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AN INVESTIGATION INTO THE FACTORS AND IMPACT OF COST OVERRUNS IN NIGERIAN HEALTHCARE PROJECTS: Abuja as case study

SHUAIB HAWAU OLAYINKA

De-Montfort University, School of Leadership Management and Marketing.

ABSTRACT

In building projects around the world, particularly in developing nations like Nigeria, time and cost overruns continue to be a significant issue. The project planning process accounts for all profit, labour, material, and overhead expenses to determine the overall cost of construction projects. The majority of building projects still experience budget overruns. Research on the primary causes of healthcare-building project overspending is lacking. Therefore, by identifying the specific issues with cost overruns that affect the completion of building healthcare projects, this study aimed to fill the gap in the literature. The purpose of this study is to determine the primary causes of cost overruns in healthcare project construction in Abuja, Nigeria, and to investigate the effects of cost overruns on project delivery. Using a positivist research paradigm, a quantitative methodology was adopted, with data gathered through a structured questionnaire administered to 40 professionals, including engineers, architects, builders, and quantity surveyors. The data gathered was analysed in SPSS and identify design flaws, insufficient project management training, and the use of inappropriate cost

Introduction

The construction sector contributes significantly to Nigeria's economic development in addition to generating jobs and social infrastructure (Oluyemi-Ayibiowu, Aiyewalehinmi, and Omolayo 2019). However, ineffective cost control in construction projects can result in cost inflation in both rich and poor countries. Akinradewo (2019) cites a number of factors, such as fluctuating material prices, a lack of understanding of building costs, bureaucratic tender awarding, changing government laws, high labour expenses, inadequate or nonexistent planning, and insufficient cost control. Construction projects ought to be completed according to project requirements, on time, and within budget. Contractual and legal considerations, risks and uncertainties,

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estimation software as the primary causes of cost overruns, while corruption was ranked as the least significant factor. The results further revealed the impacts of cost overruns, such as project abandonment, delays, increased healthcare costs, stakeholder dissatisfaction, and reduced return on investment (ROI). The study concludes with recommendations to mitigate cost overruns, including improved design practices, targeted training programs for project managers, and the adoption of advanced cost estimation software. These measures aim to enhance financial and operational efficiency in healthcare construction projects, ensuring timely delivery and sustainable outcomes.

Keywords: Cost overruns, Project delivery, Construction industry, Healthcare, Project teams

Environmental issues, government policies and economic concerns, human resources concerns, and contractors are some of the factors that influence construction project cost overruns, according to Enshassi et al. (2017). To lessen these problems, experienced staff, capable management, and adequate project coordination and communication are needed (Tariq and Muhammad, 2019). Nigerian construction projects frequently have delays and cost overruns, which impact national economies and necessitate political involvement in the planning process. The financial and time constraints often lead to the abandonment of many undertakings. This study sought to determine the underlying causes of time overruns in the Nigerian construction industry, as they are less common than cost overruns. This study aims to investigate the root causes of cost overruns in healthcare construction projects in Abuja, assess their impact on project delivery and propose actionable insights. The study therefore draws its hypothesis from the purpose which includes:

H1 - There is a significant relationship between the causes of cost overruns and construction healthcare projects.
H2 - There is a significant impact cost overruns have on construction healthcare projects.
H3 - There is a significant difference between the recommended solution of cost overruns and construction healthcare projects.

