

UNIVERSITY OF EDUCATION, WINNEBA
COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

AN EVALUATION OF SAFETY PRACTICES ON CONSTRUCTION SITES IN
GHANA: A CASE STUDY IN THE ACCRA METROPOLIS



JACOB NII KOTEY AMON

JUNE, 2014

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**A Dissertation in the Department of CONSTRUCTION AND WOOD
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to the School of Graduate Studies, University of Education, Winneba in partial
fulfillment of the requirements for the award of Master of Technology
(Construction) degree.**

JUNE, 2014

DECLARATION

STUDENT'S DECLARATION

I, Jacob Nii Kotey Amon, declare that this dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for any other degree elsewhere.

Signature:.....

Date:.....

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of dissertation as laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: DR. WILLIAM GYADU-ASIEDU

Signature:.....

Date:.....

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Unto the Lord be the glory great things He has done and greater things He is about to do.

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To everyone who supported me, but their names could not be mentioned, I say God bless you all.

Finally, to my roommate Bukari Alhasan I say may Good Lord bless you.

DEDICATION

I dedicated this work to my late beloved parents Mr. and Mrs. Neequaye, my son George Neequaye Kotey Junior, my siblings Mc Henry, Grace, Theodora, Seth, Beatrice and Emmanuel Amon for their moral support and encouragements. Last but not least to my love one Miss Linda Ami Emefa Kadau.



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ABSTRACT

The issue of ensuring at construction firms remains a critical concern that every construction firm needs to adhere to. The progress and productivity of work output are greatly achieved when safety measures are instituted and observed at the workplace. The study sought to investigate safety practices of construction firms in the Accra Metropolis. A total number of 128 responded to the study out of the sample size of 150. The sampling technique used for choosing the sample size was convenience sampling and this was carried out based on the availability of the respondents to the study. It was found that accidents at the construction firms can lead to loss of lives; decrease in productivity; tarnishes the image of the affected firm; leads huge sums of compensation and can delay project. Challenges facing the firms in practicing safety were unplanned and complex sub-contracting; inadequate training facilities on safety practices; inadequate skilled personnel to undertake the training programmes and low education on existing laws on safety practices. Safety issues are not strictly adhered to by both the management and other employees of the construction firms. It is recommended that the firms should ensure that they follow and observe the safety rules and regulations on and the off site. It is imperative for state agencies responsible for enforcing the laws on safety to ensure compliance by the firms to be on their toes to effect measures that can promote effective compliance by the firms. Training programmes should be organized on safety measures for both management and employees.

CHAPTER ONE

INRODUCTION

1.2 Background of the Study

In terms of occupational health and safety (OHS) in the construction industry, Kheni (2008) found, owners or managers of most construction firm have little or no knowledge of the legal frame work governing OHS. Earlier indication from Danso (2005) is that most firms in the construction sector in Ghana do not have safety policy and had poor safety awareness. Writing in similar vein, Quarm (2000) suggests that most building construction firms in Ghana, in terms of organizing, do not have safety department and safety representative from the government on site to deal with safety related issues. Further, Fugar (2009) asserted, most of the construction firms do not have Human Resource Management (HRM) departments together with its associated health and safety personnel to also deal with safety issues. This has led the owners /managers and operational managers to perform health and safety personnel's functions without any specialist input. The management and the operations of these large, medium and small firms are different, however one of the similarities that exist between them is the employment of casual workers, who play a vital role in the process of economic growth and development of a country (ILO, 2003) (cited in Danso, 2010).

Again construction project are considered as being risky with frequent and high accidents rate and ill-health problems to work, practitioner end use due to violation to work place safety regulation liao (2008), Nina (2008) and Hinze (2008). Many construction activities are inherently risky. Working at great height, working

underground, working in confined spaces and close proximity to falling material, handling load manually, handling hazardous substances, noises, dust, using plant and equipment, fire, exposure to live cable, poor housekeeping and ergonomics accidents. In an urban context, risks are high due to the fact that high rise buildings remain predominant with the fast-growing complexities of construction projects to cope with modernizing city areas at the same time to cope with high demand of housing, offices, services and other infrastructure due to the high level of urbanization. Most construction sites are crowded. That is they do not have sufficient storage spaces for auxiliary equipment at the same, streets are congested with traffic impeding the flow of constructional supplies. Accidents do terminate life or cause permanent and temporary disabilities to workers and users, and these result in reduced productivity, non-conformance to quality standards, time overruns and cost overruns of the projects. Improving safety practice in Ghana will not be achieved without the concern and involvement of the government. Construction accidents, which often occur, are due to neglecting certain safety regulations despite the presence of Government regulation regarding safety. These cases have been going on since the early development of the construction industry. Every case of construction accident involving casualty of an individual or to a number of workers had never been investigated thoroughly and ironically the matters are finally resolved with conclusion of careless conduct (Danso, 2010; Kheni, 2008).

Improving occupational safety in the construction industry is essential, not only because enlightened clients demand excellent safety performance from contractors/builders, but also due to continuous search for more economic benefit and

increased productivity. Economic pressures on construction firms to increase productivity can lead to increased exposure to new risks, such as increased accident and injury rates. Coupled with the organizational pressure for productivity, the individual motivation of the workers to minimize effort, push them to the brink of safe working zone. Furthermore, the dynamic, complex, and often unpredictable construction tasks and environment add to the risks (Ghosh & Young-Corbett, 2009). Thus, improving safety in construction remains a priority in almost every country around the world, because the construction industry stands out among all other industries as the main contributor to severe and fatal accidents. While there have been improvements in occupational safety outcomes over the last few decades, the construction industry remains the sector with the greatest number of fatalities. A Centre to Protect Workers' Rights report states that the fatality rate in construction industry accounts for an annual total in excess of 1,000, which is more than three times the fatality rate of the manufacturing sector. The report also states that there are more than 182,000 serious injuries annually in construction (Ghosh & Young-Corbett, 2009).

In Thailand, many construction activities have been carried out to meet the high demands of the expansive market. However, the construction industry has faced a wide range of challenges, one of which is the high accident and injury rate at the project level. According to the accident rate in all industries recorded by Ministry of Labour (International Labour Organization, 2005), the rate of accidents and fatalities in Thai construction is reported as the highest. In 2003, the construction industry accounted for 14% of the total number of 787 deaths at work and 24% of the total 17 cases of permanent disability. Construction is a labour-intensive industry, in which workers play a

very important role in the success of the various projects undertaken. Thus, the need to protect workers from accidents becomes a major consideration in any construction organization. For many years, safety practitioners have addressed physical preventive measures such as machine guarding, housekeeping and inspection, since poor physical conditions are believed to cause accidents. However, not much preventive work has been done on the human aspects. The fact that many researchers are of the opinion unsafe acts of workers are the major contributors of accidents and injuries, rather than poor working conditions (e.g., Sawacha et al., 1999; Abdelhamid & Everett, 2000; Stranks, 2000; Haupt, 2001; Holt, 2001; Goetsch, 2005), suggests that there is the need for a change of direction in construction safety research to identify the possible influential factors of workers' decisions (cited in Aksorn & Hadikusumo, 2007).

Safety improvement is one of the essential issues in construction projects. Comparing with other industry, construction industry faces with several hazards environment. It also shows the highest accident record due to its characteristics such as decentralization, high mobility, weather condition and uncertainty of work condition (Arditi et al., 2007; Chan & Au, 2007). Moreover, the consequences from construction accident are uncountable. It causes human tragedies, adversely affects other workers and breaks the goals of project such as cost overrun, project delay and low productivity. In addition, it can ruin reputation of the construction company (Mohamed, 1999). Safety management aims to ensure the construction process performed in safety status. By providing an effective safety regulation and positively workplace environment, safety management can improve spirit of workers. A good safety management system can bring more benefit to company than expected such as increase competitive bidding, improve

reputation, raise company profit by saving accident cost and high productivity (cited in Nguyen & Peansupap, 2010).

Safety remains an ongoing concern for the construction manager. Construction by nature is inherently dangerous, with a high degree of hazard and risk. The toll of construction accidents is high in terms of both costs and human suffering. Accidents add a tremendous burden of needless and avoidable expense. Financial losses pale when compared to bodily injury and death, and the resulting human, social impacts. Construction accidents add \$10 billion annually to construction cost. Insurance (such as workmen's compensation) protects the contractor from certain direct expenses, but accidents also involve substantial costs that are not insurable, referred to as hidden or indirect cost (Bob Muir, 2005).

1.2 Statement of the Problem

The Department of labour reports that the highest number of work related fatalities occur among construction workers. In Ghana the state of safety practices violation on construction site are very rampant and glaring. The labour Department in Ghana in the year 2000 reported that the country's construction industry accounted for the highest rate of occupational accidents in comparison to other industrial sectors. According to the Department report 56 out of a total of 902 occupational accidents that occurred on construction site were fatal. Workers in the construction industry have little control over safety practices on their job sites. Construction safety should be of primary concern to employers, employees, government and project participant. Thus the main parties responsible for safety on site are the client, main contractor, regulatory agencies

and employees. Safety duties and regulatory agencies, Government regulatory agencies should not neglect safety practices on site but this has become the norm. They are not ensuring that project is safe to build and use, and safe to maintain. Construction project are awarded to the lowest bidder, while this practice might promote cost effectiveness, it does not prevent contractors cutting corners on safety. The Labour Department in Ghana in the year 2009 reported that, injured jumped almost 40 percent. In a typical, one in 10 construction workers will be involved in a construction accident. Although workers compensation on a few occasion compensate injured construction workers, it doesn't cover all the costs and losses an injured worker may experience. The Ghanaian media is full of reportage of accident on construction site on daily bases; safety is becoming an important issue in the construction environment today. Therefore the research is intended to find out the extent to which safety practice requirement are observed on construction site and make recommendation for taking safety practices forward in the construction industry in the Accra Metropolis and Ghana as a whole

1.4 Objectives of the Study

The aim of the study is to investigate into the extent to which contractors comply with safety measures on site.

1.3.1 Specific objectives are:

1. To identify general safety practices on selected sites.
2. To identify the extent to which contractors are complying with safety regulation.
3. To identify the problems with the safety practices.

4. To recommend more reliable ways of ensuring safety on site.

1.4 Research Questions

To find solution to the research problem, the researcher formulated the following questions:

1. What are the safety practices adopted on construction site?
2. To what extent do safety rules and regulations abided by contractors onsite?
3. What are the problems/ challenges that construction firms encounter in the safety practices?
4. In what way(s) can the safety practices at the construction firms in the Accra Metropolis be improved?

1.5 Significance of the Study

The study is being carried out with the hope that new safety practice on construction site will be enforced and helps expose unsafe practices on construction site in the Accra Metropolis. Also the study is expected to help create safety awareness on construction site and be beneficial to the construction industry at the Accra Metropolis as form of reference material on safety practices at the construction site.

1.6 Scope of the Study

The study is conducted considering Accra Metropolis area in order to complete this work on schedule. Though there are several challenges confronting the construction industry, the researcher focus on an evaluation of safety practices on construction sites in the Metropolis of Accra.

1.7 Limitations of the Study

The researcher encountered difficulty in getting adequate recording equipments for the interviews. The approval to conduct the study at the various construction firms was much stressful despite the academic purpose of the study and the assurance of confidentiality of data that would gathered from the firms. This delayed the progress of the work since it took much time for the firms to give the green light for the researcher to start the data collection.

1.8 Organisation of the Study

This study was divided into six chapters. The Chapter One deals with the introduction of the background of the study, statement of the problem to be researched, the aim and objectives of the study, also examines the significance of the study, scope of the study, delimitation, limitations and summary of organization of the study. Chapter Two also review the related literature review that provides an overall picture of an evaluation safety practices on construction site in the Metropolis of Accra. Chapter Three discusses the methodology of the study. This is divided into research design, population sample collection and data analysis procedure and type of research instrument. Chapter Four presents the findings of the data gathered and the Chapter Five discusses the results of the study. Finally, Chapter Six presents the summary of findings, conclusions, recommendations and areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss the literature review on general safety practices on some selected construction sites, the extent to which contractors are complying with safety regulation and the problems with safety practices. The International Labour Organization (ILO) estimates that there are at least 60,000 fatal accidents on construction sites around the world each year. This means one construction fatality occurs every ten minutes. Construction accounts for a 17% (one in six) of all fatal workplace accidents (ILO, 2005). Improving safety practices in the construction industry is essential, not only because enlightened clients demand excellent safety performance from contractors/builders, but also due to continuous search for more economic benefit and increased productivity. Economic pressures on construction firms to increase productivity can lead to increased exposure to new risks, such as increased accident and injury rates (Sacks, Rozenfeld & Rozenfeld, 2005).

According to Sacks, Rozenfeld and Rozenfeld (2005), the dynamic, complex, and often unpredictable construction tasks and environment add to the risks. Thus, improving safety in construction remains a priority in almost every country around the world, because the construction industry stands out among all other industries as the main contributor to severe and fatal accidents. While there have been improvements in occupational safety outcomes over the last few decades, the construction industry remains the sector with the greatest number of fatalities. A Center to Protect Workers „Rights

report states that in 2008, the fatality rate in construction industry accounts for an annual total in excess of 1,000, which is more than three times the fatality rate of the manufacturing sector. The report also states that there are more than 182,000 serious injuries annually in construction. The loss or injury of trained and experienced workers, and the resulting disruption to progress of work, undeniably represent waste in the performance of construction. When left uncontrolled, these factors can create disruption due to many cost related factors; such as escalating workers' compensation insurance costs, high cost of medical treatment and rehabilitation program. The economic losses also include indirect losses such as administrative cost, productivity losses and low morale.

2.2 Definitions of Safety

There are important key words that are used throughout the thesis, words such as **'Safety'**, **'Practice'**, and **'Accident'**. The definition of each term is given here; The American Heritage Dictionary of the English Language, Fourth Edition, defines **safety**' as the condition of being safe; freedom from danger, risk, or injury or state of being safe; freedom from danger or hazard; exemption from hurt, injury, or loss freedom from whatever exposes one to danger or from liability to cause danger or harm; safeness; hence, the quality of making safe or secure, or of giving confidence, justifying trust, insuring against harm or loss. The concept of "safety" can also mean as "freedom from danger and risks" Concise Oxford Dictionary.

According to Accident Work Information Government of New Zealand (2003), defines “ **practice** “as a customary way of operation or behavior referring to human action; human activity accomplishment; achievement; deed; feat; effort; exploit; implementation; effectuation, or translating an idea into action, the exercise of a profession and knowledge of how something is usually done. It also defined as all practicable steps in relation to achieving any result in any circumstances.

2.3 The Theoretical Framework of Safety at the Workplace

The construction industry has long been regarded as one of the most dangerous industries. The construction industry has a history of poor safety performance. This is despite the fact that dramatic improvements have been made in the safety performance of the construction industry in the past decade (Huang, 2003). The improvements are due, in part, to the concerted efforts of owners, contractors, subcontractors, and designers. The owners of projects are the primary consumers of construction services, the sources of project finances, and, in many cases, the end users of the facilities. They are often at the pivotal position of the projects. Traditionally, owners have not been directly involved in construction safety, often in order to avoid economic losses and legal entanglements resulting from injuries. With the increase of accident costs and legal cases involving owners as the third-party defendants, owners have come to realize the importance of safety (Huang, 2003).

2.4 Decisions-to-Err in Occupational Safety

Petersen (1984) proposed a causation model which explains that the decisions of workers to err are due to three main causes:

Personal Factors

Laziness

Hall (1995) stated that most workers prefer to take shortcuts to save time because they want to avoid supportive activities. Workers oftentimes prefer to work with the wrong tools because they feel that it is too much trouble getting the right one, e.g. workers could climb or stand on rears (an inadequate working platform) instead of using proper ladder.

Past Experience

Some workers, having performed a job in a familiar way for many years are very reluctant to give up their old way of doing things. However, these old habits could prevent them from noticing the prevailing hazards, thereby increasing the possibility of accidents occurrence (Kittleson, 1995).

Being in a Hurry

Stice (1995) stated that pressure from supervisors to get jobs done quickly can cause the workers to work in hurry. As result of such pressures, workers may disregard good safety practices to save time for completing the jobs.

Showing Off

"Watch me" is usually heard from workers who like to display their manhood in order to gain the admiration of their colleagues. Kittleson (1995) stated that some

"macho" types of workers like to show off their capability to their peer improperly. This "show-off" behaviour can, and often does, result in accidents.

Being Angry

Kittleson (1995) mentioned that being angry can lead to accidents because anger nearly always rules over caution. When someone gets angry, he or she will start to sweat, tremble, get knots in the stomach, or grind his/her teeth. Unresolved anger could cause distraction, proneness to accidents, anxiety, violence and rage.

Being Uncomfortable

The International Labour Organization (ILO, undated) revealed that PPE can be uncomfortable, can decrease work performance and can create new health and safety hazards. Some workers for instance, reject the wearing of earmuff because it makes them feel hot, especially when it is used in hot regions.

Effects of Using Drugs and Alcohol

Michaud (1995) stated that workers who use drugs and alcohol have the tendency to distort or block their decision-making capability. In general, experimental research has shown that alcohol has a delirious effect on performance due to its effects on judgement, reasoning and memory. Drugs users and drinkers often experience reduced levels of awareness, a situation which could lead to decision errors and unsafe working. When the influence of the drug or alcohol is over, a worker might wonder why he did the unsafe act.

Supervisor's and Co-workers' Acceptance

In order to gain the acceptance of supervisors or coworkers, a worker could choose to perform a job unsafely. For example, a worker could decide to unload some materials

faster so as to save time for completing the job and thereby gain the acceptance, approval or the admiration of his/her supervisor or co-workers.

Overconfidence

Confidence is a good thing, but overconfidence would oftentimes do more harm than good. "It will never happen to me" attitude could lead to improper procedures or methods that could cause injury (Hirsch, 1998).

Job Factors

Stress has been defined as human's reaction against threatening situation (Goetsch, 2005). Schermerhorn (2001) further defined stress as "the state of tension experienced by individuals who are facing extraordinary demands, constraints, or opportunities." Some potential factors that could contribute to job stress in the construction industry are (cited in Aksorn & Hadikusumo, 2007).

Too Much Work (Work Overload)

Asking workers to do more than they could handle may result in the workers developing high stress, especially when deadline pressures are put on them. According to Greenberg and Baron (2000), there are two different forms of work overload: quantitative overload, which occurs when individuals are asked to do more and qualitative overload, which refers to employees' belief that they lack of the required skills or abilities to perform the work (cited in Aksorn & Hadikusumo, 2007).

