

## Review of Studies on Common Health and Safety Risks Encountered in Nigeria Building Construction Sites

Otaru Sanni<sup>1</sup>, Abdullahi Ahmed<sup>2</sup>, Jiya Moses. E<sup>2</sup>, Peter Baba Bake<sup>2</sup>, Mohammad Yabagi Lapai<sup>2</sup>, Amina Ibrahim Musa<sup>3</sup>

<sup>1</sup>Bullet International Nigeria Limited, Shehu Shagari Way Wuse, Abuja, Nigeria

<sup>2</sup>Department of Building Technology, Minna Institute of Technology and Innovation, Niger State, Nigeria

<sup>3</sup>Department of Community Health, Niger State School of Health Technology Niger State, Nigeria

Date of Submission: 15-12-2020

Date of Acceptance: 30-12-2020

**ABSTRACT:** The study reviews common health and safety risks on the building construction site. The study reveals that acquiring of new health and safety equipment is the most important health and safety program expected of the construction industry, that inadequate protective equipment and poor maintenance of the available protective equipment are the major health and safety challenges faced by the construction industry at the sites. These challenges have large extent on increasing the project cost. Thus, the results reveal the higher of cost of project execution always proposed by Nigerian construction industry is as a result of high cost of health and safety practices on site. The findings indicate the need for effective health and safety regulation and management control of activities in the Nigerian construction industry more definitively.

### INTRODUCTION

From the beginning of every new construction project, people have needed some idea of what is going to cost before embarking on it. However, forecasting the cost of a construction project usually fails to include the cost of Health and Safety of the construction workers (Idoro, 2011). The construction process itself contains a series of crafty activities which require time and costs for smooth execution. However, the great challenges posed by case of poor health and safety practices in project executions liable to raise the total cost of the construction projects and it has been a great problem for the contractors and their clients (Dimuna, 2011).

Cost is one of the primary measures of a project's success (Arditi and Yasamis, 2007). This is true, especially for public projects in developing countries like Nigeria, where public construction projects in these countries are executed with scarce financial resources (Frimpong et al., 2013). Generally, a project is considered successful, if it is

completed within a stated time and cost or budget, getting the project into use by a target date, meets the technical specification, and if there is a high level of satisfaction concerning the project outcome among the project participants (Awodele and Ayoola, 2015).

Construction projects in Nigeria are faced with a lot of problems among which is additional costs usually incur on projects (Arditi and Yasamis, 2007). Parts of these claims can, therefore, be potentially linked to cost incurred on H&S practices in the construction industry (Okoye and Okolie, 2014). Awodele and Ayoola (2015) declared that the absence of the health and safety regulations and bye laws on construction projects may be one of the major causes of the high cost of construction projects, opining that health and safety in construction is a good, practically steer to assist any expert comprehend the repercussions of health and safety rules on for the position in a project costing. This shows that there is anticipated to be a reasonable plan in adopting a health and safety issue in the budgeting of construction projects. Manuele (2013) considered the development business has focused the flourishing running of development extends on the ordinary elements of cost, time and quality. The expanding rate of site accidents has raised the cognizance of development of health and safety, in this manner, including it as a major aspect of the venture budgetary arrangement. According to Rosli (2008), good health and safety programs would definitely assist help in minimizing the costs of construction. Furthermore, Bakri et al. (2006) recommended that there is an essential to look for a new means of improving the reflection of the construction industry by getting rid of the additional costs out of the project budget. Bakri et al. (2006) suggested that the provision of safe and healthy workplace is one of the most helpful ways for cutting down the expenditure of the construction project. Bakri et al.

(2006) added that accidents do not only result to hindrance in operations and work delivered, but have also earned additional expenses. It is against this condition that this study be carried out to assess the cost influence of health and safety practices on construction projects, with the purpose to offer suitable solutions to the problem, which will serve as means for successful construction project delivery within the estimated budget.

### **Health and Safety Performance of the Nigerian Construction Industry**

For a very long time, the construction industry has been working truly to enhance its health and safety routine. Be that as it may, these endeavors have been moved from checking safety performance to prompt, proactive change in security execution (Datta, 2000). Hinze (2005) states that for safety practices to be successful, construction companies must be organized all the time. Furthermore, Hinze (2005) reported that in order to take safety practices more serious, it is required that approach to safety should not be relying on information of injuries after its occurrence, but rather design safety measure to control the challenge that prompts great safety achievement.