LITERATURE REVIEW

Due to continuous cost escalation, this section emphasises on cost overruns in building projects around the world, which are considered to be a defining characteristic of the future of construction. According to the cost section, cost overruns happen when the actual cost surpasses the initial, estimated cost (Khodeir & El Ghandour, 2019). Cost overruns in building projects have long piqued the curiosity of numerous scholars (Pollack, Helm, and Adler, 2018). After analysing the results of several worldwide

construction projects, Plebankiewicz and Wieczorrek (2020) concluded that cost overruns range from 8% to 33%. Government-run countries under pressure to upgrade their healthcare systems, and in order to avoid a drop in quality, the expenses of financing any healthcare project must be carefully distributed (Kim et.al, 2018). According to Oluyemi-Ayibiowu, Aiyewalehinmi, and Omolayo (2019), the primary causes of cost overruns are poor project execution, risk-taking, overestimating expenses, inadequate contractor supervision, and high operating costs. This chapter covers topics such as coverage regions, project execution, restrictions, project impacts, theories, existing literature, and research gaps.

Project Delivery

Project delivery, a procurement strategy where the client assigns design and construction risks to a third party, may involve a design entity and a contractor (Stromberg, 2017). There are several methods for completing projects, such as design-build, design-bid-build, construction management agencies, and construction management at risk, according to Ahmed and El-Sayegh (2020). Accordingly, the delivery mechanism chosen will depend on the specifics of the project (Mahdi and Alreshaid, 2005). The following section addresses best practices in the public sector procurement of lifting equipment and selection procedures that are efficient for both types of property owners to improve harmony and reduce costs in order to maximise the results on both public and private property (Amade et al., 2016).

According to Alwaly & Alawi (2020), the three constraints of project management—cost, time, and quality—are essential in building projects. These constraints dictate the success of the project, but customer satisfaction must also be considered (Mohamud & Nyang'au, 2020). Time and quality constraints are commonly referred to as the "iron triangle" of project constraints. Even while cost restriction research is widespread and has a big impact on the economy, there is still not much interest in this field. Cost increases are a persistent problem during the project (Akinradewo and Aigbavboa, 2019).

Cost Overruns

A cost overrun happens when the actual project expenses surpass the original estimate, claim Khodeir and El Ghandour (2019). The triangle of cost, time, and quality is essential in construction projects. Although the average cost overrun is roughly 33%, it can be much higher and even exceed the budgeted amount in underdeveloped nations (Ismail, Ramly, and Hamid, 2021). According to the research, the following study components focus on the traits of cost performance and project success as well as the statistical inference done by Memon et al. (2013). In addition to offering remedies, it outlines the possible reasons for project delays and expense increases (Shah, 2016). A regression

model was developed to examine how these factors affected cost overrun (Pham et al., 2020). Overall cost management challenges are common in Sultanate Oman construction projects, despite the fact that they happen elsewhere. Siyabi et al. (2021) and Dlamini and Cumberlege (2021) have developed project delays, lawsuits, financial losses and consequences, and substandard job projects. These are useful in establishing suitable project management guidelines and identifying the most qualified candidates for project management roles. The risk factors influencing cost overruns in Indian construction projects are evaluated in this study using a mixed-mode approach (Sharma et al., 2019). To classify possible reasons for overspending, the study used a theme method (Sharma et al., 2019). The causes of construction cost overruns fall into nine categories: subassemblies, logistics, equipment costs, ineffective parties, assets, firm rules and regulations, project rules and regulations, insufficient party coordination, hazards, and factor evaluations. A regression model is provided to investigate how the previously indicated characteristics affect cost overrun. The influence of cost overruns and timetable delays on large public construction projects is another area of interest for the study. Olawale and Sun (2010) have separated cost overrun reduction strategies into four categories: preventative, predictive, corrective, and organisational measures. In our literature review section, Saeedi et al. (2020) claimed that effective cost control, stable government policies, and sound project planning might all help avoid construction cost overruns. Hou & Wang (2018) have proposed a number of these strategies, such as communicatively managed insurance, risk and cost control, and selecting a suitable contractual structure. Doloi (2013) suggests improved structural planning and design, expert involvement, material moderation, and increased cost control.

