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ANALYSIS ON CAUSES AND SAFETY MEASURES OF WORKPLACE ACCIDENTS IN THE CONSTRUCTION INDUSTRY IN NIGERIA

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ABSTRACT

This study was conducted to examine the Causes and Influence of Workplace Accidents on the Nigerian Construction Industry. The research objectives are to investigate the factors that influence accident at workplace and examine the measures taken to reduce the incident and accident at workplace. A research questionnaire was administered some professionals in the indigenous construction within Abuja. Data were collected and analysed using Relative Important Index (RII). The research finds out that carelessness is the major cause of fatal accident in the workplace with Relative Important Index (RII) of 0.42, none compliance with site meeting to update workers on current standard of activities on site with Relative Important Index of 0.42 and rated 1st. chemical emitted by plant and equipment and lack of experience were rated 1st and 2nd with the corresponding Relative Important Index of 0.41 and 0.40 respectively. Provision of protective device mechanism, site orientation and awareness/training are the various measures taken to reduce incidences and fatalities on sites with the RII = 0.42, 0.40 and 0.39 respectively. The research concludes that Health and Safety regulations were not implemented and practiced by most of the Nigerian construction industry.

Keywords: Accident at workplace, Incidence, fatalities, causes of accident, influence, construction industry, Health and Safety.

1.0 Introduction:

Accidents in construction can be caused by various factors which include lack of knowledge, non-compliance with rules and regulations, non-use of Personal Protective Equipment (PPE), unsafe acts, and negligence (Ndekugri and Corbett, 2004). The number of accidents in construction undertakings in Nigerian is quite high (Olubunmi, 2012). Nigeria is a country with a population of more than 188million people (National Population Commission, 2016) and it has various types of construction companies that deliver diverse types of projects and employ many people (Kadiri *et al*, 2014). The Nigerian construction sector employs a lot of illiterate and unskilled individuals, and these workers frequently display a poor awareness of health and safety (H&S) standards as well as a lack of vigilance and caution, making them vulnerable to many types of accidents and injuries. However, this view cannot be substantiated statistically as the construction industry does not always report accidents to the relevant authority (Agwu and Olele, 2014). Measurable information in this regard is thus scarce, e.g. less than 100 accidents were reported between the years 2001 to 2006 (Olubunmi, 2012; Kadiri et al, 2014). Additionally, there is a lack of published literature on the topic. For the overall safety performance of the construction industry to be improved in especially Nigeria, the root causes of accidents should be scrutinized and addressed (Abdul Hamid *et al*, 2014).

One of the riskiest industries in the nation is construction, according to experts. Compared to other industries, the construction sector has a higher injury rate.

Many individuals are hurt, harmed, and even killed every year as a result of construction site accidents. Control of accident is vital in the construction industry, employers are required to access risk and take practical measures to protect, ensure safety and health of their workers, minimizing risk by means of continuous surveillance and monitoring of where accidents are likely to occur Odetoyinbo O.A (1986). Lucy et al (1999) views accident as an unplanned and unexpected occurrence which upsets a planned sequence of work resulting to loss of production,

injury to personnel, damage to plant and equipment and eventually interrupting production flow. O.S.H.A (2005) ascertained that there are at least 60,000 fatal accidents on construction sites annually around the world, the fatal injury rate for the construction industry is higher than national average among industries worldwide. Jaselskis and Suazo (1994) demonstrated a substantial lack of awareness or importance for safety at all levels of the construction industry. In addition, Lawfer and Hedbetter (1986) assessed various safety measures. Some researchers examined costs of construction accidents to employers (Leopold and Leonard, 1987; Levitt and Samelson, 1993). Therefore, any effort to identify and investigate potential means of preventing and controlling accidents should be sought after. This is why the study is necessary because accidents prevention has become an increasingly important factor that could be a significant cause of concern in the construction industry.

This paper intends to investigate the of causes accidents due to human factors, leadership and culture factors, equipment factors, specification factors and the measures taken to lessen such in the Nigeria construction industry.