Farooqui et al. (2008) display an upright picture of health and safety implementation in developing nations. Regardless of the stress placed by Adeniyi (2001) on the execution of health and safety programs to improve the activities at building sites, health and safety promotion was also emphasized by McCann and Paine (2002) by stressing that the building industry must go beyond mere writing of a safety plan for creation of a safety culture. Many big industries do have a safety guideline, but workers in general do not have the knowledge of its existence. Contractors always concern themselves with increased profit than to improve the site conditions through the training of the employee, this thereby leads to poor health and safety practices at the sites. Besides, lack of first aid facilities, unsafe workplace, and bad sanitation tend to exist on abandoned projects. According to Adeniyi (2001) the following problem areas are common to building sites:

- i. Burns on the hands and feet of the site workers due lack of hand gloves and footwear.
- ii. Workers tumble from elevation due to weak framework.
- iii. Due to lack of personal protective equipment (PPE) employee experience injuries on all parts their body; and
- iv. Inappropriate workplace keeping.

Lack of better knowledge of the duty and improper maintenance of tools are also major reasons for injuries. Many injuries, small or big are not reported. The site workers consider accidents to occur due to their own carelessness, and affirm that working with building companies is a perilous occupation. Though, many accidents including the death of a worker may not be addressed due to its monetary value and legal implication (Guha and Biswas, 2013). Also, according to Okolie and Okoye (2013) the recent high attention given to safety practices by construction companies is due to the regulation posed by the stakeholders in the fields.

### **Health and Safety Risks on Construction Sites**

The construction industry accident fatality rate stands at more than double that of the all sector average – more minor accidents are almost incalculable, construction sites are health and safety nightmare – almost every conceivable hazard exists within this constantly changing work environment (Guha and Biswas, 2013). In any case, the perils related to the construction industry are noteworthy – most dependable employer know about their obligation of care to workers and guests and those that might be influenced by their activities, and will deal with the site adequately, actualizing fitting accident aversion measures. Hazard evaluations are completed by management to distinguish dangers and risks postured. Meanwhile, safety hazards are divided into physical injury and ill-health hazards. Hazard of physical injury, sometimes lead to death while ill-health hazard result in sickness or death due to long period of time (Murie, 2007).

### **Antagonism, Aggression and Maltreatment**

Antagonism, Aggression and Maltreatment happen while individuals are orally mishandled, debilitated or ambushed in when carrying out their work. On building sites animosity as well as brutality is shown using foul dialect and physical assaults (HSE, 2008). Where there are hostility and savagery, human respect is degraded. Brutality and animosity may originate from bosses or work mates. Tormenting happens when specialists feel that they are being singled out for uncalled for treatment by a supervisor or associate. For instance, a worker is continually reprimanded as opposed to being told, being downgraded and being yelled at by work mates or bosses. Animosity, brutality and harassing can add contribute to different dangers, for example, push (Hughes and Ferrett, 2011).

### **Working at heights**

The erection of buildings brings requires tradesmen to work at height. Injuries related to working at high elevation characterize several accidents annually. The dangers linked to activities carry out at an elevation are usually extended by included getting to and versatility confinements. Planning, including safety mindfulness is fundamental for employee needed to labour at an elevation (Datta, 2000).

The main risks related to working at an elevation are items falling on employee below. Tumbles from height are notable amongst the most regular risks faced by the workers on construction sites. Measurements show that almost one thousand site workers got injured yearly. From this figure, 33% are due to falls (ILO, 2005). Investigation on various nations by Coble and Kibert, (2004) show that tumble from elevations are the main source of related wounds on the building sites in New Zealand. Also, falls represent around 51% of wounds experienced in construction companies in China (Taylor, 2002). Works linked to tumble from elevation took over 47% of every accident in Hong Kong, (Giang and Pheng, 2010). In addition, according to Lawfer and Hedbetter (2007) the nation, Taiwan attributed 30% of injuries in building sites to plunge from a height. Accordingly, plunges are the most expensive related risk in many building sites. The site falls include all height related falls experienced by any employee (Murie, 2007).

### **Dust**

Among the typical dangers faced by site workers are dust and the type of dust exposed to determine the kind of medical challenges experienced. This determines the safety measure to seek. There is high possibility of someone inhaling dust if exposed to an environment containing high amount of dust. The individual exposed to toxic dust could experience serious health challenge, ranging from insignificant disorderliness to a very serious health problem (Hughes and Ferrett, 2011). At building site's materials such as wood, cement and silica can pose peculiar dangers like breathing disease and cancer of lung and stomach.