Theory of Project Delivery

A number of project delivery theories and methods, such as activity-based costing, IPD-based cost estimation, and BIM cost management, handle expenses. lean methodology with just-in-time:

i. **Activity-Based Costing:** Numerous overheads and overall expenses are caused by complicated and disjointed subprograms in construction projects (Mignone et al., 2016) (Elghaish and Abrishami 2021). Conventional cost accounting methods like resource-based costing and volume-based allocation can be used (Aziz and Hafez, 2013). According to this study, activity-based costing, particularly when used in conjunction with IPD, can enhance project control and the reliability of cost data. Data analysis, however, is a limitation that necessitates more resources and time (Reyhanoglu, 2004).
ii. **Cost Estimation Based on Integrated Project Delivery:** Integrated project delivery, according to Mesa, Molenaar, and Alarcón (2016), is a way of finishing a project that integrates all project components, including people, organisations, and

corporate structure, from the start. According to Kent and Becerik-Gerber (2010), the main objective of IPD is to eradicate fragmentation, which happens when a project is overseen by a single entity, like a master builder, at every step. IPD seeks to maximise value and prevent waste by utilising the resources of all participants.

iii. **BIM in Cost Management:** A database of data that is available to all project participants and that has confidence in its accuracy, broad applicability, and clarity is the goal of achieving effective project delivery (Elghaish, Abrishami & Hosseini, 2020). Building information modelling is used by architects and engineers to finish their design work, and by construction companies to track performance and progress on the construction site (Watson, 2010)..

iv. **Lean Construction:** Lean construction is an administrative method used by construction experts to significantly and sustainably optimise non-value-generating production processes, according to Elghaish et al. (2020). According to Razek et al. (2006), lean construction is widely utilised to solve construction waste, cost, and schedule overruns as well as to minimise effort throughout the building project's execution. The building project used this lean manufacturing technique to reduce waste and boost project success and efficiency (Aziz and Hafez, 2013). But there are issues with the strategy.

v. **Just in Time:** The Just-in-Time (JIT) concept is one of the most popular lean technologies in the construction sector, according to Babalola et al. (2019). Its primary objectives are to introduce the right resources at the right time and maintain optimal inventory levels (Cherrafi et al., 2016). Many manufacturers in the US and Japan have been ready to modify their JIT principles to guarantee environmental sustainability and reduce pollution and traffic in urban areas (Cusumano, 1994). On the other hand, JIT has been shown to stop material spoiling and deterioration that can happen during building projects that involve a significant inventory (Ogunbiyi et al., 2014).

Gap in Study

A survey of the literature revealed a dearth of knowledge about Nigerian infrastructure project delivery, with a particular emphasis on healthcare initiatives. This study will focus on cost overruns related to healthcare project delivery to close the identified gap and improve project management competency. Infrastructure cost overruns can be further studied because there isn't much of it. Because there isn't much literature on this topic, it was selected as the research topic.

METHODOLOGY

This study, which focused on determining the causes of cost overruns in the construction healthcare project in Abuja, Nigeria, highlights the main factors driving cost overruns in

project delivery in the healthcare industry. Since the study's findings could be quantified, presented, and evaluated, a positivist approach was selected for the research process. By employing this method, the researcher was able to consider a recognised theoretical perspective on the topic while independently and objectively assessing the information acquired. Because this study used a quantitative technique to investigate the reasons behind cost overruns in healthcare construction projects, deductive reasoning was chosen. The quantitative approach is the research strategy used in this study. Since this study was only done for a group of experts, non-probability sampling was used. This study looked into the main causes of cost overruns in hospital construction projects using a quantitative methodology.

For this study, questionnaires were used as the main tool for collecting data. These surveys were designed to investigate several factors that contribute to the excessive costs of healthcare development projects in Abuja. Following a comprehensive review of the literature, the ten causes, ten impacts, and ten mitigation strategies of cost overrun in construction projects were identified and used to produce the research questionnaire for this study. Following questionnaire collection, the data for this study were analysed both descriptively and inferentially using SPSS Statistics Version 28 software.

