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Assessment of Safety and Health Performance of Contractors' Construction Projects in Nigeria Using Shassic Method

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Abstract

There is need for the construction industry to comply with necessary law and regulations as regard to safety and health of their workers in order to improve on their safety records. In Nigeria, construction industry loses 5 – 7 % of its workforce annually to construction accidents. This has gaven the industry a poor safety and health record. As such this paper will assess safety and health performance of contractor's construction project in Nigeria using Safety and Health Assessment System in Construction (SHASSIC) method. The assessment is usually carried out in three different approaches i.e document check, site/workplace inspection and employees interview. The result of the assessment show that the performance of the contractors is two (2) stars in ranking. This means that in term of compliance to safety management standard on sites, the construction firms/organizations considered for the work fall within two (2) stars in ranking were all their potential and significant workplace high risks/hazards are partly managed and not properly documented. Therefore, what the industry needs is an act (OSHAct) that provides for the promotion, coordination, administration and enforcement for occupational safety and health. Also, effective application of OSH management system can lead to safety construction work and reduce the rate of accidents on construction sites and improve safety records.

Keywords: construction, management, performance, project sites, safety and health.

Introduction

Construction industry is vital to the development of any nation, as it strongly contributes to the economic growth of any nation. As such there is need for the industry stakeholders to comply with necessary law and regulations as regard to safety and health of workers, most especially during the construction stage. Construction project i.e. a product of construction industry involves a wide range of economic activities such as housing project, commercial building project such as hotels, office building, and high rise building project and civil engineering works i.e bridge construction, Airport, Seaport, Jetty, Tunneling construction etc. At the same time the law of construction health and safety requires action to protect those at work on sites (such economic activities sites) as well as members of the public who may be affected as a result of such activities. Also Occupational Safety and Health Act of 1994 (OSHAct) obligates each employer to provide and maintain a safe and healthful workplace for all employees. Chang (2008) stated that more than 100million people in this world take construction work as a profession and according to Keller and Keller (2009) reported that tens of thousands of construction workers are injured while on the job each year and an average of over 1000 die, while in Nigeria, construction industries lose 5 – 7 % of its workforce annually to construction accidents, (Olatunji *et al.*, 2007). A number of studies have revealed that accidents and injuries in construction in many developing countries such as Nigeria are far higher and worse than in developed

countries such as the UK, US, China and Australia (Idoro, 2007). This is because, the later have active and fully functioning health and safety regulatory bodies and employ innovative and workable safety methods on construction sites. According to Awodele and Ayoola (2005), several hundreds of construction workers are killed each year on Nigerian construction sites, with many more rendered temporarily or permanently disabled. Dodo (2014) reported that accidents on Nigerian construction sites still cause devastating effects on the lives of workers, properties, project delivery times, and have also undercut the completion of projects within defined budgets and achievement of specifications. This calls for immediate efforts to identify and explore innovative ways of promoting safety on construction sites. Tam *et al.* (2004) revealed that the behaviors of contractors on safety management are of grave concern including the lack of provision of personal protection equipment, regular safety meetings and safety training. Despite the existence of laws related to safety and health at workplace in many nations, the accidents rate in most of those nations is at high rate, based on the report of center to protect worker's right (1993), that many safety professional and scholars were of the opinion that the existing safety legislations and regulations are not strong enough to bring about the require zero accidents level at construction site. Though, by complying with those legislations and regulations, safety on construction sites can be improved as legislations and regulations provided a platform for a good construction practices. Also, (Ratay, 1997) and (Haupt, 2001) agreed that a good code of standard i.e legislations and regulations can improve on construction safety at an acceptable cost. Lack of Occupational Safety and Health Act (OSHAct) and poor implementation of safety management system in Nigerian construction industry is responsible for poor performances record of safety and health. As such this paper will looked into the performance records of safety and health measures of contractors, by assessing safety and health performance of contractor's construction project in Nigeria (Abuja) using Safety and Health Assessment System in Construction (SHASSIC) method.

Assessing Safety and Health Performance

The occurrence of high incidence of accident and fatality rate are reason why the construction industry is regarded as the most hazardous industry as many constructions workers are killed, some suffer from various injuries and some suffer various illness due to occupational diseases on construction site. As such, safety management in the construction sites should be a thing of concerned to everybody in the industry, most especially the client, contractor, professional, sub-contractors etc.

