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# EVALUATION OF HEALTH AND SAFETY PLANNING PROCESS ON CONSTRUCTION SITES IN KADUNA METROPOLIS, NIGERIA

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**Abstract**
Workers are exposed to new hazards due to the changing nature of construction projects. When an integrated approach of good safety planning process is adopted accidents are prevented and the outcome is an assurance that the project delivery process will be safe. Hence, this paper evaluates the health and safety (H&S) planning process on active construction sites in Kaduna Metropolis, Nigeria. A survey research approach was used in the study. Forty-two active construction sites were visited for both the self-administration of structured questionnaires and personal observations. The study found that respondents considered factors such as the positioning of the access roads, the type of the project, the location of the project to highly influence health and safety planning at the pre-tender stage,. In addition, the study revealed that out of the 11 parameters measured to know the extent of health and safety planning put in place before the construction stage, eight can be deemed to support health and safety representative at management level. Based on the findings, it can be deduced that although all the factors affecting H&S are considered at the planning stage and H&S practices are highly applied on projects by the firms studied, high levels of accidents are still reported on construction sites. Further research is therefore required to match the frequency of accidents to factors considered and H&S practices applied during the project planning phase, to see whether significant results would be obtained.

**Keywords**: Accident, Construction sites, Health and Safety, Kaduna-Nigeria, Planning

## 1 Introduction

Construction workers lose their lives while others are injured on construction sites on an annual basis. Accidents happen daily which give rise to increase in death rate; in the year 2005, there were 4.2 million on the job non-fatal injuries and 5,702 fatalities recorded in the United States alone (Bureau of Labour Statistics, 2006; Bureau of Labour Statistics, n.d). The construction industry is known to be one of the riskiest industries in most countries (Edmonds and Nicholas, 2002). The fatalities recorded in developing countries such as Nigeria (see Windapo and Jegede, 2013) are worse than what exists in more developed countries due to lack of concern,

precise records, inadequate planning and legal regulations on health and safety. Onyejeji (cited in Adeogun and Okafor, 2013) asserts that Nigeria lacks legal regulations on health and safety and that those regulations that serve as reference point are the British ones. This has however changed with the introduction of National Building Code in 2006; it should be noted that the adoption of this Code by the States in Nigeria has been very slow.

A report by the International Labour Organisation (ILO, 1999) states that contributing to the high rate of accidents are those characteristics of the construction industry, which distinguishes it from the rest of the manufacturing sector. These are: the number of small firms and of self-employed workers; the variety and comparatively short life of construction sites; the migrant nature of the workers leading to high turnover; and the vagaries of the weather. Others include a badly planned and untidy site, which is the underlying cause of many accidents resulting from falls of material and collisions between workers and plant or equipment.

Planning aims to lay down the direction in which a move is made forward taking into account the resources that are available. Planning used in the construction industry is varied and considerable e.g. policy planning, pre-tender planning, pre-contract planning and contract planning. Health and safety planning is found in all of these planning types. Health and safety planning according to Saurin *et al.* (2003) is *sine qua non* to the requirements in safety regulations and standards. In a related development Okongwu (2010) stated that when an integrated approach of good production planning and accidents preventive mechanism is adopted, the outcome is quality assurance of the project delivery process.

Cooke and William (2009) stated that without adequate planning, it would be difficult to envisage the successful completion of any project. The following are the reasons for planning: to set a realistic time framework for the project; to establish realistic standards and avoid wishful thinking; to aid control during the project; and to review progress and take action when necessary to correct the situation.

According to Burke (2010) a change in one parameter may change other parameters as planning process not only establishes what is to be done, but also smoothens the way to make it happen. To this extent, planning asks questions, encourages participation, creates awareness, prompt action, solves problems and formalizes decisions based on consensus. Alhajeri (2011) posits that improvement can be made on health and safety by seeking to address construction problems in many different ways as long as it interrogates the crux of the research efforts in health and safety in construction. The Malta Occupational Health and Safety Authority (2006) report that many accidents in the construction industry are due to bad planning lack of organization and poor co-ordination on construction sites.

