Factors Influencing Cost Performance of Construction Projects in Kaduna State

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The prime objective of every client is to accomplish the project within the agreed budget and time. The construction industry has been described as one of the most fragmented, multifaceted, time and material-driven industry. The industry is always faced with challenges such as low quality, low productivity, delay, cost overrun, etc. The issue of cost does have obvious implications for the key stakeholders in particular, and the industry in general. Therefore, this study aimed at exploring those factors that influence cost performance of the construction projects in Kaduna State with a view of establishing the bases for professionals to note when carrying out cost management of any project. The objective of this study is to establish the main factors influencing cost in the Kaduna state construction projects. This study was carried out in Kaduna state, Nigeria. The Methodology used was quantitative research approach. With the aid of a questionnaire survey, data was collected using Simple random sampling. The target population of this study was 827 while the sample size used was 270. 198 questionnaires were filled and returned. Exploratory factor analysis was used to analyse the data so as to identify factors capable of being understood. Out of which seven underlying factors were identified. The seven-component solution explained a total of 75.782% of the variance explained with component 1 contributing 19.250%, component 2 contributing 14.585%, component 3 contributing 11.737%, component 4 contributing 10.744%, component 5 contributing 7.813%, component 6 contributing 6.872% and component 7 contributing 4.781% establishing the factors influencing cost performance in the Kaduna state construction projects. They are: Project Management Factor, Expertise and Market Forces Factors, Contract Management Factors, Contractual and Socio-economic Factors, Government Policies and External Factors, Procedural and Standards factor and, Experience and Service Cost Factor. Hence, concluded that much focus should be placed on these factors in order to reduce the cost of construction project, enhance construction cost performance for the client and generate confidence within the construction industry for professionals. The study recommended that the clients, consultants and contractors should undertake the execution of construction works with deliberate and due diligence towards minimizing these factors influence on the cost of construction project as identified from the study.
Keywords: Construction, project, performance, Nigeria, construction stakeholders

INTRODUCTION

Cost is one of the leading factors measured when assessing construction project success (Olukyode *et al.,* 2015). This is as a result of the fact that cost is the backbone and driving force of the project throughout the construction phase. Cooke and Williams (2013) explained that a completed project may not be referred to as successful unless, it is proven to be executed within the budget set for it except there is a change in scope.

According to Eshofonie (2008), the prime objective of every client is to achieve the project within the agreed budget and time. The construction industry has been described as one of the most fragmented, multifaceted, time and material-driven industry. The industry is always faced with challenges such as low quality, low productivity, delay, cost overrun, etc. The issue of cost does have obvious implications for the key stakeholders in particular, and the industry in general (Mbachu and Nkado, 2004). To the client, high cost suggests additional costs on those initially approved at the onset, resulting in less returns on investment. To the end user, the added costs are passed on as high rent payment/ tenancy costs or charges. To the consultants, it means inability to deliver value-for-money and could tarnish their reputation and result in loss of confidence reposed in them by clients. To the contractor, it implies loss of profit through penalties for non-completion on account of penalties and liquidated damages, additional costs, damaged reputation, legal action and loss of opportunity (Eshofonie, 2008). Hence, an effective cost management strategy is therefore necessary.

Mac-Barango (2018) described cost management system as a process that should be employed throughout the lifecycle of a project from the inception to the final completion and final payment to the contractor. In the light of this, the timelines and cost effectiveness of various operation and decision carried out will determine to an extent the magnitude of cost that could be saved on the project within the construction project cost in Nigeria.

Sustaining a stable cost forecast on construction projects had been until recently an issue of serious concern both to the client, consultant and project contractors. Cost deviation from initial cost plan, had been prevalent on construction site (Olukyode *et al.,* 2015). These are attributed to inflationary pressures,

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increases in material prices and workmen's wages, difficulties in obtaining construction materials, construction delays, deficiencies in cost estimates prepared by the consultants and the unexpected sub-soil conditions (Musarat *et al.,* 2021). It is uncommon to see construction projects completed within the budget. This can be accredited to the fact that construction cost is affected by a large number of factors arising from the multidisciplinary nature of the construction industry that involves many parties, such as the owner, various professionals, contractors and suppliers (Mac-Barango, 2018).