Similarly, the responsibility of safety at construction sites, most especially of the construction workers, rest on the shoulder of the main contractor of the work. But Said *et al*. (2009), realize that zero accident is indeed, an attainable objective, client, designer firm and contractors can complement each other by playing different roles in preventing accident to achieve an injury free worksite. Furthermore, Said *et al*. (2009) have drawn the attention to the fact that contractors are without doubt, still the main party to plan and control construction site safety, and that the designers can only reduce safety hazards in the working environment by considering workers safety issues in their design decision.

Taking safety issues in to design decision simply mean how a construction work or activities can be carried out without any form of injuries or illness to the construction workers. This design decision concept applies only to the design of the permanent structure as it does not initiate how to make different method of construction engineering safer. This issue is addressed by Toole *et al.* (2006), that the design for safety concept for example, working at height does not focus on how to use fall protection system but it does include design decision that influence how often fall protection will be needed. However, what this mean is that while designing for safety for working at high, it does not provide or explain how protection from working at high could be achieved i.e how to erect scaffolding but it does provide decision that influence provision, location and type of scaffolding needed to accomplish the working at high.

Also more client are now interested on issue of safety at construction sites, this may be due to high cost involved in payment on accident compensations to the victims and the legal liabilities in relation to worker's injuries. As such it is the client that stands a better chance of gaining accident free construction site, as cost of construction accidents and the legal liabilities in relation to workers' injuries will no longer be an issue of concerned to them.

A study conducted by Coble (cited in Said *et al*., 2009) showed that the average worker's compensation insurance cost could be conservatively estimated at 3.5% of the total project cost. Said *et al*. (2009) concluded that the clients can actively impact construction safety by selecting reliable contractors addressing safety issues in design and participating in safety management during construction.

Contractors Safety and Health Performance

Despite the fact that the designer and the client are nowadays much more interested on the issue of safety at the construction sites, the management of construction safety on site still rest on the shoulder of the contractor. Contractors have a role to play in promoting safety programmers and safety behavior as stipulated in OSHA 1994 Section 17 (Duties of employers and self-employed to their employees), and they have an obligation to ensure that their workers are not exposed to risk which can affect their safety and health.

As such it has become a vital issue to select a contractor with knowledge of safety and health together with a good performance on safety and health based on their previous record. A contractor is an individual or groups that work for a reword. Therefore a contractor is contracted to do something for another party and in consideration for what is done and receive a payment. Also this contractor is subjected to the same guiding rules of OSH Act 1997 and their duties are covered in part 1V of OSH Act.

The nature of operation of contractors in some countries differs most especially as regard to big jobs. For example, in Malaysia, according to Ghani *et al.* (2012), the current trend is the undertaking of big project by subcontractor; the main contractor would only lobby for the project, while construction matters would be handed over to the sub-contractor for a substantial profit. This contract system has been in existing for long in many part of the world, the only thing required is that the main contractor has to make sure that competent sub-contractor (with vast

knowledge on safety and health) is selected to handle such type of project.

A study conducted by Koehn *et al.* (cited in Ghani *et al.,* 2012) affirmed that the contractors must have a full power to select a sub-contractors, in order to ensure that the sub-contractor has both skill and manpower to undertake the job in a safer manner. Therefore, for effective implementation of safety and health at construction site, there is the need for full commitment and support from top management to the contractor in order to improve safety performance on sites. When contractors believe that the management cares about safety and health issues at construction sites, they will be more willing to improve safety performance.

Methods and Materials

The main focus of this paper is to assess the health and safety system as practiced on site by contractors in Abuja. Three (3) large indigenous construction firms that have been in construction activities for the past ten (10) years were considered. Also the construction firms must have an ongoing project that is between 25 – 75% completed. As such there is the need to study how health and safety are being handled on sites and this make qualitative approach best research method to be adopted for this work. In this work the commitment of the management must be looked into together with how workers view health and safety on their working place. Also this work required the inspection of workplace, so as to ascertain how free such workplace of element that causes accidents. As such structured or standardized questionnaire called Safety and Health Assessment System in Construction (SHASSIC) was adapted for the assessments.

SHASSIC is an independent method to assess and evaluate the safety and health performance of a contractor in the construction projects. It is recommended that the assessment be carry out when the work progress is between 25 – 75% completion. As this is the stage were different work trades activities will be going on at sites.

Assessment Approach

The assessment is usually carried out in 3 (three) different approaches as contain in the (CIS 10, 2008):

a. Document Check.