Too Little Work (Work Under load)

Similarly, being asked to do too little could also be as stressful as being asked to do too much. Greenberg and Baron (2000) proposed that there are two types of work under load: quantitative under load, which refers to the boredom arising from having too little work to do, and qualitative under load, which is the lack of mental stimulation, such as routines, and repetitive jobs (cited in Aksorn & Hadikusumo, 2007).

Time Pressure

When workers are unable to meet deadlines, they instantly get overwhelmed and begin to worry (Timm & Peterson, 1986; Stranks, 2000). In addition, when the work process is changed and the workers are not given enough time to complete the job, they easily become stressed (cited in Aksorn & Hadikusumo, 2007).

Management Factors

Management Pressure

Stranks (1994) stated that supervisors who are in charge of flow-producing units normally tend to spend more time with their subordinates. These supervisors usually divide job times into many short periods to give specific instructions such as, "do this", "do that", or "do it this way", to their subordinates, hoping to increase productivity. However, supervisors' pressure may cause subordinates to work unsafely while trying to satisfy the supervisors' objectives, such as completing the work within unreasonable time schedule (cited in Aksorn & Hadikusumo, 2007).

Management Support

Hammer and Price (2001) proposed that in order to ensure construction site safety, management should fully support and ensure that safety devices and temporary structures are in good conditions, allocate sufficient budgets for establishing safe works, and establish an effective program to monitor and audit operational activities for their safety (cited in Aksorn & Hadikusumo, 2007).

Supervision

LaDou (1994) stated that it is very obvious that any successful safety program must necessary involve the supervisors. Supervisors should closely control all the workers activities. If supervisors could convince workers that safety has to be considered all the time, then the workers will do everything to prevent accidents (cited in Aksorn & Hadikusumo, 2007).

Reward and Penalty

Motivational factors from the management could have negative impact on inspiring workers to work safely as inappropriate ways of giving rewards and penalties could motivate workers to work unsafely. For example, a worker may decide to work unsafely because he/she thinks that doing this can speed up the work, which would mean getting more reward such as bonus. Penalty could also motivate workers to work unsafely, e.g. a worker who is physically unfit could force himself/herself to go to work, out of the fear of being penalized (cited in Aksorn & Hadikusumo, 2007).

Workgroup Factors

Group Norms

Each employee is not just an individual, but a member of a group as well (Stranks, 1994; Gibson et al., 2000). Each group has its own norms, sets its own work goals, moral standards, and makes its own decisions. The norms also incorporate the behaviour of workers towards their boss, and how workers react towards safety regulations. Kittleson (1995) stated that it is easier for the workers to base their behaviour on others than to do the right thing. For example, a worker may hear, "everyone else does it that way" and therefore follow the group in working in a similar way even though it is an unsafe method (cited in Aksorn & Hadikusumo, 2007).

Group Pressure

Ellis and Fisher (1994) stated that certain groups pressure their members to conform to their established norms; otherwise, erring members will be penalized (cited in Aksorn & Hadikusumo, 2007).

2.5 Impacts of Behaviours on Safety at the Workplace

Almost construction companies have spent a lot of time, money and effort to set up a safety management system. Over a long period, these efforts tend to reduce dramatically in accident rates. However, these rates are considered too high and caused many unfortunate consequences. Approximately 80 to 95 percent of all accidents are triggered by deeply ingrained unsafe behaviour (Cooper, 1998). Consequently, researches about behaviour related to safety were carried out. The safety behaviour concept is considered one of the significant causes affect safety performance in construction site. It

can be measured and improved to achieve better safety performance at construction site (Duff et al., 1994). Zhou (2008) explored factors influencing safety behaviour and identifies strategies to control the factors that have the most impact on safety behaviour in complex construction scenarios. There are some other studies about safety behaviour were made such as Cox (2004), Prussia et al. (2003), Lingard and Steve (1998), DeJoy (1996), and Duff et al. (1994). But these researches focus on worker level only, they tried to identify the factors can affect the worker behaviour to change worker behaviour more positive safety as Brown et al. (2000), Langford et al. (2000), and Lingard (1995). Looking to the construction parties' roles, it could be pointed that supervisor is vital to organizational success. Dan Petersen had pointed that "Safety excellence only occurs when supervisors, managers and executives demonstrate their values through actions, and their credibility by asking hourly workers to improve the system"³. The owners, top executives, and middle managers must be committed to safety. However, supervisor is one of management representatives who daily contact with the employees. The supervisors claimed as the key person for implementing safety program. Even though in construction have a safety engineer or a safety director, the supervisor is still responsible for ensuring that the safety directives are carried out. The supervisor should be assured that employees can perform work safely. In addition, the supervisor should shape the employees' attitude toward safety (Ludden & Capozzoli, 2000). A supervisor behaviour on safety action is found as important attributes to influence worker, control the hazards and prevent accident at the site (cited in Nguyen & Peansupap, 2010).

2.6 Safety Practices on Construction Site

Safety practices generally implemented comply with safety statutory in the developing countries. Safety regulations are strictly applied, and it is everyone's obligation involved in hazardous work place to implement it. This may be true in advanced industrial countries where safety programs are taken seriously and programs are maintained as a priority before commencing high risk jobs. Safety practices which are identical to the techniques of accident prevention .Accident prevention in the construction industry is not just a matter of setting up list of rules and making safety inspections, although both have their place. What is required is a system for managing health and safety which meets the needs of the business and complies with the law (Holt, 2001).

Generally, in the Gaza Strip, it is observed that most of construction organizations do not have formal safety training. This will lead to absence of safety application and will contribute to occurrence of many accidents and problems in the site. Construction projects in the Gaza Strip are recommended to have formal safety training in order to improve performance of construction projects. Cheung et al (2004) remarked that safety factors affect strongly on performance of construction projects (cited in Samir & Shaban, 2008).

The contractor is responsible to use proper material when building hoarding (e.g. lumber, plywood, scaffold frames, tarps). All hoarding must be designed to sustain loads that it is likely to be subjected to such as wind and snow loads and falling debris. Hoarding must meet permit conditions and be constructed in accordance with all local regulatory requirements. Site fencing must be adequately braced and/or secured to withstand site conditions including wind. Consider securing bases and avoid base details

that create a tripping hazard. Jersey barriers can be utilized at strategic points around a construction site to protect the public and construction workers from high incident traffic intersections that are in close proximity to the entrance gates of work sites. Jersey barriers may also be used to protect fire hydrants, gas valves and main power distribution equipment. The location of Jersey barriers would be at the discretion of the jurisdiction having authority. Consider having viewing cut-outs in solid fencing, complete with protection, to allow for public viewing. Light duty scaffold, although designed of sufficient strength to provide the minimum building code or OHS Code standard for an overhead protection system, has restricted width due to the arch frame. It should only be used in the event that the exterior public walkway or sidewalk is too narrow to provide a wider frame work system. Considerations should be made to the width for ease of access and travel for the handicapped, snow removal and maintenance. Heavy duty scaffold is the preferred system if a contractor is planning to utilize the space on top of the hoarding for storage of materials or for locating their field office. This system must be engineered to comply with the building code and OHS Code and have a height of not less than 2.5 meters (8'- 3") and a clear width of not less than 1.5 meters (5' – 0"). The roofing system must be designed and constructed to safely support a minimum of 2.4 kPa (50 PSF). The roofing system must also be watertight and sloped towards the construction site. Splash boards with a minimum height of 300 mm (12") must be installed on the street side. A railing of 1070 mm (42") is required on the street side where the covered way is supported by posts. The structure must also be totally enclosed on the street side with a smooth surface. Consider the use of pre engineered structures such as modified containers. When heating equipment is used within a hoarding, adequate fire protection

must be used. Air quality monitoring may be required for enclosed hoarding. A minimum of a 20lb. ABC fire extinguisher must be placed outside the hoarding in an easily accessible location in the vicinity of propane/gas heaters (Krsek, 2012).

At the construction site planning and carrying out an assessment of the works including selection of appropriate methods of carrying out such works. ensuring that the training and experience of all team members are commensurate with the assigned task and providing training if necessary; ensuring that necessary tools, plant and equipment are properly maintained and are available for immediate use and that a plant/equipment register is kept up-to-date containing maintenance records and test and examination certificates; providing necessary information, drawings, manuals, instructions and training to the workers on all aspects related to the works including the use of tools, plant/ equipment, safe practices and emergency procedures; ensuring that adequate number of persons trained in first aid are included in the site working personnel and that necessary first aid equipment such as the first aid box, etc. are provided and maintained in accordance with the requirements under the Construction Sites, ensuring that the work is carried out in a suitable and safe place with the consent of persons having control of that place; and ensuring that effective communication exists between the place at which the work is being carried out, the persons having control of that place, and the emergency services including police, fire and ambulance service (Occupational Safety and Health Branch, 1997).

Before any organization can expect good safety performance, top management must establish goal sand commit to a safe and healthful work environment. This commitment must continue in an unbroken chain to the line supervisor. Supervisory

safety performance evaluations (SSPE) provide a complete method for determining the safety capabilities of each first-line supervisor. Including the SSPE on performance appraisals will help to determine which supervisors have a good and consistent safety performance, and which ones need additional training. Make safety training available to all supervisors to ensure the company achieves its goals and objectives (Ohio Bureau of Workers Compensation, 2012).

On safety provisions, hard hats or helmet emerged within the first three rankings of the employers and casual workers. This is also an indication that hard hats or helmet is important safety material in addressing the occupational health and safety issues of casual workers on Ghanaian construction site. Again, for employers, the training of casual workers in safety norms and appointment of safety officer on sites is a kind of proactive measures for preventing accident on site. Acting proactively requires one to anticipate problems before they occur and take steps to make sure accidents don't happen. Therefore the employers were demonstrating the proactive kind of preventing accident on site. To react proactively, casual workers think that wearing of safety boots and helmet couple with safety signs is the best option and this is to the fact that they are directly involved in the actual construction work (Danso, 2010).

When asked about their OH&S procedures, over three-quarters of the respondents said they had instituted measures in respect of first aid, portable drinking water, personal protective equipment and labour certificate on their sites. The rather high response to this question is in line with the responses to the question on whether their procedures met the requirements of OH&S provisions in conditions of contract. Public contracts contain clauses in respect of these OH&S items and, in a few cases; they are covered by

provisional sums. Two-thirds (65%) also cited insurance cover for project sites as a measure they implemented. Insurance of workers against injury is not compulsory by law although employers are required to take all necessary measures to indemnify the employer against damages resulting from accidents. Site safety inspections within the businesses surveyed was informal and very common (83%). Notwithstanding the impressive responses on these OH&S practices, contractors under the pressures of competition and desire to maximise profit, may tend to undermine these practices on project sites by pricing these OH&S items unrealistically. Thus, the amounts and types of first aid items, personal protective equipment and other measures may be insufficient (Kheniet al., 2010).



Table 2.1 Site Hazards Identified and Addressed

Hazards Identified	Actions Implemented
<p>Falling from heights (from poorly constructed / unstable scaffolding or raised pipe racks) (Falls are one of the major causes of fatalities in the construction industry)</p>	<p>Additional equipment such as, ladders and harness were purchased to complement the equipment already on site</p>
<p>Electrocutions are also a major hazard due to the use of substandard electrical equipment and the cable layouts</p>	<p>Arrange the specific training of all contractors on the site</p>
<p>Eye, finger and feet injuries</p>	<p>Additional Personal Protective Equipment (PPE) was purchased. Safety posters were strategically located around the site</p>
<p>Asphyxiation from an authorized entry to confined Spaces</p>	<p>All confined spaces on the site were identified and bilingual sign-posted. Additional gas detectors, and oxygen units were also purchased</p>
<p>Inadequate Site Emergency response procedures</p>	<p>A more relevant site plan was devised which addressed specific hazards, including; evacuation of the site, a snake bite procedures, regional medical facilities</p>
<p>Contractor attempted to conduct heavy and</p>	<p>Orica insisted that a large mobile crane be</p>

difficult lifts manually	brought to site facilitate heavy lifts
Defective tools brought on site by the contractor	Defective tools were replaced with ones fit for purpose

Source: APSEC, 2000

Formal safety meetings were held regularly on site with the project management team and contractor representatives in attendance. These meetings developed action plans to manage identified risks and made various parties accountable for the implementation. A key aspect in achieving a safe working site was that project management team members spent a considerable proportion of their day on site with workers and operation team (APSEC, 2000).

2.7 Safety policies

Safe and healthy working conditions do not happen by chance. Employers need to 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 (ILO, 1995).

The safety policy should deal with the following matters:

- arrangements for training at all levels. Particular attention needs to be given to key workers such as scaffolders and crane operators whose mistakes can be especially dangerous to other workers;

- safe methods or systems of work for hazardous operations: the workers carrying out these operations should be involved in their preparation;
- the duties and responsibilities of supervisors and key workers;
- arrangements by which information on safety and health is to be made known;
- arrangements for setting up safety committees;
- the selection and control of subcontractors (ILO, 1995).

2.8 Safety organization

The organization of safety on the construction site will be determined by the size of the work site, the system of employment and the way in which the project is being organized. Safety and health records should be kept which facilitate the identification and resolution of safety and health problems on the site (ILO, 1995). In construction projects where subcontractors are used, the contract should set out the responsibilities, duties and safety measures that are expected of the subcontractor's workforce. These measures may include the provision and use of specific safety equipment, methods of carrying out specific tasks safely, and the inspection and appropriate use of tools. The person in charge of the site should also assure that materials, equipment and tools brought on to the site meet minimum safety standards. Training should be conducted at all levels, including managers, supervisors and workers. Subcontractors and their workers may also need to be trained in site safety procedures, because teams of specialist workers may mutually affect each others' safety. There should also be a system so that site management has information quickly about unsafe practices and defective equipment (ILO, 1995).

2.9 Critical Safety Practices

After reviewing the Safety Practices described earlier, there are crucial factors that ought to be considered prior to conducting the practices. These factors may be determined as the critical safety practices. The critical items that will be discovered through this research are priorities that will be implemented in the construction industry in Ghana. Construction companies with serious concern on safety as observed by Holt (2001) will establish a Safety Management System which relate to Good Financial Establishment, Good Commitment, Adequate Policy, Adequate standard, Adequate Knowledge and Information, Good Training and Good Quality Control. These factors are critical in achieving safety Practices.

Based Clough's study (1986) critical safety practices depend very much on workers practical habits and their working environment. Therefore, he stated that there are two critical matters towards safety practices which will be explained below:

The main health and safety site requirements in construction relate to tidy sites and decent welfare, falls from height, manual handling, and transport on site. Site operatives are normally required to plan and organise their operations, ensure that they are trained and competent and know the special risks of their trade and raise problems with their site supervisor or safety representative (HSE, 2009). The main personal protective equipment (PPE) in construction (including clothing affording protection against the weather) which is intended to be worn or held by a person at work and which protects him against one or more risks to his health or safety. PPE should be regarded as a „last resort“ when considering control measures. Other methods should be considered and used that will reduce or eliminate risk to injury. However, where PPE is the only

effective means of controlling the risks of injury or ill health, then employers must ensure that PPE is available. PPE should be worn at all construction sites. A typical construction site may require workers to wear a hard hat, coveralls, safety footwear, gloves, eye protection and high visibility vest. These must be provided to all employees (cited in Laryea & Mensah, 2010).

In most developed countries, every worker is obligated to work under the safety standard rules. Neglecting safety procedure would be a serious violation for anyone, regardless of their positions and this leads them to sanctions or penalty. In Ghana safety violations in construction work has become routine. Holt (2001) has observed routine violation occurs when it becomes standard practice in a group or even an entire organization to break the rules although rules are enforced by law.

Hislop (1999) has observed that safety violation and injuries occurred because of three factors: personal factor, work factors, and those factors out of workers control. Therefore, evaluating these factors is most critical to achieve safety practices. In his study, when we talk about construction safety, our first thought is generally that this is a responsibility of the contractor. The focus reflects the contractor's control over their work place and their work practices. There are, however, many more characters that should be involved in establishing a safe job site than just the contractor. All participants in the construction process, from the client commissioning the work to the constructor and to the men and women who perform the work, are integral to the process of establishing a safe work place. Therefore, throughout the construction process we must have means in place by which hazards can be identified and effectively controlled, and safe work practices promoted. Safety practices are effective in controlling hazard by eliminating

major symptoms of accident to minimize loss. The key to critical safety practices is very much influenced by the behavior of the construction workers. The behavior of construction workers varies all over the world despite complying with the global safety regulation standard of safety practices.

2.10 Basic personal protective equipment and clothing to ensure safety at the Workplace

All workers must equip themselves with suitable clothing, shirts, and long pants for protection against both the weather and workplace hazards. Unless otherwise agreed upon, workers are also responsible for providing their own work gloves, safety headgear, and safety footwear. However, if a product requires specified gloves to protect the user against hand injuries such as slivers and cuts, the employer must provide those gloves. Employers are responsible for providing and enforcing the use of personal protective clothing and equipment (Workers' Compensation Board of British Columbia, 2005).

This includes fall, respiratory, eye, and hearing protection and any other specialized protective equipment required by the Occupational Health and Safety Regulation. Employers need to make sure that the appropriate personal protective equipment is identified for various phases of construction and is being used by workers. Employers must ensure that workers are trained in the use of specialized protective equipment prior to use; this includes fall protection equipment. Where there is a danger of making contact with moving parts of machinery, equipment, or tools (Workers' Compensation Board of British Columbia, 2005):

- Avoid loose fitting or frayed clothing, which may get caught.

- Remove accessories such as rings, dangling neckwear, loose-fitting bracelets, and watch bands.
- Confine long hair.
- Wear a short-sleeved shirt and long pants (Workers' Compensation Board of British Columbia, 2005).

Footwear must protect the ankle, sole, and toes. Safety footwear with a CSA green triangle symbol meets these requirements. It is the worker's responsibility to keep personal safety footwear in good repair. For example, exposed metal toe caps could be hazardous near electricity. Keep laces tied up at all times to avoid snagging or tripping (Workers' Compensation Board of British Columbia, 2005).

