A QUANTITATIVE STUDY ON THE MAGNITUDE OF CONSTRUCTION CLAIMS IN CONSTRUCTION PROJECTS IN NIGERIA

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ABSTRACT

The administration of construction projects in Nigeria is plagued by excessive claims which attract additional costs, and as well as leading to an adversarial relationship among project stakeholders. The purpose of this research is to assess construction claims' relationship with the original contract sum of construction projects in Nigeria. A quantitative approach in which archival data from 53 completed projects involving claims was used. Numerical data collected were analyzed using percentile ranking and Pearson's correlation. The study revealed that differing site conditions is the most frequent type of claim in construction projects in Nigeria. However, delay claims are uncommon because none of the projects experienced delay claims. The results also showed that contract ambiguity caused the highest number of claims with an average of 22% of the original contract sum while the overall claims averaged 60% of the original contract sum. This study will aid the understanding of the sources and the influence of claims on construction projects. This understanding will inform decisions on the deployment of strategies, approaches, and tools for inspiring construction project management.

Keywords: Claims, Contract, Construction, Correlation, Nigeria

1. INTRODUCTION

The construction industry is subject to inevitable changes because of the nature and complexity of operations and activities involved in the process of realising its final products. He et al. (2015) argued that construction projects are complex because they involve many human and non-human factors, usually have a long duration, involve various uncertainties and are characterized by complex relationships among participants. Therefore, the need to make changes during a construction project is a matter of practical reality. Commentators conclude that changes plague the construction projects, resulting in a wide range of claims the final effect of which is cost and time overruns (Singh & Kandan, 2005). A claim in the context of a construction project can be described as a legitimate request by a contractor for additional compensation on account of change in contract terms (Khekale & Futane, 2015). The request may be for additional time or cost, to enable the contractor to

successfully complete the works in project. Leegard (2011) described a construction claim as an unresolved change which includes a demand for money, time or some other adjustment in contract terms. Oke and Makinde (2011) observed that the main purpose of a claim is to cover the cost of the occurrence of unforeseen circumstances which result from default by the employer, or circumstances beyond the control of both parties. Yates and Esptein (2006) argued that construction claims result from an enormous range of factors such as improper drafting of contract documents, inaccurate preparation of bids, failure of the clients in their responsibility to provide access to the site, inability to take required action in a timely manner, or inadequate contract administration on the part of stakeholders. Kahssay (2003) in a survey in Ethiopia concluded that construction claims occurred when the terms and conditions of the contract change in such a way that the contractor is unable to recover expenses or profit. Chovichien and Tochaiwat (2006) in a survey in Thailand observed that construction claims occur in nearly every construction project. It should be noted that a construction claim is not a one-way affair because the employer and contractor have the right to claim against each other.

In Nigeria, the institution of the Budget Monitoring and Price Intelligence Unit (BMPIU) set up by the Federal Government in 2002 (now renamed the Bureau of Public Procurement, BPP) has not solved these problems. Ezekwesili (2005) observed that the problems faced by the BPP include ignorance and lack of cooperation among some officials to comply with the provisions of the circulars, inadequate definition of projects' scope, lack of involvement of professionals in some projects' packaging and supervision, inadequate documentation, and delays in responding to issues. As long as projects continue to exceed their budget, other projects will be dropped from the programme or the scope will be reduced to provide the funds necessary to cover the claims arising from cost growth. Such actions exacerbate the deterioration of a nation's infrastructure development. Therefore it is important to study the current trend and nature of construction claims in Nigeria.