In a related study, Laufer *et al*. (1993) points out that the planning process is an area that limited research has been carried out unlike planning tools and techniques; twenty-two (22) years on, has anything changed? It is with this in mind that this study evaluates the health and safety planning process on construction sites in Kaduna Metropolis of Nigeria towards understanding the health and safety practices on projects. Answers were sought to the following research questions:

- What are the factors considered during the pre-tender stage planning for health and safety?
- What is the extent of health and safety issues put in place during planning at the construction stage?

## 2 Health and Safety Planning Process Stages

Health and safety planning process can be looked at from three interrelated stages.

### *2.1 Pre-tender Stage Planning for Health and Safety*

Site Safe (1999) states that pre-tender stage plan contains information about the health and safety hazards of the project that will have to be managed during the work. The purpose of this plan is: to bring germane health and safety matters of design to the notice of those that are directly concerned and to ensure that contractors tendering have adequate knowledge of the project's health, safety and welfare requirements.

Health and safety planning is largely dependent on the nature, scope and complexity of the project to be undertaken. In spite of this, answers will still have to be sought to the following questions during pre-tendering health and safety planning (Site Safe, 1999): What is the nature of the project in terms of location, the type of construction etc.? What is the site location and local environment like? Are there any existing drawings and what is the importance of the drawings in relation to the project? What is the extent of information that is available on hazards that are difficult to avoid? Will clients own activities disrupt the free flow of work during the project especially if the project is to take place within the client's environment?

### *2.2 Areas to be Checked and Action to be taken during Pre-construction Stage Planning for Health and Safety*

According to Mulinge (2014), construction health and safety management deals with actions that managers at all levels can take to create an organizational setting in which workers will be trained and motivated to perform safe and productive construction work. Prior to the commencement of work, the following are to be in place in order to reduce the occurrence of accidents to their minimum. Primary factors considered during the preconstruction stage planning for H&S are location of the project; type of project (scope – high rise/low rise); complexity of the project; the local environment; design information available, relevant to H&S; client needs; and site access routes (see Table 2). In addition, the following provisions are made:

#### *2.2.1 Personal Protective Clothing (PPE)*

Occupational Safety and Health Administration (OSHA, 2007) requires the use of personal protective equipment (PPE) to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels. If PPE is to be used, a PPE programme should be implemented.

#### *2.2.2 First aid kits*

Construction sites are dangerous places, and first aid and rescue equipment should always be available. What is needed depends on the size of the site and the numbers employed, but there should be a blanket and a stretcher. On large sites with more than 200 people are employed, there should be a properly equipped first aid room.

#### *2.2.3 Safety warning signs*

Safety signs and signals are one of the main means of communicating health and safety information. This includes the use of illuminated signs, hand and acoustic signals (e.g. fire alarms), spoken communication and the marking of pipe work containing dangerous substances. If too many signs are placed together there is a danger of confusion or of important information being overlooked (Health & Safety Executive HSE, 2009).

### *2.2.4 Safety training*

Occupational Health and Safety training consists of instruction in hazard recognition and control measures, learning safe work practices and proper use of personal protective equipment, and acquiring knowledge of emergency procedures and preventive actions.

### *2.2.5 Safety audits*

Safety audits are used for gauging the extent to which an organization's policies and procedures are being followed and how they might be improved. They provide the organization with feedback, which enables the organization to maintain, reinforce and develop its ability to manage and reduce risks.

### *2.2.6 Safety policy*

Hassanein and Hann (2007) established that construction site accidents are more likely to occur when there are poor company policies. The health and safety policy affirmation must incorporate the aims, which are not quantifiable, and objectives, which are quantifiable of the organization. Construction safety policy therefore is something that must be developed by each site manager and operating company prior to starting construction on site.

### *2.2.7 Site meeting*

Site meetings are used for sensitizing workers on health and safety procedures on site and should therefore be held frequently. The absence of site meetings implies that workers are not given a forum to learn about various risks on the sites and supervisors equally do not have opportunities to communicate important health and safety matters to the workers.

### *2.3 The Construction Stage Site-Specific Planning for Health and Safety*

This entails the process of setting out the arrangements for securing the health and safety of everyone carrying out the work and all others who may be affected by it (Site Safe, 1999). The issues that are found at this planning stage include: the mechanisms for the management of health and safety of the site in terms of identifying hazards, evacuation, and frequent site safety checks; the evaluation and monitoring systems for checking that the health and safety plan is being followed.