Residential construction workers are often exposed to on-the-job noise that can permanently damage hearing. It's important that workers wear hearing protection when exposed to noise from loud equipment such as air nailers, chop saws, chainsaws, circular saws, routers, screw guns, drills, and power planers. Employers are responsible for providing the required hearing protection. To monitor the effectiveness of hearing protection, construction workers must have their hearing tested every year. Where communications with co-workers may be critical, hearing protectors that do not block out too much noise should be worn, for example, custom-molded earplugs with vents, earplugs with a connecting cord, Class B earplugs or earmuffs, and electronic earmuffs or earplugs (Workers' Compensation Board of British Columbia, 2005).

Before beginning to excavate, locate and identify all utility services, such as electrical, gas, steam, water, and sewer in the area. Any danger to workers from these utility services must be eliminated or controlled. Pointed tools cannot be used to probe

for underground gas and electrical services. If possible, blunt shovels should be used to expose the facility. Caution should be taken, especially if newer, sharper spade shovels are used. Trees, utility poles, rocks, or similar objects near the edge of an excavation must be removed or secured to prevent workers from being injured (Workers' Compensation Board of British Columbia, 2005).

Safety Gloves to protect the hands obtained an Average Index of 86.11 for the Contractors and 80.77 for the Developers. Both group has different point of view regarding to safety program whereby the contractors indicated that the program was placed third in the level of the importance while the developers marked it fifth. Using hand tools such as nailing, hammering, crushing rocks, cutting metals, cutting woods is a common task, therefore workers is obligated to work with safety gloves. Base on research conducted by Salim (1999), data obtain from PT. ASTEK shows injuries cause by accidental hitting reaches 37.75 % which shows that the type of accident has a high percentage, this is also apparent that workers are not aware of the importance of safety gloves to protect their hand and to reduce the risk of injuries (cited in Permana, 2007).

The use of safety mask or goggles to protect the eyes has an Average Index of 81.56 for the contractors and 81.73 for the developers. Safety Mask or goggles can protect the eyes from debris, hazardous chemicals and reducing the risk of high radiations during welding, or places that may harm the eyes. Workers can work safely with safety masks or goggles especially those often involve in working with hazardous chemicals like antirust proofing agents and solvents, welding, grinding and powered sanding. This concur with the study conducted by Fitri (2000) that accident due to negligence to wear

safety mask or goggle has reach 7% of the total amount of construction accident (cited in Permana, 2007).

Safety Shoes to protect the feet from stepping and kicking an object has an Average Index of 74.07 for the contractors and 81.73 for the developers. At construction site where hazardous object scattered all over the floor e.g. Pieces of steel, wood, nail, rock, construction tools and other building materials, safety shoes is a necessity. According to research conducted by Salim (1999) 18.28 %of accidents is cause by falling or slipping from slippery floor, these occur when workers are not aware of what type of shoes they need to wear or sometimes they ignored to wear. Beside the slippery workplace, safety shoes may prevent the foot from injuries cause by nail puncture, sharp metals, and other sharp objects lying all over the work floor or ground, ILO (1998) expressed that workers is obligated to wear safety shoes as danger lurks everywhere around the construction site whether it may be due to falling objects or objects lying all over the ground, wet and slippery floor (cited in Permana, 2007).

2.11 Approaches to Construction Safety

New approach to construction safety

In spite of all these efforts to improve the poor safety record of the construction industry, the rate of fatalities in the construction industry has forced researchers to look for new approaches for construction safety. Attempts have been made to introduce behaviour-based safety approaches for construction projects. Salem et al. Provided a decision support system to assist construction companies (especially small and medium sized) in implementing behaviour based safety. Although behaviour-based safety has

been widely accepted in other industries, it cannot be exactly replicated in the construction industry and it also involves a huge amount of money to implement full fledged behaviour based safety. Another approach of identifying contributing factors of accidents, other than human errors and machine malfunction, is to look into organizational factors through resilience engineering. Resilience engineering emphasizes how organizations manage unexpected events and how people in these organizations become prepared to cope with unplanned and unforeseen events (Ghosh & Young-Corbett, 2009).

Cognitive systems engineering approach

Thus far, most efforts to understand the accident process have failed to recognize the dynamic and dependent nature of construction work. Rasmussen's model of „migration to accidents“ within the paradigm of cognitive systems engineering offers a broader and more powerful view of the relationship between individual and work environment, and of the factors that lead to incidents. In this model, labourers work away from the organization's boundary of economic failure and individual's boundary of excessive effort. Accidents occur when workers migrate towards the boundary of functionally acceptable behaviour and lose control. „Migration to accidents“ model contradicts current practices by recognizing that both individual tendencies and organizational factors push people to work in risky circumstances. The ideas of Rasmussen have been advocated both in construction as well as in other industries as an effective basis for designing adaptive work systems that take into account the inevitable migration of workers towards the boundary of loss of control (Ghosh & Young-Corbett, 2009).

Human Error Theories

The approach of this theory is pointed to the worker as the main factor of the accident. This approach as mentioned by Abdelhamid (2000) studies the tendency of humans to make error under various conditions and situations, with the blame mostly fall on human (unsafe) characteristics only. But this theory does not blame the workers as the main problem for accident, other factors such as design of workplace and tasks that do not consider worker (human) limitation also take part as the reason why accident happened (Abdelhamid & Everett, 2000). In general, the overall objective of human error theory is to create a better design workplace, tasks, and tools that suitable with human limitation. There are some theory that related to the human error theory such as behaviour model, human factor model, and Ferrel theory. Most of these theories address the human (worker) as the main problem that makes an accident happen such as permanent characteristic of human, the combination of extreme environment and overload of human capability and conditions that make human tends to make mistake (Abdelhamid & Everett, 2000) (cited in Hamid, Majid & Singh, 2008).

2.12 Health and Safety Management within the Construction Industry in

Developing Countries

Construction processes in developing countries share similar characteristics in terms of the adoption of technology, construction methods, cultural environments and regulations (Hillebrandt 1999; Ofori 1999; Thomas, 2002). For instance, in Ghana infrastructure like feeder roads, wells for water, small dams, small-scale irrigation, buildings are constructed using labour based methods (European Commission, 1994).

From OH & S perspective, it may be argued that construction SMEs which dominate the construction sector in Ghana are likely to share similar characteristics with their counterparts in other developing countries. Arguably, the findings of this study are of relevance to other developing countries (cited in Kheni et al., 2010).

OH&S administration in many developing countries evolved from pre-independence colonial regulatory systems and institutions. For instance, the origin of Ghana's current Factories, Offices and Shops Act 1970 (FOSA) can be traced to the Factories Ordinance of 1952 when Ghana was a British dependency (Visano&Bastine,2003). Regulatory systems and institutions for implementing OH&S standards in many developing countries, particularly SSA, are ineffective in securing protection against backlash of worsening exposures to hazards from increasingly high rates of industrialization in these countries. Hämäläinen et al. (2006) argued that rates of accidents will increase in parallel with the pace of industrialisation in these countries. Current general literature on OH & S focus mainly on examination of factors that could lead to high OH&S performance (Fredericks et al. 2002; Hinze & Gambatese, 2003; Hinze & Wilson 2000; Huang & Hinze 2006; Jaselskis et al. 1996; Maloney et al., 2007). Equally important are studies dedicated to design issues in relation to OH&S (Coble and Blatter 1999; Gambatese et al. 2005; Seo & Choi 2008). In contrast, literature on OH&S relating to developing countries has highlighted lapses in OH&S administration. For example, Suazo and Jaselskis (1993) have found that Honduran OH &S regulations are comparatively incomprehensive and limited in coverage. More recently, LaDou (2003) reports that OH&S laws cover 10% of working population in developing countries,

omitting many high risk sectors such as agriculture, fishing, forestry and construction (cited in Kheni et al., 2010).

Reasons for poor OH&S performance in developing countries include bureaucracy, time pressures, ineffective institutional structures for implementing OH&S laws and ignorance on the part of workers about their rights to a decent workplace (Koehnet al., 1995). The influences of cultural practices on OH&S management have been noted by many authors to be relatively stronger in developing countries. However the literature remains unclear about the extent to which these practices facilitate OH&S management or hinder businesses from managing OH&S effectively. For example, Coble and Haupt (1999) argue that cultural influences on OH&S management in developing countries are stronger than in developed countries and advocate integrating positive cultural aspects with OH&S management. Similarly, Peckitt et al. (2002; 2004) found that Caribbean construction workers considered values of freedom, love and social interactions as having impact on site safety. OH&S management in developing countries is not devoid of religious influences. As Smallwood (2002) found, there is a strong link between many religions and OH&S. these studies attribute problems in construction OH&S management within developing countries to economic conditions, methods of working, attitudes and physical environment. With the exception of the first study, implementation of OH&S programs is rarely documented (cited in Kheni et al., 2010).

Health and safety management in the construction industry is influenced by cultures including; organisational culture, industry culture, existing legislation and institutions with responsibility for occupational health and safety. Research solely devoted to such influences is scarce. Lingard and Rawlinson (2005) have shown the

significance of these influences on proactive health and safety management in the construction industry. Peckitt et al. (2002, 2004) studied the construction industries of Britain and the Caribbean. Construction workers of the latter country, which has a culture similar to and originating from West Africa, were found to view values of freedom, love and social interactions as having impact on site safety, whereas British workers rated these values as having a lower impact. Other religions have been similarly linked to health and safety. The study therefore highlights the importance of national culture in the management of health and safety (Kheni, 2008).

2.13 Causes of Accidents on Construction Site

The Department for Work and Pensions in the UK commissioned a research into construction health and safety practices to ascertain the underlying causes of construction fatal accidents in the UK. The underlying causes of construction accidents identified were categorized under societal and industry wide influences (macro); project and process factors (mezzo) and worker/supervisor/workplace cause (micro). The causes of construction accidents at the macro level were identified to include immature corporate systems, inappropriate enforcement, lack of proper accident data, lack of leadership from „Government“ as a key client and a lack of influence of trades unions in practice on most sites, especially for smaller projects. Mezzo factors were identified as immature project systems and processes, inappropriate procurement and supply chain arrangements, lack of understanding and engagement by some of the design community, lack of proper accident investigation/data and consequently, a lack of organizational learning. Micro factors included a shortage of competent supervisors; a lack of individual competency and

understanding of workers and supervisors; the ineffectiveness or lack of training and certification of competence; a lack of ownership, engagement and empowerment of, communication with and responsibility for workers and supervisors. These factors were also exacerbated by poor behavior, cost pressures; poor equipment or misuse of equipment, including personal protective equipment; site hazards; poor employment practices; an itinerant workforce and inadequate management of and provision for vulnerable workers such as younger, older or migrant workers. The study was based on an international consultation with 15 overseas construction industry expert stakeholders; phone/email interviews/consultation with 27 UK senior construction industry expert stakeholders; in-depth face to face interviews with 15 practitioners from the UK construction industry; and phone interviews with 15 workers representing the UK's smaller organizations/sole-traders (Brace *et al.*, 2009 [cited in Laryea & Mensah, 2010]).

Falling has been identified as the leading cause of fatalities in construction operations. In order to minimise fall-related accidents and injuries, the international literature advocates that nonslip flooring, handrails, guardrails with safety lines and belts, harnesses and safety nets should increasingly be used onsite. Unsafe site conditions, continuously changing worksites, multiple operations and crews working in close proximity are recognised as other common causes of construction-related deaths and injuries. Secondary causes of construction accidents have been associated with management system pressures such as financial restrictions, lack of commitment to safety, policy, standards, knowledge and information, restricted training and task selection, and poor quality-control systems. Construction accidents have also been linked indirectly to social pressures, particularly group attitudes, trade customs, industry

traditions, attitudes to risk-taking, workplace behaviour norms and commercial or financial pressures experienced by contractors. The poor health and safety performance in construction is further exacerbated by the highly fragmented nature of operations, in addition to time and budgetary pressures (Charles, Pillay & Ryan, 2004).

Major symptoms such as unsafe practices and unsafe conditions, Clough (1986) stated that it would be impossible to eliminate as humans are not perfect. Having the knowledge to act safe can be considered as a good safety practice. Suggestions for establishing a safe workplace and avoiding accident also mention in various priority according to several researcher as a result to their different point of view in safety practices as observed by Niskanen and Lauttalammi (1989), wide variety of machinery and equipment for materials handling should be available on site. Bradford (1993) suggests that employees required to enter confined spaces should be instructed concerning potential hazards, precautions to be taken, and the use of protective equipment. According to OSHA, high technology, such as radio remote control, that may improve the safety and the maneuvering ability of construction machinery and equipment should be used, if applicable. Normile and Skibniewski (1989) suggest that Robots should be used as much as possible to improve safety.

It is commonly known that accidents have serious implications to the construction industry both in financial and humanitarian terms. Construction accidents may cause many problems, such as demonization of workers; disruption of site activities; delay of project progress; and adversely affecting the overall cost, productivity and reputation of the construction industry (Mohamed, 1999). In Hong Kong, the cost of accidents accounts 8.5% of the total tender price (Rowlinson, 2003). Considering the

adverse impacts of accidents, construction safety management is of genuine concern to all stakeholders in the construction industry. Government, unions and insurers have spent a great deal of time and effort attempting to evolve legislation, rules and regulations to help reduce the large loss of life and limbs, and the high number of "lost-work days" (Goldsmith, 1987). In USA, the practice of safety in construction is regulated by governmental agencies such as the Occupational Safety and Health Administration (OSHA), which provides strict rules and regulations to enforce safety and health standards on job sites. However, legislation alone cannot reduce accident rates unless craftsmen and management take positive actions to integrate these rules into their everyday activities by implementing a safety management programme. Safety management is an approach aimed at removing or minimizing the forces which cause losses through injured workers, or damaged equipment and facilities (cited in Dorji & Hadikusumo, 2006).

According to Howell et al. (1998), unsafe practices are often seen in every construction project all over the world. Unlike countries with strict regulation on safety, Ghana as well as other third world countries often contravenes safety, despite having its own regulations and law. Some examples of common unsafe practices are given below:

- Working without authority;
- Failure to warn others of danger;
- Using equipment inadequately;
- Disconnecting safety devices such as guards;
- Using defective equipment;
- Smoking in areas where this is not allowed; and

- Failure to use or wear personal protective equipment.

Holt (2001) state that unsafe practices and unsafe conditions are deviation from required safe practices, but they must be seen as symptoms or more basic underlying indirect or secondary cause which allow these deviations to exist and persist. Akhmad Suraji, et al. (2001) reveals that a deviation to unsafe practices and unsafe conditions is liable to cause accident.

Many accidents in the construction industry are due to bad planning, lack of organization and poor co-ordination on construction sites. According to the European Agency for Safety and Health at Work, in the European Union, construction work leads to most serious accidents at places of work, with more than 1300 people being killed in construction accidents every year. Worldwide, construction workers are three times more likely to be killed and twice as likely to be injured as workers in other occupations. As is evident in this Code of Practice, the costs of these accidents are not borne by workers and employers only, but are also usually shouldered by the owner or owners of the project, legally known as the “client”. These costs can amount to a considerable share of the contract price. In Malta, most occupational fatalities occur in construction sites, and most of these fatalities are due to falls from heights. Moreover, the construction sector claims the second highest rate of occupational accidents each year, reaching 16.5% of all reported accidents in 2005 (Malta Occupational Health and Safety Authority, 2006).

2.14 Safety Problems on Construction Sites

There are safety problems on almost all construction sites which relate to reporting accidents, employing and subcontracting. Employing: all personnel who are employed to carry out construction work on site must be trained, competent and fit to do the job safely and without putting their own or others' health and safety at risk; properly supervised and given clear instructions; have access to washing and toilet facilities; have the right tools, equipment, plant and protective clothing; educated about health and safety issues with them (or their representatives); have arrangements for employees' health surveillance where required. Accidents: all accidents or work-related illness should be reported to the appropriate authorities within a reasonable or stipulated timeframe. Subcontracting: main contractors should ensure that they check the safety performance of the subcontractors they plan to use; give subcontractors safety information they need for the work; talk about the work with them before they start; make sure that you have provided everything agreed (e.g. safe scaffolds, the right plant, access to welfare, etc); and check their performance and remedy shortcomings (Laryea & Mensah, 2010).

The state of health and safety on construction sites in Ghana was investigated by Department of Building Technology, Kumasi Polytechnic, using first hand observation of fourteen construction project sites in 2009 and 2010. At each site, the construction project, workers and the physical environment of the site were inspected and evaluated against health and safety indicators taken from the literature. The results reveal a poor state of health and safety on Ghanaian construction sites. The primary reasons are a lack of strong institutional framework for governing construction activities and poor enforcement of health and safety policies and procedures. Also, Ghanaian society does

not place a high premium on health and safety of construction workers on site. Interviews with workers indicated that injuries and accidents are common on sites. However, compensation for injury is often at the discretion of the contractor although collective bargaining agreements between Labour unions and employers prescribe obligations for the contractor in the event of injury to a worker.

The study by Kheni (2008) on health and safety practices among construction SMEs in Ghana revealed serious problems. The main problems identified by Kheni included lack of skilled human resources, inadequate government support for regulatory institutions and inefficiency in institutional frameworks responsible for health and safety standards. Another problem highlighted was the significance of the Ghanaian socio-cultural value systems particularly, the extended family system and traditional religious value systems in health and safety management within Ghanaian construction SMEs. The research also provided insights into difficulties posed by the internal environment of SMEs to the effective management of health and safety. Kheni (2008) provides a broad understanding of health and safety in the construction sector in Ghana (cited in Laryea & Mensah, 2010).

There are two Acts in Ghana (the Labour Act, 2003 and the Factories, Offices and Shops Act, 1970) that provide some form of regulatory instruments for ensuring health and safety on construction sites. However these are not strongly enforced and many contractors are not even aware of their Health and Safety obligations under these Acts. Regulatory bodies responsible for ensuring compliance are not properly resourced to carry out their statutory responsibilities under the two legislations. Hence there is a big problem with construction health and safety in Ghana. Most workers interviewed in the

course of the study indicated that injuries and accidents are common on sites and often they have to go through a long period of frustration and pleading with employers before they are provided with some form of compensation for injuries and accidents. The parties responsible for ensuring internationally acceptable standards of health and safety on construction sites in Ghana are Government, clients, consultants, contractors, workers and civil society. Government should take the lead in enacting appropriate legislation and enforcing this by resourcing the appropriate Ministries, Agencies and Departments of Government to do their jobs well. Clients, contractors and consultants of the construction sector in Ghana should ensure that every construction contract takes comprehensive account of health and safety requirements for the project, environment and the workers. Workers and civil society should ensure and demand the provision of adequate health and safety policies, procedures and provisions to govern construction work (Laryea & Mensah, 2010).