1.1 Statement to the Problem

Most developing nation construction managers/supervisors are highly negligent in their workplace when it comes to keeping to the organizational standard of operations, regulations, and protocol, which result in harm, injury, or damage to employees during the operational process. Casualties due to accidents in Nigeria's construction industry continue to occur as a result of certain factors due to the probabilities of human action, leadership and culture factors, equipment and specification factors, and noncompliance with health and safety regulations on the construction site. Hence, this paper examines, what could be the leading causes and possible safety measures of workplace accidents in the construction industry in Nigeria

2.0 Literature Review

Globally, over 317 million fatal accidents are attributed to construction activities (ILO, 2016). Non-compliance with safety acts by workers, not obeying working procedures, low-level of technical knowhow, poor site management, lack of cooperation and teamwork are among the causes of construction accidents (Alhajeri, 2011; Bashir, 2013). Other common causes of accident are falls from a high object or structure, being smashed by any falling/moving object from crane tower, collision with moving vehicles, striking a fixed or stationary object and slips, trips and falls (Hughes and Ferrett, 2011).

Indeed, there are many causes of accidents. Bashir, (2013) considers onsite versus offsite causes of accidents while Zailani (2012) reflects on the two-fold classes of: 1) incident Occurrence (e.g. slips, trips and falls) versus 2) immediate causes (such as using equipment improperly, not using PPE (Personal Protection Equipment) when required, etc.).

The Construction industry employs many workers (Tiwary and Gangopadhyay, 2011). The UK construction industry is quite massive (Fewings, 2013) employing over 2 million people (Rhodes, 2015) and contributing immensely to the British economy (Monagha, 2014). This sector's annual turnover recently reached over £250 billion (Hughes and Ferrett, 2016) and has significantly recorded great health and safety (henceforth H&S) achievements by reducing the number of fatal injuries and degree of accidents (HSE, 2015). Many programs have raised the level of awareness of UK construction workers towards the relevance and thus compliance to safety regulations (Hackett, 2015). Likewise, safety standards are high in the US (Ghule, 2008).

The exposure of frontline construction workers to harsh environmental conditions like sun, rain, wind, etc. makes them more prone to ailments like backache, headache, skin diseases, joint pains, lung disorders and other muscular skeletal disorders (Tiwary, and Gangopadhyay, 2011). Working in confined spaces and tight schedules compounds the risks of construction (Orji *et al*, 2016).

Whilst Fewings (2013) maintains that the performance of H&S in both developed and developing countries is poor, the analysis of Awwad *et al* (2016) suggests a disparity. Many cases of accidents and fatalities occur more in developing countries where the causes include "extensive subcontracting, absence of safety training, lack of safety awareness, inefficiency of safety regulations and legislations, and unsupportive top management" (Awwad *et al*, 2016, pp.2). Other contributors are the weak

commitment of management, ineffective supervision, inadequate training and lack of competency on the part of workers on construction sites (Awwad *et al*, 2016).

Nigeria is performing well economically (National Bureau of Statistics, 2012). Her construction industry contributed 3.01% of the total Gross Domestic Product (GDP) during the first quarter of 2012 (National Bureau of Statistics, 2012). Despite the size of this sector, many construction firms are performing below expectations (Odediran, *et al.*, 2012). Likewise, many construction companies do not value the H&S of their workers (Chia-fen *et al*., 2014). Many unskilled persons can be found on Nigerian construction sites working with bare slippers as footwear and without using other PPE (Odediran *et al*., 2012). Measures which will enable employers and employees to understand H&S deeply and implement it fully in Nigerian construction are needed (Augusta *et al.*, 2015). One action that can be taken is to identify the main causes of accidents and address these.

On a daily basis, construction workers must cope with some of the most hazardous working conditions encountered by employees in any business, whether on a little project or for a large commercial development. I.L.O (2016). Construction site by its nature is full of hazards even for the very experienced worker. Accidents still occur and undoubtly continue to occur due to both the nature of work itself and the variety of hazards faced by construction workers. The fault of accidents lies with the system, environment and the persons involved in construction activities. Seixas et al (1998) shows that occurrence of accidents differs from one site to another.

