

Utilization of Safety Facilities in Building Construction Sites in Federal Capital Territory Abuja and Niger State, Nigeria

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Abstract: The study was designed to determine the utilization of safety facilities in building construction sites in Federal Capital territory Abuja and Niger State, Nigeria. Two research questions and two null hypotheses guided the study. A descriptive survey research design was adopted for the study. The study was conducted in FCT Abuja and Niger State, Nigeria. A total of 181 respondents consisting of 20 contractors, 71 builders and 90 tradesmen with 43 items structured questionnaire were used. The internal consistency of the questionnaire was determined using Cronbach alpha method and coefficients of A = 0.889 & B = 0.727 respectively. Weighted mean and standard deviation were used to analyze the research questions while ANOVA was used to test the null hypotheses at 0.05 level of significance. The findings of the study revealed that the respondents agreed with that of the safety facilities were utilized by the construction site worker while some were not complied. This implies that, safety facilities needs to be utilized in building construction. The findings revealed that there was significant difference in the mean ratings of the responses of the three groups of respondents (20 contractors, 71 builders and 90 tradesmen) as regard the of safety facilities. Similarly, there was no significant difference in the man ratings of the respondents as regards the extents of utilizing safety facilities in building construction sites. It was therefore recommended among others that contractors, builders and tradesmen require appropriate training/induction regularly on the use of safety facilities in building construction site base on their peculiarities. There should be appropriate information concerning the use personal protective equipment (PPE) at work to prevent accident from site. Working environment should always be cleared and kept free from all objects that can cause harm or injure the workers in building construction site.

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1. Introduction

Building is a structure enclosed by walls and roof. Anyanwu (2013) postulated that building is an action of erecting a structure. Building in the context of this study is the process by which walls and roof are erected or constructed. Ogundipe (2017) defined building construction as a process that involves the interplay of many actors in the building industries. One of the actors that play a significant role, from inception to completion of a building project, is the building contractor. Building construction in the context of this study is any physical activity involving in the erection of a structure which entail laying of blocks, plastering, cladding, roofing,

fitting of services installation, to mention but a few in a building construction sites.

Building construction site is a piece of land on which housing work are being carried out. Alfred and Pao-chi (2019) viewed building construction site as plot or land on which a dwelling is being built. Building construction sites in this study are places where erection of building is being under taking through different activities. These activities in building construction sites are marking and grading, excavation, fixing footing and column steel, formwork, concreting of footing, column shuttering and concrete, backfill, plinth beam construction, brickwork, DPC and next life of concrete, slab formwork, steel fixing and concreting, electrical and plumbing works, finishing

work (tiles, doors, painting mention but a few) which are activities carried out by different personnel.

Personnel involve in the building construction site includes but not limited to architects, contractors, tradesmen, builders, estate surveyors and values, quantity surveyors, town planners, civil, electrical, mechanical and structural engineers. All the listed personnel have different responsibilities in building construction site. The contractors' responsibilities in building constructions are for hiring and supervising the workers who work on specific task of the construction project. The roles of tradesmen in building constructions are to build structures and frameworks by following specific blueprints. The architect's responsibility in building construction site is to create designs for new construction projects, and detailed drawing both by using specialist Computer Aided Design (CAD) applications and hand (Kolo, 2015). Similarly, builder construct the building which he does by taking charge of the activities on a building construction site by translating design and working drawings into a physical structure (Ogundipe, 2017). The surveyors' role in building construction site in the words of Okoye and Okoye (2013) is to measure land features such as depth and shape, based on referenced points. In the same vein Ogundipe, (2017) further opined that engineers in construction site manage planning and design stage of construction projects. All these individual personnel must adhere strictly to the safety regulations in the construction sites.

Safety can be seen as a point at which all associated risks or dangers with a particular job are well managed. Safety in building construction sites is an aspect of construction-related activities concerned with protecting construction workers and other from death, injuries disease or other related risks. Importance of safety in any kind of construction activity is unparalleled. Only when these workers are in a sound state of mind and are physically healthy that work can go on smoothly as virtually all works on site are dependent on the workers for implementation. Occurrence of accidents or injury to workers tends to demoralize the workers and in some cases leads to suspension of construction activities (Kolo, 2015). Adeagbo et al. (2019) argued that in order to safe guard workers in the building construction sites, all personnel should be advice to make effective use of safety facilities in the building construction site. However, these may further depend on the utilization of these facilities.