Previous studies on construction claims in Nigeria have considered either a single claim head or treat claims holistically: none has considered different claim heads and used archival data to determine the magnitude of each claim head. In the Nigerian context, a considerable number of studies have been conducted by scholars to explain construction claims' management. Prominent among these are those of Omoregie and Radford (2006) who studied the causes and effects of infrastructure delays and cost escalation in Nigeria. Also, Akpan and Igwe (2001) investigated the methodology for determining price variations in project execution in Nigeria. Alabi and Razak (2013) worked on the case studies of claims arising from building collapses in Malaysia, Nigeria, Singapore and Thailand. Aibinu and Odeyinka (2006) worked on construction delays and their causative factors in Nigeria. Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in the Nigerian construction industry. Other relevant studies on construction claims include those of Oke and Makinde (2011) who researched modelling the magnitude of contract claims on selected building construction projects in Abuja, Nigeria. Kehinde

and Aiyetan (2002) also worked on the nature of contractual claims in building contracts in Nigeria. Oladapo (2007) studied a quantitative assessment of the cost and time impact of variation orders on construction projects in Nigeria. It is in this context that this study evaluated the frequency and magnitude of different types of construction claims in the study area. The relationship between different types of construction claims and the initial contract sum was also assessed. In line with the specific objectives of the study as stated above, a null hypothesis was postulated. This aided the conclusion on the statistical relationship between the magnitude of various types of construction claims and the original contract sum. The hypothesis for this research is that there is no significant relationship between the magnitude of various types of construction claims and the original contract sum.

2. LITERATURE REVIEW

There is no gainsaying that the twin problem of cost and time overruns may not yet be over as they still characterize construction projects in most parts of the world, especially in developing countries (Chigara et al., 2013; Ogunsemi, 2002). Mohamed et al. (2011) concluded that construction claims occur owing to the opportunistic bidding behaviour of contractors. This implies that contractors can bid low if there is an opportunity to recoup their losses through claims during the execution of the contract. Oyewobi et al. (2011) stated that the Nigerian construction industry is extremely susceptible to ethical erosion due to the heterogeneous nature of the industry which makes it imperative for construction professionals to exhibit a high level of professional ethics. In addition, one of the circumstances that deter meaningful development in the Nigerian construction industry is the menace of corruption and corrupt practices which in turn result in time and cost overruns. Obiegbu (2005) identified unethical practices in construction projects to include favouritism in the selection of contractors and the awarding of contracts to incompetent contractors in Nigeria through corrupt and informal relationships instead of merit.

Ho and Liu (2004) examined the dynamic nature of construction claims and opportunistic bidding and confirmed that construction claims are considered by many participants to be one of the most disruptive and unpleasant events of a construction project. Zaneldin (2006) found that claims are common in construction projects and can happen as a result of several factors that contribute to project delay or increased project cost, or both. Ren et al. (2003) confirmed that analysing various types of claims is an important task in resolving the claims. Therefore, it is important to critically review previous studies on the types and magnitude of construction claims in order to identify the gap in literature and determine the focus of this study. There have been several research studies in the area of the types and magnitudes of construction claims. There are two schools of thought on the classification of

construction claims. The first group of researchers categorized construction claims according to the conditions of contract, while the second group classified construction claims on a legal basis.

The first groups include an empirical study by Oladapo (2007) on the quantitative assessment of the time and cost impact of variation orders (as a particular type of claim) on construction projects in Nigeria. The results of the study indicated that variation accounted for about 79% and 68% of the cost and time overruns respectively. Moura and Teixeira (2007) examined the types of construction claims in Portuguese construction projects and identified eight types of construction claims. The results revealed that direct changes by the owner are the most expensive type of claim. In a survey in the United Arab Emirates (UAE) Zaneldin (2006) collected information for 124 claims related to different projects and classified them into six types of construction claims. The results of the study indicate that 'change claims' were the most frequent type of claim, based on the perception of the stakeholders. Fonseka (2008) also gathered opinions of the stakeholders on construction claims covering the causes, types, frequency and ways of minimising the claims in the UAE. The results identified six types of construction claims and concluded that the most common type of claim is extra works or changes. Similarly, Asiedu and Alfen (2014) found that variations and additional works resulting from changes in site conditions are the sources of claims that contribute to cost overrun in Ghana.

