are recognized as essential for cost management, providing services from cost planning to final accounts. However, their utilization, particularly in early project stages and smaller projects, is often low due to client misconceptions about fees and roles. While QS in developed contexts leverage software for efficiency, adoption may vary in Nigeria. Research highlights the need for continuous professional development among QS, particularly in areas like value management and cost management strategies.

The literature establishes that cost overruns are a chronic and complex issue in the construction industry, affecting both global and Nigerian projects. Contributing factors range from micro-level issues such as contractor inexperience and site mismanagement to macro-level challenges like economic instability and political factors.

➤ *Research Gap*

Despite the extensive literature documenting the causes and impacts of cost overruns, several gaps remain, particularly concerning proactive cost management in the Nigerian context:

- **Effectiveness of specific proactive strategies:** While the need for better cost control is evident, there's a lack of empirical research evaluating the effectiveness of specific proactive strategies like target costing in mitigating overruns in Nigerian highway projects. The

existing studies often focus on identifying causes rather than assessing solutions.

- Target costing in Nigeria: The specific application and impact of target costing within Nigeria's unique construction industry landscape, including its institutional framework and economic challenges, remains underexplored.
- Barriers to QS involvement in target costing: While low QS utilization is known, research is needed to specifically investigate how factors hindering their involvement (e.g., client awareness, procurement methods) affect the implementation and success of target costing.
- Contextualized Frameworks: Although conceptual frameworks for cost overrun mitigation exist, there is a need for studies that develop and test frameworks specifically tailored to the nuances of the Nigerian context, incorporating local economic realities and institutional challenges.
- Technological integration for proactive management: Research is scarce on how to effectively integrate and leverage modern technologies, like specialized QS software, to support proactive cost management techniques such as target costing in Nigeria.

III. METHODOLOGY

The study was conducted utilizing highway projects documented in annual budgets spanning from 2013 to 2023 across five states in South-East Nigeria. A select number of roads were randomly chosen to facilitate a coherent and comprehensive analysis, specifically in Enugu, Ebonyi, Abia, Anambra, and Imo. The population for this research comprised 50 awarded highway projects, encompassing their design consultants, stakeholders from the Federal Ministry of Works and Housing, clients representing the Federal Government, as well as execution contractors and their workforce. The project titles encompass the following initiatives:

➤ ABIA:

- Construction of Nkporo-Abiriba-Ohafia Road
- Rehabilitation of Umuahia-Bende-Ohafia
- Rehabilitation of Bende - Arochukwu – Ohafia Road Section
- Rehabilitation of Bende - Arochukwu – Ohafia Road
- Emergency Repairs of Failed Sections
- Umuahia-Ariam-Ikot Ekpene Road
- Construction of Ahiakwu-Amangwo-Umuahia-Ngwa-Ngwa Road
- Rehabilitation and Reconstruction of the Enugu-Port Harcourt Dual Carriageway
- Lokpanta-Umuahia Tower
- Rehabilitation and Reconstruction of the Enugu-Port Harcourt Dual Carriageway
- Umuahia Tower-Aba Township Rail/Road Bridge Crossing
- Construction of Olokoro-Isiala-Oboro-Nnono Junction

Road

- Construction of Olokoro-Aluaukwu-Itaja-Okwu-Obuohia-Ikwuano.

➤ ANAMBRA:

- Rehabilitation of Umana-Ndiagu-Ebene-Amansi Awka Express Road
- Rehabilitation of the Onitsha-bound Carriageway of the Onitsha-Enugu Road
- Construction of the Main Works, including Associated Infrastructure for the Second Niger Bridge linking Anambra and Delta States
- Emergency Repairs of the Existing Niger Bridge at Onitsha/Asaba in Anambra/Delta States
- Construction of Ihiala-Orlu Road in Isseke Town-Amafuo-Ulli with Spur (Ihiala-Orlu-Umuduru)
- Construction of Ikemba Drive Spur on Oba-Okigwe Road through the Permanent Site of Nnamdi Azikiwe University Teaching Hospital
- Rehabilitation of Oba-Nnewi Road Section
- Rehabilitation of Oba-Nnewi-Okigwe Road Route 429
- Border-Ibinta-Okigwe Road, C/No. 5986A
- Construction of Oseakwa Bridge
- Rehabilitation of the Spur from Onitsha-Owerri Road to Okija-Ihembosi-Afor Ukpok-Ebenator-Ezenifite in Nnewi South LGA
- Rehabilitation of the Dual Carriageway and Roads from Upper Iweka to Zik Roundabout and the Dual Carriageway from Amawbia Roundabout to Amansea Bridge.

➤ EBONYI:

- Rehabilitation of Abakaliki-Afikpo Road Section I: Abakaliki-Onueke-Abomega Road
- Emergency Repairs of Abakaliki-Oferekpe Road Due to Erosion
- Rehabilitation of Abakaliki-Afikpo Road, Abomega-Afikpo Road in Enugu State
- Construction of Nnenwe-Uduma-Uburu Road and Spur to Ishiagu-Mile 2 Road (14km).

➤ Enugu:

- Rehabilitation of the Enugu-bound Carriageway of the Onitsha-Enugu Road, Phase I of Section I, C/No. 5929 in Anambra State
- Rehabilitation of the Old Enugu-Port Harcourt Road (Agbogugu-Abia Border Spur to Mmaku)
- Rehabilitation of Inyi-Akpugoeze to Anambra Border
- Umulungbe-Umuoka-Amokwu Ikedimkpe
- Egede-Ojeyi Awhum Road C/No. 6459
- Rehabilitation of Amugo Uno-Oriemba Market-Amugo Isiorji Onuani Road in Enugu State
- Construction of Oji-Achi-Mmaku-Awgu Road with Spur to Obeagu-Ugbo in Enugu State, C/No. 6269
- Rehabilitation of the 9th Mile-Enugu-Port Harcourt Dual Carriageway in Enugu/Abia States, C/No. 6018

- Rehabilitation of Ozalla-Akpugo-Amagunze-Ihuokpara-Nkomoro Isu-Onitsha (Enugu-Onitsha) Road with Spur to Onunweke in Enugu State
- Construction of Ugwueme-Nenwenta-NkweEzere-Awgunta-Obeagu-Mgbidi Nmaku Road Project in Enugu State, Contract No. 6293
- Rehabilitation of 9th Mile-Orokam Road in Enugu State, Contract No. 6290
- Rehabilitation of Enugu-Port Harcourt Road
- Enugu-Lokpanta Rehabilitation of Outstanding Section of the Onitsha-Enugu Expressway: Amansea-Enugu State Border in Enugu State
- Rehabilitation of Nsukka-Obollo-Ikem-Ehamufu-Nkalagu Road.

➤ *IMO:*

- Rehabilitation of Owerri-Umuahia Road
- Rehabilitation of Owerri-Umuahia Road in Imo/Abia States
- Rehabilitation of Oba-Nnewi-Okigwe Road, Route 429 Section II: Anambra/Imo States
- Border-Ibinta-Okigwe Road, C/No. 5986A
- Rehabilitation and Asphalt Overlay of 1.72km Internal Roads, including Construction of Reinforced Concrete Drains at The Federal University of Technology Owerri
- Construction of Mbaize-Ngwa Road with Bridge at Imo River, Phase I in Imo/Abia States
- Construction of Ikot Ekpene Border-Aba-Owerri Dualisation Road (11.26Km from Owerri End) in Akwa Ibom/Abia/Imo States, C/No. 6155
- Repairs of Mbaize-Umuahia Road
- Repairs of Owerri-Okigwe Road
- Repairs of Owerri-Onitsha Dual Carriageway (Route No. 25A)
- Emergency Repairs of the Onitsha-Owerri Road
- Rehabilitation of Amanwaozuzu-Uzoagba Eziana Ori Amaohia Road.