### **Moving Objects**

A building site is an always busy place; so the dangers are natural to this kind place. Building sites can be very busy such that numbers of the item and workers are randomly moving – Movement like slide lifting, gear moving, movement of supply vehicles, trucks for dumping take place on this site (Idoro, 2008).

### **Slips, outings, and falls**

Due to numerous activities going on at the building site, for a certain period of time one is forced to believe that on daily basis falls, strips and trips occur. Building sites are made up of various constructions at different stage of completion which required every worker at the site to watch out very well at all time (Hughes and Ferret, 2011).

According to Hughes and Ferret, (2011) trips and slips are the most common accidents that take place in the construction sites and made up to about 30% of all common accidents peculiar to building sites. Also, HSE, (2004) asserted that almost all the broken bones suffered by about one thousand employees due to trip and slip annually in nearly every nation take place in roughly all building sites. These common accidents usually cost management of site, millions of pounds yearly. From the findings of Lipscomb et al. (2008) on the study of construction sites in the USA, it was showed, that slips are responsible for the about 19% of the site hazards and about 24 % of the employees' reparation fee. Trips and slips can also lead to many other accidents like height falls. Trips and slips occur due to random scattering of items on the floor, wet or greasy floor, improper use of the footwear, imbalance of employee carrying heavy material and poor lighting

### **Noise**

In building sites, noise is a usual issue. But high level of it can lead serious hearing challenges and precarious interruptions. According to Hughes and Ferret, (2011) assessment of risk posed by noise should always be conducted and recorded in order to adopt a best protective method, because the utilization of ear protection device does not offer absolute protection against damage that it can cause.

Lipscomb et al. (2008) defined workplace noise as the hearing harm cause due to long term encounter to undue noise and may lead to workplace deafness. This harm cause by too much noise is extraordinarily common among site workers. On a building site, activities that lead to serious noise are such as vehicle movement, pouring of concrete, breaking of rock, machinery operation and tool utilization (HSE, 2008).

### **Vibration Disorder of Arm**

A vibration disorder of a worker's arm also sometime known as blue finger is a hazard caused to nerves, veins and join as a result lingering uses of high level vibratory equipment. This workplace hazard appears to be the most often

in damages claim by former site workers (Murie, 2007).

### **Movement of Material**

It was revealed by Smallwood, (2008) that at building site equipment and materials are regularly moved or lift from place to another using manual means or a crane. The uses of manual technique and crane for material movement required enough training and competency test. This kind of training and test should always be documented.

According to Hughes and Ferret, (2011) handling of site materials manually, simply mean moving of material or load around the building site by the site workers. This risky task includes activities such as lifting, pushing, pulling, carrying of item like block, cement brick, concrete. Health challenges like injuries in back injuries, muscles, slipping of joints are caused by this risky activity. Smallwood (2008) reported that material movement contribute to twenty – five percent of injuries experienced by site workers and that nearly thirty percent of site workers experienced this and as a result one month off is always granted for them.

### **Combustion**

Among the several hazards that site workers encounter, fire is one. Even if it is not taken as a serious risk as trip, slip and tumble from height, it is always taken into consideration during construction planning (HSE, 2008). Yearly, record shows that site workers are either found dead or wounded due to combustion. According to Hughes and Ferret, (2011) annually in UK nearly hundreds of site workers encountered fire hazards, while thousands of pounds of property are affected. Fire outbreak at building site is usually caused by many factors among which are fault in plumbing work and bad electrical work.

### **Collapse**

Collapse of structure is an awaiting site risk. Yearly, there is a series of reported cases of collapse of trench and excavation which usually lead to the burying of workers and cause serious wounds to them, sometimes deaths. Preventive measures in this regard are required during the planning of the site work. The danger of an accidental collapse is often linked with pulling down works (Datta, 2000).

### **Asbestos**

These days, present site employees see asbestos as a problem, which was not treated the

same in the past. In developed nations like the United Kingdom about half a million public buildings are exposed harmful asbestos materials and this is a disturbed state. Site workers required to have knowledge materials that might contain asbestos (Jaselskis and Suazo, 2004).

### **Airborne Strands and Materials**

Health challenges such as silicosis, asthma and obstructive pulmonary are among the problems caused by unseen, volatile and harmful airborne materials. For adequate protection of the employee against this horrible condition, adequate provision of personal protective equipment should be done and enforcement of its usage by the employers is also highly required, such that any employee that fail to comply should be disciplined by the management (Guha and Biswas, 2013).

