

Improving Safety Procedure and Accident Prevention on Construction Sites in Abuja, Nigeria

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Abstract

The study determined ways of improving safety procedure and accident prevention on construction sites in Abuja, Nigeria. Today, construction sites are considered as one of the most hazardous places in the world. The population of the study was 100 (20 professional builders and 80 building professionals). Two research questions were raised and two hypotheses were formulated that guided the study and tested at 0.05 level of significance. A twenty (20) items instrument titled Improving Safety Procedures and Accident Prevention on Construction Sites (QISPAPCS) Questionnaire was developed by the researcher and used for data collection. The questionnaire was validated by three specialist and a pilot test of the instrument was carried out. A reliability coefficient of 0.08 was obtained using Cronbach alpha reliability method. Data was analyzed using Mean, Standard Deviations and Z-test statistics. Findings revealed among other that there are seven (7) major causes of accidents at buildings construction sites, there is no significant difference between the mean ratings of professional builders and building technicians on the major causes of accidents at building construction sites. Based on the findings, the study recommends among others that there should be training and appointment of a resident safety personnel/manager to implement safety policies and form a monitoring control system to always remind workers about personal safety responsibility at the site.

Key Words: Safety Procedure, Accident Prevention, Construction Sites and Sustainability.

Introduction

Construction sites are considered as one of the most hazardous places in the world. There has been a tremendous increase in the number of buildings which are built for commercial, residential and office purposes every year. The construction market continues to expand gradually due to the day by day increase in the need of infrastructural facilities, homes, office spaces etc. The construction site is very complex

and therefore frequently prone to numerous health dangers. Therefore, safety should be a vital concern in the construction site in order to have a hazardous free society. Enhancing safety at building construction sites also ensures sustainability because it is only when builders are safe and healthy that they can undertake the construction of more buildings. Accidents on construction sites are a major cause of avoidable ill-health, injury and death (Beus, Dhanani, &

McCord, 2015). Blair (2014) suggests that 20% of reported construction accidents on site could be attributed to poor site logistics.

In a typical decade, about 1100 people are killed on construction sites in Nigeria and 20,000 – 25,000 more are seriously injured. In addition, 250,000 – 300,000 suffer injuries sufficient to keep them off work for at least three days (Leitao & Greiner, 2016). The construction industry needs proper practices for risk evaluation based on the employee's experiences and requirements to avoid workplace injuries (Bascompta *et al*, 2016). Nigeria is still a developing country and as such, there is no proper framework for safety procedures. Occupational safety is characterized by reduction in work place accidents. Contrastingly in the Nigerian building construction industry, the National Storm Shelter Association (NSSA, 2014) reported that in 2014, occupational deaths increased by 45% and occupational injuries increased by 30% from previous year. NSSA (2014) also reported that 60% of the registered construction companies were complaint with occupational and safety regulation, whereas 33% were not complaint, thereby exposing employees to occupational dangers and risk.

According to Amponsah-Tawiah and Mensah (2016), Construction site safety includes organization policies, regulations, procedures, leadership, and training that guide worker's behaviors and experiences in the workplace. Improving workplace safety adequately requires a well-defined safety behavior, attitudes, and commitment (Amponsah-Tawiah & Mensah, 2016). According to the Occupational Safety and Health Administration (OSHA, 2015), one out of every five workplace deaths is that of a construction worker. Construction, however, can be a safe occupation, but the employee must be aware of the hazards, and use an effective safety and health program. Below are some specific ways outlined by the OSHA (2015) on how construction employers and employees can avoid accidents and improve safety procedures at construction sites:

- i. Provide safety training for all employees: Employers should educate employees on all workplace safety standards and the hazards that they may face while on the job. Workers need to review the health and safety policies for each job they are called to do. The written safety policy should include procedures and the name and location of a trained first aid responder. Employees should not operate any equipment they are not qualified or trained to use.
- ii. Keep the workspace clean: keeping work areas clean and free of debris will lessen the chances of construction worker injuries and help prevent worksite accidents such as slips, trips, and falls. Employees should store tools and materials when finished with a job. Walkways should be kept clean of debris to prevent accidents that include slips and falls.
- iii. Maintain equipment's and tools: Before using a piece of equipment or machinery, workers must ensure it is in proper working order. Tools and machinery should be kept on a regular inspection schedule. Workers have been known to get trapped in or under heavy equipment that was not working properly. Broken parts and malfunctioning gear can also cause serious injuries and deaths.
- iv. Hold frequent crew meetings: At some construction sites, these meetings should be held daily. For example, if high-risk work is being done. Employees should be reminded to stay focused and relevant issues should be discussed. Real-life factual and job specific safety information tends to be more motivating for workers.
- v. Prevent falls: Falls are the leading cause of fatalities in the construction site. It is important that workers are protected from falls on the job. The installation of fall protection systems can protect construction workers. These systems should consist of such items as guardrails, toe boards, screens canopy structures or nets. Scaffolding can prevent falls, but must be installed properly to make sure it is constructed well enough to hold the intended weigh load.

After it is put up, scaffolding must be inspected regularly.

- vi. Recognize the dangers and make a plan: Before any project starts, the site should be inspected for any unusual dangers. A risk assessment can protect workers' health and safety. After completing the risk assessment, a list of preventive procedures should be made and implemented. It is important to ensure that all workers receive appropriate information, education, and training.
- vii. Use equipment's in the manner prescribed: if construction tools or equipment's is used in ways for which it is not designed, the manufacturers built in safety features can no longer be relied on. Misusing equipment's may also damage the equipment's and cause employee injuries. The equipment itself should meet OSHA standards.
- viii. Make safety an integral part of the job: The use of safety committees, which include both managers and rank and file workers, can be an effective way to improve safety. But if the job is large enough to justify it, the budget should also include an on-site safety manager.

The distress caused by accidents on construction sites to employees and their families is incalculable. Unfortunately, many Nigerian building construction companies do not follow strict safety guidelines even though construction workers are more likely to be killed by construction site accidents than any other type of employment. Limitations on the part of management and authority in the construction sites means such safety procedures exist only on paper, leaving the safety and well-being of construction workers in the country at the mercy of employers. While other sectors of the economy have safety development policies to control them, building construction industries in Nigeria do not seem to have a comprehensive safety policy frame work. Thus in this research, the main focus is on improving safety procedures and accident prevention methods so as to ensure a safe working environment on building construction sites in Nigeria, especially in a fast growing city like Abuja.

Objective of the Study

The study aimed to improve safety procedures on building construction sites in Abuja with a view to reducing on site accidents. Specifically, the study found out the:

- i. Significant causes of accidents on building construction sites.
- ii. Feasible methods of improving safety measures and preventing accidents from happening on building construction sites.

Research Questions

The following research questions guided the study:

- i. What are the significant causes of accidents on building construction sites?
- ii. What are the feasible methods of improving safety measures and preventing accidents from happening on building construction sites?

Research Hypotheses

The following null hypotheses, tested at 0.05 level of significance further guided the study:

- H₀₁. There is no significant difference between the mean ratings of building professionals and building technicians on the significant causes of accidents on building construction sites in Abuja.
- H₀₂. There is no significant difference between the mean ratings of building professionals and building technicians on the feasible methods of improving safety measures and preventing accidents from happening on building construction sites in Abuja.

Methodology

A descriptive survey design was adopted for the study. A descriptive survey design according to Sani (2015), is a descriptive study which uses sample of an investigation to document, describe and explain what is in existent or non-existent on the present status of phenomena being investigated. Sani (2015), further stated that in a descriptive survey study, views and facts are collected through questionnaire, analyzed and used for answering research questions. The design is considered appropriate as the present study sought answers on how to improve safety

procedures and prevent accidents on construction sites in Abuja. The study was carried out in Abuja, the capital city of Nigeria, located within the Federal Capital Territory (FCT). Abuja was chosen as the area for the study because of the large presence of various construction companies and construction sites in the City. The target population for the study was 200, comprising forty (40) builders and one hundred and sixty (160) building technicians. The respondents were sampled from the above population using simple random technique. Thus, 20 builders were sampled from 40 builders while 80 building technicians were sampled from 160 building technicians.