Multistage sampling methodology was employed to select the sample. The initial stage involved the selection of five states in southeastern Nigeria. The subsequent stage entailed the selection of ten projects from each of the chosen states, culminating in a total of fifty project sites, utilizing a simple random sampling technique. The third stage comprised the selection of five construction project stakeholders, which included professionals (civil engineers, geomatics specialists, Federal Ministry of Works personnel, quantity surveyors, project managers, etc.), contractors, clients, technicians (masons, carpenters, etc.), and material suppliers, resulting in a total of one hundred (100) highway construction project workers, also through a simple random sampling technique. The researchers visited each of the five states to obtain the list of respondents. Data for the research was gathered from both primary and secondary sources, employing a structured questionnaire designed to elicit information from the respondents.

➤ *Method of Analysis the First Objective :*

Importance Index for Factor Ranking Evaluating the factors that causes project of cost overrun in federal highway projects in South East Nigeria.

The data generated were subjected to analysis utilizing an importance index for the ranking of factors. To ascertain the determinants of project cost overruns in federal highway projects within South East Nigeria, respondents were presented with five options to indicate the extent to which cost overruns are prevalent in these federal highway initiatives. For the purpose of analyzing the data (responses) through an ordinary scale, an importance index (I) was employed (Enshassi et al., 2007). The relative importance index figures will be computed employing a five-point Likert scale (1-5) for a specific productivity factor, ranging from:

- Low effect,
- Some effect;
- Average effect;
- Large effect;
- Very large effect.

For analyzing data by ordinary scale, the indexes were computed by the following equation:

$$\text{Importance Index} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{5(n_1 + n_2 + n_3 + n_4 + n_5)} \times 100$$

Where

n_1 = 'low effect'

n_2 = 'some effect'

n_3 = 'average effect'

n_4 = 'high effect'

n_5 = 'very high effect'

This procedure is explained in the productivity factors ranking matrix in Appendix(iii). The following procedures were employed for synthesis and analysis of questionnaires, figure 1.

- Gathering of returned documents (questionnaires) and sorting
- Collation of respondents
- Tallied data transferred to Excel spreadsheet to create charts.
- Results comparison on subject basis.
- Computation and discussion of results.

$$\bar{x} = \sum Fx / N$$

- *The Mean Score*
- *Summation Sign*

• *Frequency*

• *No of Respondents*

The scaling statements used were: “strongly agree”, “agree” and “not agree”, for objectives (ii), (iii), (iv) and (v). The mean of the measurement scale was calculated as follows:

$$= \frac{3 + 2 + 1}{3} = \frac{6}{3} = 2$$

The decision rule is therefore based on this mean value of 2. Any mean value greater or equal to 2 is therefore acceptable. Mean values less than 2 are not acceptable.

IV. RESULTS AND DISCUSSION

➤ *Profile Characteristics of the Highway Construction Project Workers*

Table 1 Shows that majority of the highway construction workers (80%) were males; a greater proportion are within the age range of 26-35 years (54%), majority (80%) were married. The table also showed that majority of them were secondary school leavers. (45%), while also a good number (40%) had tertiary diploma/degree levels of education. This shows that the respondents are knowledgeable and therefore would understand and interpret research questions. This is in line with Baridan, (2005) who pointed out that research respondents should be informed and knowledgeable about the subjects which they are given questionnaire to respond.

