Lagos Journal of Environmental Studies
Volume 12, Issue 1; October, 2023

Causes of Inadequate Resources for Health and Safety Provisions in Construction Projects

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Abstract

Purpose – The study investigates the causes of inadequate resources for H&S in the Bill of Quantities (BOQ) as a determinant for adequate planning for health and safety provisions of construction workers.

Design/methodology/approach – This study employs a questionnaire survey approach to determine financial provisions for health and safety through BOQ preliminaries. 291 construction professionals participated in the study by providing responses to the questionnaire. Mean Scores and factor analysis were used to analyse the data.

Findings – The study revealed that financial provisions for health and safety in the bill of quantities are inadequate for construction activities during the construction stage; hence, health and safety provisions are limited.

Research limitations– This paper only considered construction professionals in Lagos State; therefore, the findings may not be generalised.

Theoretical/Social/Practical implications – This study recommends that construction professionals should ensure that detailed risk assessment is conducted and all health and safety issues are discussed at the preliminary and the design stages of the construction projects.

Originality/value – More than ever, more importance should be ascribed to health and safety in the administration of construction projects. This will aid a healthy and safe work environment for construction workers and promote multi-stakeholder health and safety education.

Keywords: Bill of quantities, Construction workers, financial provision, Preliminaries, Resources.

1.0 Introduction

The complex nature of work in the construction industry exposes workers to hazards such as accidents, injuries, and fatalities. For example, the International Labour Organisation (ILO) estimates that 100 000 fatalities each year are attributable to the construction industry (ILO, 2012). Although Nigeria is a member of the ILO, statutory regulations relating to H&S practices on construction sites are not enforced or implemented (Umeokafor *et al.,* 2014). Idoro (2008) asserts that there are no policies prescribed for the construction industry in Nigeria. Therefore, contractors, employees of contracting firms, and site workers are left to use their discretion with respect to issues relating to H&S practices. The unhealthy and unsafe environments contribute to the poor execution of projects, which in turn leads to poor labour productivity on sites (Ikpe *et al.,* 2012). Hence, this study is designed to investigate the facilitation of financial provision for construction H&S in Lagos State, Nigeria.

Construction projects poor performance in terms of H&S practices (Ikpe *et al.,* 2012) has resulted in several academic investigations aimed at addressing H & S concerns on construction sites (Koehn *et al*., 1995; Yario & Watcher, 2014, Kukoyi et al., 2017, Kukoyi et al., 2021). Several factors have been identified as significant to the H&S performance of construction projects. They include pre-task and post-task H&S reviews, H&S work procedures, hiring for H&S, cooperation facilitation, employee involvement in implementing specific H&S-related processes, H& S training, communication and information sharing, and accident investigation (Yario & Watcher, 2014). However, some major factors such as lack of commitment, work pressure, ignorance on the part of workers, ineffective institutional structures, and bureaucracy are among the barriers to improving H&S performance in the construction industry (Koehn *et al.,* 1995; Smallwood, 2013; Hadjimanolis & Boustras, 2013). Furthermore, Tam *et al.* (2004) note that the inadequate provision of PPE, inadequate H&S awareness, and inadequate resources for H&S are barriers to effective H&S performance. Zahoor *et al.* (2016) mention that training, non-inclusion of H&S in contract documents, and workers' non-involvement in H&S planning affect H&S performance on sites.