Negligence is an important factor identified in accidents in the construction industry. The Gerling law defines negligence in the workplace as the failure of an organisation to maintain and uphold its standards of operations, behaviour, or protocol, which in turn may lead to harm, injury, or damage to employees during the process of operating or moving around (Gayle, 2015). The contribution of negligence to accidents in the construction industry in especially developing countries like Nigeria has been acknowledged by researchers like Abdulhamid *et al*. (2014) and Alhajeri (2011). Rahman (2015) considers workers who intentionally operate without using personal protective equipment (PPE) as being negligent.

Employers too may contribute to this default by not insisting on the use of PPE (Orji *et al,* 2016). This realization creates a window into researching negligence as an accident cause, a topic that is investigated in the paper. Understanding the causes of accidents is very important for devising solutions for overcoming these (Radomsky *et al*., 2001; Ford, 2016).

Policies and regulations are used to control as well as improve the standards of H&S at work places. In the UK for instance, the working at height regulation (WAHR) act of 2004 demands that suitable and sufficient measures be employed to prevent any person from falling when working up at a height that would be liable to cause personal injury (Anderson, 2004). Several measures to minimise the occurrence or impact of accidents can be teased out of the WAHR e.g. the use of airbags to arrest falls (Hughes and Ferrett, 2011).

It is important to have effective and efficient H&S rules and regulations in the Nigerian construction industry (Anderson, 2004). According to Dodo (2014) the *Nigerian Factories Act* of 1958 which was updated in 2002 placed the burden of responsibility for the health, safety and welfare of personnel that are operating in many industries including construction on the Federal Ministry of Labour and Productivity. This act was later replaced with the Factories Decree No.16 and Workman's Compensation Decree No.17 and later signed into law and became effective in 1990. However, it seems that H&S regulations are virtually not enforced in developing countries like Nigeria (Diugwu *et al.*, 2012; Idubor and Oisamoje, 2013). Thus, Umeokafor *et al*, (2015) opine that the Nigeria government has failed to provide functional H&S regulations.

The construction industry continues to have a significant number of work-related incidents that have resulted in many injuries and occasionally fatalities, despite the existence of regulations and their compliance. The situation is graver in developing countries like Nigeria, where the attention to the proper implementation of H&S is relatively low (Awwad *et al.*, 2016). In order to prevent accidents in Nigeria, Bashir *et al.* (2012) suggest the application of lean construction tools on sites.

Utilizing contemporary technology and accepted materials, removing hazards from projects in their early stages, and encouraging employees to practice H&S in all aspects of their job are some guidelines that can be taken to prevent accidents in construction in developing nations like Nigeria.

The focus of this paper is to identify and, analyse the most leading causes and effective safety measures of workplace accidents in the Nigerian construction industry.

2.1 Causes of Accidents

There are numerous and an enumerable cause of accidents that occurs on site it is a duty of the site manager or supervisor to identify these causes and ways of eliminating them. Siri Wardena et al (2006) points that acts of God or disasters as related to construction are events or actions which causes severe damages to construction products, processes and stakeholders. Various acts of God that cause casualties on sites are rain, flooding, wind, earthquake, landslides etc. Adeniye (2001) states it is much easier to carry out construction works on site during the dry season than the wet season in event of rain workers on scaffold may lose his balance and step or slid of the plank hence resulting to fall. Sotoire (1992) also points out that since construction workers work on unsheltered environment adverse weather conditions should be avoided because continuous exposure to adverse weather could lead to general discomfort and illness. Continuous exposure to moderately high noise level or relatively high level of impulse noise such as explosives on site, noise produced by heavy equipment, welding noise etc. these are major causes of occupational deafness Adeniye (2001). Lucy et al (1999) states that human error is considered to be an undesirable human decision or action that reduces or has the potentials for reducing the effectiveness of safety or system performance. This is also due to failures on the part of construction workers, errors in judgements, lack of concentration at work, lack of awareness on the danger surrounding the activities and safety requirements. Therefore, there must be adequate safety training for all construction and building site workers and personnel on site to raise their awareness level about safety.