2.15 The Impact of Safety Practices on Construction Sites

In examining the impact of worker safety attitudes on construction safety outcomes, McCabe et al. (2005) surveyed construction workers and supervisors. The research revealed that employee demographics influence safety attitudes. Siu et al. (2003) observed similar results in their study into the impact of age differences in safety attitudes and performance among Hong Kong construction workers. It was found that older workers exhibit more positive attitudes to safety than younger workers and that an impetus exists for safety programs to reflect this trend. Conversely, Gun and Ryan (1994) observed that risk of injury was unrelated to operator age or experience. Keeping within

this theme of worker demographics and accident causes, Chau et al. (2004) examined the relationship between individual characteristics and OHS injuries in the French construction sector. Their case-control study involved surveying 880 male workers who had experienced one or more workplace injuries within a two-year period. Chau et al. (2004) observed that, although young age, sleep disorders, smoking, disabilities, sporting activities and experience influenced the likelihood of occupational injuries, the risk for individual workers was dependent on their specific position within the construction supply chain. In addition, Ringen et al. (1995) noted that, where a large proportion of the construction labour force in an Anglophone nation is comprised of immigrants with limited language capabilities, the inability of workers to understand English also has the capacity to increase the risks of injury (cited in Charles et al., 2004).

Poor safety records lead to increases in insurance premiums which in turn lead to increases in construction project costs. Contractors with poor safety records pay approximately twice the amount of insurance premiums of those with good safety records. In the United States, the construction industry accounts for 20 percent of traumatic occupational injuries and 12 percent of disabling injuries, but only represents 5 percent of the nation's employed workforce (Liska, 1993). Construction projects that have successful safety programs were found to also have management commitment, hazard control, safety training and meetings, employee support, safety inspections, internal communications, accident investigation procedures and record keeping, emergency procedures and services, and a safety coordinator (Liska, 1993). Many of these items go hand in hand with the type of objectives that effective teams focus on (cited in Sykes, 1998).

2.16 Improving Safety Practices at the Workplace

Appropriate safety material must be produced in such a way as to be understood and followed by the industry parties themselves. Everyone within the industry has a duty to protect themselves and others who may be affected by their own work or process. The role of Workplace Health and Safety Officers, Workplace Health and Safety Representatives and Workplace Health and Safety Committees are extremely important in providing the information and support necessary where informed decisions can be made to minimise risk. Greater workplace consultation requires further consideration and will cut across all industry boundaries for development and resolution. The consultative process is essential in providing avenues where genuine health and safety concerns can be raised and resolved in an atmosphere of cooperation and trust (Australia Department of Employment, Training and Industrial Relations, 2000).

Identifying and assessing the hazards and risks is an essential step in safety management (Brown, 1976; Goetsch, 1996; Holt, 2001). Job Safety Analysis (JSA), also known as Job Hazard Analysis (JHA), is a practical method for identifying, evaluating and controlling risks in industrial procedures (Chao & Henshaw, 2002). However, the differences between construction sites and manufacturing facilities give rise to the need for a specialized method for construction. Construction projects are dynamic (Bobick, 2004). They are characterized by many unique factors – such as frequent work team rotations, exposure to weather conditions, high proportions of unskilled and temporary workers. Construction sites, unlike other production facilities, undergo changes in topography, topology and work conditions throughout the duration of the projects. These features make managing construction site-safety more difficult than managing safety in

manufacturing plants. Particularly in construction, a different approach is needed to identify hazards and risks, increase safety and prevent accidents (cited in Rozenfeld, Sacks, Rosenfeld & Baum, 2010).

Eliminating or reducing accidents and injuries at the place of work will not only save a great deal of pain and suffering to workers but will also help to reduce the many direct and indirect financial costs related to these accidents and injuries. Furthermore, owners of projects (clients), client appointed supervisors, employers, directors, managers and other supervisors can be held responsible for failing to have effective occupational health and safety control measures in place (Malta Occupational Health and Safety Authority, 2006).

A successful corporate safety programme should include a clear statement of policy by the client or owner, expressly showing management support for meeting safety objectives and the involvement of different stakeholders in the management system. Contractors who have experience of undertaking public sector projects should be quite familiar with concepts of a site safety plan, risk assessment, safe working method statement and other safety management arrangements, but private sector clients and contractors may not have the same experience and exposure, particularly for the smaller developers and contractors (The Real Estate Developers Association of Hong Kong and The Hong Kong Construction Association, 2005).

Establish a clear position on safety. The owner's position on safety should be clearly communicated to the project team at the beginning of the project and to all team members joining the project as part of the construction phase. The position can be written in the project documents and contracts, and verbally communicated in project team

meetings during design and construction. The actions of all members of the owner's organization during the course of the project must reflect and reinforce the established position. Ensure that safety is addressed in project planning and design. Thus, owners must provide the initial impetus, by requesting or even requiring, by contract terms, that designers consider construction site safety in their designs (Huang, 2003).



CHAPTER THREE

METHODOLOGY

3.1 Introduction

The third chapter presents the methodology that the researcher adopted in conducting the study. The chapter includes factors such as how the research was designed, the population that was studied, the sample size drawn from the population, the sampling technique, sources of data, data collection tools and how the data was analysed.

3.2 Research Design

The academic purpose of the study was effectively communicated to the authorities and the respondents before and during the process of the data gathering. The study employed descriptive method to handle the process by using a cross sectional survey and observational means to conduct the work. The study employed the use of convenience sampling technique to select the sample size from the construction firms. The sources of data were gathered from two areas being primary and secondary data sources. Administered questionnaires and interviews were used as the main instruments for gathering the data from the respondents. The mixed approach that consists of both quantitative and qualitative methods in analysing the data was employed by the researcher. The quantitative aspect was backed by the administered questionnaires and the qualitative aspect was facilitated by the interviews that were conducted. The data gathered was analysed by using descriptive statistics and that of inferential statistics.

3.3 Population and Sample Size

The study was centred on construction firms in the Accra Metropolis. For the purpose of anonymity, the researcher did not include the names of the construction firms in the study. The population is individuals or group of people or organisation that the study is focused and data gathered from them. The sample size is a representation of the population. The researcher chose to use a sample size of 150 to represent the population.

3.4 Sampling Technique

The researcher employed the use of convenience sampling technique in selecting the sample size. The respondents were chosen by the researcher during his visit to the construction firms in the Accra Metropolis and the selected respondents were the ones who had the chance to respond to the questionnaires and the interviews. The technique was preferable to other alternatives such as simple random sampling and purposive sampling techniques since the population was infinite.

3.5 Sources of Data

To be able to achieve a good outcome of any research, there must be the sources from which data would be collected for the study. In respect to this study, the researcher collected data from two angles namely primary and secondary data sources. The primary data are gathered from the questionnaires administered and any the interviews conducted on the respondents. In the study, the primary data was analysed quantitatively and the interviews were qualitatively analysed to give better understanding to the outcome of the study. In addition to the primary data, secondary data was used by the researcher in

diverse ways by reviewing literature selected for the study in both empirical and theoretical perspectives. These include books, journals, reports, articles, newsletters and from internet search engines. The secondary data aided the researcher in understanding the issues related to the study.

3.6 Data Collection Tools

The researcher used administered questionnaires, interviews and personal observations in gathering data from the respondents. The questionnaire was grouped into five sections with A presenting the respondents personal data. Section B shows the general information about the construction firms, C presents safety practices at the firms, D shows safety law regulation and organisation and observations of safety measures by personnel on site are presented in E. The interview conducted was structured to follow the pattern of the questionnaires to get reliable data from the respondents.

3.7. Pilot Study

The researcher conducted a pilot study in a construction firm close to his vicinity. The questionnaire and interview guide prepared was tested to check for errors and better ways of phrasing the questions to get accurate responses from the final respondents. The detected errors were corrected before administering the final questionnaires to the respondents.

3.8 Data Analysis

In the process of analysing the gathered data, there was cleaning of the data, sorting and grouping them in their respective categories. The categories include factors such as gender, age, educational background, nationality, safety practices on site and causes of accident. The questionnaire was quantitatively analysed and the interview was qualitatively analysed. These were carried out by using descriptive statistics. The entries were coded and tested for their consistency, validity and reliability. The final results were presented in tabular, graphical and chart forms.



CHAPTER FOUR

RESULTS ANALYSIS

4.1 Introduction

In this chapter, the results from the data gathered was presented in a meaningful way. The results were presented in the form of pie charts, bar charts and tables in a form rankings and percentages. They included the demographic characteristics of the respondents, the consequences of accidents on sites, adherence to safety rules and regulations, and safety practices on site. From the study, 128 participants responded out of the 150 selected sample size to the questionnaires that were administered to the stakeholders of the selected construction firms.

Section A: Background Information of Respondents

4.4 Demographic Characteristics of the Respondents

The demographic characteristics of the respondents in this study comprised of their gender, age interval, educational background and nationality. This was done without including the names of the respondents to ensure anonymity in respect of not exposing the respondents to any unfavourable conditions.

4.4.1 Gender of Respondents

Gender was important in the study because it was crucial to know the number of males who responded to the study as well as that of the females. The outcome of the number of males relative to that of the females respondent have been presented in Figure 4.1.

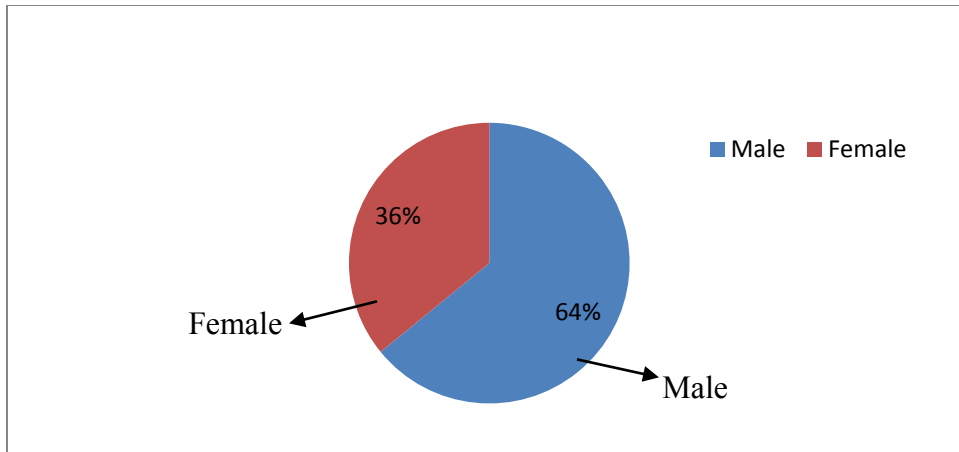


Figure 4.1: Gender of Respondents

It was found from the study that the male respondents accounted for 64% and the female respondents were 36% of the total respondents of the study. It was appropriate to know the gender distribution of the respondents in relation to the study. It has been often said in the Ghanaian culture that the issue of gender equality cannot always hold despite the fact that men and woman can be equally placed on jobs and societal roles in general. Taking keen exception to these claims it was not strange to find from the study that the construction industry due to its nature would employ more males than females. Thus it is necessary to employ men who can lift heavy equipment and perform other duties that may require the use of maximum strength. This is not to say that

women are not strong enough to undertake heavy duties but cannot be compared to men in the construction firms.

4.2.2 Age Interval of Respondents

The views of age groups may be different with respect to safety issues based on the experience and years served within the various firms selected for the study. The responses are shown in Figure 4.2.

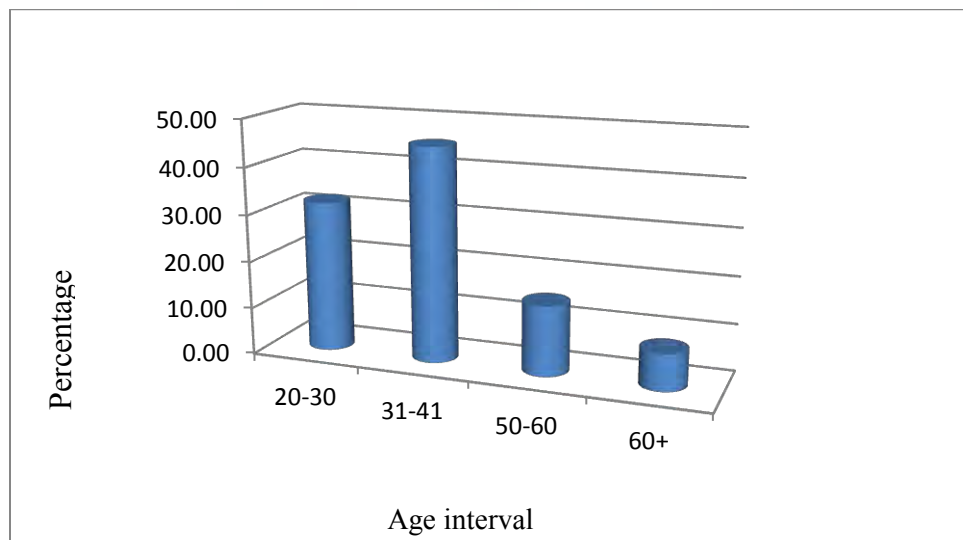


Figure 4.2: Age Interval of the Respondents

From Figure 4.2, it was realised that 45.3% of the respondents were within the age interval of 31-41. This represented the highest in the response and by that it clearly shows the youthful nature of the respondents. Thus they would be in position to carry out effectively operational activities because the youth are mostly smart, active and energetic in performing their duties. This was followed by 32% of the respondents who had their age interval being 20-30. The members within this category were heavily workers who have not had long experience on the job and were fresh graduants from institutions with a

maximum of 6 years experience on the job. Respondents within the age interval of 50-60 had a representation of 14.8%. A majority of them were in management and supervisors. Thus they were in charge of running the day-to-day affairs of the construction firms at the metropolis. The respondents with 60+ were very experienced personnel and a majority of them were consultants to the firms. They represented 7.8% of the total respondents.

4.2.3 Educational Background of the Respondent

The study considers qualification of the respondents since it was significant in knowing their educational background in relation to their profession. The responses to this are presented in Figure 4.3.

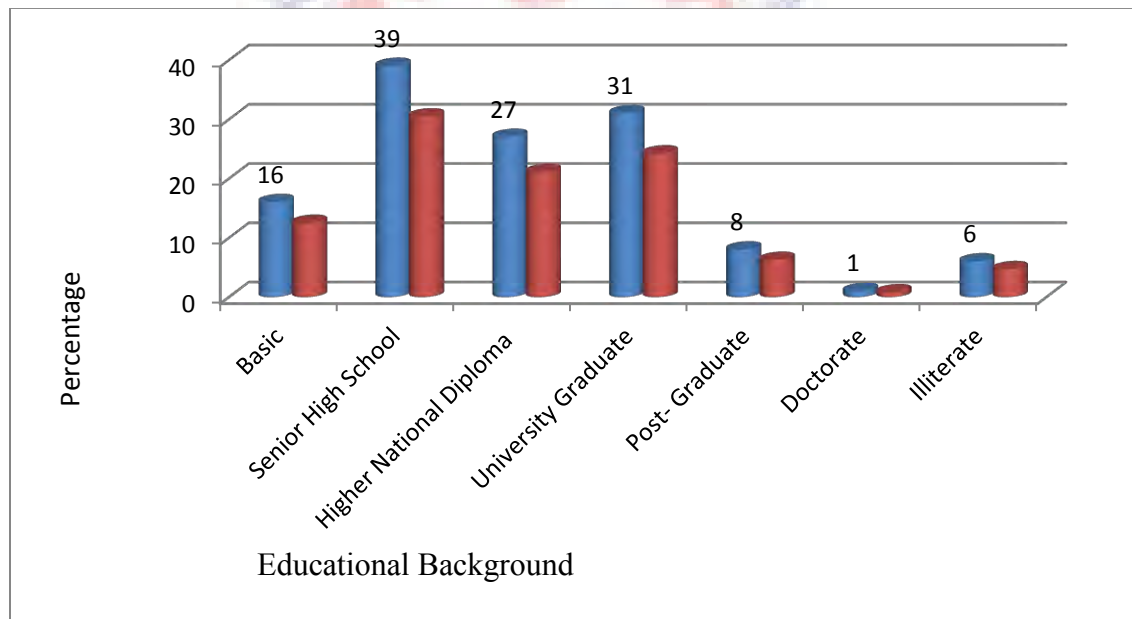


Figure 4. 3: Educational Background of the Respondents

From Figure 4.3, the highest representation of the respondents came from the workers who had completed Senior High School with 30.5%. In addition to this, 12.5% of the respondents had completed basic school and 4.7% of the respondents were illiterate. These category of the respondents normally receive poor pay than their

colleagues with other qualification. Thus because the employers pay less to them they prefer their services to personnel with high qualifications (cheap labour). It was alleged that the workers in this category were sometimes discriminated in terms of promotions and benefits as compared to their colleagues with high qualifications. One doctorate holder who responded to the study was a consult to one of the construction firms that the researcher visited and contributed to 0.8% of the total percentage. 21.1% of the respondents held HND as their educational qualification. The graduate and post-graduate respondents that represented 24.2% and 6.3% respectively were in the majority of the position of supervisors and management. The overall indication depicts that the respondents from the selected construction firms in the metropolis were more literates.

4.2.4: Nationality of Respondents

Since the construction industry in Ghana is a growing one full of multinationals and the local people, it was important to ascertain the number of respondents who were Ghanaians and that of Non-Ghanaians who responded to the study. The Figure 4.4 presents the nationality of the respondents.