In order to realize the above, the following questions should be answered:

- How should health and safety responsibilities for implementation on site be assigned?
- How should the various methods for hazard be identified?
- How should incident and accident investigation and reporting methods be carried out?
- What are the strategies for site meetings and information sharing?

## 3 Research Methodology

The study reported adopted a quantitative research approach, wherein a questionnaire survey was used for data collection. Collis and Hussey (2003) describe a survey as a positivistic methodology that draws a sample from a larger population in order to draw conclusions about the population. The non-probability convenience sampling technique was used in identifying the study respondents. According to Collins, Onwuegbuzie, and Jiao (2007) this is a sampling method that involves choosing from a sample that is not only accessible but the respondents are willing to take part in the study. The study was such that the respondents were asked questions based on the projects they were found handling during the self-administration of the questionnaires. This may explain why the responses obtained were limited to 42 and invariably 42 construction projects were examined. Hence, the unit of analysis was the construction project handled by each respondent. A unit of analysis according to Collis and Hussey (2003)

refers to the phenomenon under study, about which data is collected and analysed. The data was analysed using descriptive statistics.

## 4 Findings and Discussion

The study sought to find out the level of experience of the respondents. Data collected in this regard is presented in Table 1.

**Table 1. Years of experience of respondents**

| Years of experience | Respondents | Percentage |
|---|---|---|
| 1-5years | 21 | 50.0 |
| 6-10years | 13 | 31.0 |
| 11-15years | 5 | 11.9 |
| 16-20 | 3 | 7.1 |
| **Total** | **42** | **100.0** |

**(Source: Field survey, 2015)**

Table 1 indicates that 50.0% of the respondents have between 1-5 years of experience, 31.0% have between 6 - 10 years of experience, 11.9% of the respondents have between 11-15years of experience and 7.1% of the respondents have between 16- 20years of experience and above. Based on the result, 50% of the respondents had amongst them 6-20 years of experience in the construction industry; this is an indication that their responses can be deemed to be reliable as they should have the requisite knowledge of health and safety issues.

The study sought to know the factors considered during the pre-tender stage planning for health and safety. Table 2 shows the factors considered during pre-tender stage planning for health and safety on site, these were measured using a five point Likert scale with scores from 1= No Influence, 2=Little Influence, 3=Moderate High Influence 4= High Influence, 5= Very High influence.

**Table 2. Factors considered during pre-tender stage planning for health and safety**

| S/N | Factors | NR | TS | MS | RANK | Decision |
|---|---|---|---|---|---|---|
| A | The positioning of the access or existing point | 42 | 173 | 4.11 | 1st | Hi |
| B | The type of the project | 42 | 165 | 3.93 | 2nd | HI |
| C | The location of the project | 42 | 164 | 3.90 | 3rd | HI |
| D | The local environment | 42 | 164 | 3.90 | 3rd | HI |
| E | The complexity of the project | 42 | 161 | 3.88 | 4th | HI |
| F | Specific client needs | 42 | 157 | 3.74 | 5th | HI |
| G | Existing planned design and information that cannot be avoided | 42 | 149 | 3.55 | 6th | HI |

Key: NR=Number of responses; TS=Total score; MS=Mean score; RNK=Rank; HI=High influence

**(Source: Field survey, 2015)**

The result presented in Table 2 reveals that from a ranking perspective, that an existing planned design and information that cannot be avoided or changed has the least mean score of 3.55 and was ranked 6th followed by the specific client needs ranked fifth with (MS of 3.74). Some of the other factors that received the highest consideration are: The complexity of the project ranked fourth with (MS 3.88), the location of the project and the local environment which ranked third with (MS 3.90), the type of the project ranked second with (MS 3.93), and the positioning of the access or existing point ranked first with (MS 4.11). Based on Morenikeji (2006) cut-off points, it can be concluded that all the 7 factors have high influence and are considered during pre-tender stage planning for health and safety on those construction sites studied.