Study Area

Abuja, the capital of Nigeria and the Federal Capital Territory (FCT), is the primary subject of this study. Abuja is situated in the north-central region of the nation. This is because to the significant growth that has taken place around the city and the many ongoing development projects. Because of its convenient location, accessibility, healthy environment, small population, and potential for growth, the site was selected to serve as Nigeria's next capital. In Nigeria, it was the country's first planned city. Abuja, which is 1,180 feet (360 meters) above sea level, experiences lower humidity and a colder climate than Lagos. The municipal hall, national cultural institutes, and other government buildings are in the Central Area of the city. One lovely aspect of Abuja's central location is that it shares the savannah grass with the north. Abuja benefits from good ground for agricultural and year-round temperatures that are neither too hot nor too cold.

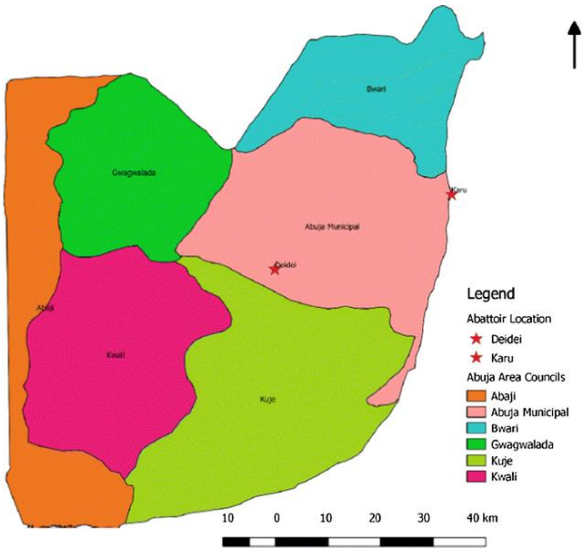

Figure 1: Image showing the study area Source: (Mabel, 2024)

FINDING/ANALYSIS

The data for this analysis were collected from a survey of 40 employees involved in healthcare construction projects in Abuja. All 40 participants provided complete responses. The survey included equal representation from key professions within the construction project team: engineers, architects, builders, and quantity surveyors, comprising 25% of the respondents (see Table 1). Organizationally, the majority of the project team members (35%) were employed by a real estate company, as indicated by the respondents (figure 2). This distribution reflects the diverse professional and organizational backgrounds of those engaged in Abuja's hospital construction projects

Table 1: Project participants

Participants	Frequency	Percentage
Builders	10	25%
Architects	10	25%
Quantity Surveyors	10	25%
Engineers	10	25%
Total	**40**	**100%**

Source: Researchers Fieldwork (2023)

Table 2: Organisation of respondents

Participants	Frequency	Percentage
Building firm	8	20%
Real Estate firm	14	35%
Architectural firm	6	30%
Engineering firm	12	15%
Total	**40**	**100%**

Source: Researchers Fieldwork (2023)

According to Figure 2, which enquires about the types of projects they have managed in the healthcare sector, most of the 35 survey respondents managed construction projects for healthcare facilities of various kinds. Nigeria's strong desire for residential development appears to be the reason why many businesses are focussing on healthcare construction projects rather than highways and infrastructure. According to Figure 3, the majority of respondents (26 respondents) rated all of the hospital, transportation,

and infrastructure construction projects their companies had completed in the past and present as medium projects.