### **Electricity**

In most workplaces and sites, electricity is broadly used, also can be very dangerous with probably deadly outcomes. Power can bring about shock and death of an individual that comes in contact with it. Two percent of all the accidents in United Kingdom workplaces are attributed to the shocks caused by electricity. The major causes of numerous wounds and hazards from electricity are due to improper maintenance of electrical machines, contact with live electrical lines and buried electrical cables during the digging of the ground and also inappropriate use of PPE (Hughes and Ferret, 2011).

According to Farooqui, et al., (2008) at least 3 building site workers encountered electrocution yearly while carrying out renovation work. Also, expose to electrical hazard are employee whose activity is near to high tension lines. Other site workers like plumbers are also prone to electrocutions due to the nature of their work.

### **Equipment, machinery, tools and transport**

In building sites, equipment and machines are required for various purposes, but improper usage of them can lead to hazards even death as a result of crashing during site works like excavation and overhead fixing (HSE, 2004). Many injuries like fractures are as a result of crashing, which may lead to removal of the injured. Besides, a lot of site workers encountered chopping and cutting while using tools like saws, chisels, drilling machines as a result of lack of maintenance and misuse.

### **Chemical substances**

Building activities usually involve the uses of substances that contain toxic chemicals like adhesives, paints, varnishes and pesticides which can cause various health challenges (eye irritation, faintness, headaches, dizziness, and sleepiness) to site workers (HSE, 2008). At the sites, employees are exposed to these substances through ingestions, inhalation and direct contact (Murie, 2007). Among other health problems that exposure to these chemical substances can cause are like cancer, reproductive disorder, kidney, liver and skin (Hughes and Ferrett, 2011). Also, these toxic solvents, lead to defects in human reproduction (Murie, 2007).

### **Causes of Accident in the Construction Industry**

Nearly all accidents that are encountered were caused due to bad actions or conditions. Meanwhile, accidents could be avoided. The bad actions are an abuse of a normal safety rules which leads to the accident and these acts are dangerous safety cultures that pave way for the accident occurrence. Most accident results from a combination of contributing causes and one or more unsafe acts and unsafe condition. Presently, laying the cause of accidents to employees, the equipment and the environment are no more the proper way of control occurrence of accidents, but using well designed theories and format it control is what should be the most concerned about the employers

Most of the previous literatures show that identifying the causes of site accidents in building sites cannot be over emphasized. A study on Kuwaiti building industry done by Kartam and Bouz (2008) revealed accidents were caused by employee income and sham acts; poor safety act; inappropriate clearing of unusable materials; poor maintenance; inadequate supervisory. Also, a wide study of the USA work site was conducted by Abdulhamid et al. (2003) and they grouped the causes of accidents in sites as into employee and environmental factors. Employee factors were such as improper use of PPE; carelessness; wrong operation of machines; failure to adhere to operating manual. While, environmental factors were poor site design, wrong approved procedures; inappropriate dress code; fire; poor handling of hazard; uses of incorrect method and other unsafe factors. These revelations are supported by Lubega et al. (2000) on their works in Uganda construction sites.

Furthermore, from the study carried out by Toole (2002) in the USA. It was revealed that accidents in sites were caused by inadequate

training; poor control of risks; absence of safety gadgets; uses of wrong methods; poor site order; uses of faulty equipment and bad safety culture. Still, Tam et al (2004) conducted work in China and concluded accidents are caused by unawareness of safety procedure; improper of training; lack of provision safety program; careless operation; absence of skilled employee; faulty equipment; absence of medical aid; unrestriction in terms of safety rules; inadequate commitment by the employers; low level of education of the employees; absence of consciousness of safety procedures of the employees; inadequate PPE; absence of procedural help; lack of strict operational procedures and poor managerial skills.

### **Health and Safety Measures in Construction**

This section presents some health and safety measures commonly used by construction professionals on construction sites.

#### **Site Design and Plan**

Several accidents are mainly caused due to wrong planned and dirty work site causing falls of material and collisions between workers and plant or equipment. The small size of workplace is the major challenge faced and a design which gives best for the health and safety of workers may be uneasy to contain workers and equipment. Better site plan is a crucial aspect of safety costing for the risk free workplace and proficient site activities. The occurrence of several accidents in site can be attributed poor site design and plan (Idoro, 2008).