Utilization is a condition of being sufficient in meeting the requirement of safety facilities for use during erection of building at the construction site with workers. International Labour Office (ILO, 2017) explained that utilization of safety facilities is the appropriate welfare provided to everyone in the work place. Ogundipe (2017) identified various safety facilities required at any building construction sites to include: hardhat, safety glasses or face shield, respirator, body protective wears, gloves and safety foot wears, ladder, good working environment that's healthy and safe to everyone in the workplace, including those with disabilities. Provision of these facilities at the building construction site may reduce risks

of accidents and contractors must also ensure that these facilities are utilized properly.

Utilization is the pivot of using safety facilities/equipment in an effective ways. Olelewe and Amaka (2011) viewed utilization as a fraction of a specified time period that is actually used to produce quality work. Utilization in the context of this study is the process of using safety facilities provided in building construction site. Proper function of all these safety facilities may reduce tendency of accident in the building construction sites. It is also advisable that these safety facilities are properly utilized and proper safety/procedures practices strictly adhered to.

Safety facilities at construction sites play an essential role in worker's health and wellbeing. Adequacy and utilization of safety facilities on construction sites leads to direct impact on increase productivity of workers and profits. Dok Yen et al. (2018) explained that construction site need to be equipped with minimum welfare and safety facilities such as safety helmet, protective clothing, dust catchers for aggregate works, speed reader, first aid box, suitable toilet and washing facilities, portable drinking water, facilities for storage and rest. These safety facilities when provided may enhance workers output, as well as improve the health condition of construction workers by preventing unintentional injuries and improving quality of life's in construction sites productivity.

The foregoing explanations clearly revealed that the importance of safety facilities in building construction sites can never be over emphasized because when accidents occurs on sites, they may chose human tragedies, de-motivate workers, disrupt site activities and affect overall project cost, productivity and reputation of the construction company concerned. Kolo (2015) Argue that accident on the construction sites in Nigeria are caused and still cause devastative effects on property and lives of workers. Most of the accidents that occurred could be attributed to lack of provision of safety facilities and non-compliances to safety procedures and poor utilization of the existing safety facilities in the building construction sites. It is against this backdrop that researcher intends to determine the utilization of safety facilities in building construction sites in FCT, Abuja and Niger State, Nigeria.

It has been observed that the provision of safety facilities such as safeties boots, safety helmet mention are grossly inadequate even the few available ones are not being effectively used. Construction Design and Management regulation (CDM, 2015) argue that, neglecting of this safety facilities from both building construction personnel and clients may results to potential life threatening of building constructions workers and also may contributes to lack of productiveness of the construction workers. Most sites does not have average require numbers of safety facilities for the workers and also most cases the limited facilities on site are not in good conditions for workers to utilized for their safety status. This study was design to determine the utilization of safety facilities in building construction site in FCT Abuja and Niger State.

1.1. Hypothesis

H₀₁ There is no significant difference in the mean responses of contractors, builders and tradesmen as regard the utilizing of safety facilities in building construction sites.

H₀₂ There is no significant difference in the mean responses of contractors, builders and tradesmen as regard the extents of utilizing safety facilities in building construction sites.

2. Materials and methods

FCT Abuja and Niger state is situated in the North-Central geopolitical zone of Nigeria with a total land mass of 86,000km²; approximately 8.6 million hectares constituting about 9.3% of the total land area of the country. Lying on latitude 3.200 East and longitude 11.300 North, the state shares a country border with the Republic of Benin (West) Niger State and the Federal Republic Territory (FCT) are bordered on the South-East by Nassarawa and Zamfara, West by Kebbi, North-West by Kwara, Kogi by South-West and Kaduna (North East). The study adopted descriptive survey research design for the study. FCT Abuja and Niger State was chosen base on the fact that, massive construction of residential buildings are going on within the geographical areas with total negligent on safety facilities and utilization by the contractors, builders and tradesmen, necessitate the choice of FCT Abuja and Niger State as the area of study. The targeted population for the study was 181 respondents consisting of 20 contractors 71 builders and 70 tradesmen in FCT, Abuja and Niger State. The entire population for FCT and Niger were used for the study. The population was not too large.