Sa'id and Azmi (2022) noted that fraudulent practices and kickbacks occasioned by greed are perpetrated by some major players in the construction industry which is an important factor affecting construction cost in Nigeria. As such, this has led to many diverse problems such as arbitral cases, abandonment of projects, contractor losing profit through penalties or non-completion. Also, negative word of mouth that could jeopardize the contractor's chances of winning further jobs if at fault. Similarly, some unclear contract procedures lead to disputes, project delay and cost overrun.

Therefore, this study aimed at exploring those factors that influence cost performance in the Kaduna state construction projects with a view of establishing the basis for professionals to note when carrying out cost management of any project. The objective of this study is to establish the main factors influencing cost in the Kaduna state construction project. This will help close the gaps in budget planning, resource allocation, risk management, decision-making, benchmarking and performance evaluation and stakeholder communication. This study was carried out in Kaduna State, Nigeria.

LITERATURE REVIEW

The construction industry is one of the fastest-growing sectors in Nigeria and is responsible for contributing up to 50% to the domestic fixed capital formation, and about 6.83% of the Gross Domestic Product (GDP) in the second quarter of 2020 (Olanipekun & Saka, 2019). It boosts infrastructural development and is also a major source of sustainable employment opportunities (Guardian Nigeria, 2022).

Construction projects in Nigeria are driven by both the government and private investors. The government provides key infrastructure such as roads, bridges, dredged water ways and ports, and railways via several means including full government financing, public-private partnerships (PPPs), multilateral development banks (MDBs), and bilateral creditors. (Eshofonie, 2008). Due to the increasing cost of key infrastructure projects in the country and dwindling government financing, the government has made use of PPPs as a tool to finance projects for which the government was not able to secure debt financing. Based on the proposed share of investment across critical sectors in Nigeria, the housing sector is expected to account for 11% of this fund while transportation will account for 25% of infrastructure investments. (Husseini, 2014).

Furthermore, the construction industry is said to have contributed about half of the total stock of fixed capital investment in the Nigeria economy. Yet the construction industry is facing a lot of challenges in achieving project cost performance in some of its project due to some factors. One of the top challenges is cost overrun, which occurs when a project exceeds its pre-planned budget. A McKinsey study estimates that 98% of large construction projects deal with cost overruns of more than 30% globally (Richer, 2023).

Factors Influencing Cost in the Nigerian Construction Industry

Table 1 shows factors identified as factors influencing cost in the Nigerian construction industry

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Table 1: Factors influencing cost in construction projects

S/No.	Factors influencing cost of construction project.	Authors
1	Supplier manipulations, Poor financial control on site, Government policies, inaccurate estimating, Contract management, Lack of productivity standard, Site characteristics and Insurance cost.	Eshofonie (2008)
2	High cost of machinery	AL– Khaldi (2014), Eshofonie (2008).
3	Waste on site	Eshofonie, 2008), Olukyode *et al.* (2015)
4	Lack of coordination between designers and contractors	Mansfield *et al.* (2019), Eshofonie, (2008).
5	Bureaucracy in tendering method	(Elinwa & Silas, 2019), (Eshofonie, 2008).
6	Material specification	Nur and Ismail (2018), (Eshofonie, 2008).
7	Incorrect planning, Contractual procedures, Dispute on site, Absent of construction cost data, Unforeseen site condition, Design changes and Mistakes and discrepancies in contract document.	Mac-Barang (2018)

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8	High cost of labour	Emmanuel and Anjiba (2020),
9	Mode of financing bond and payment	Omole (2016)
10		Mac-Barang (2018)
11	Economic stability	AL– Khaldi (2020)
12	Project financing	Mansfield *et al.* (2019)
13	Contractors cartel	Nuru and Ilias (2014)
14	Duration of contract period	Oluwoye and Crawford (2015)
15	High cost of transportation, Relationship between management and labour	Cunningham (2013)
16	Wrong method of estimation	Mansfield et al (2019), Olukyode *et al.* (2015)
17	fluctuations of prices of materials	Nur and Ismail (2018)
18	Inadequate production of raw materials	Hussein (2014)
19	Plan shape	Elinwa and Silas (2016)
20	Political interference	Omole (2016)
21	Poor technical performance, Fraudulent practices and kickback, Previous experience of contractors, Cost of materials	Olukyode *et.al* (2015)
22	Inadequate labour availability	Emmanuel and Anjiba (2020)
23	Long period between design and tendering time	Olukyode *et al.* (2015), Omole (2016)