The existing H&S studies have made notable contributions to the research field. However, the H&S problem has continued to bedevil the Nigerian construction sector. This suggests that existing studies have not largely benefited construction organizations or that their recommendations have not been taken up in practice. This necessitated the need for more research to examine key construction areas that could contribute to improving H&S in the construction sector. The need for this research is further justified by the limited H&S research in Nigeria as opposed to other developed economies (Laryea & Leiringer, 2012). Over the years, incident rates have been on the increase in Nigerian construction. Olasupo (2016) and Abdulahi *et al.* (2015) report a five-storey building under construction in Lagos State that collapsed; 30 workers lost their lives, 12 were injured and 76.4% of artisans have been involved in one incident or the other. There is also a similar case of a 21-storey building that collapsed in Ikoyi; a high-brow area in Lagos State resulting in the death of about 45 people and injuring 15 people (Idris, 2022). Okoye (2016) maintains that these reports provide a warning to the largely unreported volume of accidents or near misses on construction project sites. Workers' unhealthy and unsafe work practices such as incorrect use of personal protective equipment (PPE), use of drugs while at work, unethical behaviour, poor hygiene leading to communicable

diseases such as the novel Covid – 19, poor methods of construction have continued to influence the image and performance of the industry (Adebowale *et al*.,2022 and Kukoyi *et al*.,2021). The central question of this study is therefore: "Are there facilitation of financial provisions for H&S through preliminaries in construction projects' in Lagos, Nigeria?"

2.0 Literature Review

2.1 Provision of adequate financial resources

Clients' inadequate financial provisions have been reported by various researchers to have an adverse effect on H&S management on construction sites (Smallwood, 1998; Gambatese *et al*., 2008; Okorie *et al*., 2014, Adebowale *et al*., 2021, Kukoyi *et al*., 2021). Regulations such as the South African Construction Regulation (2014) make it mandatory for clients to be adequately committed financially to their projects (RSA, 2003). Hence, from the pre-planning stage, adequate financial budgets are provided for H&S during the construction process. Okorie *et al*. (2014) and Chouldhry *et al.* (2016) are of the view that clients do not provide adequate financial resources for H&S because H&S is not considered as important compared with other project performance parameters such as quality and time. This results in contractors' not submitting their H&S policy and H&S plan before the start of work. This situation may improve if clients take a leading role in ensuring compliance with H&S.

The client has the obligation as specified in the H&S regulation to establish a team of qualified professionals with H&S competence. This is one of the key responsibilities of clients toward ensuring workers' H&S. Therefore, steps should be taken to enquire about the competence of each stakeholder to be employed. Prequalification of contractors and subcontractors should include H&S competence, knowledge, and training courses attended to ensure compliance. Clients play a critical role in construction H&S. Huang and Hinze (2006) and Kukoyi *et al*. (2017) are of the opinion that clients should be supportive of H&S by being committed at every stage of work. Clients' brief to designers is vital in addressing accidents on construction sites; providing adequate financial support; developing a contract to include H&S as a selection criterion to contractors' prequalification; requiring an H&S programme before work begins; and visiting the site to observe adherence to compliance. Similarly, a qualitative study undertaken by Huang and Hinze (2006) and Kukoyi *et al*. (2021) reveals that clients can influence H&S performance positively by integrating H&S best practices into their organizations' core values and sharing positive H&S values with other stakeholders. These include adequate financial resources for H&S in the bill of quantities (BOQ) and H & S communication to all stakeholders and inspection of the site during construction to evaluate H & S performance of the contractor.

Furthermore, construction H & S also depends on the clients' H & S leadership role. Various studies have revealed that clients' H&S culture and H&S modelling influence the project's H&S performance. Clients' H&S values on a project in turn influences the stakeholders' attitude to H&S (Wu *et al*., 2016; Adebowale et al., 2020; Kukoyi *et al*., 2017; Kukoyi *et al*., 2021). Clients' positive influence on H&S will safeguard the H&S of

workers, reduce construction costs, improve the quality of work, and ensure an overall H&S performance.

Poor performance of construction projects has been linked to several problems facing the industry, such as increasingly sophisticated projects, conflicting client values, changing technology, and changing skills and techniques (Olarewaju, 2016). The implication of these challenges as opined by Olarewaju (2016) and Adebowale et al. (2020) is the poor performance of construction professionals. Poor construction performance and low client satisfaction have been linked to quantity surveyors. Recent research reveals that quantity surveyors' advice to clients accepting the lowest bidder could lead to the reduction in the quality of construction work, which may in turn be linked to delay, cost overrun, and clients' dissatisfaction (Aibinu & Jagboro, 2002; Olarewaju, 2016; Adebowale *et al*., 2020).