The structured questionnaire titled Utilization of Building Construction Safety Facilities Questionnaire (UBCSFQ) developed by the researcher and authenticated by three specialists was used for the facts collected for the study. All sections of the research questions were structured on 4-point rating scale options of very adequate (VA), adequate (A), moderately adequate (MA), not adequate (NA) with 4 points rating scale and assign numerical values of 4, 3, 2, and 1 were used.

Mean and standard deviation were the arithmetic tools adopted to explore the statistics for replying research question, while analysis of variance (ANOVA) was used to test the hypothesis at 0.05 level of significant.

3. Results

Data in Table 1 revealed that three (3) items had there mean values within the real limit of 3.50- 4.00, indicating that the 3 adequacy of safety facilities items were Very Adequate. Similarly, the data further revealed that 14 items had there mean values within the real limit of 2.50 – 3.49, indicating that the 14 items were Adequate. In addition, 3 items had there mean values within the real limit of 1.50-2.49, indicating that the 3 items were

moderately adequate. However, 4 items had there mean values within the real limit of 0.50-1.49, indicating that the 4 items were not adequate as agreed by the respondents as regard adequacy of safety facilities in building construction site. All the 24 standard deviation on each items were within the real limit of 1.96 indicating that the respondents were not too far from the mean or from one another in their responses.

Data in Table 2 revealed that four (4) items had there mean values within the real limit of 3.50 – 4.00, indicating that the 4 items were very often. Similarly, the data further revealed that 10 items had there mean values within the real limit of 2.50 – 3.49, indicating that the 10 items were often. However, 5 items had there mean values within the real limit of 0.50-1.49, indicating that the 5 items were not often as collaboratively agreed by the respondents on the extent of safety facilities utilized in building construction sites. All the 19 standard deviation on each items were within the real limit of 1.96 indicating that the respondents were not too far from the mean or from one another in their responses.

H₀₁: There is no significant difference in the mean responses of contractors, builders and tradesmen as regard the adequacies of safety facilities in building construction sites.

The result of the One-way ANOVA of mean scores of the respondents on the significant difference between the contractors, builders and tradesmen as regard the adequacies of safety facilities in building construction sites in Table 3. Levenes test of homogeneity of variance for the data was 0.354. The assumption of homogeneity was met, since the value is greater than the significant level of ($P < .05$), ANOVA can be used for analysis.

Table 3 revealed that there were significant differences ($P < 0.05$) in the mean ratings of the respondents (contractors, builders and tradesmen) as regard the utilization of safety facilities in building construction sites. These data supported the hypothesis, $F(2, 178) = 4.860, p = .009$. The mean and standard deviation for the contractors were 2.79 and 0.33. The mean and standard deviation for builders were 2.62 and 0.50. In addition, the mean and standard deviation for tradesmen were 2.85 and 0.45 respectively. Hypothesis one was rejected. This mean, there was significant difference in the mean achievement scores of contractors, builders and tradesmen as regard the utilization of safety facilities in building construction sites in FCT Abuja and Niger state. Showed that there was statistical difference between the responses of builders and contractors $p = 0.006$; and tradesmen and contractors $p = 0.006$. There was no significant difference in the mean response of tradesmen and builders $p = 0.859$ as regard utilization of safety facilities in building construction sites. This could be as a result of inadequacy of safety facilities in construction site in FCT Abuja and Niger State.

H₀₂: There is no significant difference in the mean responses of contractors, builders and tradesmen as regard the extents of utilizing safety facilities in building construction sites.

Table 4 revealed that there was no significant difference (P<0.05) in the mean ratings of the respondents (contractors, builders and tradesmen) as regard the extents of utilizing safety facilities in building construction sites. These data supported the hypothesis, $F(2, 178) = 1.576$, $p = 0.210$. The mean and standard deviation for contractors were 2.71 and 0.19. Similarly, the mean and standard deviation for builders were 2.72 and 0.39. In addition, the

mean and standard deviation for tradesmen were 2.81 and 0.31 hypothesis two was retained. This mean, there was no significant difference in the mean achievement scores of contractors, builders and tradesmen as regard the extents of utilizing safety facilities in building construction sites.

