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Impact of Project Management Practices on Cost and Time Overruns in Construction Projects in Nigeria

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ABSTRACT

A major contributor to economic growth in Nigeria, the construction sector is frequently beset by large cost and schedule overruns that jeopardize project profitability and impede the development of infrastructure. This study looks into how project management techniques affect these overruns in building construction projects in Nigeria. The goal of the study is to pinpoint the major project management variables that lead to overspending and delays while also offering recommendations for best practices to address these problems. A mixed-methods strategy was used, integrating qualitative case studies with quantitative data analysis. Project engineers, contractors, Architects, and Technicians were given standardized questionnaires to complete about a variety of Nigerian building projects. In-depth interviews and focus groups were also held to acquire a deeper understanding of the real-world difficulties and experiences encountered in the field. The study pinpoints several crucial project management techniques that affect time and cost performance. The results show that Inadequate construction site management and supervision ranked 1st with an RII of 0.7877, Improper construction techniques and lack of experience of the consultant came 2nd and 3rd with RII of 0.7215 and 0.7213 respectively. Late payments during work progress and Use of improper equipment are contributors to project time overrun; while, factors affecting cost overrun are fluctuation in building material costs ranked 1st with RII of 0.7354, frequent design changes, (0.7138), omissions and errors in bills of quantities (0.6754), import of construction materials (0.6754). The report suggests enhancing project management through effective resource management techniques, ongoing training and certification programs, and implementing advanced technology to improve communication, resource management, and planning precision, contributing to sustainable growth in Nigeria's construction industry.

Keywords: stakeholder management, construction sector, project management, major contributor

INTRODUCTION

The building sector significantly impacts economic productivity, investing in services, industry, and agriculture. The public and private sectors aim to improve project performance through cost reduction, timely completion, and quality improvement [1]. Project control aims to ensure projects meet goals, finish on time, and within budget, but modern methods in the building industry often lead to delays and overruns. Construction projects often face overspending due to ignorance of time and expense variables [2]. These overruns impact project goals, schedule, quality, and productivity, potentially leading to bankruptcy. Understanding these factors is crucial for efficient project management and financial losses [3]. Developing nations face increased vulnerability to ineffective performance, leading to delayed services, higher expenses, and decreased income [4]. Nigeria's construction industry frequently experiences budget and schedule blowouts, exacerbated by misconceptions and arguments. Nigeria's building construction industry is vital for economic growth and employment but often faces cost and time overruns [5]. Understanding these issues is crucial for improving project performance and sustainable development. This study investigates the impact of project management techniques on time and cost overruns in Nigerian building construction projects. Also, to identify best practices and analyze stakeholder management to provide practical advice for industry professionals. The causes of time and cost overruns in Nigeria project construction were identified which are common in developing nations, but research on the causes is lacking to sum up, to resolve cost

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and time overruns in Nigerian building construction projects, it is imperative to improve project management procedures.