2.2 Quantity surveyors' influence on H & S provisions

Traditionally, quantity surveyors engage in cost planning, estimating, contract negotiation, procurement advice, advice on budget, preparation of bills of quantities (BoQ), and the assessment of variations, among others. Quantity surveyors are involved in all phases of the life cycle of construction projects such as feasibility, design, construction, refurbishment, maintenance, and demolition. Quantity surveyors provide advice to clients on procurement and contractual matters. Engagement of the quantity surveyor at the early stages of a project ensures that the client gets 'best' value for monies spent. According to Olarewaju (2016), today's clients are more "…demanding and sophisticated". Projects must be within cost, H&S, quality, and time parameters.

However, a balance between the wants of the client and the resources (money) to satisfy the wants is hard to find. The duty of the quantity surveyor is, therefore, to efficiently utilise the resources available to satisfy these parameters. Therefore, the role of the quantity surveyor is a prominent one in the successful completion of projects. Inadequacies in skill, experience, and knowledge have been documented as challenges facing quantity surveyors in today's construction, specifically in Nigeria (Olarewaju, 2016). For example, inaccurate estimates could hinder the achievement of the project's set objectives. Eyiah-Botwe*et al.* (2015) and Olarewaju (2016) further emphasised the need for quantity surveyors to meet the requirements of other stakeholders in the construction industry based on the current construction culture. Reports show that H&S of workers have been neglected due to the lack of consideration for it during the process of estimating project cost. Choudhry and Zahoor (2016) examine construction site H&S practices in Pakistan. The authors discovered no adequate budget allocation in the bill of quantities for H&S. The absence of finance is perceived to influence the H&S performance of construction contractors. Also, the increased competition in the construction sector means that contractors must reduce their mark-up and cut costs. Cost cutting strategies tend to increase H&S risk at construction sites. However, Ikpe, Hammond, Proverbs, and Oloke (2011) established that the benefits from accident prevention to the cost of accidents is at a ratio of 3:1. This implies clearly an economic incentive for addressing H&S.

3.0 Research Methods

The aim of this paper is to determine the cause for inadequate provisions for H&S in the preliminaries. A review of relevant literature was conducted to understand the subject matter. This study adopts a survey approach. This choice is dependent on the nature of the problem (Saharan, 2003). In addition, Creswell (2012) opined that the survey method has the advantage of securing vast data within a short time frame. A questionnaire was used to collect data from construction stakeholders in the built environment.

The questionnaire was divided into two sections. Section A had details of the respondents and section B had questions on the subject matter based on a 5-point Liker scale of 1 (Strongly disagree) to 5 (Strongly agree). This is to enable the statistical analysis to extract the factors adequately. Firstly, Dosunmu and Iyagba (2013) stated that most construction firms have their head offices in Lagos because Lagos is viewed as an economic base for construction activities, hence, Lagos was chosen for the research. Secondly, it is difficult to assess controlled data of construction professionals from a database therefore registered firms with the Federation of the Construction Industry (FOCI) are used for the study. Further, a convenient sampling method was adopted based on the availability of professionals on site for the research.

The questionnaire was pre-tested to ensure no confusing statements before the questionnaires were distributed by hand and electronically. The questionnaire was pre-tested and piloted with experienced construction stakeholders. Out of the 361 questionnaires distributed for the study, 297 were found adequate for use. 23%, 14% and 12% were Architects, Engineers, and Clients respectively. Construction managers, Quantity surveyors, and project managers were 13% each and Contractors were 11%. Respondents had a mean work experience of about 10 years which indicates that the respondents are knowledgeable in the construction industry therefore the data retrieved for the study can be considered reliable.