#### **Personal Protective Clothing (PPC)**

PPC simply means self-protective items used to cover the sensitive parts of the body against any harsh conditions to ensure safety of a site worker. OSHA (2007) necessitate the use of PPC to prevent the exposure of workers from hazards when there are no adequate controls of health and safety adopted by the employers. The uses PPC required implementation of PPE program. Meanwhile, this program should be able to guarantee the health and safety (face, eye, hearing, leg, foot, head, arm, hand, fall and nose protections) needed at the site.

#### **Medical Aid Kit and Reporting of Accident**

Building sites are always unsafe places, so medical aid kit is required to be promptly made available, although this depends on the capacity of sites and number of site workers. On a site of about two hundred employees, at least well equipped medical aid room is required and also at least one

employee be trained on how handle accident victim and administer first aid.

On every working day, there should be register where all accidents either minor or major will be recorded. From survey carried out it was established that the medical aid boxes available at building sites were adequately furnished with necessary items and also, no one is trained per shift on the handling of accident victim. More so, information obtained from most of the sites visited revealed that medical aid is not given due consideration on sites, which explains why employees are always exposed to accidents. For the fact that there is high rate of accidents occurrence in sites, so accident medical aid materials are very important (Idoro, 2008).

### **Warning Signs**

Safety Signs and Signals are one of the main means of communicating health and safety information. Safety signs include but not limited to hand, sound, noise, warning and prohibition signs for fire and hazardous chemicals. Sign board is expected to be easily understood by mere looking at it. Sign post used in building sites should maintain good size and be readable for proper guide. Signboards also need to be durable, securely fastened and properly maintained to ensure they remain visible. The uses of too many signs and signal items closely should be avoided to ensure easy sighting and effective communication (HSE 2009).

### **Site Safety Policy**

It is the duty of a site safety officer to put into written policies expected to control the activities in the sites, as the main objective of the industry. In this kind of document safety expert that will be in charge of checking for standards and assigning duties should be named. This expert will ensure that objective set by the management is met. Safety policy of building site is an issue that must be planned and designed by the site manager before any activities commence at the site. As soon as the site safety policy is designed, it should be made to be part of the safety training program that each and every site worker will have undergone before involved in any task at the site. Also, regular meeting of the site workers to discuss safety issues should be stressed out in the policy, because it will go a long way educate them more on the safety culture they needed to develop.

### **Health and Safety Risk Assessment**

The assessment of Health and safety risks in a building site is essential way to reduce site

accidents. Contextually, site risk may be defined as the probability of accidents to occur and cause harm. This is due to activities and exposure of the employee. Also, the assessment of risks at sites containing at least five employees and its findings needed to be documented by the employer, as this assist the employer to design reasonable means for risk control

### **Health and Safety Programme on Construction Sites**

With respect to Occupational Safety and Health, the program comprises of direction in danger acknowledgment and control measures, learning safe work hones and appropriate utilization of personal protective gear, and obtaining information about crisis strategies and preventive activities. The program likewise furnishes workers with approaches to get included data about potential perils and their control; they could pick up aptitudes to expect a more dynamic part in actualizing danger control programs or to impact authoritative changes that would improve the work - site insurance (Idoro, 2008). Site workers needed to be given serious Health and safety training involving fire safety and medical aid, before engaged in any work at the site. Add to this training, is the specialist training the focus only employee specific duty. On the carrying out duty, there should be training in case there is change in the risks. From the review studies, it was confirmed that there is adequate safety training at building site (Idoro, 2008).

### **Provision of Facilities for Employee Welfare**

Due to the stress and various risks involved in the building industry, there is need for better employee welfare facilities, because this will increase their efficiency. In any building site, facilities such portable water, toilet, shelter, lunch, breakfast, transportation are highly needed, because they assist to minimize stress and enhance employee safety (Idoro, 2008). Therefore, Health and safety measures should include check for presence of welfare.

### **Enforcement Mechanisms of Health and Safety Regulations**

A proper framework which clearly defines the functions of each and every of the site workers needed to be put in place for adequate implementation of health and safety policy. It is very important to integrate safety as part of production, to aid total dedication to safety. Health and safety staff in a site includes the safety officer, supervisor, worker safety team, representatives of the government and insurance firm. In Nigeria like

other developing nations, the Acts were provided to allow the regulations of health and safety matters in the construction companies. In this act, health and safety personnel are prompt to carry out site inspections in order to be sure that the Act are adhered to by all concerned personnel and as well ensure adequate enforcement of health and safety measures at the sites.