LITERATURE REVIEW

Overspending and delays in project completion are widespread issues in the worldwide construction sector, and Nigeria is no different. Project delays, major financial losses, or even project abandonment can result from these overruns [6][7]. Using efficient project management techniques is crucial to reducing these risks. This analysis of the literature looks at different aspects of project management techniques and how they affect time and cost overruns in Nigerian building construction projects [7]. A vast array of procedures is included in project management to guarantee the effective start, planning, carrying out, overseeing, and ending of projects [8]. Important methods for project management consist of Project Planning and Scheduling which requires careful planning and precise scheduling. Comprehensive project planning can dramatically lower the risk of schedule and expense overruns, according to studies [9][10]. Stakeholder management is essential to engage and effectively communicate with stakeholders. Poor stakeholder management frequently results in miscommunications, scope modifications, and project delays, [10]. Risk management can be conducted by recognizing and reducing risks early in the project lifecycle. According to research by [11], effective risk management techniques are linked to better project outcomes. Resource Management and Allocation are essential to manage and allocate resources such as labor, supplies, and equipment efficiently. According to [12], problems with resources are the main reason behind building project overruns. Overruns in Expense and Duration in Nigerian Construction Projects involve the frequency of time and expense overruns in Nigerian building projects has been shown by numerous studies. Among the elements causing these overruns are economic elements budget overruns can be caused by currency volatility, inflation, and shifting material pricing. In [13] found that cost overruns in developing nations are significantly influenced by economic instability. In [14] state that disagreements over contracts frequently cause delays in building projects in Nigeria.
Planning and Scheduling for Projects Successful project scheduling and planning are essential. Research suggests that projects with thorough planning and reasonable timelines have lower overrun rates. Also, [9], for instance, stresses the significance of employing sophisticated scheduling tools and approaches, such as the Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM), to improve project control and lower delays. Management of Stakeholders. Stakeholder management that is effective guarantees that everyone participating in the project is informed and in agreement. According to [10], frequent stakeholder engagement and communication can help avoid miscommunication and scope modifications, which frequently result in overruns. Actively involving stakeholders in decision-making processes generally results in better projects. For a project to go well, risk management is essential for foreseeing and averting possible problems. According to [9], projects that have thorough risk management plans are more resilient to setbacks. Proactive risk assessment and mitigation techniques can handle frequent problems like supply chain disruptions and variations in the economy in the Nigerian setting. To guarantee maximum efficiency, this covers not only the management of supplies and machinery but also the appropriate workforce scheduling.

Optimal Methods and Suggestions

The previous research suggests effective practices to reduce time and expense overruns in Nigerian building projects such as Improved Training and Certification [15]. According to [16], project managers can become more proficient at managing complicated projects by pursuing ongoing professional development and certification [17]. Also, the adoption of Technology, Planning precision, resource management, and communication can all be improved by using cutting-edge project management software and tools [18]. Effective Resource Management just-in-time delivery and resource leveling are two techniques for optimal resource allocation that can be used to make sure resources are available when needed without creating delays [19]. This emphasizes how important it is to use efficient project management techniques to reduce costs and delays associated with building construction projects in Nigeria [20]. Through the implementation of thorough planning and scheduling, proactive stakeholder management, strong risk management, and effective resource allocation, Nigeria's construction sector can greatly enhance project performance and guarantee the timely and economical completion of infrastructure projects [17]. Subsequent investigations ought to concentrate on crafting customized project management models that tackle the distinct obstacles of the Nigerian building landscape.

METHODOLOGIES

This research involved both quantitative and qualitative methodologies were used in this study. Data were gathered from project managers, contractors, and other stakeholders involved in the chosen construction projects in Nigeria using a questionnaire that was constructed based on a review of the literature and semi-structured interviews. The questionnaire was both open-ended and closed-ended questions to collect data that was both qualitative and quantitative. The 140-person study sample, which included project managers, architects, builders, quantity surveyors, contractors, engineers, clients, and other pertinent parties participating in Nigeria's building projects, received the questionnaires. Only 130 of the questionnaires that were completed were completed. The respondents'

ratings will be correlated with the numerical impact and likelihood values that were assessed using a five-point Likert scaling rating system ranging from 1 to 5. (1 being less significant, 2 being somewhat significant, 3 being moderate, 4 being significant, and 5 being highly significant). Data Analysis Techniques for both quantitative and qualitative data analysis were used. Statistical techniques such as the relative relevance index for ranking, were used to identify patterns in the quantitative data. The Relative Important Index (RII) was utilized in this study to determine ranking. The relative importance or significance of various aspects or variables in a research study can be evaluated using the (RII) approach. It is frequently used in survey-based research projects where participants are asked to rank or rate the significance of several aspects.

$$RII = \frac{\Sigma ai \times ni}{N \times A} \qquad (1)$$

Where:
ai = assigned weight to ith response,
ni = frequency of ith response,
N = total number of respondents,
A = highest weight
The factors were ranked in descending order according to their RII scores. The most significant element is the one with the highest RII, and the least significant factor is the one with the lowest RII. It helped to determine the most important variables. It assisted in setting priorities for elements requiring more investigation or decision-making by offering a quantifiable measure of relative importance. The research complied with ethical guidelines, which include getting participants' informed consent, protecting participant data confidentiality, and making sure the study doesn't negatively impact participants or the community.