Checking OSH related document will enable the assessor to ascertain the level of compliance with safety and health programs and activities. There are 63 questionnaires identified for this component check.

b. Site/Workplace Inspection

Workplace inspection are expected to be carry out at five different highly risk area within the site, there are 62 items identified for inspection. Workplace inspection provides valuable visual comparison evidence on the OSH programs implemented, enforced and practiced at site/workplace.

c. Employee's Interview

Employees shall be randomly selected from all levels and occupations so that they could be interviewed by the assessor using established standard questionnaire. There are 48 questions for this component. The employees are categorized into 3 (three) categories. The (CIS10, 2008) list the numbers of employee from each category to be interview as follows:

Category A Management personnel, 1 employee from management personnel, The Project Manager represents the management personnel.

Category B Safety and Health Committee Members, Section 30 of OSHA (Act 514) of 1994, requires the employer to establish a safety and health committee at workplace that employed forty or more people at such place of work. Among the function of the committee at workplace include investigating any matter at workplace which a member of the committee or a person employed consider as a threat or not safe or risk to safety and health of those at workplace and have been brought to the attention of the employer. Also the safety and health committee review the measures taken to ensure the safety and health of person at work.

Category C, Construction Workers

Assessment Method

Weightage

The weightage for safety and health performance are allocated in accordance to 3 (three) components as shown in the Table 1 below;

Table 1: Allocation of Weightage for Components

COMPONENTS	WEIGHTAGE.
Document check	40%
Workplace inspection	40%
Employee interview	20%
Total score	100%

Source: CIDB CIS 10:2008.

The weightage system is aimed at making the score quantitative in representing the safety and health performance of the respective contractor. Basic formulas for respective component weightage are as follows;

1. Document check.

Total Number 'C' Scored. X 40% = SHASSIC score for Document Checked-(A)
(63– Number of 'NA')

2. Site/Workplace Inspection

Total Number 'C' Scored. X 40% = SHASSIC score for workplace inspection-(B). (310 –Number of 'NA')

3. Employee's Interview

Total Number 'C' Scored. X 20% = SHASSIC score for employees interviewed-(C). (330 – Number of 'NA').

Where:

C is the total number of "Compliance"

NA is the total number of item that is "Not Applicable".

b. S

tar Ranking

The total SHASSIC score in Document Check (A) plus (+) total SHASSIC score in Workplace Inspection (B) plus (+) total SHASSIC score in Employees Interview (C). Component shall justifying the ranking star or stars. Stars awarded ranges from 1 star to 5 stars as shown in the table 3.2 below:

Table 2 Star Ranking

SHASSIC (score %).	Star(s) Awarded.	Justification.
85 to 100	*****	Potential and significant workplace high risks/hazards are managed and documented.
70 to 84	****	Potential and significant workplace high risks/hazards are managed and documented but there are few low risks work activities are neglected.
55 to 69	***	Potential and significant workplace high risks/hazards are managed and documented but there are few medium risks work activities are neglected.
40 to 54	**	Potential and significant workplace high risks/hazards partly managed and not properly documented.
39 and less	*	Potential and significant risks/ hazards poorly managed and not properly documented.

Source: CIDB CIS 10: 2008

Results of the SHASSIC Analysis

This consists of construction industry standard questionnaire, which is administered on each of the three sites selected for this work. At each of the three sites three (3) set of questionnaires were administered i.e document checking, workplace inspection and employee interview questionnaire. Table 3 shows the analysis and the result of assessments carried out in each of the three construction sites.