### **Management of Health and Safety Challenges on Building Sites**

Some of the major challenges in the management of health and safety of the building sites noted included but not limited to; inadequate PPE, improper handling of PPE, lack of support from the management, inadequate enforcement mechanisms, lack of health and safety officers and lack of medical aid kits. The site workers were of the opinion that the provision of PPE, formation of safety team, inspections by the concerned stakeholders, and education are measures for proper handling of the major challenges faced in the building sites. However, these measures still remain unimplemented (Haefeli et al., 2005).

### **Influence of Health and Safety Performance on Construction Project Cost**

Haefeli et al. (2005) revealed that reduction of accidents and construction related health and safety costs do not give off an impression of being the contributing variable for powerful health and safety administration. Many conditions have shown to be of more motivational factors to encourage better health and safety culture in building industries. These conditions lead to reduction of risk claims; prompt handling of legal right; implementation of insurance rules; proper control of client and the customer desires; meeting of target set by the government; adoption of moral settings; gaining of confidence of the employee; good maintenance and enrollment. Health and safety failure is well known to affect the cost of project execution (Haefeli et al., 2005).

Based on the above assertions, it is concluded by Guha and Biswas (2013) that the assumption of health and safety cannot be limited and that there is need for a logical verdict for health and safety to maintain the cost related to severe health problems in developing nations like Nigeria. This is basically unsustainable due financial implication, particularly when the cost of accident is low comparable to the economy. Many industries were seen to already possess zeal to enhance health and safety continuously, such that the need for further motivation seems to be important. Conversely, a series of conditions were noted as being the major

controls for this adjustment, this includes: amount spent on interventions, the expenses incurred due to health and safety failures; decreases in premiums of the insurance firms; decrease in exposure of legal claims and unacceptable drift in the rate of incidents.

It commonly believed that the cost of health and safety is compulsory and useful to production cost. Also, alleged gains of complying is far below the expense incur on legislation. This last observation is the common beliefs among the representatives of medium size firms. Most participatory industries had not clearly established savings of cost due to health and safety interference. According to Haefeli et al., (2005) both direct and indirect health and safety performance cost includes; cost of providing of safety programs; training and re-training costs; designing and planning costs, cost of implementation.

### **Construction Health and Safety Regulations**

The importance to organize health and safety procedure was due to the high incidence of accidents on building sites with exemption with nobody being considered capable (Li and Poon, 2009). Many researchers have shown that in the developed nations like U. K, health and safety regulations are taken very serious in most of their building industries. While in developing nation like Nigeria health and safety is exceptionally divided and inadequately actualized and require a dire requirement for the arrangement of sufficient and enforceable health and safety controls for construction operations and in addition the foundation of construction industry preparing organizations incorporating exchange focuses in Nigeria. According to Murie, (2007) upon the new regulations and designs to enhance safety of employees, still, building industries in Hong Kong continue to encounter high rate of site accidents.

Studies on health and Safety status of building industry in Nigeria reveal that the industry is great pitiable, such that urgent practical attention and actions are highly required (Okolie and Okoye, 2013). In this regard the challenges of health and safety regulations in Nigeria with reference to foreign countries like US, UK is attributed to many factors. It becomes obvious that there is no law that can adequately explain all the risk conditions and at the same time proffer solutions to them, even if there are regulations for health and safety. This failure is further intensify due to the fact laws are only language tools but a lot of differences in interpretation cannot be avoided, as this always exist between stakeholders in the industry and legal

practitioners. Safety performance of a building industry should not be measured by the rate at which cases are filed in court.

### Repercussion of Nonperformance of Health and Safety on Building Site

It was strongly stressed by Okolie and Okoye (2013) that health and safety risks of the site workers must not be played with, due to the fact that the breakdown of it will cost the building industry their reputation, increase the total cost of the project, discourage the workers and retard the progress of the project. Furthermore, McCann and Paine, (2002) recognize the loss of profitability, disturbance of current work, equipment damages and harm to the completed work as the main factors that contribute to the financial implication of accidents in the building industry. It is obvious that any accidents that occur at sites involve cost. The costs of accidents at building site can be grouped into:

**Direct:** Direct cost includes the medical expenses incurred by an employee in managing the injuries sustain. This cost is usually paid to the injured workers during his absence from work.