RESULT PRESENTATION AND DISCUSSION

A total of 150 copies of questionnaires were distributed and 130 were collected. Table 1 illustrates that the response rate was 93%. A response rate of more than 50% is deemed appropriate according to [21], therefore the acquired response rate of 93% shows that the returned rate was both acceptable and adequately representative.

Table 1: Respondent Rate

Total Questionnaire	140
Returned	130
Percentage	93%

According to the jobs or professions of the respondents, 37% of the sample consisted mostly of technicians. With 29% of the respondents, consultants make up a sizeable section of the population. The sample is composed of 22% of project engineers. Architects make up the smallest group of respondents 12%. These findings provide light on the professional backgrounds of the study participants. It is crucial to take into account that different professionals in the construction sector may have differing viewpoints regarding the causes of cost and schedule overruns. Refer to Figure 1 and Table 2.

Table 2: Respondents Profession

Profession	**Number**	% age
Project Engineer	29	22
Consultant	38	29
Architect	15	12
Technician	48	37
Total	130	100

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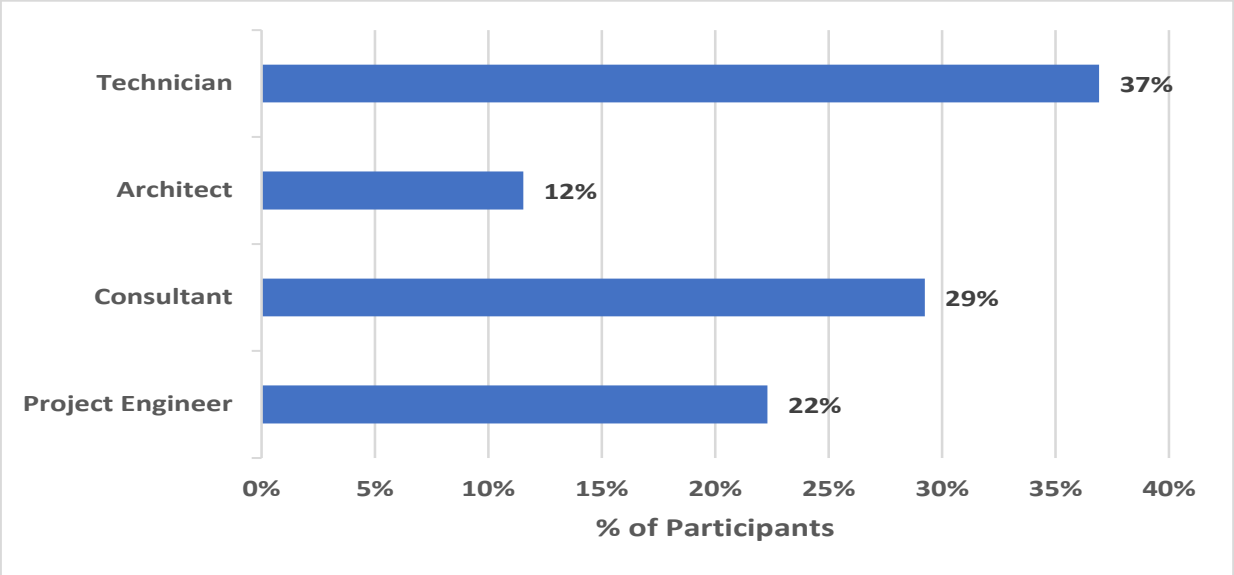

Figure 1: Participants Demographics

It can be seen that 44% of the sample, or most respondents, possessed an O-level certificate according to the respondents' educational backgrounds. A bachelor's degree was the second most prevalent educational level held by respondents, accounting for 38% of the sample. A lower percentage of responders 4% held a PhD, showing that a portion of the sample was well educated. Just 14% of respondents indicated they have a master's degree as illustrated in Table 3 and Figure 2.