The second groups of researchers are those who categorize construction claims by considering the legal basis. In a study in India, Apte and Pathak (2016) classified construction claims into five major types, namely contractual claims, extra-contractual claims, quantum merit claims, counterclaims, and ex-gratia claims. The results of these studies were based on theoretical literature reviews and personal experience. Al Mohsin (2012) in a study in Oman identified three types of construction claims, namely common law claims, ex-gratia claims, and contractual claims. The results of this study were also based on a theoretical literature review and personal experience of the author. Several attempts were also made to study the magnitude of construction claims. Halloum and Bajracharya (2012) concluded that 93% of the projects experienced cost overrun, and more than 90% witnessed time overrun in Abu Dhai, UAE. Memon, Rahman and Azis (2012) found that 92% of construction projects witnessed time overrun, and 89% of the projects experienced cost overrun. A survey on delay in the Florida construction industry by Ahmed et al. (2003) revealed that the major cause of delay is building permits claims and that 44% of the delays on construction sites are caused by the contractors.

Aibinu and Jagboro (2002), in a survey on the effects of construction delay on project delivery in Nigeria, revealed that cost and time overruns amount to about 18%. Similarly, Omoregie and Radford (2006) used the results of a survey by Mansfield et al. (1994) on infrastructure delays and cost escalation causes and effects in Nigeria. The results indicate that the minimum average percentage escalation of

cost was 14% while the minimum average percentage escalation period of projects was found to be 188%. Shehu et al. (2014) claimed that projects often suffer from cost overruns in Malaysia as approximately 55% of projects were completed above the contract sum. From a detailed literature review, it was found that most of the studies on construction claims are common within the context of the developed world while only a few studies were conducted in Nigeria. Hence, the following questions served as guide for this paper so as to address the identified problems: (1). How frequent are the different types of construction claims? and (2) What are the magnitudes of different types of construction claims?

3. RESEARCH METHODOLOGY

The study adopted a quantitative (statistical) method and archival data were collected from 53 projects that had been completed relating to construction claims. Rowley (2002) suggested the use of case study research to assess contemporary events when it is difficult to manipulate relevant behaviour. Rowley (2002) described diverse sources of evidence that are employable in case study research which include documents, artefacts, interviews and observation. In this study, a series of activities including company visits and document analysis were carried out. All the projects considered were constructed over a period of nine years (2006 to 2014) in Ondo State, Nigeria. There were five health services buildings, thirty-four institutional buildings, two residential buildings, three social services buildings and nine office buildings. The information collected on claims contained the activities of both the main and subcontractors. Only 35% of the building projects had more than four floors, while the remaining 65% had fewer than four floors. The costs of the projects ranged from US$1.31 million to US$26.28 million. The assumptions made in the study include (i) the type of claims used as independent variables are linearly related to the original contract sum. This assumption ensures that the variables are linearly related, and violations of this assumption may indicate that non-linear relationships exist among variables; (ii) change in project characteristics and specifications do not materially affect the relationship between the types of claims and original contract sums. The reason for this is that although the claims may be as a result of the change, the focus is mainly on claims and not on the cause. Percentile ranking was used to assess the frequency and magnitude of various types of construction claims while Pearson's correlation was employed in evaluating the relationship between the magnitude of various types of construction claims and the original contract sum or for testing the null hypothesis.

The percentage of occurrence (POC) of different types of claims is calculated by dividing the summation of projects with a particular type of claim by the summation of number of occurrences of different types of claims and the result is multiplied by 100:

$$POC = \frac{\Sigma P}{N}$$

where ∑P = the summation of number of projects with that type of claim and N = the summation of the number of occurrences of different types of claims = 138. For example in Table 1, the frequency of different site condition claims = 46/138*100 = 33.33%.

The relationship between the magnitudes of claims and average initial cost is expressed as the average claim for each type of claim divided by the average initial cost and the result multiplied by 100

$$R = \frac{AC}{AIC}$$

where AC = average claims for a particular type of claim and AIC = average initial costs for the number of projects with the claims. For example, in Table 2, contract ambiguity claims = 0.169/1.227*100 = 13.77%.