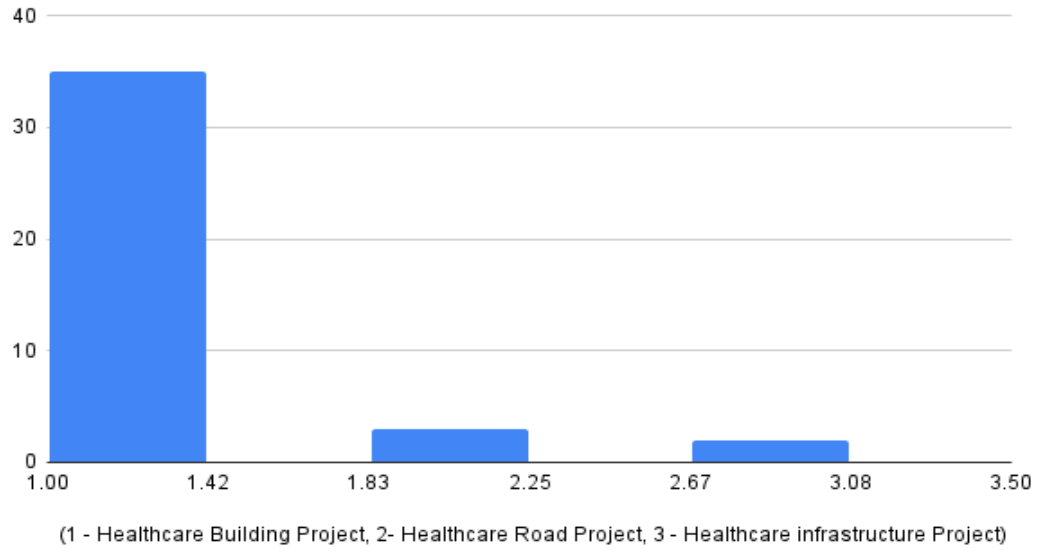

Figure 2: Type of construction healthcare project
Source: Researchers Fieldwork (2023)

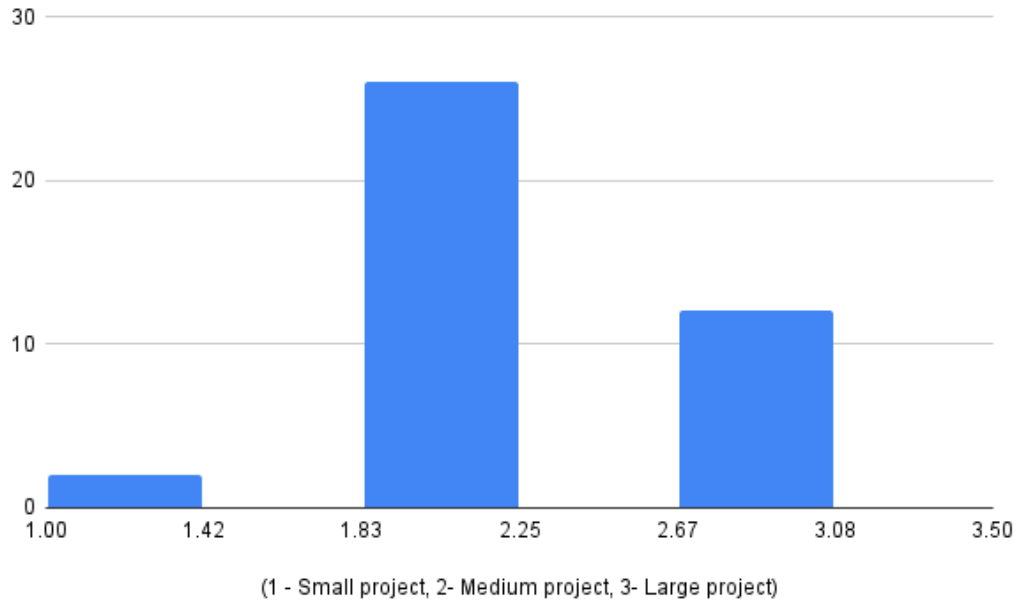

Figure 3: Size of construction healthcare project
Source: Researchers Fieldwork (2023)

Figure 4 shows the academic qualification level of respondents, with a frequency of 20, P.G.D./M.Sc. had the highest percentage of participants. This is because postgraduate degrees are necessary to advance to particular levels in most Nigerian professional practices. This suggests that there are more people with postgraduate degrees working in the construction industry. There are more seasoned experts in Abuja's construction companies, and they were easier to contact during the survey, according to the data displayed in Figure 5, which reveals that 23 participants had five to ten years of experience or more in the industry.