Table 3: Respondents Educational Background

Educational Background	Number	% age
O' Level Cert	57	44%
Bachelor Degree	50	38%
Master's Degree	18	14%
Doctor of Philosophy	5	4%
Total	130	

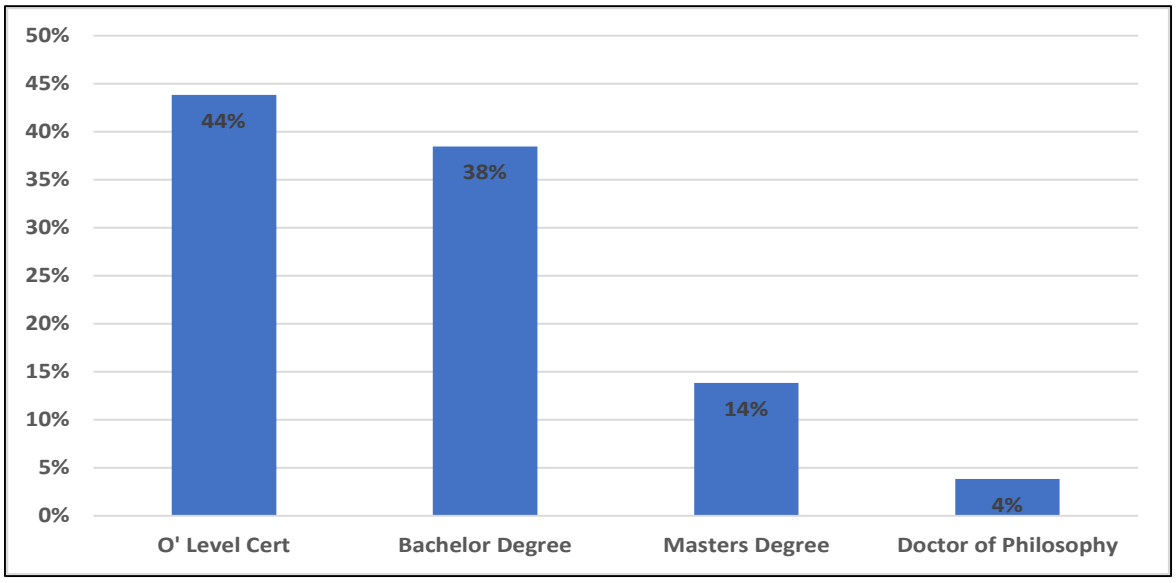

Figure 2: Level of Education

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46% of the respondents, or the largest group, reported having up to five years of experience in the field. With 31% of the group, the second largest had ten years of experience. 23% percent of them have more than ten years of experience. As seen in table 4 and in figure 3.

Table 4: Respondents Years of Experience

Years of Experience	Number	%age
Up to 5	60	46%
6 to 10	40	31%
11 and above	30	23%
	130	