Table 1: Frequency of different types of construction claims

Types of claims	Frequency	Percentage	Rank
Different site condition claims	46	33.33	1
Change claims	43	31.16	2
Contract ambiguity claims	33	23.91	3
Extra works claims	13	9.42	4
Acceleration claims	3	2.18	5
Delay claims	0	0.00	6
Total	138	100.00	

In evaluating the relationship between the magnitudes of various types of construction claims and the project contract sums, Pearson's moment correlation coefficient was adopted since the data are numeric and the data set is not categorical (i.e. classifying subjects in predefined 'classes'). Also, Pearson's correlation was used to support the underline assumption of a linear relationship between dependent and independent variables. This statistical technique measures the strength of the relationship between the dependent and independent variables. According to Lakin (2011), a measure of correlation will take a value between - 1 and +1, where +1 represents perfect positive correlation, -1 represents perfect negative correlation, and values in between the range represent varying levels of correlation (including 0 where there is no correlation at all). The value such as 0.9 represents a very strong positive correlation, a value such as – 0.5 represents a moderate negative correlation, and so on.

4. FINDINGS AND DISCUSSION

The data obtained from the 53 construction projects were processed to achieve the aim of this research and the results are presented in this section. Table 1 shows that claims associated with different site conditions occurred in 46 projects which is 33% of the total occurrences and is ranked first, while change claims occurred in 43 projects which is 41% of the total occurrence and is ranked second. The table also indicates that contract ambiguity claims occurred in 33 projects which is 24% of the total occurrences and is ranked third while extra work claims occurred in 13 projects which is 10% of the total occurrence and is ranked fourth. Table 1 further indicates that acceleration claims occurred in three projects which is 2% of the total occurrence and was ranked fifth while none of the projects experienced delay claims. Table 1 shows that some of the observed projects did not experience certain types of claims which is the reason why the highest frequency is less than the total number of projects (53). It can be deduced that differing site conditions accumulate more claims than other types of claims. In addition, delay in construction projects seemingly attracts few or no claims in the study area.

Table 2 indicates that the amount of contract ambiguity claims is 13.77% of the original contract sum and is ranked first. This may be as a result of pressure to meet with bidding time or deliberate action to underbid many competitors with the intention of subsequently recovering costs through the instrumentation of claims. The amount of change claims is 6.07% of the original contract sum and is ranked second. Change is inevitable in most construction projects in Nigeria which may be due to unstable economic conditions as well as clients' desire. The result also shows that the amount of different site condition claims is 2.27% of the original contract sum and is ranked third while the amount of extra works claims is 2.18% of the original contract sum and is ranked fourth. The result further indicates that the amount of acceleration claims is 1.05% of the initial contract sum and is ranked fifth while the overall claimed amount averaged 25% of the original contract sum.

Table 2: Relationship between magnitudes of claims and average initial cost**

Types of claim	Average claim (USD$) Million	Percentage (%)	Rank
Contract ambiguity claims	0.169	13.77	1
Change claims	0.074	6.03	2
Different site conditions claims	0.028	2.28	3
Extra work claims	0.027	2.20	4
Acceleration claims	0.013	1.06	5
Delay claims	0.000	0.00	6
Overall average %		25.34	

**Note: The average initial cost = US$ 1.227 million

Table 3 presents the results of a correlation analysis for the relationship between the original contract sum and various types of claims. Using Pearson's correlation, the relationship between the original contract sum and change claims, acceleration

claims, different site conditions claims and contract ambiguity claims revealed a p-value of 0.000 (correlation coefficient of 0.820, 0.773, 0.499 and 0.870 respectively) as indicated in Table 3. This shows that the relationship is significant at a 1% level of significance. The relationship between the original contact sum and extra work claims also revealed a p-value of 0.021 (correlation coefficient of 0.822). This implies that the relationship is significant at a 5% level of significance. This implies that there is a positive relationship between the original contract sum and various types of claims. The null hypothesis was therefore rejected.