RESEARCH METHODOLOGY

This study has to do with the construction industry Stakeholders, specifically the clients, consultants and the contractors hence, their opinion on the subject matter will be of great importance. Thus, this study employed a quantitative research approach. A questionnaire survey was used to collect data by physical dissemination. The sampling techniques was both stratified and simple random sampling technique due to the nature of the respondents. The client in this study comprises of are the total number of tertiary institutions in Kaduna state. These are: Kaduna state university (KASU), Kaduna State College of Education Gidan-Waya, Federal School of Statistics Manchock, Kaduna State College of Nursing and Midwifery Kafanchan, Nok University Kachia, Nuhu Bamali Polytechnic, Federal College of Education Zaria, Greenfield University Kaduna, Ahmadu Bello University Zaria, National Open University of Nigeria, Nigerian Defense Academy (NDA), Air Force Institute of Technology, Federal Cooperation College Kaduna, Jama'tu College of Education Kaduna and Kaduna State Polytechnic. The target consultants for the study include Registered: Quantity Surveyors, Architect, Electrical Engineers and Mechanical Engineers. The contractors are those registered with the Kaduna State Public Procurement Authority. Table 2 shows the total target population for this study.

Table 2: Target population and sample size

S/No.	Categories	Population	Source	Percentage	Sample size
1	Client	15	Existing Tertiary institutions in Kaduna State	1.80%	5
2	Consultant				
	Quantity surveyors	172	QSRBN (2022)	20.80%	56
	Architect	245	ARCON (2022)	29.63%	80
	Civil and Services Engineer	300	NSE (2022)	36.28%	98
3	Contractors	95	KADPPA (2022)	11.49%	31
	Total	**827**		**100.00%**	**270**

For an inference to be made on a population, a sample size which represented the population must also be established. To achieve this, according to Bartlett *et al.* (2001), their table for determining minimum returned sample size for a given population size for continuous and categorical data, the closest to this study's population of 827 is 900 and

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the sample size to be used should be 270. Therefore, 270 was used but 198 respondents only were able to completely give their opinion on this study which is to say about 73.33% responded. According to Nulty (2008), the overall average acceptable response rate was 55.6%. Thus, the response rate of this study is said to be adequate. This was followed by the used of the "statistical package for social sciences (SPSS)" software version 24 towards performing Exploratory Factor Analysis (EFA) as observed by Rahn (2018), that Factor analysis enables researchers to explore ideas by way of variable reduction to small number of unrevealed factors capable of being understood.

RESULTS

Exploratory Factor Analysis (EFA)

Yong and Pearce (2013) opined that the far-reaching purpose of factor analysis is to summarize data so that relationships and patterns can be easily interpreted and understood. For that reason, it is normally used to regroup variables into a limited set of clusters based on shared variance. Hence, it helps to isolate constructs and concept. The inspection of the correlation matrix revealed the presence of many coefficients of 0.4 and above. Below are the findings.

Table 3 shows the KMO and Bartlett's Test for Factors influencing Cost in Construction Project of which the Kaiser-Meyer-Olkin Measure of Sampling Adequacy value is 0.766, which is greater than the proposed minimum value of 0.6 (Kaiser, 1970; Kaiser, 1974) and Bartlett's Test of Sphericity (Bartlett, 1954), was statistically significant, encouraging the correlation matrix factorability. Revealing the presence of Seven (7) components from the Principal Components Analysis (PCA) with an eigenvalue exceeding 1.

Table 3: KMO and Bartlett's Test for Factors influencing Cost in Construction Project.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.766
Bartlett's Test of Sphericity	Approx. Chi-Square	5091.167
	Df	105
	Sig.	.000

a. Based on correlations

To help interpret these seven components, varimax rotation was performed. The rotated solution revealed the presence of a simple structure (Thurstone, 1947), with all components showing a number of strong loadings revealing the presence of seven (7) components from the PCA with some eigenvalues exceeding 1. The seven-component solution explained a total of 75.782% of the variance explained with component 1 contributing 19.250%, component 2 contributing 14.585%, component 3 contributing 11.737%, component 4 contributing 10.744%, component 5 contributing 7.813%, component 6 contributing 6.872% and component 7 contributing 4.781% as shown in Table 4.

