AN ASSESSMENT OF OCCUPATIONAL ACCIDENTS ON CONSTRUCTION SITES IN NIGERIA

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ABSTRACT

Occupational health and safety issues are concerned with protecting employees and other people affected by what the company produces and does, against the hazards arising from their employment or their links with the prevention of ill-health arising from working conditions. No Personal Protective Equipment (PPE), Welfare facilities, training and protection are offered workers. The Environmental Protection Agency (EPA) which is the only regulatory body plays an insignificant role when contractors fail to provide a healthy and safe environment for workers. Using simple random sampling technique, 70 questionnaires were distributed to Project Architects, Quantity Surveyors, Project Engineers, Project Managers, Site Foremen, Artisans and Labourers. 56 questionnaires were retrieved representing Eighty percent response rate. The data was analyzed using descriptive statistics, relative importance index and scale ranking. From the research the main cause of occupational accidents on construction sites is faulty tools. The findings also indicate that keep the workspace clean, provision of Personal Protection Equipment (PPE) and training of workers on safety procedures were the measures needed for addressing the occupational accidents issues confronting workers on construction sites, it is recommended that special consideration should be given to the use of Personal Protective Equipment (PPE) dealing with the cause of occupational accidents on construction sites. It is also recommended that Employers and contractors should provide suitable programmers' that are consistent with National Laws and Regulations to ensure the health and safety of workers.

Keywords: Accidents, Construction, Health and Safety Project and Site

1.0 INTRODUCTION

Construction industry plays a key role in advancement of countries economic growth. Despite the contributions to economic growth, construction industry has always been blamed for the high rates of accidents and fatalities: this issue has placed the construction industry among the industries with unreasonable rates of accidents, permanent and non-permanent disabilities and even fatalities (Seyyed and Zahra, 2012). Accidents are unforeseen events, which cause damages or injuries unintentionally and unexpectedly. In the construction sector, accidents are unavoidable and has higher risk compared to other occupations (Asanka and Ranasinghe, 2015).

According to Fatih (2015), mentioned that in every year, 60,000 fatal accidents occur worldwide in construction sector and one worker die because of an occupational accident in every 10 minutes, construction sector involve high risk due to its production process and labour intensive characteristics and the sector is faced with financial loss in large scale because of occupation accidents. Lucy, Ian and Ian, (1999); Kadiri, Nden, Avre, Oladipo, Edom, Samuel, and Ananso (2014) views accident as unplanned and unexpected occurrence which upsets planned sequence of work resulting to loss of production, injury to personnel, damage to plant and equipment and eventually interrupting production flow. Accidents prevention has become highly important aspect which could be major cause of concern in the construction industry, therefore any effect to identify accidents explore possible ways of preventing and controlling accidents should be sought after, hence the need for the study. Occupational accidents in construction in construction industry have only influenced safety and health but also have negative impact on economics of the countries (Ahmad, Iraj, Abass, and Mahdi 2016). This study will assess the causes of occupational accidents and factors relating to cause of occupational accidents on construction

sites. With rapid economic development and industrialization, the construction industry continues to rank among the most hazardous industries in the world (Yahya, Hassan, and Ebrahim 2014). In many countries, occupation accidents are a major problem in public health. This is usually involved with situation that cannot be hold and control by other workers and employers at the workplaces (Zakaria, Hussin, and Noordin 2010). Occurrence of accident on construction site causes losses to the employer on labour due to compensation paid by the company. Occupational accidents in Nigeria, normally seen in almost every construction site, are caused by human error. The human error is considered as an undesirable human decision or action that reduces the effectiveness of safety or system performance (Panassaya, Parichat, Calmin, Pichapa and Thanwadee 2015).

2.0 LITERATURE REVIEW

2.1 Causes of Occupational 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. International Labour Organization (I.L.O) (2005), 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. Neitzel, Sexies and Ren (2001) shows that occurrence of accidents differs from one site to another. Siri Wardena (2006), points that an 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 judgments, 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. Furthermore different types of accidents with varying rates of occurrence and fatalities from previous works are scaffold accidents (O.S.H.A 2005; HSE, 2006; Mccann and Paine; 2002, U.S dept. of labour 2005); accidents due to slip, trips and falls Tappin (2004); crane accidents (Neitzel et al. 2001; Skinner 2006). Ladder accidents (O.S.H.A 2005; and electrocution and electrical accidents (Taylor 2002; Crowley and Homce, 2001).