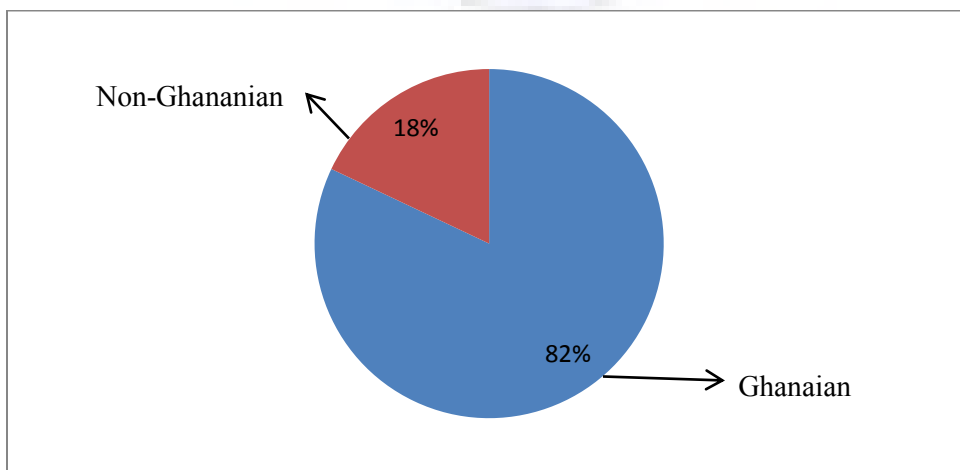


Figure 4.4: Nationality of the Respondents

It was found that 82% of the respondents were Ghanaians and 18% of them being foreigners. The foreigners were mainly Chinese nationals with six of them being from UK and US. The foreign nationals acted majority as supervisors for the various sections of work activities. This was applicable to the large firms owned by foreign nationals.

4.2.5: Type of Job on Site (Respondent)

The construction firms have varieties of jobs that their stakeholders are assigned to. Some of those jobs as professions and it was therefore significant to find out the type of jobs that the respondents were doing on site. This has been presented in Figure 4.5.



Figure 4.5: Type of Job on Site (Respondents)

From the study, it was realised that the labourers constituted the majority of the respondents with 33.6%. The labourers were the workers undertaken the tasks on the various aspects like mixing of concrete, steel bending, operating equipments, laying blocks and fixing materials. They receive instructions from the management on how to carryout operational activities. Supervisor/Foremen contributed 25% of the respondents to the study. They were responsible for checking on the labourers to make sure that they

perform up to standard. The supervisors /foremen were given precise task to supervise based on the department or nature of work that ought to be done. The number of respondents at management level constituted 28.1%. . The management members develop policies for the firms and are in charge of the administration of the day-to-day operations of the construction firms. The artisans were the workers involved in the manual way of carrying out tasks using their hands. They represented 13.3% of the respondents. These show that the respondents to the study cut across different positions with similar and divergent views on the issue of safety practices at the site.

4.2.6: Size of Firm in terms of Permanent Employees

The construction industry in Ghana has been characterised by variety of sizes depending on the resource capacity of the firm. Well resourced firms are able to employ more people than those with inadequate or small resources. The views of the respondents in relation to the size of their firms have been presented in Figure 4.6.

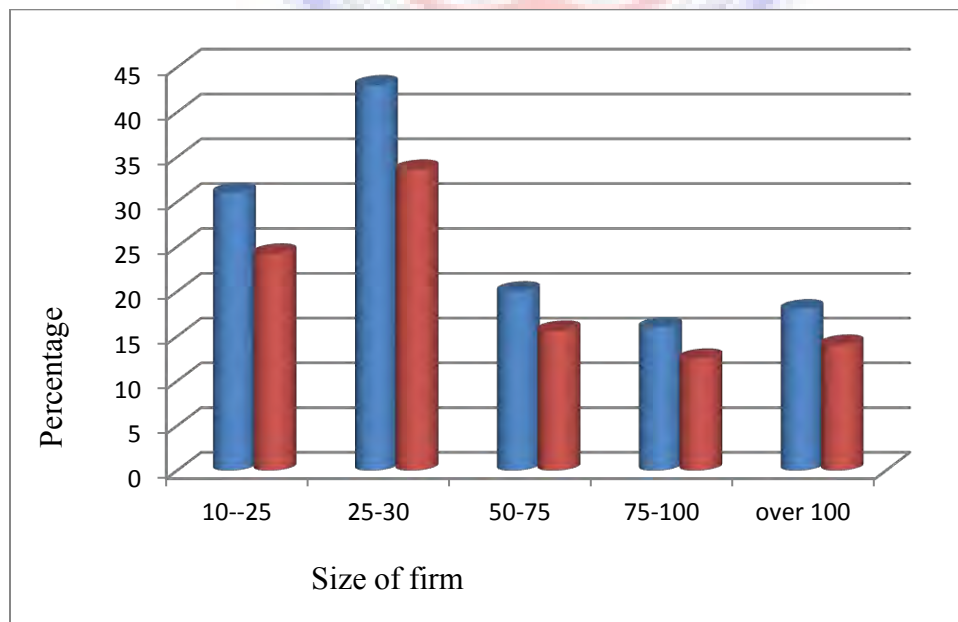


Figure 4.6: Size of Firm in terms of Permanent Employees

The majority of the construction firms that had permanent workers between 25-30 , 10-25 and 50-75 were found to be local construction firms that were not large in size even for the casual workers. They also indicated that it was prudent to hire few permanent workers due to the nature of construction in Ghana especially when government and other private clients do not release funds regularly to promote speedy completion of projects. A majority of the construction firms that had their number between 75-100 and over were mostly foreign companies. These firms were found to have most of the needed equipments (larger) to undertake bigger projects such as roads, big commercial buildings and industries as compared to the local firms.

4.2.7: Years in Active Business

This brings to explain the number of years that the construction firms have in active business. It is quite obvious that an employee's experience is enhanced as he/she stays on the job for a very long time. Thus, the more an employee concentrates on the job, the better he/she understands and gets a lot of experience from it. Figure 4.7 shows the number of years the firms have been into active business.

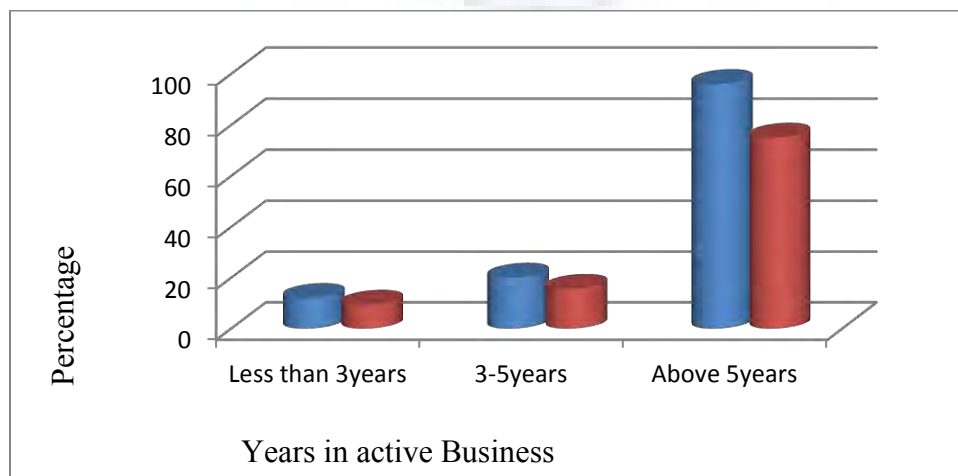


Figure 4.7: Years in Active Business

From Figure 4.7, it was found that most of the construction firms had being in business more than 5 years and this contributed 75%. Some of the firms had being in business between 3-5years and constitutes 15.63%. 9.38% of the respondents indicated that they had being in active business for less than 3 years. This means that they have had enough experience in the construction industry. In view of this, they are capable of carrying out operations that may be assigned to them when the needed equipments and logistics are in place. The firms that had operated for less than 3years were mostly firms with few workers and they were mostly into residential buildings.

4.2.8: Nature of Buildings Built by Firms

It became necessary to find out the nature of buildings that the selected firms usually built since it has the possibility of depicting the safety standards likely to be laid down at the various firms.

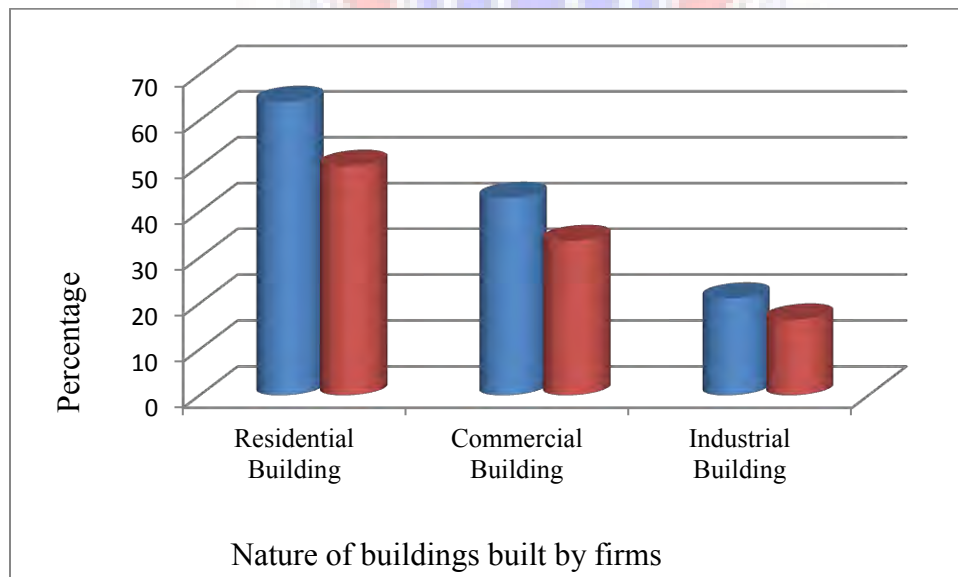


Figure 4.8: Nature of Buildings Built by Firms

From Figure 4.8, it was found that majority of the construction firms were normally into residential building activities and this constitutes 50%. Commercial building was found to be next kind of building that firms usually undertake with 33.59%. This was followed by industrial building with 16.41%. Most of these firms were found to have small number of workers and they did not have the capital capacity to procure larger equipments for huge projects. The commercial buildings/projects and that of the industrial buildings were found to be handled by capable firms that have the financial will to undertake such projects and these firms were found to have large number of employees.

Section B: Main Questions

4.5 Maintaining Equipment on Regular basis

One cannot talk of safety without proper and adequate maintenance. Carrying out maintenance on equipments and machines should be done on regular basis. Figure 4.9 presents the results from respondents on maintaining equipments on regular basis.

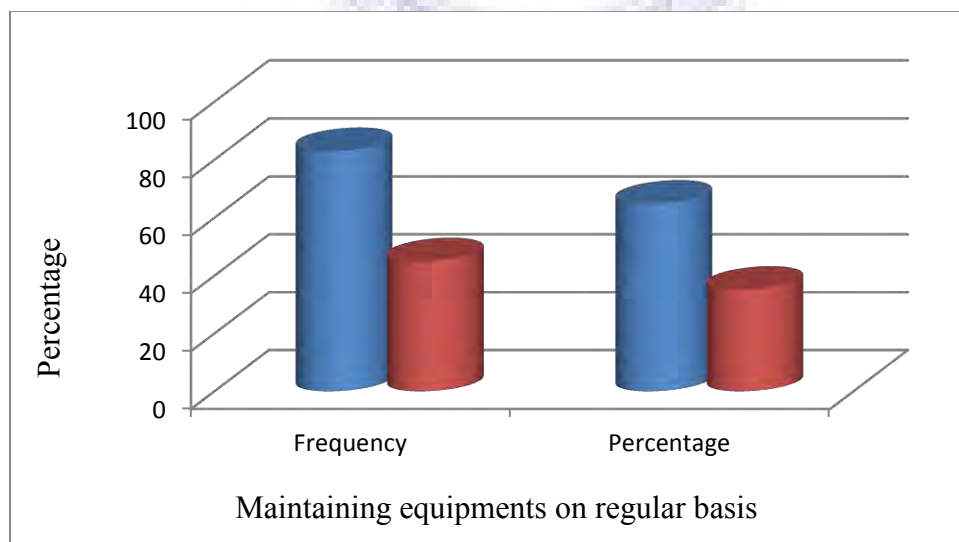


Figure 4.9: Maintaining Equipments on Regular basis

It was realised that 65% of the respondents indicated that they maintain their equipments on regular basis when the need arises. 35% of the respondents on the other hand indicated that regular maintenance are not carried out in their firms.

4.4: Availability of Maintenance Staff

There cannot be proper maintenance without a maintenance staff who can timely deal with maintenance issues at the workplace. Figure 4.10 shows the results on the availability of maintenance staff.

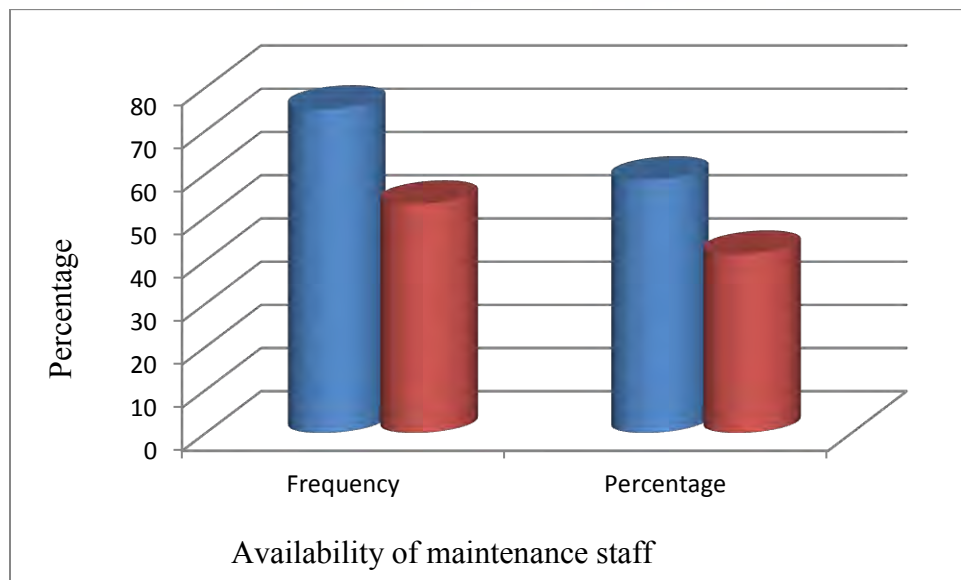


Figure 4.10: Availability of Maintenance Staff

The respondents were probed to indicate whether the construction firms have their own maintenance staffs. It was found from Figure 4.10 that 58.59% of the respondents indicated that they have a maintenance staff within their firms and 41.41% of the respondents indicated that they do not have any maintenance staff.

4.5: Personal protective Clothing/Equipment on Site

It is appropriate for authorities to ensure that workers as well as visitors wear protective clothing/equipment on site to prevent sustaining injuries that might occur from accidents. Figure 4.11 shows the results from respondents on the wearing of personal protective clothing/equipment on site.

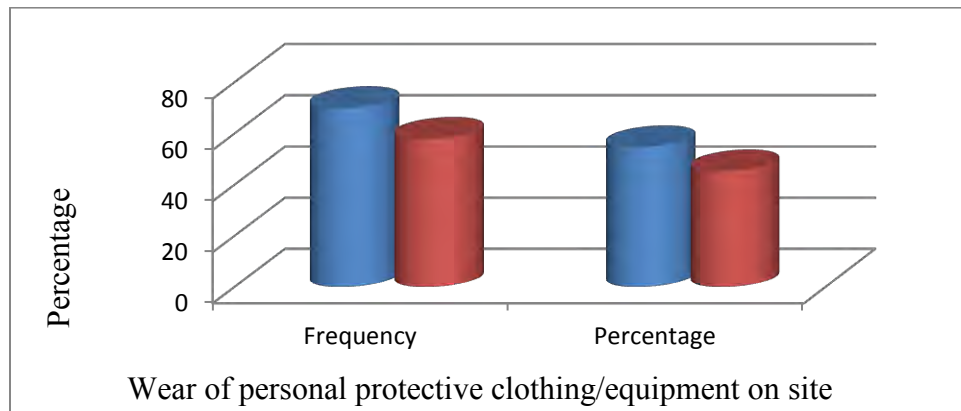


Figure 4.11: Wear of Personal protective Clothing/Equipment on Site

It has been found from Figure 4.11 that workers wear protective clothing/equipments on site and this constitutes 54.69% of the views from the respondents. 45.31% of the respondents indicated that they do not wear protective clothing/equipment on site.

4.7 Personal Protective Equipments used on Site

The provision of personal protective equipments used on site is an effective way of preventing accidents on sites. From the Figure 4.12, the views of the respondents in relation to personal protective equipments used on sites have been presented.

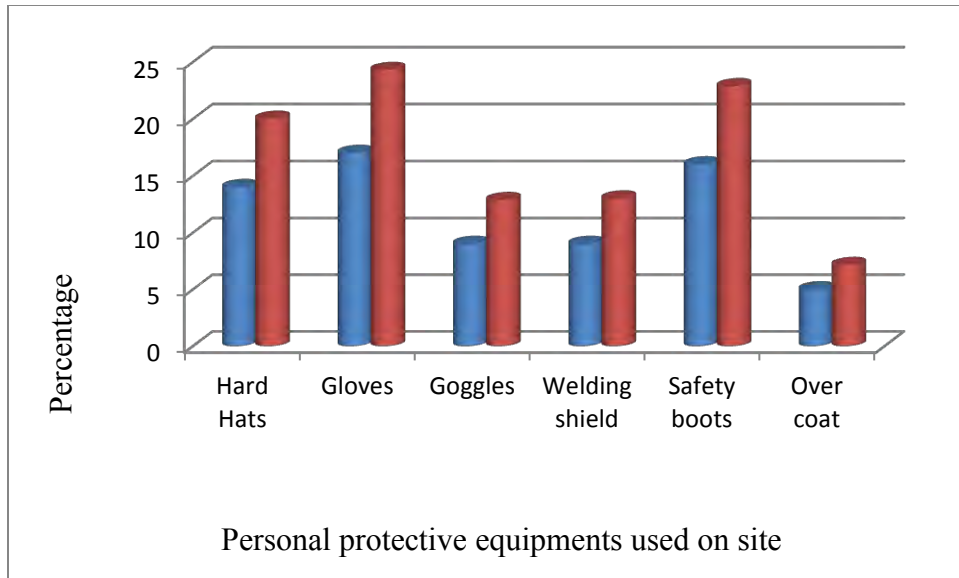


Figure 4.12: Personal Protective Equipments used on Site

Out of the 70 respondents who responded to the issue of use of personal protective on site, 20% of them indicated that they wear hard hats on site, 24% were found to wear gloves, 13% wear goggles, 13% wear welding shield, 23% wear safety boots and 7% of the respondents wear over coat.