The demographic characteristics of the respondents are given in Table: 1

Table 1 Profile Characteristics of the Highway Construction Project Workers

Demographic characteristics	Frequency		Percentage	
Sex	80	20	80.00	20.00
Male				
Female				
Age (years)			6.00	54.00
Below 25	6	54	30.00	
26 -----35	30	10	10.00	
36 -----45				
Above 46				
Marital status:	20	80	20.00	
Single			80.00	
Married				
Work Experience (years)	5	18	5.00	31.00
-----5	30	16	30.00	16.00
6 – 10				
11 – 15				
16 – 20				
21 – above				

Source: Field Survey, 2025

➤ *Nature of Project Cost Overruns in the Federal Highway Projects in South East Nigeria*

The findings presented in Table 2 elucidate the underlying nature of cost overruns in highway construction projects within South East Nigeria. The respondents concurred that cost overruns manifest when the actual construction expenditure surpasses the budgeted allocation for the highway project (X = 2.19); when cost inflation arises due to variables such as economic fluctuations (X = 2.28); when construction projects fail to be completed in a

timely manner, adhering to budgetary constraints, and meeting the requisite technical or quality standards (X = 2.46); and when there are additional expenses incurred beyond the contractual sum agreed upon during the tender phase of the project (X = 2.23). This assertion is corroborated by Cantarelli (2012), who posits that cost overruns represent the discrepancy between the final actual cost of a highway construction project upon completion and the contract amount mutually established by the client and the contractor at the time of contract signing.

Table 2 Respondents Information on the Nature of Cost Overruns in Highway Construction Projects in South East Nigeria.

Nature of cost overruns in highway Construction Projects	Strongly Agree(3)	Agree (2)	Disagree(1)	Mean ($\bar{x}$)	Remaks
Significantly increase the overall cost of a project, exceeding the allocated budget and inaccurate cos estimates	32(96)	55(110)	13(13)	2.19	Agree
Additional work/variation in client's decision/inadequate Scope of civil engineering project	34(102)	60(120)	6(6)	2.28	Agree
Poor contract management	56(168)	34(68)	10(10)	2.46	Agree
Inadequate funding and payment arrangements.	35(105)	53(106)	12(12)	2.23	Agree

Source: Field Survey, 2024

➤ *Factors that Causes Project Cost Overruns on Federal Highway Projects in South East Nigeria*

Table 3 delineates the factors contributing to project cost overruns in federal highway initiatives within southeastern Nigeria. These factors encompass inaccurate cost estimations and inflation, which received a mean score of 2.08; challenges in financial and payment arrangements, with a mean of 2.09; and design modifications, which garnered a mean of 2.72, indicating consensus among respondents that this is a significant contributor to cost overruns in highway construction projects. Additionally,

inadequate planning was rated with a mean of 2.24. This aligns with the findings of Robert (2007). Conversely, respondents expressed disagreement regarding the notion that poor contract management ($X = 1.92$) constitutes a principal factor leading to project cost overruns, asserting instead that it primarily results in substandard work quality. Furthermore, the respondents also refuted the idea that political interference (with $X = 1.81$) serves as a predominant cause of project cost overruns in highway construction within southeastern Nigeria.

Table 3 Distribution of Respondents According to their Opinions About Factors that Causes Project Cost Overruns in Federal Highway Projects in South east Nigeria

Factors that causes highway project cost overruns	Strongly Agree(3)	Agree (2)	Disagree(1)	Mean ($\bar{x}$)	Remaks
inaccurate cost estimations and inflation	34(104)	55(110)	15(15)	2.19	Agree
Ifinance and payment arrangements	29(87)	51(102)	14(14)	2.11	Agree
Design changet	26(78)	55(110)	18(18)	2.08	Agree
inadequate planning	26(78)	57(112)	17(17)	2.09	Agree
Poor contract management	28(84)	54(108)	16(16)	1.92	Disagree
Poor qualification/shortage of labors	76(228)	20(40)	4(4)	2.72	Agree
political interference	21(63)	39(78)	40(40)	1.81	Disagree
Unforeseen site condition	42(126)	40(40)	18(18)	2.24	Agree
Poor/inaccurate estimate	41(123)	33(66)	26(26)	2.15	Agree

Source: Field Survey, 2024

➤ *Impacts of Project Cost Overruns on Federal Highway Projects in South East Nigeria*