Table 3: Correlation between original contract sum and construction claims

Original Contract Sum	Pearson Correlation	1	.820**	.773**	.499**	.870**	.021
	Sig. (2-tailed)		.000	.000	.000	.000	.882
Change Claims	Pearson Correlation	.820**	1	.939**	-.011	.472**	-.029
	Sig. (2-tailed)	.000		.000	.935	.000	.838
Acceleration Claims	Pearson Correlation	.773**	.939**	1	-.076	.446**	.208
	Sig. (2-tailed)	.000	.000		.587	.001	.136
Differing Site Claims	Pearson Correlation	.499**	-.011	-.076	1	.795**	.025
	Sig. (2-tailed)	.000	.935	.587		.000	.861
Contract Ambiguity Claims	Pearson Correlation	.870**	.472**	.446**	.795**	1	-.032
	Sig. (2-tailed)	.000	.000	.001	.000		.820
Extra Works Claims	Pearson Correlation	.021	-.029	.208	.025	-.032	1
	Sig. (2-tailed)	.882	.838	.136	.861	.820	

**Correlation is significant at the 0.01 level (2-tailed), N = 53

The results of the analysis reveal that the most frequent type of claim is ‘differing site conditions’. This implies that the most commonly occurring claims at construction sites are the alleged ‘differing site conditions’ claims. More often, contractors encounter some conditions at the subsurface level that differ from the evidence contained in the geotechnical report, or other conditions in the field that are different from what was anticipated or illustrated on the plans. Mahfouz, Davlyatov, and Kandil (2016) posited that differing site conditions is considered to be one of the most prominent reasons for claims within the construction industry. In some cases, documents used for past projects are transferred to current projects without proper alignments which eventually give room for claims as a result of variations in site conditions. This, according to Sambasivan and Soon (2007), was described as lack of

adequate site inspection and omission of the necessary geotechnical survey prior to preparation of contract document. This is in contrast with what was obtained in United Arab Emirates where Zaneldin (2006) observed that the most frequent type of claim was changes claims while Fonseka (2008) later found out that delay claims was most frequent. It can be deduced that occurrence of certain claims is relative to locations. For instance, projects in some locations with good and similar topography may necessarily not attract claims with regard to site conditions as applied in this study. Occurrence of claims may also be as a result of design errors, different interpretations of contract documents or incomplete specifications as identified by Apte and Pathak (2016).

The study also revealed that overall construction claims averaged 60% of the average initial cost. Having additional cost as a result of claims, running above half of the initial contract sum is worrisome. Chigara et al. (2013) argued that construction project cost is one of the most difficult issues to manage. Contractors are mainly businessmen, and bidding is a kind of business in which contractors are usually hard-pressed for time and are determinedly looking for a way to underbid a number of competitors. As a result, they may not be able to promptly fix out ambiguities in the contract documents prior to bidding. Consequently, their estimate is based only on certain costs which they think the contract terms will allow the clients to insist upon to ascertain performance. However, the claim on the ground of contractual ambiguity may not be granted in favour of the contractor if the ambiguity was so noticeable and glaring as to necessitate the contractor to request explanation prior to bid submission. One of the likely effects of this will be project abandonment, especially when the owner could no longer fund the project owing to excessive claims. This is a pointer to the reason why project abandonment is prevalent in Nigeria (Olusegun & Michael, 2011). Within the period of one decade (between 2006 and 2016), construction claims in Nigeria seem to have escalated, comparing the finding from this study with previous finding by Omoregie and Radford (2006) who observed that costs of projects in Nigeria increased by a figure of 14%. Purposeful tender that satisfies the clients' requirements should be considered for the award of contract rather than the 'lowest responsive tender' as currently stipulated by the Public Procurement Act of 2007 in Nigeria. This is to discourage the award of contract to contractor that based his bid on opportunistic behaviour which will result in excessive claims during the execution of the contract.

The result of Pearson's correlation shows that a strong positive relationship existed between the original contract sum and both change claims and contract ambiguity claims. The implication of this is that most changes introduced after the contract has been awarded do attract additional cost. There are different factors responsible for change in construction projects as discussed by Sun and Meng (2009). Contract ambiguity-related claims also correlate significantly with the original contract sum. When the contract is poorly written by the quantity surveyor

or any other cost expert, it will create room for claims by the contractor which will invariably affect original contract sum. This is in agreement with the opinion of Zaneldin (2006) who posited that contract ambiguity could attract significant claims in construction projects. The result indicates that a positive relationship exists between the original contract sum and acceleration claims. Also, the relationship between differing site conditions claims and original contract sum is positively significant. In the event of unforeseen circumstances that delay the job and shorten the contractor's completion time or when the project owner requires the contractor to complete the work preferably earlier than initially scheduled, acceleration claims can be accrued. In agreement with Ahmed et al. (2002), acceleration claims can bring about additional cost in construction projects.