2.2 Health and Safety in the Work Place

Occupational health and safety has been defined by the International Labour Organization (ILO), 2001 as: *"The prevention and maintenance of the highest degree of physical, mental and social well-being, the prevention of ill-health among workers caused by their working conditions, The*

protection of workers from factors adverse to their health in their employment, and the placing and maintaining workers in occupational environments adapted to their individual and psychological conditions." Health refers to the protection of bodies and minds of people from illness resulting from materials, processes or proceeding used in the work place whereas safety is protection of people from physical injury (Hudghes and Ferrett, 2008). Safety means a state in which no danger of a damage causing accident exists. A high level of occupational health and safety contributes to the achievement of material and economic objectives and provides high quality and performance in working life. In spite of this, conditions at work and in the work environment for many occupations and in many countries still involve a distinct and even severe hazard to health that reduces the well-being, working capacity and even the life span of working individuals.

2.2.1 Construction Industry Health and Safety

Construction workplaces the workers are exposed to hazards of occupational diseases and injuries and the adverse effects of excessively long hours of work. Machines, plants and other sophisticated construction equipment pose danger to the operators, who in most cases do not have prior skills for operating such machines or plants. A worker should be assigned duties in relation to his physical and mental health and skills. Further, employers should have complete control over their employees and therefore ensure adherence to safety practices. The company must comply with all provisions of safety and health regulations that pertain to the construction works itself. A number of factors having a negative impact on health and safety management in developing countries which include poor infrastructure; problems of communication due to low literacy level; unregulated practices on construction sites; adherence to traditional methods of working; non availability of equipment; extreme weather conditions; improper use of equipment

and corruption. The culture of the construction industry in developing countries also does not promote health and safety.

2.2.2 Health and Safety Measures in Construction

2.2.2.1 Site Layout and Planning

A badly planned and untidy site is the underlying cause of many accidents. This results from falls of material and collisions between workers and plant or equipment. Space constraints, particularly in urban work sites, are nearly always the biggest limiting factor and a layout which caters best for the safety and health of workers may appear to be difficult to reconcile with productivity. Proper planning by management is an essential part of preparation and budgeting for the safe and efficient running of a construction operation. There are many accidents due to tripping, slipping or falling over materials and equipment which have been left lying around, and stepping on nails which have been left projecting from timber.

2.2.2.2 Personal Protective Equipment (PPE)

Personal protective equipment (PPE) refers to protective clothing, helmets, goggles, or other garment or equipment designed to protect the wearer's body from injury by blunt impacts, electrical hazards, heat, chemicals, and infection, for job-related occupational health and safety purposes. 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 program should be implemented. This program should address the hazards present; the selection, maintenance, and use of PPE;

the training of employees; and monitoring of the program to ensure its ongoing effectiveness.

2.2.2.4 Health and 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 pipework containing dangerous substances. Traditional signboards, such as prohibition and warning signs, signs for fire exits, fire action plan notices (fire drills) and fire-fighting equipment are also considered to be Safety Signs. It is critical that all Safety Signs and Signals can be easily understood. Where signboards are used in a workplace they should be sufficiently large and clear so that they can be easily seen and understood. Signboards also need to be durable, securely fastened and properly maintained to ensure they remain visible. Care must be taken to avoid using too many signboards in close proximity, signboards are only effective if they can be seen and understood. If too many signs are placed together there is a danger of confusion or of important information being overlooked (HSE 2009).

2.2.2.5 Safety Policy

Site managers should have a written safety policy for their enterprise setting out the safety and health standards which it is their objective to achieve. The policy should name the senior executive who is responsible for seeing that the standards are achieved, and who has authority to allocate responsibilities to management and supervisors at all levels and to see they are carried out.

2.2.2.6 Health and Safety Risk Assessment

According to HSE (2004), employers are required to make an assessment of the health and safety risks to which employees and others are exposed on construction sites. The significant findings must be recorded where five of more people are employed. Since managing health and safety is different from managing any other aspect in construction there need to do a risk assessment to find out about the risks, and to put sensible measures in place to control them, and make sure they stay controlled.

2.3 Legislation and Enforcement of Health and Safety Regulations

Cotton, Sohail and Scott (2005) noted that the institutional and legal governance frameworks on occupational health and safety in developing countries have little impact. The majority of contractors are small and medium Enterprises operating within their domestic markets where enforcement of health and safety standards and labour standards is very lax. Enforcement of health and safety regulations remains a problem due to lack of adequate resources available to government institutions responsible for occupational health and safety administration. Also, there remains an acute need for contract provisions to support the enforcement of labour laws in developing countries.