4.7: In-Service Training for Workers on Safety Matters

The provision of training facilities such as the in-service training for workers on safety matters cannot be undermined by the construction since it helps to inform and educate workers on the need to ensure safety in their activities.



Figure 4.13: In-Service Training for Workers on Safety Matters

It was realised from Figure 4.13 that 50.78% of the respondents agreed that in-service training on safety matters were made available to them and 49.22% of the respondents indicated that they do not receive any in-service training.

4.8: Frequency of Training given to Workers

The rate at which training programmes are organised for workers is major concern that constructions firms should look at. Frequent training on safety issues helps to update the workers on safety needs.

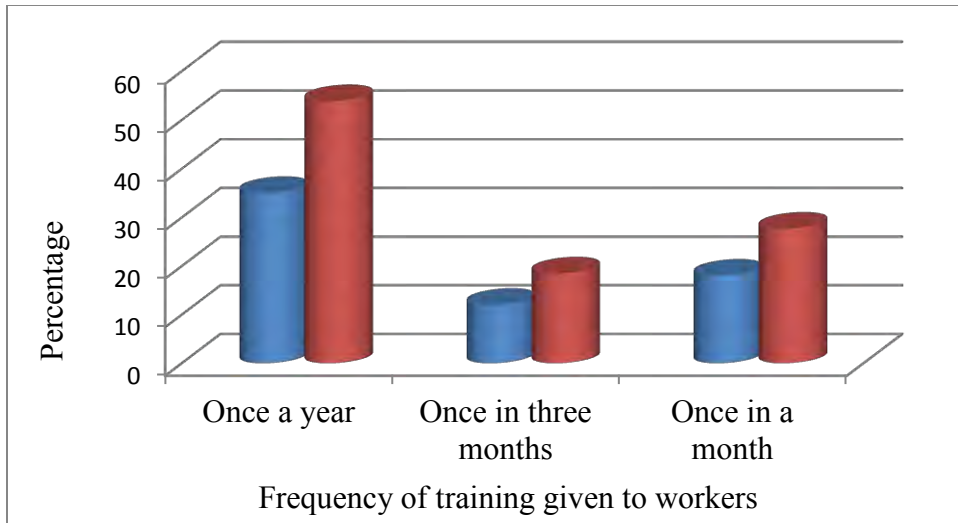


Figure 4.14: Frequency of Training given to Workers

It was found from Figure 4.14 that training programmes were mostly organised once a year and this constitutes 53.85%. This was followed by once in a month (18.46%) and least being once in three months (27.69%).

4.9: Provision of Safety equipments by Management

It is appropriate for management of construction firms to ensure that there exist adequate provision of safety equipments on site to prevent or minimise accidents likely to be caused by their absence

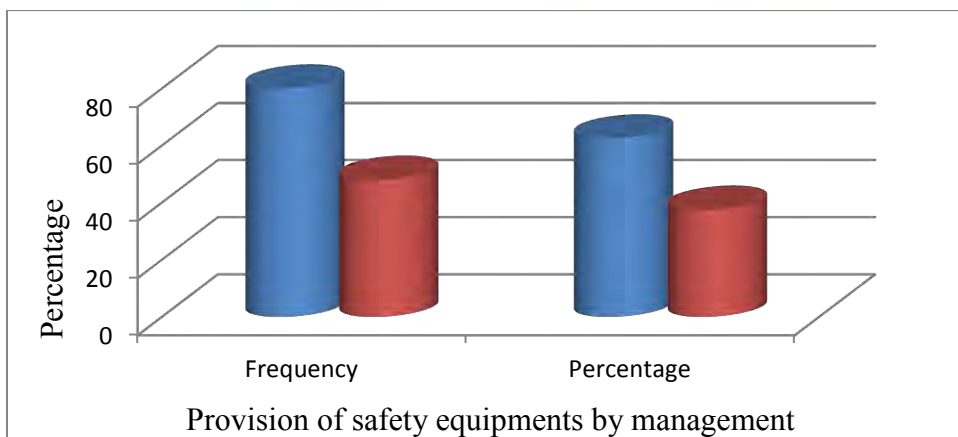


Figure 4.15: Provision of Safety equipments by Management

It was found that 62.5% of the respondents agreed that management provided safety equipments on site whilst 37.5 refuted the claim and indicated nothing of that sort are put in place on site.

4.10: Safety Method adopted by Management

It is always appropriate to know the kind of safety methods employed by management on site. This keeps workers well informed on safety measures put in place to enhance workplace comfort.

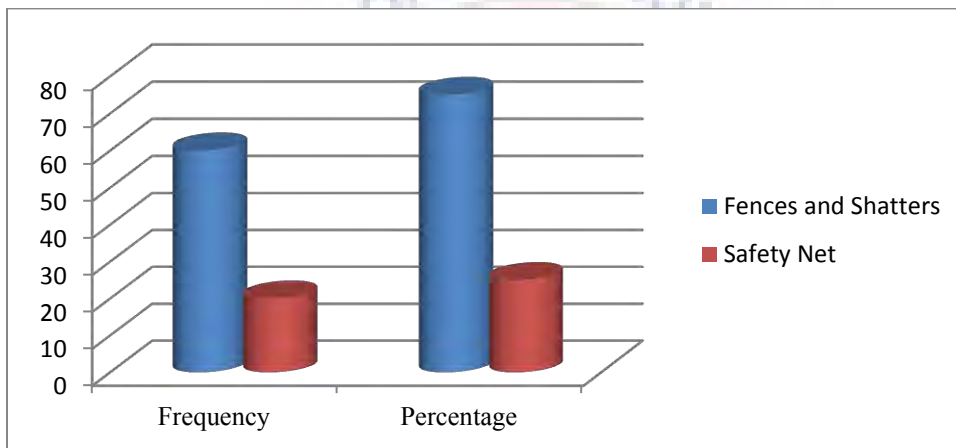


Figure 4.16: Safety Method adopted by Management

From Figure 4.16, it was found that 75% of the respondents indicated that fences and shatters were used as safety methods on site and 25% indicated that safety nets were used.

4.11: Fatal Accident during Construction

In the Figure 4.11, the views on the issue of whether fatal accidents have occurred during construction activities was presented.

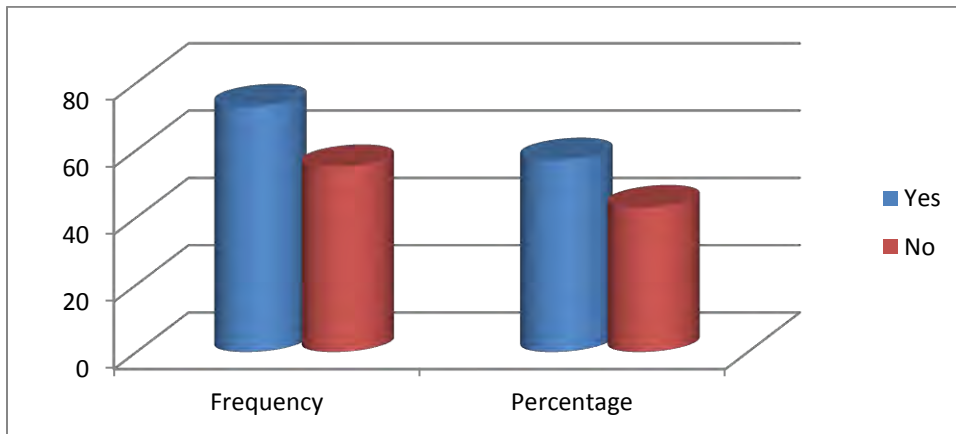


Figure 4.17: Fatal Accident during Construction

Out of the 128 respondents to this issue, 57.03% indicated that indeed fatal accidents do occur during their operations and 42.97%, however noted that they have not experienced such cases.

4.12: Number of Fatal Accidents within a Year

It was appropriate to know the magnitude of fatal accidents that do occur at the workplace. From the Figure 4.18, the results on the rate of fatal accidents within a year have been presented.

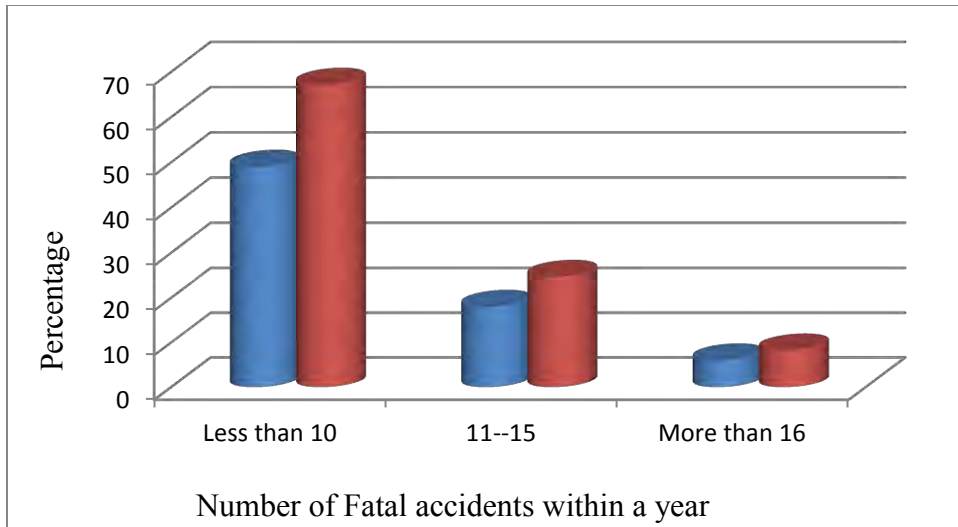


Figure 4.18: Number of Fatal Accidents within a Year

In response to the issue how often fatal accidents occur on site within a year, 67.1% of the respondents indicate that less than 10 gets involved in fatal accidents, 24.7% indicated that 11-15 people are injured and 8.2% indicated that more than 16 people affected by accidents.

4.13: The Involvement of Non-Employees in Accidents on site

Since the construction firms do not operate in an isolated environment away from other stakeholders who are non-employees, it was appropriate to find out whether non-employees are sometimes involved in the accidents.

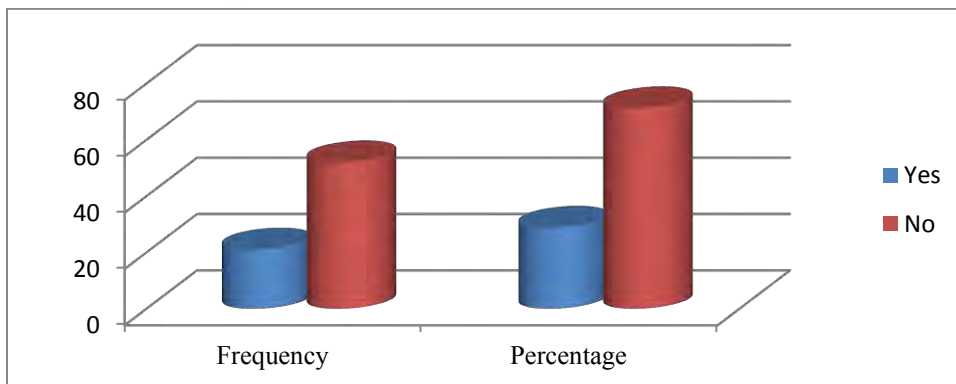


Figure 4.19: The Involvement of Non-Employees in Accidents on site

28.8% of the respondents indicated that non-employees gets involved in accidents on site and 71.2% of the them indicated that even though accidents do occur but do not involve non-employees.

4.14: Things to do when a Worker gets injured

Accidents on site are issues that cannot be avoided but can be prevented or minimised. It would be unfortunate when they do occur but when it occurs the construction firms ought to take decisions on the needed action as soon as possible. Responses on things to do when a worker gets injured have been presented in Figure 4.20.

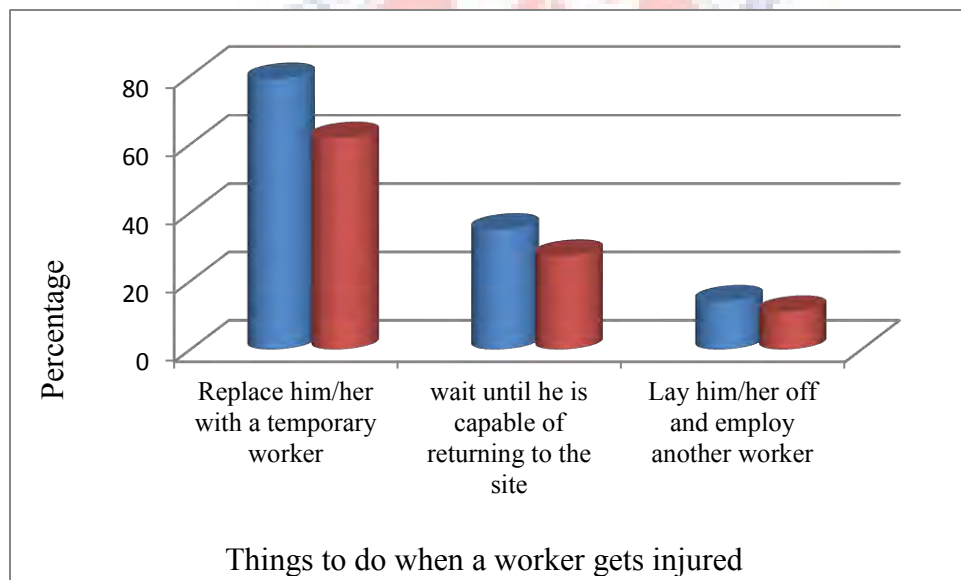


Figure 4.20: Things to do when a Worker gets injured

From Figure 4.20, it was found that the respondents indicated that in case of a worker who gets involve in accident, the appropriate thing to do is to replace him/her with a temporary worker (61.72%). 27.34% indicate that the firm should wait until the

affected person fully recovered. 10.94% of the respondents indicated that he/she should be laid off and another employee should be employed.

4.15: Insurance for Workers

Workers are expected to be insured on the job so that in case of accidents while performing their duties, they can be compensated. From Figure 4.21, the responses from the respondents in relation to insurance for workers on safety have been presented.

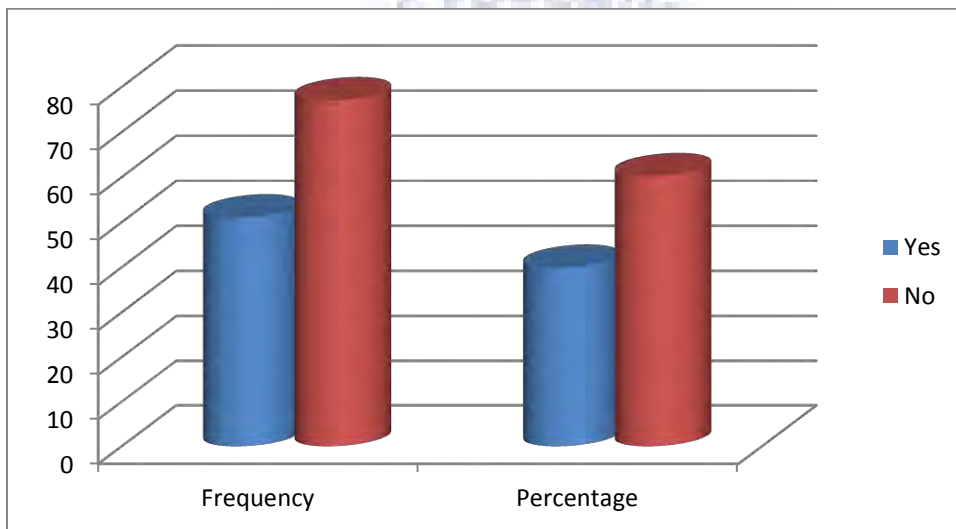


Figure 4.21: Insurance for Workers

From Figure 4.21, it was realised that a majority of the respondents consisting 60.16% indicated that they do not benefit from insurance and 39.84% indicates that they are insured.

4.16: Kind of Insurance for Workers

It became necessary to find out the kind of insurance that were given to the workers who responded that they were insured. These have been presented in Figure 4.22.

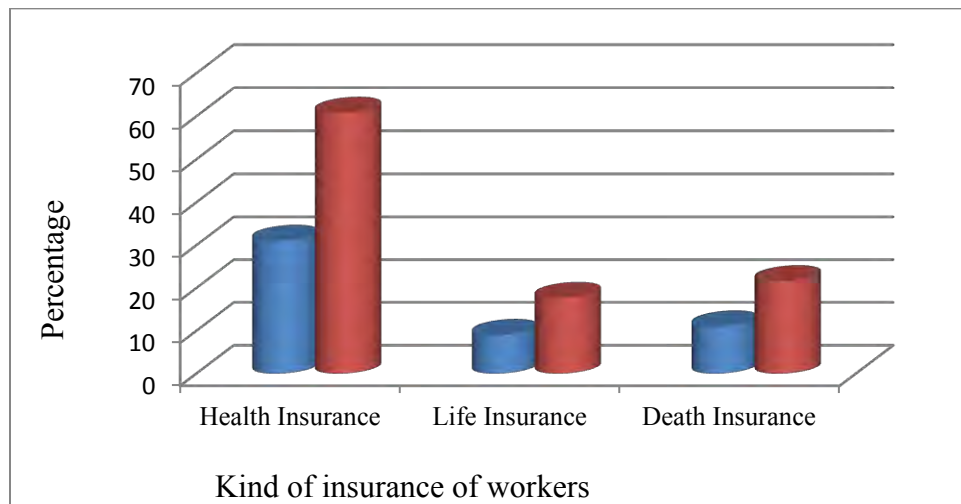


Figure 4.22: Kind of Insurance for Workers

From Figure 4.22, it was realised that 60.78% of the respondents indicated that they are given National Health Insurance. 17.65% indicated Life Assurance and 21.57% indicated Insurance.

4.17: Supervising Agencies on Safety Measures

The contribution of supervising agencies on safety measures by the construction firm is a crucial matter that cannot be ignored. The responses from Figure 4.23 show the supervising agencies that supervise safety measures put in place by the construction firms.