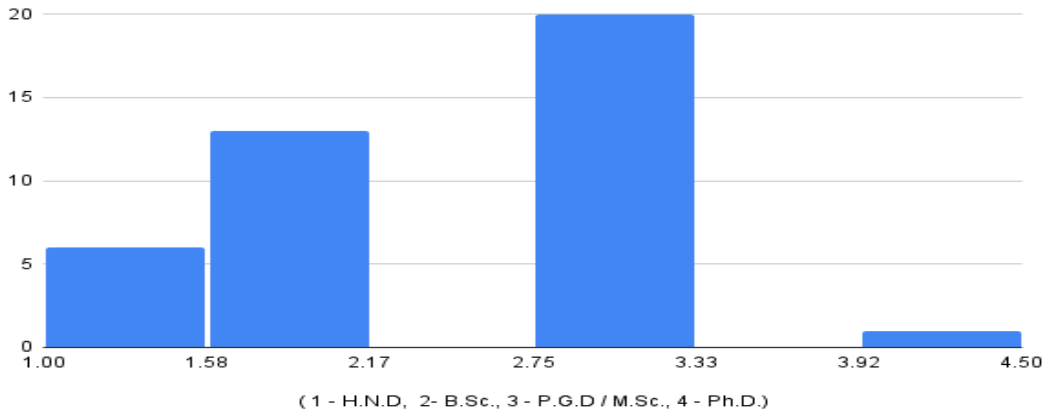

Figure 4: Level of Academic Qualification
Source: Researchers Fieldwork (2023)

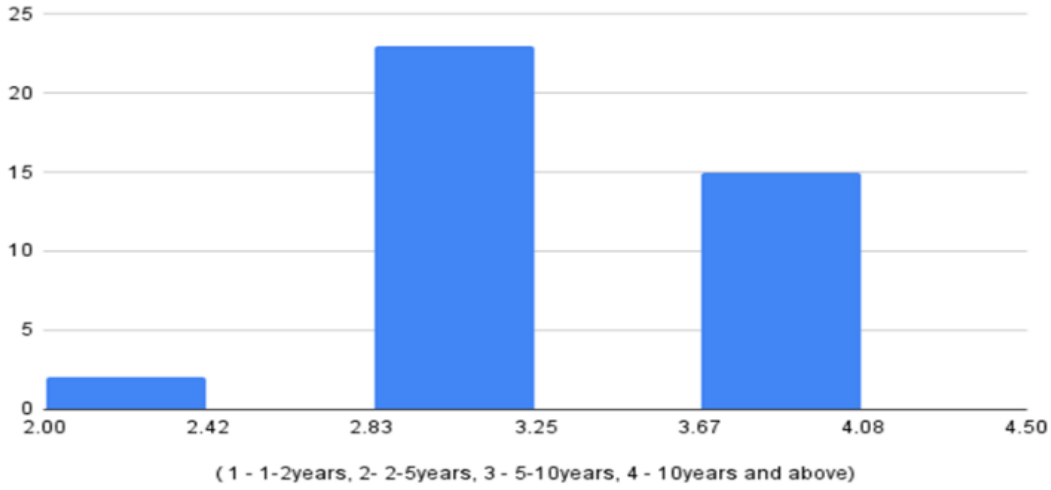

Figure 5: Level of Experience
Source: Researchers Fieldwork (2023)