3.0 RESEARCH METHODOLOGY

3.1 Research Design

The target population of the study is the construction companies that engaged in contracting, consultant, maintenance, services, civil engineering works, renovation, refurbishment and rehabilitation and also includes all construction professionals (Architect, Engineers, and Quantity Surveyors etc.). A simple random sampling was adopted for the purpose of the study in order to identify heterogeneity in the population and reduce sampling error.

3.2 Sampling Technique

Due to the nature of the data to be collected from the population, questionnaires were administered on these sampled respondents to obtain data/information relevant to the study in the study area (Lagos state, Nigeria). However, this was achieved using a random sampling method.

4.0 DATA ANALYSIS AND PRESENTATION OF RESULTS

4.1 Presentation of Results

However, the total number of questionnaire retrieved and analyzed were Fifty Sixty (56) which formed 80% of the total number of questionnaire administered. Many of the questions were close ended with option given and an open choice question.

4.2 Cause of Accidents on Construction Sites

Table 1: Mean and Ranking of the Types of Construction Claims

Types/Causes of Accidents	Mean	Rank
Faulty tools	4.18	1

Operator's error	3.86	2
Improper fixing of component	3.86	3
Reaching too far to the sides	3.48	4
Broken ladder	3.43	5
Unstable ladder	3.32	6
Uneven surface	3.27	7
Electric shock	3.23	8
Unsecure loads	3.23	9
Collapse of scaffold structure	3.13	10
Falling objects	3.11	11
Fall from height	3.09	12
Contact with electrical wire	2.70	13
Collapse of crane	2.39	14

Table 1 above indicates that the "faulty tools" type/cause of accidents on construction site were ranked first, the next is "operator's error" while "collapse of crane" type/causes of accidents on construction site were ranked last. The result obtained from the ranking reveals that the common type/cause of accidents on construction site is "faulty tools".

Table 2: Factor Related to the Causes of Occupational Accident

Rotated Component Matrix

	Component							
	1	2	3	4	5	6	7	8
Memory lapse	.087	-.168	.470	.014	.663	.122	.178	.001
Attention	.400	-.178	-.162	.253	.157	.450	.147	.478
Competence and skills	.022	-.048	-.368	.716	-.101	.110	-.033	.061
Personality	-.256	.426	-.086	-.135	.584	-.055	.447	.022
Attitude	-.086	.149	-.026	-.086	.824	-.210	-.061	.081
Individual characteristics	.068	.376	-.038	-.279	.280	-.600	.038	.326
Risk perception	.247	.096	-.113	.152	.203	-.073	-.003	.814
Sight and visibility	.081	.128	.025	-.057	.201	-.026	.896	.056
Ambient temperature	.140	.748	.011	-.127	.011	-.084	.132	.130
Sound and air pollution	-.219	.862	-.196	.200	.080	.040	-.059	-.166
Water pollution	-.142	.604	.137	.111	.356	.097	-.267	-.344

Population density in work area	.367	-.353	.146	-.049	.209	.114	.392	-.153
Operator fatigue	.658	-.089	.162	.133	-.211	.119	.114	.273
Power failure	.148	.215	.709	.261	-.195	.055	.132	-.155
Broken or damaged part	-.344	-.064	.790	-.070	.171	.115	.095	.089
Mechanical mismatch	-.195	.358	.120	-.164	-.223	.671	.167	.275
Control system failure	.112	.029	.130	.774	.112	.331	.040	.146
Fuel factor	.006	.080	.383	.782	-.175	-.108	.088	.091
Fair wear and tear	.189	-.353	.727	-.008	.140	-.256	-.050	-.045
Lack of certified skilled labour	.110	-.037	-.069	.186	.017	.795	-.198	-.021
Shortage of safety manuals	.436	.236	-.151	-.154	.292	-.147	.072	-.671
Poor inspection program	.870	-.072	.112	-.116	-.055	-.009	.078	-.065
Lack of innovative technology	.720	.027	-.334	.219	.039	-.065	.070	.085
Lack of training	.189	-.131	.158	.255	-.232	-.125	.690	-.019

Table 3: Relative Importance Index and Ranking of the Level of Prevention of Occupational Accidents on Construction Sites