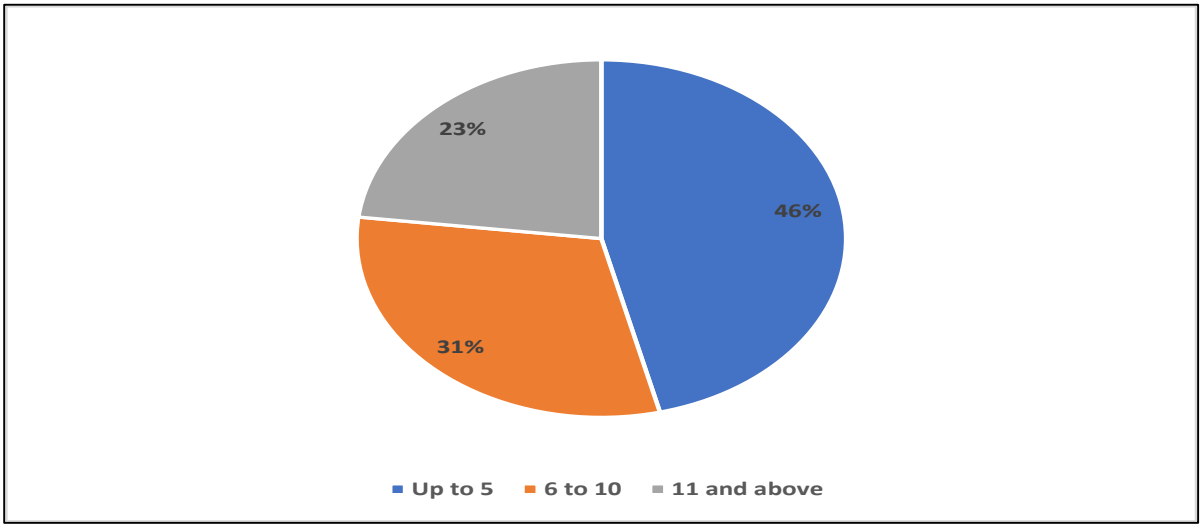

Figure 3: Years of Experience

Time overruns

These rankings in Table 5 offer a thorough understanding of the variables causing construction project delays, making it possible to identify and successfully handle the most pressing problems first. Thirty-two factors were identified, but only seventeen are deemed most important based on the ranking. Greater relevance is indicated by higher RII scores. Mitigation efforts for factors numbered 1 through 5 should be prioritized since they are deemed "highly Significant" drivers of time overruns. Inadequate construction site management and supervision ranked 1st with an RII of 0.7877, Improper construction techniques and lack of experience of the consultant came 2nd and 3rd with RII of 0.7215 and 0.7213 respectively. Late payments during work progress, and Use of improper equipment. Factors ranked from 4 to 10 are "Significant" contributors and Delay in site set up, Lack of contractor's experience, financial constraint encountered by contractor, Delay in passing information, and Lack of management with project participants. Factors ranked from 11 to 20 are "Moderate" contributors to time overruns. Based on ranking, HS = Highly significant, S = significant, M = moderate, SS = slightly significant, and LS = less significant.

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Table 5: Factors contributing to time overrun in their highest order

Factors	HS	S	M	SS	NS	RII	Ranking
Inadequate construction site management and supervision	33	65	24	7	1	0.7877	1st
Improper construction techniques	24	64	22	7	13	0.7215	2nd
Lack of experience of the consultant	34	58	10	3	25	0.7123	3rd
Late payments during work progress	31	36	36	25	2	0.7062	4th
Use of improper equipment	12	78	18	8	14	0.7015	5th
Delay in site setup	45	35	14	6	30	0.6908	6th
Lack of contractor's experience	34	44	10	28	14	0.6862	7th
Financial constraints encountered by the contractor	25	37	36	30	2	0.6815	8th
Delay in passing information	18	38	60	6	8	0.6800	9th
Lack of management with project participants	16	48	47	7	12	0.6754	10th
Late procurement of materials and delivery	42	18	28	31	11	0.6754	11th
Poor scheduling of the project	41	30	9	27	23	0.6600	12th
Late Preparation of Request	9	62	28	16	15	0.6523	13th
stoppage of work by the promoter	30	36	11	41	12	0.6477	14th
Poor communication with project parties	21	40	33	18	18	0.6431	15th
Variation during the execution stage	29	25	36	20	20	0.6354	16th
Lack of technical study during bidding	26	34	26	17	27	0.6231	17th
Unavailability of expertise within the locality	9	20	58	26	17	0.5662	18th
Unclear delegation of work	15	21	44	22	28	0.5585	19th
Late approval of site inspections	8	27	28	64	3	0.5585	20th
Delay in contractor's works	8	44	18	30	30	0.5538	21st
Fluctuation materials price	4	23	60	23	20	0.5508	22nd
Late payment to contractors by the main contractor.	21	11	33	44	21	0.5492	23rd
Rework due to mistakes	10	24	29	53	14	0.5431	24th
Ambiguities, inconsistency, and discrepancies in drawings and specifications.	4	30	43	22	31	0.5292	25th
Unexpected government regulations	3	24	46	35	22	0.5246	26th

These findings imply that certain tactics have to be put into practice to raise contractor proficiency, foster better collaboration amongst project stakeholders, guarantee adequate site management, deal with budgetary issues, and encourage the application of suitable building techniques. By focusing on these areas, the construction industry in Nigeria can work to minimize project delays and improve project outcomes. Comparison of these findings with existing literature reveals a consistent alignment with global trends in construction project management [5]. However, these results offer unique insights into the specific challenges faced in the Nigerian construction industry. The study's factor ranking is consistent with a large portion of the body of research on construction project management. Numerous studies have identified poor coordination, insufficient experience from contractors, and