**Indirect:** Indirect costs are expenses that are not insured, but constituted about seventy to ninety percent of the total accident cost. These are such as cost of overtime, expenses incurred due to production lost, the cost of replacement, cost of damage done to the product and managerial costs.

In support of the above assertion, Heinrich (2007) carried out a study of twenty Ireland building sites and revealed that series of costs of about 3.8 million pounds were incurred by employers when accidents occur. These costs include costs of replacing the injured employee, the cost of paying for overtime, cost incurs due lost in production, cost of retraining, cost incurred to compensate claims and many other expenses. Thus, according to Section seven and nine of the Nigeria Worker's Compensation Edict (2010) in Nigeria, employee of every industry is entitled to compensation for injuries sustained while carrying out his or her duty, while part four, section seventeen of the same edict explain the scale of that should be used for such case. Also, Li and Poon, (2009) disclosed that in Hong Kong, there are a large number of judiciary cases involving payment of employee compensation for site accidents. In this regard, the legal and financial consequence of health and safety risks breakdown is enormous and any attempt to underestimate it, will negatively affect the industry.

### REFERENCE

- [1]. Abdulhamid, A.R., Wanyusuf, W.Z., & Singh, B. (2003). Hazards on Construction Sites, Proceeding of the 5<sup>th</sup> Asia – Pacific Structural Engineering and Construction Conference, Johor Bahru.
- [2]. Adeniye, A. A. (2001). Health and Safety on Construction Site, Journal of Nigeria Institute of Building, 2, 3, 54 – 65.
- [3]. Arditi, D., & Yasamis, F. (2007). Reasons for delays in Public Projects in Turkey, Journal of Construction Mngement and Economics, 3, 12, 171 – 181.
- [4]. Awodele, O. A., & Ayoola, A. C. (2015). An Assessment of Safety Programs on Construction Sites, Journal of Land Use and Development Studies, Federal University of Technology, Akure, Nigeria. 1, 1, 1 - 13.
- [5]. Bakri, A., Zin, R. M., Misnan M. S., and Mohammed, A. H. (2006) Occupational Safety and Health (OSH) Management Systems: Towards Development of Safety and Health Culture. Universiti Teknologi Malaysia, 81310 Utm Skudai, Malaysia. Proceedings of the 6th Asia-Pacific Structural Engineering and Construction Conference (APSEC 2006) pp. C19- C28.
- [6]. Coble, R. J., & Kibert, C. J. (2004). The environment as a Construction Safety Concern, Proceedings of the 5th Annual Rinker International Conference Focusing on msConstruction Safety and Loss Control, Florida, 535 - 542.
- [7]. Datta, M. (2000). Challenges Facing the Construction Industry in Developing Countries Gaborone, Botswana, Proceedings of the 2nd International Conference on Construction in Developing Countries, 15 - 17.
- [8]. Dimuna, K.O. (2010). Incessant Incidents of Building Collapse in Nigeria: Challenges to Stakeholders. Global Journal of Researches in Engineering. Vol.10, Issue 4 (Ver 1.0) September, pp.75 – 84.
- [9]. Farooqi, R. U. (2008). Safety Performance in Construction Industry of Pakistan, First International Conference on Construction Education, Research and Practice Karachi, Pakistan.
- [10]. Frimpong, Y., Oluwoye, J., & Crawford, L. (2013). Causes of Delay and Cost Overruns in Construction of Groundwater Projects in Developing Countries; Ghana as a Case Study, International Journal of Project Management, 21, 5, 321 – 326.