Level of Prevention of Occupational Accidents on Construction Sites	RII	Rank
Keep the workspace clean	0.93	1
Safety Gear	0.89	2
Provide safety training for all employees	0.88	3
Ensuring safe working environment	0.88	4
Use equipment in the manner prescribed	0.87	5
Mandatory Safety Meetings	0.86	6
Use site signs and symbols as a medium of communication	0.86	7
Maintain the equipment and tools	0.86	8
Reflective Clothing	0.86	9
Follow HSE guidelines and report any dangerous working conditions	0.85	10
Recognize the hazards and make a plan	0.82	11
Regular Break	0.81	12
Be careful with vehicles	0.75	13

Prevent falls	0.75	14
Employ calm and quite individual	0.68	15

Table 3 above indicates that the “Keep the workspace clean” level of prevention of occupational accidents on construction sites were ranked first, the next is “Safety Gear” while “Prevent falls” and “Employ calm and quite individual” level of prevention of occupational accidents on construction sites were ranked last respectively. The result obtained from the relative importance index and ranking reveals that the most level of prevention of occupational accidents on construction sites is “Keep the workspace clean”.

Table 4: Mean and Ranking of the Worker’s Compliance to the Use of Personal Protective Equipment (PPE) on Construction Sites

Personal Protective Equipment (PPE)	Mean	Rank
Boots	4.52	1
Helmet	4.38	2
Gloves	4.02	3
Googles	3.98	4
Overall	3.91	5
Safety net	3.89	6
Safety belt	3.51	7
First aid kits	3.09	8
Pads and Guards	3.04	9
Disposal filtering face	2.61	10
Breathing aids	2.36	11
Air Purifying Respirator	2.30	12
Earplugs	2.04	13
Earmuffs	1.95	14
Kevlar chaps	1.70	15

Table 4 above indicates that the “Boots” worker’s compliance to the use of personal protective equipment (PPE) on construction sites were ranked first, the next is “Helmet” while “Kevlar chaps” worker’s compliance to the use of personal protective equipment (PPE) on construction sites were ranked last. The result obtained from the ranking reveals that the most common worker’s compliance to the use of personal protective equipment (PPE) on construction sites is “Boots”.

4.3 Discussion of Results

`A general overview of this research project indicated that the most common type/causes of accident on construction site is faulty tools being used by the worker, it is imperative for contractors to look into the fault to prevent and protect the workers from occupational accidents on construction sites. The study also reveals that keeping the workspace clean at all times prevent occupational accidents on construction sites. It further reveals that the worker’ comply most especially with the use of boots among all the Personal Protective Equipment (PPE).

5.0 CONCLUSION ANDRECOMMENDATIONS

5.1 Conclusion

The study has successfully examined and identified the assessment of occupational accidents on construction sites in Nigeria. It was discovered that faulty tools happen to be the main type/cause of accidents on construction sites as shown in table 1, sight and visibility is the factors related to the causes as shown in table 2. To ensure a safe and accident free construction site, prevention of accident must be understood and proper use of Personal Protective Equipment (PPE) must be implemented and compulsory to all construction workers. The work environments in construction activities are generally more hazardous, than other industries due to the use of heavy equipment, dangerous tools, and hazardous materials, all of which increase the potential

for serious accidents and injuries. Therefore, it is evident that a focused dedication inwards safety is needed from construction at all levels.

It is expected that the findings of this research will assist all construction companies to prevent occupational accidents. It will also help their workers to comply with the use of Personal Protective Equipment (PPE) at all times on construction sites.

5.2 Recommendations

It is recommended that special consideration should be given to the use of Personal Protective Equipment (PPE) dealing with the cause of occupational accidents on construction sites. The best means to avoid occupational accidents on construction sites is to encourage all workers on site to use PPE. There are certain fundamental means of preventing occupational accidents; the essential steps contractors can take to prevent occupational accident and deal with the aforementioned identified causes are: Employers and contractors should provide suitable programmes that are consistent with national Laws and Regulations to ensure the health and safety of workers. This includes maintaining a workplace that has minimal risks and accidents that can result in injury or death. Contractors of the various construction firms should be encouraged to provide PPE to workers and set up Human Resource and Safety Departments for the purpose of executing safety education campaigns and training programmes for all levels of management and workers. They should also ensure that a competent person inspects the construction project site at suitable intervals to ensure safety guidelines are adhered to. Employers must make an assessment of the health and safety risks to which employees and others are exposed on construction sites. Contractors should make provision for safety and health when preparing bids. The provision for safety and health must be made competitive with the aim

to compete with other bidders and to avoid a monetary loss. Costs for Personal Protective Equipment's measures should be explored and explicitly be part of tendering and costing for the project implementation.

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