3.0 Research Methodology

This research study targets the perception of the construction professionals in respect of the health and safety management practice in the Nigeria construction industry. To achieve this, a well-structured questionnaire through snowballing approach, was administered to some construction professionals with a wide range of experience in building construction management within Abuja, Nigeria. The respondents selected were all senior cadre level professionals in the construction industry i.e Architects, Builders, Engineers and Quantity Surveyors. All are those managing construction projects at various categories of construction firms. A four-point Likert-type scale and Relative Important Index (RII) method was used in analysing the views of the construction professionals within Nigeria

3.1 Method of Data Collection

A total of 81 questionnaires were distributed to some selected construction professionals out of which 60 were filled and returned, 21 not returned. A total of 60 therefore was used for the analysis.

The mathematical formula below was used for the computation of sample size;

$$n = \frac{N}{1+Ne^2}$$

where n is the sample size or number of samples, N is the Total population target and
e is the acceptable sampling error or error tolerance
For this research, the 95% degree confidence level corresponds to e =0.05. The population target was chosen to be (N) 101 samples. Therefore, the sample size is computed as follow;

$$n = \frac{101}{1+(101*0.05^2)} = 80.6$$

The sample size is rounded up to 81.
registered with the Corporate Affairs Commission in Abuja, Nigeria.

3.2 Data Analysis and Results

The questionnaire used a four-point Likert-type scale to measure a range of views from construction professionals regard to the issue of health and safety management practice in the Abuja, Nigeria. Relative Important Index (RII)

method was used in analyzing the views of the construction professionals within Abuja.

$$RII = \frac{\Sigma^{n} 1 - nWS}{Nn}$$

Where: W = Rating variable
S = Number of respondent placing equal
n = The largest attainable rating
N = Sample size

Also, values were arranged using ranking of: 4 = always, 3 = often, 2 = At times, 1 = once

4.0 Research Findings

Table 1: Accident caused by Human Factors

Accident caused by Human Factors	FREQUENCY OF OCCURRENCE					
	Always	Often	At times	Once	RII	Ranking
Fall from height	26	14	12	08	0.29	5th
Slip and strip	28	14	16	02	0.33	4th
Fatigue	30	15	10	05	0.34	3rd
Noise	35	20	05	0	0.39	2nd
Negligence	35	10	06	09	0.39	2nd
Carelessness	40	10	07	03	0.42	1st

Source: Field survey, 2022

The major human factors that were rated first, second, and third with corresponding Relative Important Indexes of 0.42, 0.39, and 0.34 were carelessness, negligence, noise, and fatigue.
This was due to the fact that many construction workers in Nigeria were illiterate and unskilled, displaying a lack of awareness of health and safety standards. This is consistent with an author's argument (Tiwary and Gangopadhyay, 2011) that construction industry employs many workers. Carelessness as the greater value of Relative Important Index (0.42), therefore, the major accident source in the indigenous (Nigeria) construction site due to the high level of illiteracy of the workers.

Table 2: Accident caused by Leadership and Culture Factors

S/N	Accident caused by Leadership and Culture Factors	Always	Often	At times	Occasional	RII	Ranking
1	Lack of safety, security policies and regulations	13	16	28	03	0.33	5th
2	Lack of adequate orientation	07	10	18	25	0.30	6th
3	Complete design	06	09	15	30	0.34	4th
4	Poor working environment	18	28	09	05	0.33	5th
5	Lack of provision of protective device to site workers	33	20	05	02	0.36	3rd

6	Poor supervision of material and work on site	35	20	05	0	0.39	2nd
7	None compliance with site meeting to update awareness	40	12	05	03	0.42	1st

Source: Field survey, 2022

Table 2 above shows leadership and culture as a factor to accidents at workplace. This implies that management and supervision in the Nigerian construction industry were not assisting in the elimination of accidents on construction sites. Indeed, they are a major contributor to fatal injuries, deaths, and other incidents on the job site. According to the results of the analysis, none compliance with site meetings to update awareness, poor supervision of material and work onsite, lack of provision of protective devices, and complete design were rated 1st, 2nd, 3rd, and 4th, with individual Relative Important Index (RII) values of 0.42, 0.39, 0.36, and 0.34. According to the findings, management and site supervisors were not enforcing workplace safety regulations on their employees. This aligns with the contribution of some authors (Awwad et al, 2016) that the weak commitment of management, in effective supervision, inadequate training and lack of competency on the part of workers on construction site. The research pinpoint noncompliance with site meeting to update awareness has the highest incident caused by leadership (Management and Supervision).