Causes of Cost Overruns

Most of the causes that were examined were accepted by all of the respondents. The main cause of cost overruns was identified by a mean score of 2.0 for the design, 1.95 for insufficient project management training, and 1.63 for utilising the wrong software for cost estimating. The lowest mean score was found in causes relating to corruption within the project (1.58). This is in line with the findings of Akinradewo & Akinradewo (2019), who re-examined the elements that lead to project cost overruns in Nigerian building construction projects and came to the conclusion that one of the primary causes of cost overruns is a lack of professional training. The highest mean score for the design issues which relates to the use of inappropriate software for cost estimation can lead to frequent changes, rework during construction, and ultimately increased cost. Project managers without proper training may struggle with scheduling, resource allocation, and risk mitigation, resulting in inefficiencies and cost escalations. Although corruption was rated the least significant cause, its presence still reflects systemic issues that can undermine project efficiency.

Table 3: Sample statistics and test of the causes of cost overruns

No	Causes	Mean	Standard deviation	P-value	T-test
D1	Project corruption	1.58	0.549	<0.01	-16.402
D2	Inflation and fluctuation of construction materials	1.80	0.405	<0.01	-18.735
D3	The risk associated with healthcare project	1.83	0.385	<0.01	-19.312
D4	Change of project design	1.65	0.483	<0.01	-17.676
D5	Lack of proper training of Project Managers	1.95	0.389	<0.01	-17.074
D6	Use of inappropriate software for cost estimation	2.00	0.320	<0.01	-19.748
D7	Change in government policy	1.93	0.417	<0.01	-16.312
D8	Additional work	1.75	0.439	<0.01	-18.028
D9	Delay of work	1.88	0.404	<0.01	-17.598
D10	Complexity of work	1.73	0.452	<0.01	-17.832

Source: Researchers Fieldwork (2023)

As shown in Table 3, each reason for cost overruns has a statistically significant p-value of less than 0.05, meaning that the null hypothesis has a 5% chance of being correct. The null hypothesis was thus disproved. It also illustrates the wide range of reasons why healthcare building projects have cost overruns.

Impacts of Cost Overruns

Table 4, which displays the respondents' answers regarding the potential effects of cost overruns on the healthcare building projects under investigation, answers the second research question. Regarding the impact of cost overruns on the healthcare construction project, the respondents agreed with every component that was considered. These possible consequences of cost overruns were investigated using descriptive statistics. Project abandonment, project delay, the impact of cost overruns on national growth, and the high cost of healthcare all had respective averages of 2.00, 1.95, 1.75, and 1.55 respectively. The contractor loses out on profit (1.93), the customer experiences additional expenses (1.87), stakeholder unhappiness (1.65), litigation (1.93), conflict (1.97), and a decrease in return on investment (ROI) (1.95). This revealed a significant implication for healthcare construction projects, the high means score of project abandonment and delays highlights the urgent need for improved budgetary planning and effective contingency management. When cost overruns remain unchecked, they not only waste resources but also leave critical healthcare infrastructure incomplete, impacting public health delivery. Furthermore, the economic and social consequences, such as increased healthcare costs and slowed national growth, underscore the far-reaching effects of inefficiencies in project execution. These overruns also strain stakeholder relationships, as dissatisfaction, conflicts, and legal disputes become inevitable outcomes of mismanaged budgets. Financially, contractors face reduced profits, and clients are burdened with additional expenses, jeopardizing the financial sustainability of such projects. These findings emphasize the need for transparent communication, strict cost control, and robust risk management strategies to mitigate the adverse effects of cost overruns and ensure the successful delivery of healthcare facilities. These results are consistent with Nwokenkwo's (2019) study on the effects of budgeting and budgetary management on building project completion in Nigeria, which discovered that cost overruns affected each of these factors.