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financial issues as major causes of project delays [4]. These variables are similar to the challenges experienced by the global construction sector and indicate fundamental issues that can impact project timeframes [15]. When compared to previous research, there may be some differences or surprises in the rankings, particularly given the unique circumstances of Nigeria. A high rating for "Improper construction method/techniques" could be a sign of particular difficulties or methods used in the regional building sector. These findings' implications imply that to reduce project delays in Nigeria, efforts should be focused on enhancing contractor expertise, fostering participant coordination, resolving financial issues, and making sure that the right construction techniques are used.

Cost overrun factors

Given a high priority for mitigation, the factors listed from in Table 6 are the most significant contributors to cost overruns. The ranking of factors contributing to cost overrun in construction projects is as follows: fluctuation in building material costs ranked 1st with RII of 0.7354, frequent design changes, (0.7138), omissions and errors in bills of quantities (0.6754), import of construction materials (0.6754), others contract period duration, inadequate review of contract documents, poor site financial control, unstable economic conditions, lack of local skilled labor, lack of updated cost data, unexpected government regulations, political interference, poor contract management, and high transport costs.

Table 6: Ranking of factors contributing to cost overrun

Factors	HS	S	M	SS	LS	RII	Ranking
Fluctuation in the cost of building materials	39	38	27	24	2	0.7354	1st
Frequent design changes	41	32	29	17	10	0.7138	2nd
Omissions and errors in the bills of quantities	22	22	44	45	19	0.6754	3rd
Construction materials cannot be procured on the local market and have to be imported.	6	69	15	31	9	0.6492	4th
Duration of Contract period	27	39	27	8	29	0.6415	5th
Inadequate review of drawings and other contract documents.	24	33	31	27	15	0.6369	6th
Poor site financial control	12	50	21	38	9	0.6277	7th
Government's Unstable economic conditions	11	48	26	31	14	0.6169	8th
Lack of local skilled labor	16	26	26	57	5	0.5862	9th
Lack of updated cost data on specifications	23	12	39	45	11	0.5862	10th
Adjustment of prime cost and provisional sums	8	28	44	46	4	0.5846	11th
Unexpected government regulations	24	21	26	34	25	0.5769	12th
Political interference	3	22	63	40	2	0.5754	13th
Poor contract management	20	18	37	31	24	0.5677	14th
High cost of transport	16	31	10	43	30	0.5385	15th

CONCLUSION

These elements highlight the necessity to be considered to avoid cost overrun. These rankings provide a comprehensive view of the factors contributing to cost overruns in construction projects, allowing project stakeholders to prioritize and address the most critical issues effectively. This study examined the crucial elements of time and cost overruns in building projects within the framework of Nigeria in agreement with previous work by [18, 22, 23]. The study has broken down the relevant elements, created prediction models, and gleaned insightful information that could have a big impact on the local building sector. The course of this inquiry revealed several significant findings and their ramifications, paving the path for future building projects in Nigeria that are both more successful and efficient. The study started by classifying and identifying the variables that lead to time and expense overruns in building projects. The management of the contractor's site, information and communication, design and documentation, human and non-human resources, financial management, external variables, and project and contract management were among the many domains in which these aspects were present. The aforementioned categories serve as a thorough framework that encompasses the diverse range of obstacles encountered by construction projects in Nigeria.

RECOMMENDATIONS

The study suggests several recommendations to minimize overruns in building project costs and schedules in Nigeria and the surrounding area. These include improving project and contract management, enhancing contractor

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site management, ensuring timely preparation and approval of technical studies, investing in local workforce training, making wise financial decisions, monitoring spending and budgets, and ensuring proper time management. Additionally, keeping current cost data on project specifications and ensuring reasonable and well-scheduled contract periods can help prevent overspending and delays.

Contribution to Knowledge

The study on Nigerian construction projects' project management practices impacts cost and time overruns, providing insights for the industry, identifying critical factors, and improving project capabilities. It informs policy-makers, develops theoretical frameworks, and improves resource allocation and performance.

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