Table 4: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.967	19.250	19.250	5.967	19.250	19.250	4.448	14.347	14.347
2	4.521	14.585	33.834	4.521	14.585	33.834	4.008	12.930	27.277
3	3.639	11.737	45.572	3.639	11.737	45.572	3.990	12.870	40.147
4	3.331	10.744	56.316	3.331	10.744	56.316	2.843	9.170	49.317
5	2.422	7.813	64.129	2.422	7.813	64.129	2.656	8.568	57.885
6	2.130	6.872	71.001	2.130	6.872	71.001	2.438	7.863	65.748
7	1.482	4.781	75.782	1.482	4.781	75.782	2.169	6.996	72.744
8	.935	3.016	86.555						
9	.817	2.634	89.189						

Extraction Method: Principal Component Analysis.

The interpretation of the seven components whose variance is explained in Table 4 is shown in the Table 5.

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Table 5. Rotated Component Matrix[a] for Factors influencing Cost in Construction Project

	COMPONENT							
	1	2	3	4	5	6	7	8
Design changes	.911							
incorrect planning	.794							
Waste on site	.751							
Fraudulent practice and kickback	.750							
Poor financial control on site	.622							
Cost of materials		.956						
High cost of machinery		.938						
Wrong method of estimation		.921						
Suppliers manipulations		.698						
Dispute on site			.921					
High cost of labour			.777					
Fluctuations of prices of materials			.768					
contract management			.707					
mode of financing bond and payment			.407					
Contractors cartel				.806				
Duration of contract period				.756				
Mistakes and discrepancies in contract document				.562				
contractual procedures				.476				
Economic stability				.434				
Lack of coordination between designers and contractors				.403				
Government policies					.845			
Material specifications					.845			
Inadequate production of raw materials					.547			
Poor technical performance						.769		
Lack of productivity standard						.695		
Absent of construction cost data						.672		
Insurance cost						.591		
High cost of transportation							.770	
Previous experience of the contractor							.675	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 13 iterations.

DISCUSSION

From the analysis and findings, seven (7) groups of factors were identified to be the underlying factors influencing on cost performance in construction projects in Kaduna State. They are hereby, explained as follows:

Project Management Factors

Project management is known for the use of specific knowledge, skills, tools and techniques to deliver something of value to people. It uses processes, skills, tools and knowledge to complete a planned project and achieve its goals. It differs from general management because of the limited scope of a project (PMI, 2023). According to the Association for Project Management (2023), there are 12 success factors that can be used as a framework for success. From these factors, five were found to have the strongest and most consistent relationship with the traditional measures of project success: time, cost and quality. These were: Project planning and review, competent project teams, clear objectives and goals, top management support, effective communication. Also, Other factors that can contribute to project success include stakeholder engagement, risk management, change management, resource allocation, and project governance. All these will help achieve project success.

On the other hand, the analysis grouped these factors due to their shared variance. They are: Design changes, Incorrect planning, Waste on site, Fraudulent practice and kickbacks, Poor financial control on site are signs of poor project management by the professionals, contractor and client. In project management these pose a threat to the success of any project cost hence having an influence on project cost negatively.

Expertise and Market Forces Factors

These are two factors that can influence the competitiveness and attractiveness of any business. Market forces are the factors that influence the price and availability of goods and services in a market

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economy, that is an economy with the minimum of government involvement. Market forces push prices up when supply declines and demand rise and drive them down when supply grows or demand contracts (Market Business News, 2023). Expertise is the knowledge or skill in a particular field or subject area. It is an important factor in determining the competitiveness of a project. A company with expertise in a particular field can offer better products or services than its competitors (Kenton, 2023). With these in mind the findings show that the Cost of materials, High cost of machinery, Suppliers manipulations are being influence by market forces while, wrong method of estimation is as a result of the lack of proper expertise in estimating. Therefore, stakeholders in the construction industry needs to pay keen attention to these.