**Table 3. H & S Practices used at the pre-construction planning stage**

| Health and safety planning practices | NR | TS | MS | RANK |
|---|---|---|---|---|
| Making arrangements to control the level at which visitor access construction site to minimize accident | 42 | 161 | 3.83 | 1st |
| Ensuring the competency of the subcontractors in providing suitable provision for safety | 42 | 158 | 3.76 | 2nd |
| Making arrangement to pass on information regarding safety issues from the client or designers/ adviser to other subcontractors and employees | 42 | 156 | 3.71 | 3rd |
| Obtaining and checking the site specific safety plans from subcontractors | 42 | 153 | 3.64 | 4th |
| Developing and carrying out site specific health and safety planning process | 42 | 151 | 3.60 | 5th |
| Ensuring that incident and accident are reported | 42 | 151 | 3.60 | 5th |
| Developing a designated safety budget as part of the normal operating budget. | 42 | 150 | 3.57 | 6th |
| Ensuring the arrangement for discussing health and safety matters with people on site | 42 | 148 | 3.52 | 7th |
| Ensuring the coordination and cooperation of subcontractors for information and on site for safety | 42 | 143 | 3.40 | 8th |
| Making sure that training for health and safety is carried out | 42 | 143 | 3.40 | 8th |
| Making arrangement to monitor health and safety performance | 42 | 141 | 3.36 | 9th |

Key: NR=Number of responses; TS=Total score; MS=Mean score; RNK=Rank
**(Source: Field survey, 2015)**

The study found out that all documented H&S practices available to the researchers have a very high level of application on the construction projects examined with Mean Scores above 3.30 From a ranking perspective, making arrangements to pass on information regarding safety issues from the client or designers/ adviser to other contractors and employees was ranked 9th with (MS 3.36);, making sure that training for health and safety is carried out and ensuring the co-ordination and co-operation of subcontractors for information and on-site safety were ranked 8th with a mean score value of 3.40; ensuring the arrangement for discussing health and safety matters with people on site was ranked 7th with a mean score of 3.53.

In addition, making arrangements to control the level at which visitors' access construction sites to minimize accident; ensuring the competency of the subcontractors in providing suitable provision for safety; and making arrangements to pass on information regarding safety issues from the client or designers/adviser to other subcontractors and employees were ranked 1st, 2nd and 3rd respectively with mean score values of 3.83, 3.76 and 3.71. These findings are consistent with the results of earlier studies by - Okongwu (2010) who found that construction firms do not comply with health and safety provisions; Windapo and Jegede (2013) echoing the same thing stated that compliance level of indigenous construction firms in terms of health and safety policies and procedures was low; Alkilani *et al.* (2013) who established that there were inadequate training and education programmes; and Shibani *et al.* (2013) who report that workers are not trained and firms do not have safety officers which results in poor health and safety policies. In a related study, Jimoh *et al*. (2014) found that contractors' level of compliance regarding the provision of training and orientation on health and safety issues to workers in Ilorin-Nigeria was low.

Adapting one of the total quality management practices (commitment and leadership by top management at location) produced by the European Construction Institute as indicated in Harris and McCaffer (2005), it can be concluded that eight of the issues considered during the pre-construction planning stage for health and safety having mean score values greater than 2.50 are perceived by the respondents to support health and safety at the management level of all the construction firms studied. Conversely, the remaining three issues interrogated are perceived by the respondents to provide spasmodic support to health and safety during pre-construction planning due to their mean score values of 3.36 and 3.40 as shown in Table 3.

## 5 Conclusion and Further Research

The paper evaluates the health and safety planning process on construction sites in Kaduna Metropolis in Nigeria with a view to improving health and safety practices. Answers were sought to the factors that affect health and safety planning during pre-tender stage and the extent of health and safety planning put in place before the construction stage. The results showed that all the seven factors considered as the factors that affect health and safety planning during pre-tender stage, all had high influence on the planning process but the positioning of the access or exit point was ranked first with mean score of 4.11. In a related development, it can be concluded that eight of the issues considered during pre-construction planning stage for health and safety having mean score values greater than 2.50 are perceived by respondents to support health and safety at management level for all the construction firms studied. Conversely, the remaining three issues can be deemed to provide spasmodic support to health and safety during the pre-construction planning stage due to their mean score values of 3.36 and 3.40. Based on these findings, it can be concluded that accidents still happen on construction sites, despite the fact that construction companies consider all the factors affecting H&S at the planning stage and adopt appropriate H&S practices on projects during construction. Further research is therefore required that would match the frequency of accidents to factors considered during the project planning phase, and H&S practices applied during the project execution phase.

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