- [11]. Giang, D. T., & Pheng, S. L. (2010). Role of Construction on Economic Development, Review of Key Concepts in the past 40 years. Habitat International.
- [12]. Guha, H. and Biswas, P.P. (2013). Measuring Construction Site Safety in Kolkota, India. *International Journal of Scientific and Engineering Research*, 4, 5,2138 - 2143.
- [13]. Haefeli, K., Haslam, C. and Hsalam, R. (2005). Perceptions of the Cost Implications of Health and Safety Failures. Health and Safety Executive Research Report 403. Available at <http://creativecommons.org/licenses/by-nc-nd/2.5/> assessed 15/3/2013.
- [14]. Health and Safety Executive and Accounts (2008), presented to Parliament by the Secretary of State pursuant to the following provisions of the Health and Safety at Work etc Act 1974: section 10(2) and paragraph 10(4) of Schedule 2; and by the Comptroller and Auditor general pursuant to section 10(2) of, and paragraph 10(2) of Schedule 2 to, that Act. Ordered by the House of Commons to be printed 2 July 2009.HC580 London: The Stationery Office Gratis
- [15]. Health and Safety Executives HSE (2004). Improving Health and Safety in Construction Phase 2 Depth and Health, Fall from Height Research Report, 5, 234.
- [16]. Heinrich, H. W. (2007). Industrial Accident Prevention, McGraw-Hill Book Corporation, New York.
- [17]. Hinze, J. W. (2007). Construction Safety, Prentice-Hall Incorporation, New Jersey.
- [18]. Hughes, P and Ferrett, P (2011). Introduction to Health and Safety at Work the Handbook for the NEBOSH National General Certificate, Fourth Edition, 153 – 167.
- [19]. Idoro, G. I. (2008). Health and safety management efforts as correlates of performance in the Nigerian construction industry. *Journal of Civil Engineering and Management*, 14, 4, 277-285.
- [20]. Idoro, G.I. (2011). Comparing occupational health and safety (OHS) management efforts and performance of Nigerian construction contractors,” *Journal of Construction in Developing Countries*, 16(2), 151–173, 2011.
- [21]. International Labour Office. (2005). Global Estimates of Fatal Work Related Diseases and Occupational Accidents, World Bank Regions, Geneva.
- [22]. Jaselskis, E. J., & Suazo, G. A. R. (2004). A Survey of Construction Site Safety in Honduras. *Construction Management and Economics*, 12, 245 - 255.
- [23]. Kartam, N.A. and Bouz, R.G. (2008) Fatalities and Injuries in Kuwait Construction Industry.
- [24]. Lawfer, A. & Hedbetter, W. B. (2007). Assessment of Safety Performance Measures at Construction Sites. *Journal of occupational of construction engineering and management*, 112, 4, 530 - 542.
- [25]. Lipscomb, H. J., Dale, A . M., Kaskutas, V., Sherman – Voellinger, R., & Evanoff, B. (2008). Challenges in Residential fall Prevention: Insight from Apprentice Carpenters, *American Journal of Industrial Medicine*, 51, 60 -68.
- [26]. Liu, J., & Poon, L. (2009). Developing an Organizational Learning – Based Model for Risk Management in Chinese Construction Firms, *Journal of Dissater Prevention and Management*, 18, 170 -186.
- [27]. Lubega, H., Kiggundu, B .M & Tindiwensi, D. (2000). An Investigation into the Causes of Accident in the Construction Industry in Uganda, *Management*, 128, 3, 203 – 210.
- [28]. Manuele, F. A. (2013). On the Practice of Safety. NJ: John Wiley & Sons
- [29]. McCann, M., & Paine, D. (2002). When is a Fall not a Fall? Power through partnerships: 12th Annual Construction Safety and Health Conference, Proceedings, 21-23.
- [30]. Muries, F. (2007). Building safety – An International Perspective, *International Journal of Occupational Safety, Environmental Health*, 13, 1, 5, 11.
- [31]. O.S.H.A. (2007). Construction Industry Digest: Occupational Safety and Health Administration (Revised Edition) U.S Department of Labour.
- [32]. Okolie, K. C. and Okoye, P. U. (2013). Assessment of National Culture Dimensions and Construction Health and Safety Climate in Nigeria. *Science Journal of Environmental Engineering Research*, 167.
- [33]. Okoye, P. U., & Okolie, K. C. (2014). Exploratory Study of The Cost of Health and Safety Performance of Building Contractors in South- East Nigeria. *British journal of Environmental sciences*, 2, 1, 21 - 33.
- [34]. Rosli, B. A (2008). Best Practices in Safety Management for Conventional Civil Construction Industry in Malaysia, A Master

- Thesis of Science Construction Management. Malaysia: University Teknologi Malaysia.
- [35]. Smallwood, J. (2008). Health and Safety and the Environment as Project Parameters, Proceedings of CIB World Building Congress, Symposium, Gavle, Sweden, 1587 - 1594.
- [36]. Tam, C., Zeng, S., & Deng, Z. (2004). Identifying Elements of Poor \construction Safety Management in China, Safety Sciences, 42, 7, 569 – 586.
- [37]. Taylor, A. J. (2002). Fatal Occupational Electrocutions in the United States, A Journal of Occupational Medicine, 52, 102 - 106.
- [38]. Toole, T. M (2002). Construction Site Safety Role, Journal of Construction Engineering and Management, 22, 9, 937 – 946.