Data was collected using a 20 items questionnaire developed by the researcher and known as

Questionnaire titled Improving Safety Procedures and Accident Prevention on Construction Sites (QISPAPCS). The QISPAPCS is made up of two parts. Part one contains the introduction and the respondent's personal data while, part two contains the questionnaire and is divided into two sections: A and B. Section A contains research question one which focuses on the causes of accidents on building construction sites in Abuja and contains 10 items. Section B contains research question two which focuses on the feasible methods of improving safety measures and preventing accidents from happening on building construction sites in Abuja and also contains 10 items. Sections A and B were structured using four-point rating scales of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). These ratings

weighted 4, 3, 2 and 1, beginning from the highest to the lowest respectively.

The instrument was content validated by three experts of building technology education from the department of Industrial and Technology Education, Federal University of Technology Minna, and their comments and suggestions were considered in preparing the final draft of the instrument. The instrument was trial tested in Lafia, Nasarawa State, on 15 respondents comprising 9 building professionals and 6 building technicians. Cronbach alpha coefficient was used to determine the internal consistency of the instrument and 0.80 was obtained as the overall reliability coefficient of the instrument. The instrument was later administered to the respondents by the researcher and a 100% return rate was recorded from both the building professionals and building technicians.

Mean and standard deviation were used to answer the research questions. Mean scores above 2.50 and above were considered Agreed; while mean scores of 2.49 and below were considered Disagreed by the respondents, in accordance with the research questions. Furthermore, Z-test was used to test the hypotheses. Decision was made by comparing the Zcalculated value with that of Z-critical at 0.05 significance level. Hypothesis was rejected if Zcal is found to be greater than Z-critical; otherwise it is accepted.

Results:

Research Question 1: What are the significant causes of accidents on building construction sites?

Table 1: Mean Responses of Building Professionals and Building Technicians on the Major Causes of Accidents on Building Construction Sites.

S/N	ITEMS	X1	X2	Xt	Remarks
1	Lack of fall protection for workers on elevated structures.	2.65	3.06	2.98	Agreed
2	Tripping hazards from construction materials and debris.	3.45	3.50	3.49	Agreed
3	Negligence, drug addiction, and alcohol intake by construction workers.	2.95	2.91	2.92	Agreed
4	Poor inspection program, and inadequate warning system	2.75	2.49	2.54	Agreed
5	When workers assume safety is not important and fail to comply with safety regulations.	1.70	1.55	1.58	Disagreed
6	Poor site management such as; excessive noise, poor illumination, poor ventilation.	3.35	3.40	3.39	Agreed
7	Struck by an object, electrocution and ladder accidents	1.60	1.55	1.56	Disagreed
8	Fire hazards; from combustible dust, flammable liquids and gasses.	1.45	1.53	1.15	Disagreed
9	Lack of awareness, training and education on importance of safety.	3.05	3.18	3.15	Agreed
10	Failure to obey work procedure.	3.15	2.98	3.01	Agreed
N1=20		N2=80			

N1=Number of builders.

N2=Number of building technicians

X1=Mean response of builders. X2=Mean response of building technicians

X=Average mean of builders and building Technicians

Table 1 shows the significant causes of accidents on building construction sites in Abuja. The results reveal that both group of respondent agreed that items 1, 2,3,4,6,9,10 are significant causes of accidents on construction sites in

Abuja. This implies that respondents did not agree with all the items in the questionnaire.

Research Question 2: What are the feasible methods of improving safety measures and preventing accidents from happening on building construction sites?