Table 4 delineates the mean scores of respondents regarding the ramifications of project cost overruns on federal highway initiatives within the southeastern economy of Nigeria. Respondents largely concurred with the majority of the variables assessed. These include the additional expenses exceeding those initially stipulated by the client ($X = 2.40$), diminished returns on taxpayer investments for the federal government of Nigeria ($X = 2.39$), adverse effects on end users ($X = 2.38$), the tarnishing of professionals'

reputations ($X = 2.15$), and a reduction in profits for contractors ($X = 2.40$). Moreover, project abandonment and a decline in highway activities within the construction industry ($X = 2.48$), a downturn in economic and transportation services ($X = 2.45$), and a detrimental impact on the nation's overall growth rate ($X = 2.10$) were also noted. These findings corroborate the insights presented in the literature review by Flyvbjerg et al. (2018), regarding the effects of project cost overruns on stakeholders within the construction sector, the industry at large, and the southeastern economy as a whole.

Table 4 Distribution of Respondents According to their Opinions About the Impacts of Project Cost Overruns in Federal Highway Projects in South East Nigeria

Impacts of highway Project Cost Overruns	Strongly Agree(3)	Agree (2)	Disagree(1)	Mean ($\bar{x}$)	Remaks
Financial strain on the government and stakeholders	40(150)	40(80)	10(10)	2.40	Agree
Delays in project completion	52(156)	35(70)	13(13)	2.39	Agree
Delay and abandonment of projects	49(147)	40(80)	11(11)	2.38	Agree

Decline in public trust in the construction industry	40(120)	35(70)	25(25)	2.15	Agree
Quality of the project will be impacted negatively	50(150)	40(80)	10(10)	2.40	Agree
Leads to disputes among the parties to the contract	52(156)	44(88)	4(4)	2.48	Agree
It will ultimately hinder economic growth of the south east Nigerian region.	50(120)	45(90)	5(5)	2.45	Agree
Cost overruns affects the rate national growth	35(105)	40(80)	25(25)	2.10	Agree

Source: Field Survey, 2024

Highway project abandonment in south east Nigeria resulted drop in economic activities for the construction industry ($X = 2.48$), decrease in transportation of goods and services for the region ($X = 2.45$), and for the nation also, rate of national growth is affect ($X = 2.10$). these results agree on the information revealed in the literature review Omoregie & Radford (2019), on the effects of cost overruns on the stakeholders of the construction industry, the industry itself and the Nigerian economy in general.

➤ *Mitigating Measures for Project Cost Overruns in Federal Highway Projects in South East Nigeria.*

Data in Table 5 presents the factors that can mitigate or avert cost overruns in highway construction projects in Nigeria, as perceived by the respondents, along with their corresponding mean scores. The respondents concurred with the majority of the factors identified as potential remedies for cost overruns in highway construction endeavors.

Notable among these factors are the application of project management scheduling tools ($X = 2.68$), adherence to the originally defined project scope ($X = 2.60$), meticulous planning of projects prior to the initiation of execution ($X = 2.58$), selection of contractors possessing both substantial experience and the financial capacity to manage highway construction contracts ($X = 2.33$), and the imperative of eliminating communication barriers among stakeholders involved in highway construction projects ($X = 2.35$). Conversely, the respondents expressed disagreement with the notion that sufficient funding must be secured prior to the commencement of project implementation. Collectively, these findings align with the insights delineated in the literature review. Table 5: Distribution of Respondents According to the Factors They Consider as Remedies for Cost Overruns in Highway Construction Project Delivery in South East Nigeria.