Table 3: Accident caused by Equipment and Specification Factors

S/N	Accident caused by Equipment and Specific Factors	Frequency occurrence					
		Always	Often	At times	Occasional	RII	Ranking
1.	Lack of experience	0	10	14	36	0.40	2nd
2.	High noise of locomotive machine	05	12	15	28	0.33	5th
3.	Poor handling power of hand tools	08	10	12	30	0.34	4th
4.	Electricity (electric shock)	0	05	20	35	0.39	3rd
5.	Chemical emitted by the plant/equipment	04	06	38	12	0.41	1st

Source: Field survey, 2022

According to the table above, many construction workers were employed regardless of their educational background or qualification. These employment methods result in a large number of illiterates on the jobsite, which automatically leads to increased redundancy, carelessness, inexperience, poor handling of plants and equipment, and a lack of knowledge regarding safety regulations. It is also deduced that chemicals emitted by plants/equipment, lack of experience, electric shocks, poor handling power of hand tools, and high noise locomotive machines are the key factors of accidents by equipment and specification with rating values of 1st, 2nd, 3rd, 4th, and 5th and corresponding Relative Important Index values of 0.41, 0.40, 0.39, 0.34, and 0.33. This aligns with the agreement of an author (Adeniye, 2001) that continue exposure to moderate high noise level or relatively high level of impulse noise such as explosive on site, noise produced by heavy equipment, welding noise etc. are the major causes of occupational defines. As a result of the analysis, chemical emitted by construction equipment has a high defective impact on construction workers.

Table 4: measures taken to reduce incident and accident at workplace.

S/N	Measures taken to reduce accident and incident at workplace	Frequency occurrence					
		Always	Often	At times	Once	RII	Ranking
i.	Site orientation and awareness	02	06	38	14	0.41	2nd
ii.	Provision of mechanical plants to reduce complication of work activities	04	11	30	15	0.35	5th
iii.	Provision of protective device mechanization to workers	12	40	06	02	0.42	1st
iv.	Provision sign board at a regular interval on site in order to enlighten the workers of the danger zones on site.	04	07	16	33	0.36	4th
v.	Provision of good working space	18	29	04	09	0.34	6th
vi.	Implementation of Health and Safety Regulations	0	07	18	35	0.39	3rd

Source: Field survey, 2022

Table 4 above analyses methods taken to reduce incident and accident at workplace. The analysis shows that provision of protective devices was rated 1st, site orientation and awareness was rated 2nd, and implementation of Health and Safety was rated 3rd, with Relative Important Indexes of 0.42, 0.41, and 0.39, respectively. This implies that, despite existing regulations and their patchy compliance, construction workers' safety is not prioritized. This aligns with an author argument (Bashir et al, 2012) that application of lean construction tools on site will prevent accident in Nigeria.

Conclusion

The Nigeria construction industry are faced with varieties of incidents, accidents and fatal injury case caused by many related factors. The author identifies some of the major factors that contribute to workers fragile incidences. The accident causes include human factors, leadership and culture factors, and equipment and specification factors. From the study, the highest Relatives Important Indexes of the various accident factors are 0.42 (for Human Factors), 0.42 (for Leadership and Culture Factors) and 0.41 (for Equipment and Specification Factors). Other causes were stated in the author's literature review alters construction process on sites due to varieties of incidents like fall from heights. The research also conclude that health and safety regulations were not implemented in the majority of the Nigeria construction industry because most of the workers were illiterates which give rise to high level of carelessness in construction work on site. Also, both management and supervisors contribute to accident of workers due to their negligence on the safety regulations, lack of professionalism, lack of orientation, lack of training and fatigue. Some guidelines that can be followed to prevent accidents in construction in developing countries like Nigeria include using modern technology and accepted materials, removing hazards from projects in their early stages, and encouraging employees to practice H&S in all aspects of their job.

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