The research questions were captured using the mean score value range to ensure consistent classification and interpretations of data (Adebowale, 2018; Kukoyi et al., 2017. Regarding the 5-point scale used in the study, 1 was subtracted from 5, which equals 4; after that, the 4 was divided by 5, equalling 0.8, which becomes the mean score value range. Thus, factors with the mean score value range $>1.00 \leq 1.80$ were considered to have minor to near minor influence, factors with the mean score value range $>1.80 \leq 2.60$ were considered to have minor to near minor influence / near minor influence, factors with the mean score value range $>2.60 \leq 3.40$ were considered to have near minor to moderate influence / moderate influence, factors with the mean score value range $>3.40 \leq 4.20$ were considered to have moderate influence to a near major / near major influence and factors with the mean score value range $>4.20 \leq 5.00$ were considered to have near major to major / major influence. It is on the basis of these mean scores value range that the results of this study have been discussed.

4.0 Analysis and Discussion

Table 1 illustrates the influence of factors in terms of mean scores (MSs) based on the responses to a scale of 1 (Minor) to 5 (Major). Five of the seven factors achieved MSs $> 3.40 \leq 4.20$ between a moderate influence to a near major or near major influence, while

two of the factors achieved MSs > 2.60 ≤ 3.40 between a near minor to moderate / moderate influence. All the factors have achieved MSs above the midpoint of 3.00. H&S is not considered as important compared to cost, quality, and time. Clients' poor understanding of site H&S and project managers' inadequate H&S knowledge relative to the nature of work ranked first, second, and third, with MSs of 3.84, 3.65, 3.49 respectively. It is evident that all the factors have high levels of influence in contributing to inadequate provision for H&S on construction sites. This indicates that the respondents can be deemed to rate the factors between 'average' and 'above average'. This result is similar to prior research findings such as those of Musonda *et al*. (2009), Chouldry *et al*. (2016) and Kukoyi (2021) that indicate limited consideration of H&S as compared to cost, quality, and time by construction stakeholders.

Table 1: Factors influencing adequate financial provisions for H&S

Factor / Issue	Response (%)							MS	Rank
	Unsure	Does not	Minor……				Major		
			1	2	3	4	5		
H&S is not considered as important compared to cost, quality, and time	3.8	3.5	6.6	6.3	12.9	31.1	35.7	3.89	1
Clients' poor understanding of site H&S	4.9	4.2	11.9	9.8	10.1	21.7	37.4	3.69	2
Project managers' inadequate H&S knowledge relative to nature of work	4.2	3.1	6.6	16.1	17.5	29.7	22.7	3.49	3
Contractors' price H & S low to be competitive	8.7	5.2	6.3	12.2	25.9	24.8	16.8	3.39	4
Clients' inadequate financial budgets	2.4	5.2	8.7	18.5	19.9	23.8	21.3	3.33	5
Contract documentation does not include H&S	8.4	3.1	9.4	15.4	18.5	29.0	16.1	3.30	6
H&S competencies of quantity surveyors	10.5	9.4	7.3	12.6	26.6	21.0	12.6	3.24	7

4.1 Factor analysis

This is a method that enables variables with high inter-correlation to be clustered based on the factor loading range between 0.3 – 0.4 (Ho, 2014). The results of Barlett's test of sphericity and Kaiser Meyer Olkin (KMO) indicate that the samples are adequate for factor analysis. This study adopted a factor loading of 0.4 in the SPSS software.

Table 2 presents the factor analysis statistics relative to the factors influencing adequate financial provisions for H&S. The results suggest that all the factors are strongly correlated and have a total percentage variance of 44.406. This may imply that all the factors can influence financial provisions for H&S during the project preliminaries that is

to say that all stakeholders have an influence towards ensuring that financial provisions are made by the quantity surveyors in the bill of quantities (BoQ). Therefore, the factors have an influence on the provision of H&S through H&S preliminaries in the BoQ.