Table 2: Mean Responses of Building Professionals and Building Technicians on the feasible methods of improving safety measures and preventing accidents on building construction sites

S/N	ITEMS	X1	X2	Xt	Remarks
1.	Provide proper working equipment's.	3.25	3.39	3.92	Agreed
2.	Bring foreseeable dangers and accidents to management's attention.	3.70	3.80	3.78	Agreed
3.	Stay up to date in equipment maintenance	3.05	3.16	3.14	Agreed
4.	Keep workspaces clean.	3.25	3.16	3.18	Agreed
5.	Provide adequate safety training for all employees	3.40	3.39	3.39	Agreed
6.	Use equipment's in the manner prescribed.	3.40	3.58	3.54	Agreed
7.	Make safety an integral part of the job.	3.20	3.08	3.10	Agreed
8.	Use of safety wears, and adequately placed safety posters and sign post.	3.50	3.43	3.44	Agreed
9.	Supervisors encouraging safety when construction work is in progress.	3.25	3.29	3.28	Agreed
10.	Site manager ensures there is adequate site planning.	3.50	3.40	3.42	Agreed

N1=20

N2=80

N1=Number of builders.

N2=Number of building technicians

X1=Mean response of builders. N2=Mean response of building technicians

Xt=Average mean of builders and building Technicians

Table 2 shows the feasible methods of improving safety measures and preventing accidents from happening on building construction sites in Abuja. The results reveal that all ten items had their mean values ranging from 3.10 to 3.92 which is above the cut-off point of 2.5, indicating that the respondents agreed that all ten items were feasible methods of improving safety

measures and preventing accidents from happening on building construction sites in Abuja.

Hypothesis 1: There is no significant difference between the mean ratings of professional builders and building technicians on the significant causes of accidents on building construction sites.

Table 3: Z-Test Analysis of Mean Ratings of Professional Builders and Building Technicians on the Major Causes of Accidents on Building Construction Sites.

S/N	ITEMS	X1	X2	SD1	SD2	Z-cal	Z-crit.	Remarks
1.	Lack of fall protection for workers on elevated structures.	2.65	3.06	0.67	0.71	-1.32	1.98	NS
2.	Tripping hazards from construction materials and debris.	3.45	3.50	0.68	0.63	-0.30	1.98	NS
3.	Negligence, drug addiction, and alcohol intake by construction workers.	2.95	2.91	0.82	0.78	0.19	1.98	NS
4.	Poor inspection program, and inadequate warning system	2.75	2.49	0.63	0.81	1.34	1.98	NS
5.	When workers assume safety is not important and fail to comply with safety regulations.	1.70	1.55	0.65	0.50	1.12	1.98	NS
6.	Poor site management such as; excessive noise, poor illumination, poor ventilation.	3.35	3.40	0.58	0.56	-0.35	1.98	NS
7.	Struck by an object, electrocution and ladder accidents	1.60	1.55	0.59	0.57	-0.34	1.98	NS
8.	Fire hazards; from combustible dust, flammable liquids and gasses.	1.45	1.53	0.51	0.55	-0.55	1.98	NS
9.	Lack of awareness, training and education on importance of safety.	3.05	3.18	0.75	0.65	-0.74	1.98	NS
10.	Failure to obey work procedure.	3.15	2.98	0.74	0.77	0.90	1.98	NS

df= 98.

SD1= standard deviation of builders, SD2= standard deviation of building technicians, NS= not significant. df= degree of freedom.

Results from table 3 reveal that all of the items have their z-calculated values less than the zcritical value of 1.98. This implies that there was no significant difference in the mean ratings of builders and building technicians on the significant causes of accidents on building construction sites in Abuja. Hence, the null hypothesis is accepted.

Hypothesis 2: There is no significant difference between the mean ratings of professional builders and building technicians on the feasible methods of improving safety measures and preventing accidents from happening on building construction sites in Abuja.