Unexpected site conditions can be the most bothersome, complicated, and costly problems to overcome on a construction project. In spite of great advancements in technology, Nelson (2016) posited that existing utilities are often wrongly positioned in the plan, underground boulders are sometimes larger than what they represented in the geotechnical report, and soils are more saturated than boring tests had revealed. In addition, the discovery of buried human remains during earthwork can cause significant delays. This is particularly relevant here in Nigeria where tribal graves are rarely identified prior to construction works. Although a 'changed conditions clause' is normally introduced in the contract to give room for non-adversarial claims, contractors could forfeit their claims if it is established that proper site investigation was not carried out prior to bidding. It is therefore recommended that site investigation and adequate planning should be carried out in order to reduce the frequency of different site conditions claims. The result further indicates that there is a weak significant relationship between the original contract sum and extra works claims. This could be as a result of the type of contract used for the identified projects. Claims for extra works done by the contractor are guided by the types of contract (Cunningham, 2014). For instance, under a re-measurement contract, claims can be made on extra works without formal instruction prior to work execution, hence there could be more claims than necessary. However, under lump-sum fixed contract, a formal instruction is needed to claim for extra work done by the contractor which limits the number of claims to a reasonable extent. Therefore it can be inferred that more lump-sum contracts were used for the case projects than re-measurement contracts.

5. CONCLUSION AND RECOMMENDATION

Claim in construction projects is one of the critical risk factors that could significantly influence a construction project's cost and time. If project parties ignore this risk, it may cause adversarial relationships and consequential losses. Claims can adversely affect construction project participants by resulting in bankruptcy, lack of

trust or dispute if not properly managed. Hence, in the common interest of all participants it is necessary to forestall the claims from the inception and to minimize them if they eventually arise. This study aims to raise a consciousness of claim potential so that proactive action can be taken regarding claim management. In this paper, six types of claims were identified through the literature review and verified through 53 real-life projects. The most frequent type of claim is related to different site conditions, followed by changes claims while none of the projects used for the study experienced any delay claims. Projects with contract ambiguity had the highest amount of claim while the claims of projects with different site conditions, even though they occur more frequently than other types of claims, accrue lesser amounts of claim in terms of cost. It is expected that claims relating to differing site conditions should attract more claims costs contrary to the finding in this study. This may point to the numbers of such claims that are successful in favour of the contractors. This could also explain the reason why some projects are abandoned in the Nigerian construction industry. The study also revealed that the overall amount claimed by the contractors was more than half of the original contract sum. Thus, the impact of claims on the cost performance of construction projects in the study area is significant. Identification of these claims supports efforts to understand their sources and influence on construction projects.

The findings also provide a better understanding for construction project stakeholders of the importance of early management of risks that could lead to claims during project execution. This understanding enables the enhancement of strategies, approaches, and tools for the better management of construction projects. Given the realisation of the occurrence and influence of different types of claims, the strategies to be employed should be implemented in the planning process during the early stage of a project. The understanding also enables estimators, project owners, and contractors to promptly recognise specific claims that could impact a project in order to mitigate the impact and to establish precise and realistic expectations. Hence, the claims that were significantly correlated to the original contract sum should be considered as core determinants in estimating the cost of uncertainty associated with building projects.

Though the findings are based on archival data from Nigeria, the results are similar to studies conducted in other developing and some developed countries. By giving balanced and sustained attention to the identified claims, and variations between initial project cost and final cost, a prevailing and worrying situation in Nigeria and other countries can be minimised in order to save costs in construction projects. While this study has provided useful information regarding construction claims, care must be taking in interpreting the findings owing to some limitations. For instance, findings from this study are drawn from archival data without considering the causes of the identified claims in relation to the case projects. Another limitation is associated with the assumption of a linear relationship among the variables relationships. It is recommended that future research explores further factors responsible for each of the identified claims as well as exploring a statement neutralising or negating the assumption. Such studies would enable the isolation of the key issues that must be put in place to minimise the occurrence of claims.

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