Table 2: Factor analysis for factors influencing adequate financial provisions for H&S

Factor / Issue	**1**
Clients' poor understanding of site H&S	0.543
H&S competencies of quantity surveyors	0.674
Clients' inadequate financial budgets	0.597
Contract documentation does not include H&S	0.630
Contractors' price H&S low to be competitive	0.626
Project managers' inadequate H&S knowledge relative to nature of work	0.459
H&S is not considered as important compared to cost, quality, and time	0.609
% of variance	44.406

Lack of considering H&S during the process of estimating project cost and adequate budget allocation in the bill of quantities are causes of inadequate resources for H&S. Yilmaz and Celebi (2015) opined that inadequate budgets for construction activities have a significant impact on the construction output. Identifying hazards specific to each construction activity reflects the need for clients' understanding of ensuring best H&S practices during construction. Clients not perceiving H&S as important with respect to cost, quality, and time is also a factor. Failure to allocate budgets for the provision of H&S results in inadequate H&S performance of contractors.

Inadequate facilitation of financial provision for H&S resources by the QS in the BoQ results in inadequate contractor resources for H&S. The descriptive statistics show that clients prioritise cost, quality, and time versus H&S. Poor understanding of site H&S by clients and shortage of funding from clients makes it difficult to consider H&S as important. This results in poor H&S performance by construction contractors. According to Adebowale et al. (2020), improving H&S measures have a substantial influence on workers' and projects' performance. Therefore, the client should be informed and educated on the benefits of providing adequate finance for H&S. For example, financial resources for procuring personal protective equipment (PPE) clear included in the BOQ. At the early stage of a project, there should be adequate H&S allocation of resources in the BoQ.

The result is consistent with the findings of Yilmaz and Celebi (2015) which showed that work stresses imposed by budgetary constraints adversely affect H&S performance. Construction Clients lay more emphasis on profit maximisation and do not appreciate the effect that H&S may have on project deliverables until it is too late. This situation may in turn stimulate attitudes and behaviours related to H&S issues on construction sites (Liu *et*

al., 2015). Stakeholders' (such as the client and/or quantity surveyor) influence, which can be positive or negative have the propensity of affecting adequate budgets for H&S, hence contributing to H&S outcomes.

5.0 Conclusion and Recommendations

This study determined the causes of inadequate resources for H&S in construction projects. It also gave a description of the role of quantity surveyors in facilitating financial provisions for H&S in the BoQ. Lack of considering H&S during the process of estimating project cost and adequate budget allocation in the bill of quantities are causes of inadequate resources for H&S. Clients not perceiving H&S as important with respect to cost, quality, and time is also a factor. Failure to allocate a budget for the provision of H&S results in poor H&S performance of contractors.

The descriptive statistics show that clients prioritise cost, quality, and time over H&S. Poor understanding of site H&S by clients and shortage of funding make it difficult to consider H&S as important. This results in poor H&S performance by construction contractors. In addition, the results from the factor analysis show a strong relationship amongst the 7 (seven) variables.

The findings of the study show that all the variables which include: Clients' poor understanding of site H&S, H&S competencies of quantity surveyors, Clients' inadequate financial budgets, Contract documentation does not include H&S, Contractors' price H&S low to be competitive, Project managers' inadequate H&S knowledge relative to nature of work, and H&S is not considered as important compared to cost, quality, and time influence adequate financial provisions for H&S in construction projects in Lagos State, Nigeria.

The results of the study enhance understanding of the factors that influence the inadequate facilitation of financial resources for H&S in construction projects. The findings are expected to contribute to knowledge relevant to construction stakeholders in the construction industry. The limitation of this study lies in the setbacks in using a questionnaire survey such as respondents being biased in opinion hence, taking caution in generalising the findings.

Further research is needed in the H&S training and education of construction professionals in the industry to improve H&S performance in the construction industry in Nigeria. This will enable informed decisions on the formulation and implementation of legislations and policies to foster best H&S practices on construction sites in Nigeria.

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