Contract Management Factors

This is the process of managing contract creation, execution, and analysis to maximize operational and financial performance at an organization while reducing financial risk (Conlin, 2023). The success of contract management depends on three factors: Contract management policy and contract management processes sufficient and competent staff and process-supporting systems contracts that are created with the desired contract management approach in mind (Tonkes, 2023). From the analysis, Dispute on site, High cost of labour, Fluctuations of prices of materials, Contract management, Mode of financing bond and payment were identified to be under this group. They are all risky in project execution. Therefore, proper contract management is essential for the project to perform within budget.

Contractual and Socio-economic Factors

Contractual and socio-economic factors are two different concepts. Contractual factors refer to the terms and conditions of a contract between two parties. Socio-economic factors refer to the social and economic conditions that influence an individual's life. These factors include access to education, healthcare, employment opportunities, and social support systems (world Bank, 2010). From analysis, the following factors were grouped together: Duration of contract period, Mistakes and discrepancies in contract document, Contractual procedures, Economic stability, Lack of coordination between designers and contractors and contractors' cartel. These, factors are contractual and social economic issue. They are risks flags in any contract and has great influence on project cost performance. Therefore, stakeholders should be mindful of these.

Government Policies and External Factors

Government policies and external factors can have a significant impact on Projects and organizations. A PESTLE analysis studies the key external factors (Political, Economic, Sociological, Technological, Legal and Environmental) that influence an organization. It can be used in a range of different scenarios and can guide people professionals and senior managers in strategic decision-making (Chartered Institute of Personnel and Development, 2023). Hence, Government policies, Material specification and inadequate production of raw materials are seen to be in the same group from the data analysis. These factors do have an influence on project cost and directly affects the performance of the project cost both positively and negatively. Therefore, stakeholders are to critically consider these factors during project planning.

Procedural and Standards factors

Procedural and standards factor are important in many industries. A standard operating procedure (SOP) provides clear-cut directions and instructions as to the steps necessary to complete a specific task or process. SOPs are used in a variety of industries to ensure that tasks are completed consistently and efficiently, and to reduce the risk of errors or omissions (Oragui, 2023). Procedures, including method statements, work instructions, permits to work etc., are agreed safe ways of doing things. They usually consist of instructions and related information needed to help (Health and Safety Executives, 2023). A procedure manual, also known as a policy and procedure manual, is a resource for employees that establishes guidelines and protocols for all the major principles, actions and decisions of a department or organization. From the analysis, Poor technical performance, lack of productivity standard and absent of construction cost data and insurance cost are all identified in this group to influence the cost of construction project. Therefore, construction stakeholders need to take proactive measures to minimize these risks and avoid cost overruns.

Experience and Service Cost Factors

Experience and service cost factor are important metrics for construction professionals to track as they can help identify areas for improvement in client service and support (Qualtrics, 2023). In that light, high cost of transportation and previous experience of the contractors are critical when it comes to project performing within budget.

CONCLUSION

For construction cost to perform as expected, it is a function of several variables. This study looked into the factors influencing cost in the Kaduna state construction project and identified some underlying factors that influence the cost performance of construction project in Kaduna state. From the data collected and analysed, seven (7) factors were discovered to have a potential influence on the cost performance of the projects within the budget. These factors had strong loadings revealing the presence of seven (7) components from the PCA with eigenvalues exceeding 1. The seven-component solution explained a total of 75.782% of the variance explained with component 1 contributing 19.250%, component 2 contributing 14.585%, component 3 contributing 11.737%, component 4 contributing 10.744%,

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component 5 contributing 7.813%, component 6 contributing 6.872% and component 7 contributing 4.781%. These factors are, hence named as project management factor, expertise and market forces factors, contract management factors, contractual and socio-economic factors, government policies and external factors, procedural and standards factor and, experience and service cost factor. Hence, much focus should be placed on these factors in order to reduce the cost of construction project, enhance construction cost performance for the client and generate confidence within the construction industry for professionals. Also, the key players that is, clients, consultants and contractors should undertake the execution of construction works with deliberate and due diligence towards minimizing these factors influence on the cost of construction project as identified from the study.

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