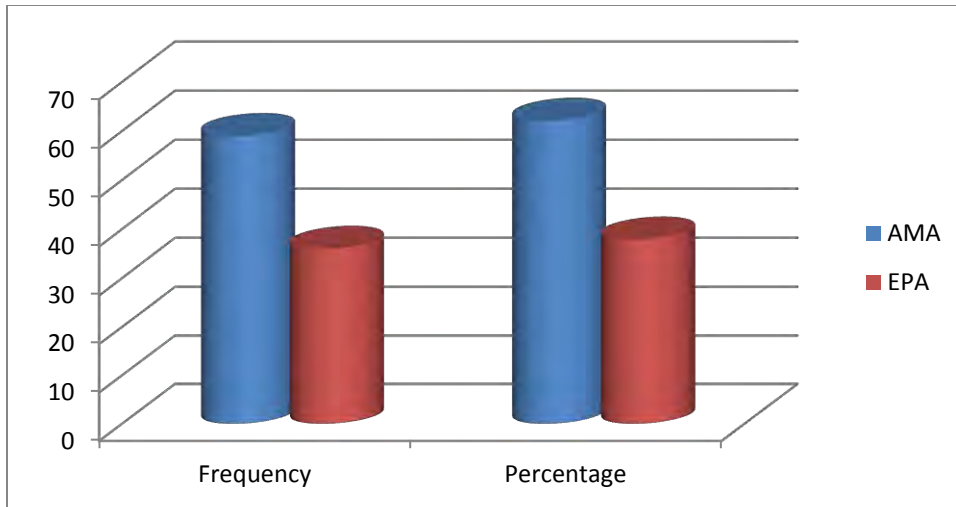


Figure 4.23: Supervising Agencies on Safety Measures

From Figure 4.23, it was found that the Accra Metropolitan Assembly (AMA) was responsible for the supervision (62.11%) and 37.89 of the respondents were with the view that the EPA was responsible for supervision of safety issues on site.

4.18 Workers observe safety regulations on site

Safety measures can be put in place on site but the most significant aspect of it should be its observation or implementation. Thus, good measures not observed would not yield any proper results of its intended purpose.

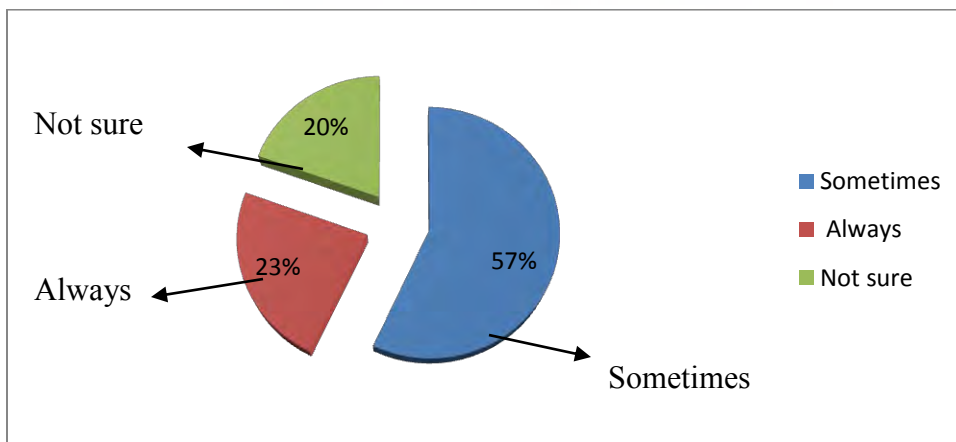


Figure 4.24: Workers Observe Safety Regulations on Site

On the issue of whether workers observe safety regulations on site, it was found that 57% of the respondents were with view that workers sometimes observe safety regulations on site. 23% of the respondents indicated that workers always adhered to the safety regulations on site. 20% of the respondents were however not sure as to whether workers observe safety regulations on site or not.

4.19: Consequences of Accidents on Site

The views and comments of the respondents in relation to the consequences of accidents on construction sites have been presented in Figure 4.25.

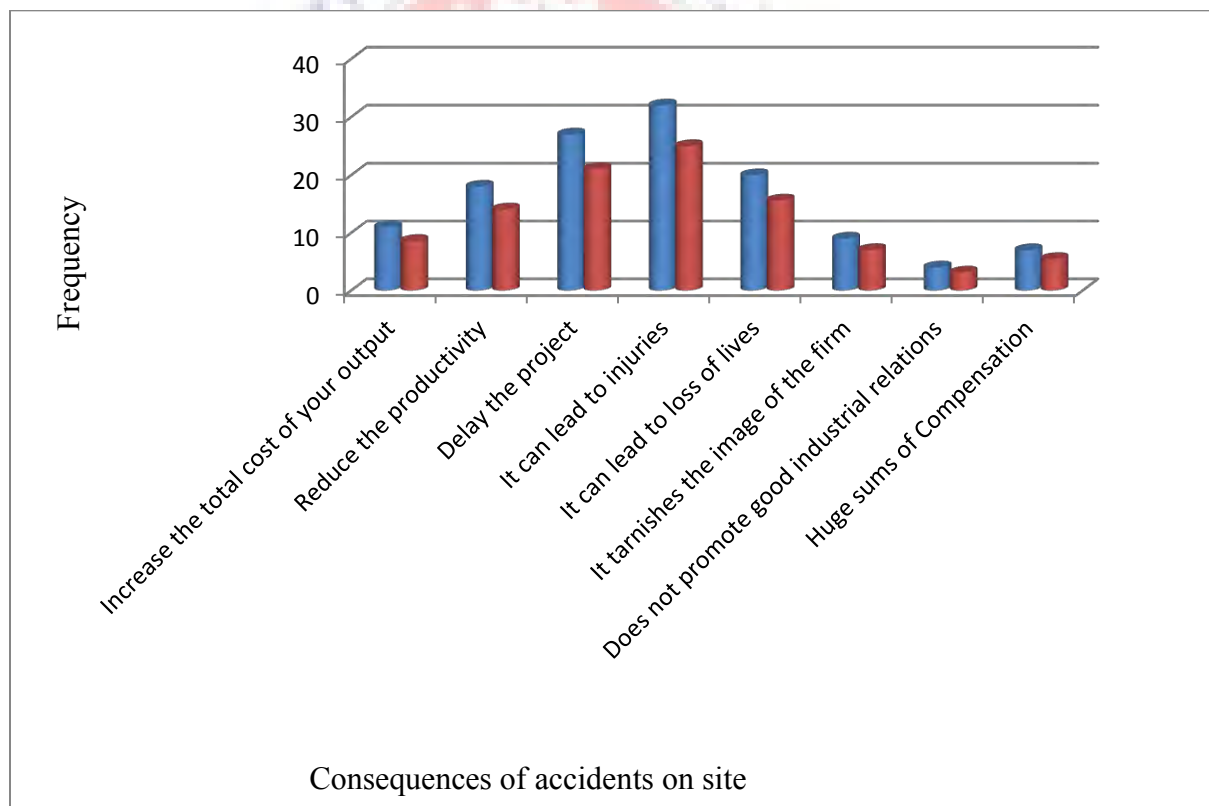


Figure 4.25: Consequences of Accidents on Site

It was found in Figure 4.25 that accidents can lead to injuries and the respondents rated this 25%. The issue of delay of projects as a result of accident on construction sites

was affirmed with 21.1%. Accidents were found to lead to loss of lives and this assertion was rated with 15.6%. Accidents were found to decrease productivity with 14.1%. The total cost of work output is increase as a result of accident (8.6%). The respondents also indicated that accidents on construction sites tarnish the image of the affected firms (7.0%). Accidents at the construction sites do not promote good industrial relations within the firms (3.1%). Accidents at the construction firms were found to have led to huge sums of compensations to the affected parties (5.5%).

4.20 Observation of Safety Measures by Personnel on Site

Ratings of observation of safety measures by personnel on site using a 4-likert scale. The following range are used to explain the weighted means of the responses:

[1-1.5= Strongly disagree 1.6-2.25= Disagree 2.6-3.5=Agree 3.5-4= Strongly Agree]

Table 4.1: Observation of Safety Measures by Personnel on Site

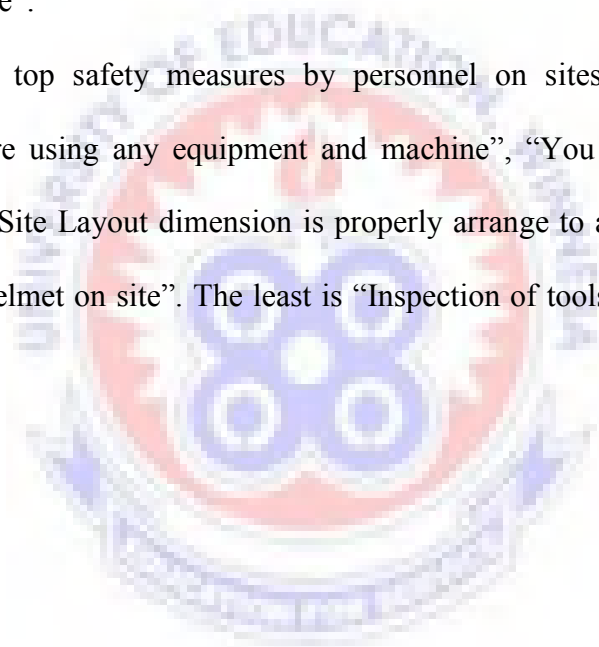
Statement	Weighted mean	Interpretation of response	Ranking
1. You normally wear helmet on site	2.98	Agree	3
2. You always wear safety boot on site	2.81	Agree	5
3. Operators wear goggles	2.19	Disagree	8
4. Operator use protective clothing other than those mentioned above	2.49	Disagree	7
5. Operators ask for permission before using any equipment and machine	3.44	Agree	1
6. You always use first kits aid when injured	3.24	Agree	2
7. Official visitor use safety clothing's	2.67	Agree	6

8. Inspection of tools and equipment are done before usage	2.06	Disagree	9
9. Site Layout dimension is properly arrange to all department	2.86	Agree	4

Source: Field Survey, 2013

Out of the nine Statements of safety measures by personnel on sites respondents to “agree” with all except these, “Operators wear goggles”, “Operator use protective clothing other than those mentioned above and Inspection of tools” and “equipment are done before usage”.

The four top safety measures by personnel on sites are “Operators ask for permission before using any equipment and machine”, “You always use first kits aid when injured”, “Site Layout dimension is properly arrange to all department” and “You normally wear helmet on site”. The least is “Inspection of tools and equipment are done before usage”.



CHAPTER FIVE

DISCUSSIONS OF THE RESULTS

5.0 Introduction

Chapter Five presents the discussions of the results from the data that was gathered for the study. The results were compared with previous findings of other authors to ascertain whether it supports or rejects the claims of those findings.

5.1 Maintaining Equipments on Regular Basis

A majority of the respondents consisting of 64.84% indicated that they maintain their equipments on regular basis. They indicated that maintaining the equipments helps to promote their life span and this saves cost of buying new equipments that might result from lack of maintenance. However, 35.16% of the respondents indicated that they do not maintain their equipments on regular basis. To them, they repair the equipments when faulty and not on regular basis.

5.2 Availability of Maintenance Staff

A majority of the respondents (58.59%) indicated that they have their own maintenance staffs who undertake maintenance issues in their firms. The maintenance staffs were responsible for making sure that the equipments are put to proper use and are well catered for to prevent mishandling. 41.41% of the respondent noted that they do not have maintenance staff and therefore when there is the need to maintain equipments, the contractor decides who should handle that from outside the firm. This does not auger well for the construction firms since in the absence of the maintenance staff, operational

activities could be halted due to equipment breakdowns. This supports Kheni (2008) that lack of skilled human resources to maintain equipments do not promote effective maintenance.

5.4 Wear of Personal Protective Clothing/Equipment

A majority of the respondents (54.69%) indicated that they wear personal protective clothing/equipment on site. This made them less vulnerable to possible risk to accidents. The rest being 45.31% noted that they do not wear any personal protective clothing's/equipments during their operational activities. A majority of these respondents were found in the firms with few workers and those working on residential buildings. The use of personal protective clothing/equipments have not have been adequately adhered to based on the magnitude of the number of responses from those who did not use such materials. This is in support of Workers' Compensation Board of British Columbia (2005) that employers are responsible for providing and enforcing the use of personal protective clothing and equipment.

5.5 Personal Protective Clothing/Equipments used on Site

Out of the 70 respondents who responded to the issue of use of personal protective on site, 20% of them indicated that they wear hard hats on site. The hard hats protect the workers from being hurt on the head. 24% were found to wear gloves, the gloves are meant to handle equipment easily without getting in contact with the hand, 13% wear goggles, the goggles protect the eye from any possible damage as a result of operational activities, 13% wear welding shield, 23% wear safety boots, it protects the

workers from stepping on objects that can cause accident and 7% of the respondents wear over coat. The use of personal protective clothing/equipments on site based on the results have not being encouraging enough since most firms do not adequately provide such facilities to workers. Workers' Compensation Board of British Columbia in 2005, suggested that all workers must equip themselves with suitable clothing, shirts, and long pants for protection against both the weather and workplace hazards.

5.5 In-Service Training for Workers on Safety matters

50.78% of the respondents indicated that they receive in-service training on safety matters from their firms. This created the avenue for improving upon the safety standards on site and make the workers more conscious of safety matters. This was however admitted by most of the larger firms that had large number of employees and were into huge projects. 49.22% on the other hand stated that they do not receive in-service training on safety matters at all. Based on the results, small construction firms are expected to make sure that they provide adequate in-service training on safety for their workers so that that the rate of accidents can be reduced at the workplace. This supports the findings of Samir and Shaban (2008) who observed that most of construction organisations in Gaza Strip do not provide formal safety training for their employees.

5.6 Frequency of Training given to Workers on Safety Practices

Most of the respondents (53.85%) asserted that the management of their firms organised training programmes on safety practices once every year. This practice was highly asserted by the respondents who noted that although the programme was organised

in every year but to them it was not enough especially when new equipments continues to procure by the firms“ day-in-day-out. Safety training programmes were organised once in a month (18.46%). Most of these construction firms were found to be foreign and 27.69% of the respondents indicated that they received safety training programmes every three months. Some of the firms were the ones with large number of employees and were capable of handling big projects. The local firms have not been doing well in their quest to provide training facilities on safety as compared to that of the foreign ones. They should the training as an investment and not cost. This is in line with the work of Samir and Shaban (2008) that training on safety practices are not effectively practiced on site.

5.7 Provision of Safety Equipment by Management

A majority of the respondents (62.5%) indicated that indeed they are provided with safety equipments to protect them from potential accidents. Some of the safety equipments are safety boots, hard hats, gloves, goggles and welding shield. 37.5% claimed that they are not provided with any safety equipment by the management on site. Based on the results, it appears that majority of the firms (management) do not adequately provide safety equipments to their workers and this is not good for the sanity of the firms in terms of safety. Before any organization can expect good safety performance, top management must establish goals and commit to a safe and healthful work environment (Ohio Bureau of Workers Compensation, 2012).

5.8 Safety Method Adopted by Management

It was realised that 75% of the respondents were with the view that within their firms, fences and shatters were used as the best method of ensuring safety the workplace especially where there have been some diggings that can cause severe accidents either affecting a worker or a visitor. In addition to this, safety nets were used as another method by management to prevent accidents on sites. The nets are normally put in place to give signals that there are possible dangers at a particular place. This supports the findings of Hammer and Price (2001) proposition that in order to ensure construction site safety, management should fully support and ensure that safety devices and temporary structures are in good conditions, allocate sufficient budgets for establishing safe works.

5.9 Fatal Accidents during Construction

A majority of the respondents noted that they have witnessed fatal accidents at their firms. They indicated that the fatal accidents involved both workers and visitors at places where safety measures were not effectively adhered to. Some of the respondents (42.97%) indicated that they had not experienced fatal accidents and that although sometimes accidents do occur but they were minor ones. Fatal accidents that occur on site are due to poor safety measures and put in place the construction and the unwillingness of some workers to abide by them. This affirms the position of Charles, Pillay and Ryan (2004) that unsafe practices on construction sites lead to fatal accidents.

5.10 Number of Fatal Accidents in a Year

Some of the respondents (67.1%) noted that the number of accidents that occurs within their firms were estimated at less than 10 casualties. This was relatively lower than the other two factors and since more than half of the respondents indicated that the rate is less than 10, it is quite impressive although measures needs to be put in place to reduce or eliminate such occurrences. The other two ranges between 11-15 and that of more than 16 casualties within a year is something that needs to be addressed by the firms. As the number of fatal accidents keep on increasing on site, it demoralises workers and tarnish the image of the affected construction firms to the general public. This confirms earlier findings by ILO (2005) that construction fatality occurs in every ten minutes.

5.11 The Involvement of Non-employees in Workplace Accidents.

28.8% of the respondents indicated that non-employees gets involved in accidents on site and 71.2% of the them indicated that even though accidents do occur but do not involve non-employees. In view of this, it can be asserted that even though accidents do normally occur but does not mostly involve non-employees at the construction sites.

5.12 Things to do when a Worker gets injured

Some of the respondents (61.72%) responded that it was appropriate for the construction firms to replace an employee who gets involved in an accident with a temporary worker so that the affected employee can resume his activities when he gets better. This was asserted to ensure productivity and instil some level of confidence in the affected employee that the firm cares about his/her welfare. Some of the respondents

(27.34) indicated that the firm should wait until the person gets better. This has the possibility of affecting the firm's productivity when the role of that affected individual is critical to the success of the firm. Others consisting of 10.94 noted that the affected person should be laid off and new one employed. This however has the tendency of demoralising the workers in such as situations since they may consider themselves to be used and dumped when they are challenged with accidents. This can affect the smooth industrial relations of the firm between management and employees. This supports the findings of The Real Estate Developers Association of Hong Kong and The Hong Kong Construction Association (2005) that there should be management support systems for accident victims.

5.13 Insurance for Workers

A majority of the respondents (60.16%) indicated that they do not benefit from any insurance from their firms. Some of the respondents indicated that because they were casual workers, the firms did not provide any insurance cover for their operations. It was realised that those who responded that they benefit from insurance indicated that the insurance were health insurance, life assurance and death insurance. A study by Kheni, Gibb and Dainty (2010) shows that insurance of workers against injury is not compulsory by law although employers are required to take all necessary measures to indemnify the employer against damages resulting from accidents.

5.14 Kind of Insurance for Workers

Most of the respondents (60.78%) indicated that they are benefited from the national health insurance scheme provided by their firms. This is meant to cater for their health challenges. In addition to this, life assurance was instituted for some of the respondents (17.65%) to ensure that the employees are benefited greatly during their retire and death insurance that seeks to ensure that in case unfortunate incidence (death) occurs, the dependants of the employee would be compensated. It appears that the construction firms do not have adequate packages that insures their workers when injured.