Discussion of Results

Various firms/organizations sizes implement health and safety in different ways. For, these types of firm/organization (large size) they are expected to have an in-house safety and health expertise and are less likely to need or seek external assistance. It can be observed from table 4.1 that the size of the site determines the number of subcontractors. The site with lowest number of employees has 18 subcontractors while the site with highest employees has 20 subcontractors. The subcontractors are supposed to be vast in safety and health knowledge. In term of document checking, site 3 has the highest number of scores 19 while site 1 has 15 and site 2 has 14. Therefore it can be observed from Table 3 that the scores of document checking are determined by the size of the site and the number of subcontractors. The effectiveness of document checking on sites depends upon how management of those sites was able to document and manage their document on sites. As regard to workplace inspection, there exist inconsistences as the site with higher employees and higher numbers of subcontractor (site 3) score less than site with less employees and subcontractors (site 1). Both sites 1 and 3 score more than site 2 as regard to workplace inspection. Therefore size of site and number of subcontractors has little or no impact on workplace inspection scores. The size of the sites and the number of subcontractors has little determinant on the knowledge of safety and health management practice on sites among the employees i.e management personnel, safety and health committee members and the construction workers. Site 1 with 135 employees and 19 subcontractors scores 11, while site 3 with 138 employees and 20 subcontractors also scores 11. The size of the firm/organization determines the percentage scores of SHASSIC, which automatically determine the star ranking of the sites. From table 4.1, site 3 and 2 with the highest numbers of employees scores 48.25 and 46 respectively and qualified as 2 star in ranking. Site 2 scores 33 and qualified as 1 star in ranking. Therefore, the size of the sites determines the SHASSIC scores. The average SHASSIC scores of the 3 sites is 42.42%, (40% – 52%), this qualified the sites as 2 star in ranking. This means that in term of compliance to safety management standard on sites, the construction firm/organization consider for the work falls within two (2) stars in ranking were all there Potential and significant workplace high risks/hazards are partly managed and not properly documented. It was observed that only foreign construction companies that are well established in their mother's countries are able to compete and have the ability to maintain their standard in the existing situation as regard safety and health at workplace.

Table 3 Analysis of SHASSIC Results

S/no	Size of the site	Number of Subcontractors	SHASSIC Results				
			Document check scores (40).	Workplace inspection scores (40)	Employees interview scores (20)	SHASSIC Scores (100)	Star ranking.
1	135	19	15	20	11	46	2star
2	128	18	14	10	9	33	1star
3	138	20	19	18.25	11	48.25	2 star

Also observed is that many accidents at construction sites can be prevented if the construction teams can carry out their responsibility with emphasis on accident prevention in mind from the design stage to completion stage down to the demolition stage, but the main issues is how to encourage the design team, management and the workers to see safety and health as a way in achieving zero accident at sites. Another issues observed is that accident prevention measures are left in the hand of the contractors alone, despite the fact that both the design team and the client have great impact on the project. Some clients' views issues of safety as an additional cost and are much more engaged in safety violation.

Conclusion and Recommendation

From the analysis of performance of contractors construction project as regard to safety and health measures on the construction sites using Safety and Health Assessment in Construction (SHASSIC) method, it can be concluded that the contractors' performance are two (2) star in ranking. This means that at the contractor's construction project sites most of the potential and significant high risks/hazard are partly managed and are not properly documented. Therefore, the current standard of safety and health measures of construction site i.e were potential and significant workplace high risks/hazards are partly managed and not properly documented makes the construction sites a dangerous place of work were all form of injuries and illness can occur.

Effective application of OSH management system can lead to safety construction work and reduce the rate of accidents on construction sites. This view have been supported further by (Hinze, 1997), that the implementation of the OSH Management system by the main construction parties must apply at all level of the construction process and must comply with the existing safety and health laws and regulation at workplace. Therefore, what Nigeria construction industries need in order to improve on their safety records is enforcement act i.e OSHAct together with adoption and implementation of safety-conscious contractors supported by experienced and trained employees. Safety training is an important aspect of improving safety records. Lack of safety training will have a bad impact on the workers as they do not have knowledge and education to prevent the accident at construction sites. There is need for government to support a specific safety management system in place as a legal requirement at workplace like the construction sites. Reiman and Rollenhagen (2011) stated that safety management is associated with the policies, objectives, procedures, methods, roles and functions that aim at controlling hazards and risk in socio-technical systems. The company's management should ensure that training; personal protective equipment and other resources are provided to the project

management team in order to demonstrate its commitment. Effective safety culture within a firms/organizations structure should be established as this will enable employees to have a good attitude toward workplace safety and health practice. In order for the safety cultural system to be effective and to achieve its objectives, it needs to be supported at all levels of management in the firmd/organisations and at the same time the system must be able to create a positive safety culture and climate in which everybody should be convinced of the importance of safety and acts accordingly. Also there is need for the firms/organizations to have a clear, complete and workable site safety plan as it is among the most effective methods for ascertaining site safety. Regular safety audits provide an effective way to review and refine site safety plan, thus improving safety in the jobsite or workplace. Adequate and well-articulated safety program can cut down the rate of accident, which could help in promoting the image of the companies most especially as regard to safety and health of construction sites. There is need to have a construction insurances in order to protect those involved and the equipment against any form of accident due to the high risks involved in the construction operation. The objective of any insurance at any workplace is to protect lives of those at work and properties/equipment at the workplace.

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