Table 4: Sample Statistics and Test of The Impacts of Cost Overruns

No	Impacts	Mean	Standard deviation	P-value	T-test
E1	Abandonment of project	1.55	0.549	<0.01	-18.202
E2	Project delay	1.75	0.405	<0.01	-18.028

E3	High cost of medical treatment	1.95	0.385	<0.01	-17.074
E4	It affects national growth	2.00	0.483	<0.01	-27.928
E5	The client will incur additional costs	1.88	0.389	<0.01	-21.243
E6	Reduction in Return on Investment (ROI)	1.95	0.320	<0.01	-21.000
E7	The contractor loses out on profit	1.93	0.417	<0.01	-25.488
E8	Litigation	1.93	0.439	<0.01	-25.488
E9	Dispute	1.98	0.404	<0.01	-41.000
E10	Stakeholders' dissatisfaction	2.00	0.452	<0.01	-19.748

Source: Researchers Fieldwork (2023)

The p-values for the effects of cost overruns are less than 0.05, as shown in Table 4.6. This indicates that each cause is statistically significant and that the null hypothesis has a 5% chance of being true. Consequently, the null hypothesis was refuted. It implies that the impact of cost overruns on construction and healthcare projects varied greatly.

Recommendation Solutions for Tackling Cost Overruns

Table 6, which shows the outcomes of the suggested mitigation strategies for the causes of construction-related cost overruns, answers the third and final study question. Most of the parameters taken into consideration were accepted by all respondents. These mitigation strategies were examined using descriptive statistics. While appropriate project planning had a mean score of 1.75, material pricing management and control received a mean score of 1.90. Additionally, budgeting for inflation estimates (overhead costs), hiring specialists, and preserving the project scope all received mean scores of 1.70, 1.95, and 1.95, respectively. Furthermore, with a mean score of 2.00, detailed design was given the highest suggested therapy for cost overruns. These findings are consistent with research on cost overrun management techniques conducted by Hamid & Waterman (2018), Sohu et al. (2019), and Musarat et al. (2019).

Table 5: Sample Statistics and Test of Recommended Solution of Cost Overruns

No	Solution	Mean	Standard deviation	P-value	T-test
F1	Adequate and proper project planning	1.75	0.439	<0.01	-18.028
F2	Regulation and control of Prices of materials	1.90	0.379	<0.01	-18.360
F3	Employ experts	1.70	0.464	<0.01	-17.716
F4	Maintaining the project scope	1.95	0.316	<0.01	-21.000
F5	Accounting for inflation forecasts in the budget (overhead cost)	1.95	0.316	<0.01	-21.000
F6	Detailed design	1.80	0.405	<0.01	--18.735
F7	Risk assessment	1.93	0.267	<0.01	-25.488
F8	Cost control	1.93	0.267	<0.01	-25.488
F9	Using total cost analysis	1.95	0.316	<0.01	-21.000
F10	Stability of government policy	1.98	0.276	<0.01	-23.472

Source: Researchers Fieldwork (2023)

The p-values for the proposed cost overrun solutions are less than 0.05, as shown in Table 5, suggesting that each of the reasons is statistically significant and that the null hypothesis has a 5% chance of being correct. Thus, the null hypothesis was refuted. It suggests that the recommended solutions for construction and medical project cost overruns differed significantly.

CONCLUSION AND RECOMMENDATIONS

This study aims to identify the reasons behind cost overruns, how they affect them, and the best way to deal with them in a hospital construction project in Abuja, Nigeria. Project corruption, inflation, fluctuating construction costs, cost risk, design changes, inadequate project manager training, inefficient cost estimating software, governmental policy changes, other work, time overruns, poor site management, and complex work are some of the causes identified in the study. The study concluded that cost overruns contribute to high medical costs, delays, abandonment, and a slowdown in the country's

growth. Respondents recommended a few strategies to lessen these problems, including careful project planning, effective cost control, hiring professionals, managing material prices appropriately, accounting for inflation in project costs, detailed designs, risk assessments, and government regulations. In building projects, design changes made by all project partners lead to cost overruns. The ramifications and necessity of project management technologies should be communicated to construction professionals early on. The economic consequences of project delivery and the recommended remedies must be closely adhered to, according to this study.

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