Table 1: Mean and standard deviation of respondent on the adequacy of safety facilities in building construction sites (N = 181)

SN	Items	\bar{x}_R	SD	Remark
1	Safety helmet	3.17	0.84	A
2	Use of Safety harness while working above 3m	1.67	0.51	MA
3	Protective clothing	3.60	0.66	VA
4	Safety goggles	2.59	0.75	A
5	Ear plugs	1.01	0.69	NA
6	Use of nose mask in dusty environment or aggregate works	3.90	0.67	VA
7	Bee net+	2.96	0.65	A
8	Safety boots	1.14	0.77	NA
9	Head pans	3.24	0.78	A
10	Fire truck	1.96	0.75	NA
11	Safety cones	2.98	0.90	A
12	Speed reader	3.12	0.63	A
13	Safety panels	2.55	0.86	A
14	Safety basket for cranes	3.62	0.60	VA
15	Dust catchers for aggregate works	1.90	0.77	MA
16	Ammonia detecting device	1.01	0.63	NA
17	Oxygen detecting device	2.97	0.60	MA
18	First aid box	3.13	0.73	A
19	Fire extinguishers	3.09	0.73	A
20	Fire blankets	2.95	0.81	A
21	Warning signs	3.00	0.85	A
22	Oxyacetylene cylinders	3.01	0.81	A
23	Constant supervision by expatriates	2.93	0.78	A
24	Safety gadgets	2.91	0.85	A
Total Mean/SD		2.68	0.73	

N = Number of respondents, \bar{x}_R = mean, SD = Standard Deviation, VA= Very Adequate, A= Adequate, MA= Moderately Adequate, NA= Not Adequate

Table 2: Mean and standard deviation of respondent on the extent of safety facilities utilized in building construction sites (N = 181)

SN	Items	\bar{x}_R	SD	Remark
1	Safety helmet	3.16	0.76	O
2	The use of Safety harness when working above 3m	3.59	0.78	VO
3	Protective clothing	2.20	0.70	O
4	Safety goggles	2.01	0.48	O
5	Ear plugs	1.12	0.45	NO
6	Use of nose mask in dusty environment or aggregate works	2.17	0.65	O
7	Bee net	3.77	0.61	VO
8	Safety boots	3.56	0.62	VO
9	Safety helmet	2.14	0.44	O
10	Fire truck	1.48	0.77	NO
11	Safety cones	1.07	0.68	NO
12	Speed reader	3.32	0.95	O
13	Safety panels	2.51	0.72	O
14	Safety basket for cranes	2.49	0.71	O
15	Dust catchers for aggregate works	2.04	0.80	O

16	Ammonia detecting device	1.18	0.90	NO
17	Oxygen detecting device	1.54	0.68	O
18	Use of first aid box	3.69	0.60	VO
19	Fire extinguishers	1.25	0.65	NO
Total Mean/SD		2.49	0.75	

N = Number of respondents, \bar{x} = mean, SD = Standard Deviation, VO = Very Often, O= Often, NO= Not Often

Table 3: One way analysis of variance summary table showing the difference in the mean response of the contractors, builders and tradesmen as regard the adequacies of safety facilities in building construction sites

	Sum of Squares	df	Mean Square	F	Sig.	Remark
Between Groups	1534.810	2	767.405	4.860	.009	SD
Within Groups	28104.273	178	157.889			
Total	29639.083	180				

(P<0.05) SD = Significant different

Table 4: One way analysis of variance summary table showing the difference in the mean response of the contractors, builders and tradesmen as regard the extents of utilization of safety facilities in building construction sites

	Sum of Squares	df	Mean Square	F	Sig.	Remark
Between Groups	389.725	2	194.862	1.576	0.210	NS
Within Groups	22014.386	178	123.676			
Total	22404.110	180				

(P<0.05) NS = No Significant

4. Discussion

The finding in Table 1 relating to research question one revealed that the respondents agreed that some of the safety facilities were adequately utilized in construction site while some were not adequate. The findings of Adeagbo et al. (2019) submitted that the use of protective clothing, nose mask in dusty environment or aggregate works and safety basket for cranes were adequate, by implication should be utilized in construction. The findings of Abdelhamid & Everett (2000).