Table 5 Distribution of Respondents According to their Opinions About the Mitigating Measures for Project Cost Overruns in Federal Highway Projects in South East Nigeria

Mitigating measure of highway project Cost overruns	Strongly Agree(3)	Agree (2)	Disagree(1)	Mean ($\bar{x}$)	Remarks
Use of good and robust construction project management scheduling tools	70(210))	28(56)	2(2)	2.68	Agree
Employment of appropriate construction methods and up-to-date technology, and ensuring clear communication channels are crucial	65(195)	30(60)	5(5)	2.60	Agree
Proper strategic planning of project activities before commencing project execution	62(186)	34(68)	4(4)	2.58	Agree
Observation of frequent project meetings, and leveraging past experiences already executed similar projects	22(66)	23(46)	55(55)	1.67	Disagree
Contractors should be pre-qualified by consultant project engineer and quantity surveyor before basing on lowest bid selection.	54(162)	25(50)	21(21)	2.33	Agree
Ensuring that there is no communication gap between the professionals, the contractors, the clients and the technicians.	45(135)	35(70)	30(30)	2.35	Agree

Source: Field Survey, 2024

V. CONCLUSION AND RECOMMENDATIONS

The study evaluates the determinants that contribute to project cost overruns in Federal Highway projects within the South East region of Nigeria and seeks to analyze the substantial impacts these overruns exert on the region, as well as on stakeholders involved in highway construction projects, including the federal government, professionals, clients, contractors, technicians, material suppliers, and taxpayers from randomly selected highway projects in the states of Abia, Anambra, Ebonyi, Enugu, and Imo. The findings of the study revealed that 80% of the respondents were male, and a corresponding 80% were married. A

significant proportion of the respondents (54%) fell within the age demographic of 26 to 35 years. Approximately 85% of the respondents possessed a formal education, indicating that they were well-informed and capable of comprehending and interpreting the research inquiries.

The respondents concurred that cost overruns transpire when there is an underestimation of actual costs during the budgeting phase of highway construction projects. They further acknowledged that project cost overruns arise due to cost escalations attributable to factors such as inaccurate cost estimations, design modifications, shortages of quality materials, inflationary pressures, insufficient planning,

contract management issues, political interference, and a dearth of skilled labor. Additionally, they noted that such overruns occur when construction projects are not completed in a timely manner, within budgetary constraints, and with the requisite technical or quality performance.

The respondents identified several causes of cost overruns, including difficulties in procuring construction materials, the non-engagement of experienced quantity surveyors in the preparation of cost estimates and project bills of quantities—services often rendered by civil engineers—unexpected subsoil conditions, and challenges related to financial arrangements and payment processes, among others.

➤ Recommendations

The ramifications of project cost overruns on the construction industry and the broader Nigerian economy, as articulated by the respondents, encompass instances where overruns surpass the project award sum allocated by the client to the contractor. This situation precipitates inflated costs for the end user, tarnished reputations for industry professionals, and diminished profit margins for contractors. Within the construction sector, respondents highlighted that project abandonment and a downturn in the transportation of goods and services are direct repercussions of cost overruns. On a national scale, they contended that such overruns culminate in loss of life and property due to road accidents, in addition to a stagnation in national growth resulting from revenue deficits.

To mitigate or avert cost overruns in highway construction project delivery, the respondents concurred on several pivotal measures:

- Professionals should employ sophisticated and robust construction project management scheduling tools in their project execution.
- It is imperative for the client, contractor, and associated professionals to utilize appropriate construction methodologies and contemporary technology, while ensuring transparent communication channels throughout and subsequent to the construction process.
- Strategic planning of project activities prior to the commencement of execution should be diligently adopted.
- Only contractors possessing adequate experience and the financial capacity to undertake highway construction projects should be entrusted with contract awards.
- Communication gaps among stakeholders involved in highway construction projects must be eradicated.

Ultimately, the respondents opined that while previous project experience is undeniably vital for successful project delivery, the necessity for frequent project meetings and the leveraging of past project experiences need not precede the initiation of project implementation. Should these remedial measures be meticulously considered by all parties engaged in highway construction project delivery, they will significantly contribute to alleviating the challenge of

project cost overruns in the South East region and across Nigeria as a whole.

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