Substantiated this claim by pointing out that making use of warning signs, constant supervision by expatriates, fire extinguishers among others were adequate. However, the findings of Agwu, (2012) were in agreement with the findings of the study but differs that the using of safety boots, fire truck and ammonia detecting device were totally neglected, this implies that the safety facilities were not adequately used in construction site as supported by the Author.

The finding in Table 2 relating to research question two revealed that the respondents agreed that some of the safety facilities were often use in construction site while some were not often. The findings of Agwu & Olele, (2013) were in same direction with the findings of the study that making use of first aid box and fire extinguishers were very essential. This is not coming as surprise since it is expected that warning signs and regulation of speed be limits by all vehicles within and outside the site were very often in construction site. Similarly, the findings of Ahmad, (2016) & Anon, (2010) were also in conformity with the study which stated that,

appropriate use of oxyacetylene cylinders, safety education before work on daily basis, among others were often and should be utilized in construction site. However, the author disagree with the findings of Charles et al. (2019) that reviewing accidents and near misses, regular inspections, using of safety cones, as well as fire truck and ear plugs were not often used in construction site.

H01: It was found out that there is significant difference in the mean ratings of the responses of the three groups of respondents (20 contractors, 71 builders and 90 tradesmen) as regard the adequacies of safety facilities in building construction sites. Using Post Hoc test, the null hypothesis of no significant difference was therefore rejected for the two groups (builders and contractors $p = 0.006$; tradesmen and contractors $p = 0.006$), but upheld (tradesmen and builders $p = 0.859$) on utilization safety facilities in building construction sites. Generally the findings of the study on hypothesis one were in line with the findings of Ogunbanjo, (2010) where it was found out that there is significance difference in the mean ratings of the responses of contractors, builders and tradesmen. The findings of Okolie & Okoye, (2012) gave credence to the findings of this study on hypothesis one as regards the adequacies of safety facilities in building construction sites.

H02: It was found out that there was no significant difference in the mean ratings of the responses of the three groups of respondents (20 contractors, 71 builders and 90 tradesmen) as regards the extents of utilizing of safety facilities in building construction sites. The null hypothesis of no significant difference was therefore upheld for the three groups on extents of utilization of safety facilities. Generally, the findings of the study on

hypothesis two was in conformity with the findings of Paul (2013) where it was found out that there is no significance difference in the mean ratings of the responses of contractors, builders and tradesmen. The findings of Prasad & Rao (2013) gave credence to the findings of this study on hypothesis two as regards the extents of utilizing of safety facilities in building construction sites.

5. Conclusion and recommendation

Both the contractors, builders and tradesmen collaboratively agreed that there should be adequate use of safety facilities in building construction site in FCT Abuja and Niger state in order to improve the safety of workers. The contractors, builder and tradesmen required appropriate information concerning the applications, dissemination and diffusion of using personal protective equipment (PPE) at work, such as the use of Safety harness while working above 3m, ammonia detecting device, safety boot and fire extinguishers in order to prevent accident from site.

Interventions are needed on the part of the government by reviewing the safety act (law), based on the dynamisms in present safety facilities and peculiarities involve when working. The study also revealed that contractors, builders and tradesmen are aware of challenges affecting the effective utilization of safety facilities in building construction site based on their responses in the present study. Working environment should always be cleared and kept free from all objects that can cause harm or injury to the workers in building construction site. This means that safety on construction sites protects the workers, keep public safe where the general public is coming and going decrease time and money lost when an accident occur it cause injury or death and work cannot continue.

The following recommendations have been derived based on the findings of the study:

- There should be strict enforcement of safety facilities in building construction by the construction site administrative in order to improve the safety of workers .contractors, builders and tradesmen required appropriate training/induction regularly on using the safety facilities in building construction site base on their peculiarities.
- There should be appropriate safety education concerning the applications, and diffusion of using personal protective equipment (PPE) at work, such as the use of safety harness while working above 3m, ammonia detecting device, safety boot and fire extinguishers among others in order to prevent accident from site.
- Interventions are needed on the part of the government by reviewing the safety act (law), base on the dynamisms in present safety facilities and peculiarities involve when working.
- The safety personnel's in charge of safety should ensure working environment is always cleared

and kept free from all objects that can cause harm or injury to the workers in building construction site. Both the contractors, builders and tradesmen are aware of challenges affecting the effective utilization of safety facilities in building construction site based on their responses in the present study.

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