5.15 Agencies Responsible for the Supervision of Safety Practices

A majority of the respondents (62.11%) alluded that the Accra Metropolitan Assembly (AMA) was responsible for making sure that they supervise the activities of construction firms on safety measures. However, some of the respondents were not impressed with the supervision of such measures and indicated that the supervision of AMA has not being effective as expected. 37.89% also indicated that the Environmental protection agency was responsible for the safety supervision and noted that they had also not played their role as expected. The supervising agencies are not adequately equipped to carry out their duties well and this has led to the numerous accidents on construction sites. This is because punitive actions are not exerted on firms that frown on the need to implement safety practices and this compounds the rate of accidents on sites. This supports Kheni, Gibb and dainty, (2010) that reasons for poor safety performance in

developing countries include ineffective institutional structures for implementing OH&S laws and ignorance on the part of workers about their rights to a decent workplace.

5.16 Workers Observe Safety Regulations on Site

The respondents were asked to indicate whether the construction firms observe safety regulations on site. It was realised from Figure 4.6 that 57% of the respondents indicated that workers adhered to safety regulations sometimes and not all times. This indicates that safety regulations at the construction sites are not adequately observed as it should. In addition, some respondents representing 23% indicated that the firms observe safety regulations at site. 20% of the respondents indicate that they are not sure of any adherence to the safety regulations on site. The mandated state institutions to enforce safety regulations by the construction firms do not often carry out their task on enforcing the laws to ensure compliance by the firms. This has led to the firms not taken keen interest in abiding by the laws on safety practices.

5.17 Consequences of Accidents on Site

From Figure 4.7, it was found that a major consequence of accidents at the construction was injuries. Injuries was said to be caused by factors such negligence, falls, stepping on tools, poor design or layout of work. Eliminating or reducing accidents and injuries at the place of work will not only save a great deal of pain and suffering to workers but will also help to reduce the many direct and indirect financial costs related to these accidents and injuries (The Real Estate Developers Association of Hong Kong and The Hong Kong Construction Association, 2005). The respondents asserted to this claim

with 25%. Projects are delayed when accidents occur at the workplace. Thus the firm must attend to the victim and do the appropriate action so that the affected person would be catered for. This slows the pace of working activities which at the end affect performance as well. The respondents alluded to the delay issue with 21.1%. This supports Mohammed (1999) that accidents leads to disruption of site activities. Aside first two mentioned, accidents can lead to loss of lives either from the workers or visitors. Thus when the nature of the accident is so severe the effect may be death. This supports Hinze (2008) that accidents leads to loss of lives. The workers are demoralised and demotivated when such occurrences do pertain at the workplace and are normally not willing to give out their best towards work output. The respondents agreed to this claim with a percentage of 15.6. Another significant consequence of accidents at the workplace was that it decreases productivity (14.1%). The overall output level of the construction firms are adversely affected. Thus happen as a result of halting the operational activities to attend to the affected parties. Decrease in productivity of the firms would affect their profit margins and also the amount of benefits given to the workers in general in addition to pay increases. It was found that accidents increase the cost of work as replacement has to be made and putting extra resources to the section that was affected as a result of the accident (8.6%). The respondents indicated that accidents at the workplace tarnish the image of the firm to the outsiders. The public would perceive the firm to be lacking strategies and resources to manage and prevent accidents. They would perceive the firm as not caring for the welfare of their workers and this can negatively affect the firm's recruitment of competent employees since nobody would be willing to work happily at an accident prone work zone. The industrial relations at the workplace become hostile

especially between management and employees. The employees may think that the management team are comfortable in their offices whilst exposing them to dangers without any measures to prevent such occurrences. On that note, communication barrier would set in and affect information dissemination at the workplace which affects the progress of the firms. Compensations are paid to the affected parties as a result of the accidents which may affect the profit margins of the construction firms.

5.18 Respondents View on Observation of Safety Measures by Personnel on Site

The respondents agreed with view on wearing helmet on site to protect themselves from any potential accidents. From the interviews, it was realised that helmet are worn by the workers to prevent being hurt from undue object falls and being hit on the head by possible materials whiles working or carrying out duties/ visiting. This supports the assertion by Worker Compensation Board of British Columbia (2005) that workers must wear protective equipments on sites such as helmet to prevent fatalities. A few of the respondents were not in tuned with this assertion and claimed that some of them do not wear helmets at the construction sites whiles working. A majority of the respondents agreed on the statement that safety boots are worn at the construction site. The boots are worn to prevent the workers/ visitors from sustaining injuries that may result from stepping on sharp objects on site such as nails, iron rods and sharp equipments. However, a few of the respondents took exceptional views on that claim and indicated that the constructions firms do not provide safety boots for their operations and therefore they use their own prescribed boots to the site. This they said sometimes makes them vulnerable to injuries as their boots are not normally of quality to prevent them

from such risk. A large number of the respondents disagreed that goggles are worn at the construction sites during operational activities. They asserted that normally the act of wearing goggles during work activities are not normally adhered to and that all that was needed was to be diligent in carrying out task. Some of the respondents on other hand supported the claim that goggles are worn at site. The respondents disagreed that workers use other protective clothing other than the ones mentioned earlier. In their view, when the firms provide their own prescribed clothing's, the workers are forced to use them without having to rely on other ones outside the firm's. They indicated that the statement holds when the firms fails to provide the workers with their own designed/prescribed clothing. Laryea and Mensah (2010) indicated that Ghnaians does not place high premium on health and safety issues on construction sites. The respondents agreed that permissions are sought from their supervisors and equipment managers before using machines and equipments especially when they are not official operators but are conversant the usage of such equipments. In addition, first kits were given to injured workers in the course of duty/visit. The kits were given to cater for the victim before taking him/her to the hospital for treatment. Individuals or groups who visit the construction sites are given safety clothing to protect them from accidents. These practices are not practiced heavily by small firms that do not have the financial capabilities to undertake such cost. Most of the respondents rejected the statement that equipments and tools are inspected before and after use. This means that equipments are not well catered for by some of the firms and this reduces their life span and thereby increasing the firms operational and maintenance cost. It was the views of majority of the

respondents that site lay out at the construction sites are properly laid to ensure that each employee/department knows his/her domain.

5.19 Problems Facing Construction Firms in their Safety Practices

Unplanned and Complex Sub-contracting

It has been the habit of main contractors practicing sub-contracting to other firms without due diligence. The main-contractors sometimes fail to update the sub ones on the standing orders of a particular task they are assigned to undertake. Complexities normally arise as a result of unclear instructions given to the sub contractors on how certain specific tasks should be carried out. In view of this, the safety practices in relation to ensuring that appropriate site layout are designed, using the right equipment for its intended purpose and better supervision of work activities are normally not given the needed recognition by some of the sub-contractors. This retards the swift progress of work activities. This is in line with the findings of laryea and Mensah (2010) that main contractors should ensure that they check the safety performance of the subcontractors they plan to use; give subcontractors safety information they need for the work; talk about the work with them before they start; make sure that you have provided everything agreed.

Lack/Inadequate Training Facilities on Safety Practices

The constructions are faced challenges with regards to adequate training facilities on safety practices. The respondents indicated that the firms do not offer enough training on ensuring safety at the workplace. Thus the efficient and effective way of handling

equipments and conducting work activities. Some of the respondents stressed that they lacked training on how to ensure safety at the workplace and therefore carry out task as it seems fit to them. The construction firms have not cultivated the habit of investing in training facilities on safety measures for their workers and their main interest lies on completing projects on time. This habit has gained enough grounds because of the failure of state institutions to effectively monitor and enforce safety regulations and policies on construction firms.

Lack/ Inadequate Skilled Personnel to Undertake Training Programmes

The respondents again indicated that an inadequate skilled personnel to undertake the training exercise (trainers) was another worrying factor. Skilled personnel required to educate employees on safety measures are not adequate and this affect the quality and rate at which firms enjoy safety training. This supports the findings of Kheni (2008) that lack of skilled human resources, inadequate government support for regulatory institutions and inefficiency in institutional frameworks responsible for health and safety standards.

Low education on existing laws governing safety practices on site.

The laws enacted to govern the safety practices of construction firms in Ghana has not been effectively observed by contractors, clients, employees, management and state institutions. Some of the respondents vehemently indicated that they were not aware of safety rules and regulations that are supposed to be abided by the firms in their operations. They indicated that they were not conversant the provisions in the Labour Act 2003 (Act 651) and the Offices and Factories Act 1970 that talks on safety practices that

ought to be observed by the firms. In addition, they were not privy to the appropriate actions that could be taken against their employers upon failure to abide by such safety provisions in the laws. The few ones who indicated that they had knowledge of the laws were however afraid to remind authorities on safety measures for fear of losing their jobs.



CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The chapter talks of the summary of the findings, conclusions that were made on the premises (results) from the study and the suggestions that were made on the study to improve the safety practices by the construction firms in the Accra Metropolis. The suggestions made for further studies were also presented in this part of the study.

6.2 Summary of the Findings

The study captured that a majority of the supervisors were foreign nationals with Chinese nationals leading followed by the US and UK. The foreign nationals were found in the construction firms owned by foreigners. The study showed that the construction firms in the metropolis sometimes adhere to the safety regulations and not all the time. Thus, most of the firms were not adequately conscious of the need to maintain safety standards at the workplace and this was partly blamed on the failure of the state mandated institutions to monitor the conduct and enforce the existing laws so that the firms would take cognisance of the safety measures on site.

Accidents were found to have resulted in decrease in the productivity of the construction firms and increasing the cost of work such as operational and maintenance cost. Injuries were found to be as a result of accidents on sites. Project delays were major factor when there was an accident at the site and the most unfortunate thing that can happen is the victim losing his/her life. The firms that records high number of accidents

has their image tarnished and this affect their recruitment of competent staffs because they are perceived as „careless“ firm that does not consider the welfare of its workers as a major priority. Huge sums of compensations are paid to the victims and this sometimes affects the financial position of the firm.

Workers were found to wear helmet on site to protect them from sustaining injuries on sites and purposely for protecting being hurt on the head. Workers were not in the habit wearing goggles on site in the course of their duties. Permissions are normally sought before equipment can be put to use by operators or any worker who may need them in their activities. First kits were given to injured persons by the construction firms before the victim would be sent to the hospital for treatment. Tools and equipments were found normally not inspected before and after use by the most of the firms in the Accra Metropolis. However, the site layouts were designed to ensure that each worker knows his/her boundaries to work.

Sub-contracting without given the needed instruction by main contractors was found to be a problem affecting the practice of work safety on construction sites. Lack/inadequate skilled personnel to educate workers on safety measures was a worrying factor that hinders the construction firms in maintaining best safety practices to enhance their operations with minimal occurrence of possible accidents. The training facilities organised on safety practices were inadequate. Majority of the workers were not conversant with the existing laws and the penalties involved. The few ones who had knowledge of the laws were not prepared to voice them out to their employers for fear of losing their jobs.

6.3 Conclusions

The construction firms in the Accra Metropolis do not offer adequate training facilities for their workers on safety measures coupled with inadequate skilled personnel to undertake the training programmes for the firms. Majority of the workers are not conversant with the safety rules and regulations that are supposed to be observed by all parties in the firms. The existing laws such as the Labour Act 2003, (Act 651) and the Offices, Shops and Factories Act 1970 have not been enforced by the requisite state institutions mandated to ensure that construction firms at the metropolis operate within safety precautions had not been effective. Awareness on safety practice has not dominated the construction firms in the metropolis. Accidents at the construction site decrease the productivity of the firms, cause injuries, delay of projects and can lead to loss of lives of the affected parties. The issue of safety measures observed by some of the workers has been a major issue that hinder the effective utilisation of safety practices on site. Some workers due to their negligence and unwillingness to comply with certain safety directives do not comply with orders and other laid down procedures.

6.4 Recommendations

The management of construction firms should ensure that there are adequate training facilities on safety practices organised for all concerned parties in the firms ranging from senior members to the junior ranked employees. The professional bodies and state institutions like Environmental Protection Agency should be equipped well to train more personnel who would in turn educate and monitor the construction firms in maintaining safety standards in their operations to minimise or prevent accidents. When

the trained are given on regular basis and becomes effective, the stakeholders in the construction firms would be abreast with laws governing safety practices.

The existing laws such as the Labour Act 2003, (Act 651) and the Offices, Shops and Factories Act 1970 should be enforced in a manner that construction firms that break the rules and regulations on safety should be brought to book and appropriate sanctions should be acted to serve as symbol of deterrence to other potential culprits. This would improve the safety practices by construction firms and prevent possible dangers that can be caused by accidents due to negligence and the inertia of state machineries to punish offenders.

The employees and other stakeholders at the construction site should also make it a point to observe the safety practices because the willingness to adhere to the rules and regulations themselves would help them from getting involved in accidents. Thus the employees should cultivate the habit of abiding by the laws to enhance conformity to safety practices. It is expected of the construction firms to provide the needed and adequate safety equipments/tools and materials to help prevent possible accidents likely to emanate from the absence of such materials.

6.5 Recommendation for further studies

The study focused on assessing safety practices on construction sites in the Accra Metropolis. It is recommended that future studies are directed towards examining the impact of poor safety practices on the performance of construction companies in Ghana.

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APPENDIX

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION – KUMASI CAMPUS

DEPARTMENT OF DESIGN AND TECHNOLOGY EDUCATION

**QUESTIONNAIRE FOR EVALUATION OF SAFETY PRACTICE ON
CONSTRUCTION SITE'S IN THE ACCRA METROPOLIS**

**This questionnaire is prepared by a final year Master of Technology
(Construction Management) student to solicit information for the
writing of thesis for the award of Master of Technology Degree from
UEW-K.**

Please your confidentiality is assured, so feel free to express your views.

Thank you for participation in this survey.

SECTION A

PERSONAL-DATA

Please read and tick [] the appropriate box

1. Gender

[1] Male

[2] Female

2. Age

[1] 20- 30

[2] 31-41

[3] 50-60

[4] 60+

others (specify).....

3. Level of education (highest certificate)

[1] Basic

[2] Senior High School

[3] Higher National Diploma

[4] University Graduate

[5] Post- Graduate

[6] Doctorate

[7] Illiterate

Others (specify).....

4. Nationality

- [1] Ghanaian
- [2] Non Ghanaian

5. Type of job on site

- [1] Management
- [2] Supervisor/Foremen
- [3] Artisan
- [4] Labourer

Others (specify).....

SECTION B

GENERAL INFORMATION ABOUT THE COMPANY

6. What is the size of the company in terms of permanent employees?

- [1] 10-25
- [2] 25-50
- [3] 50-75
- [4] 75-100
- [5] over 100

7. For how many years have you been in active business?

- [1] Less than 3years
- [2] 3-5years
- [3] above 5years

8. What kind of building does your company usually build?

- [1] Residential Building
- [2] Commercial Building
- [3] Industrial Building

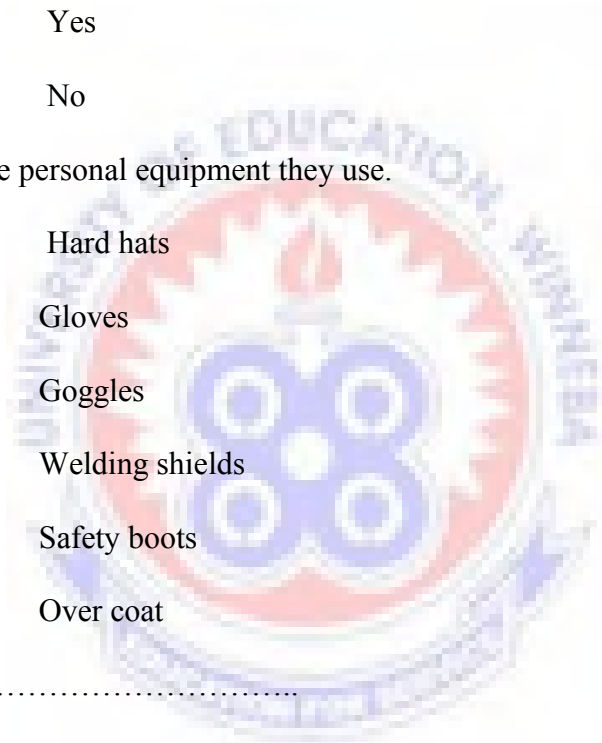
11. Do the company workers wear or use any personal protective equipment during work?

- [1] Yes
- [2] No

12. If yes, tick the personal equipment they use.

- [1] Hard hats
- [2] Gloves
- [3] Goggles
- [4] Welding shields
- [5] Safety boots
- [6] Over coat

Others (specify).....



SECTION C

SAFETY PRACTICES ON SITE

13. What are the safety practices on site?

.....
.....
.....

14. Does management give in -service training to workers on safety matters?

[1] Yes

[2] No

15. If yes, how often

[1] once a yare

[2] once in three mouths

[3] once in mouths

16. Does management provide safety equipment to workers?

[1] Yes

[2] No

17. What safety method on site does the management use?

[1] None

[2] Fences and shatters

[3] Safety net

18. Has the company ever experienced a fatal accident during construction?

[1] Yes

[2] No

19. If yes, what is the total?

[1] Less than 10

[2] 11-15

[3] More than 16

23. Do accidents affect the company's reputation?

[1] Yes

[2] No

24. What are the consequences of accidents at the site?

- a) Increase the total cost of your output
- b) Reduce the productivity
- c) Delay the project
- d) It can lead to injuries
- f) It can lead to loss of lives
- g) It tarnishes the image of the firm
- h) Does not promote good industrial relations
- I) Leads to huge sums of compensation to victims that may affect the firms.

[1] All of the above

[2] None of the above

Others (specify).....

25. Does the management provide a first aid kit's on site?

[1] Yes

[2] No

[3] Not sure

26. What are the safety practices problems facing the construction firms?

.....
.....;
.....

SECTION D

SAFETY LAW, REGULATION AND ORGANIZATION

27. Do workers observe safety regulations on site?

[1] Sometimes

[2] Always

[3] Not sure

28. Do operatives abide by the signs and symbols displayed on the site?

[1] Sometimes

[2] Always

[3] Not sure

29. How do you expect safety practices to be addressed at the construction

site?.....
.....

30. Does the company provide any kind of insurance for its workers?

[1] Yes

[2] No

31. If yes, what kind of insurance?

[1] Health insurance

[2] Life insurance

[3] Death insurance

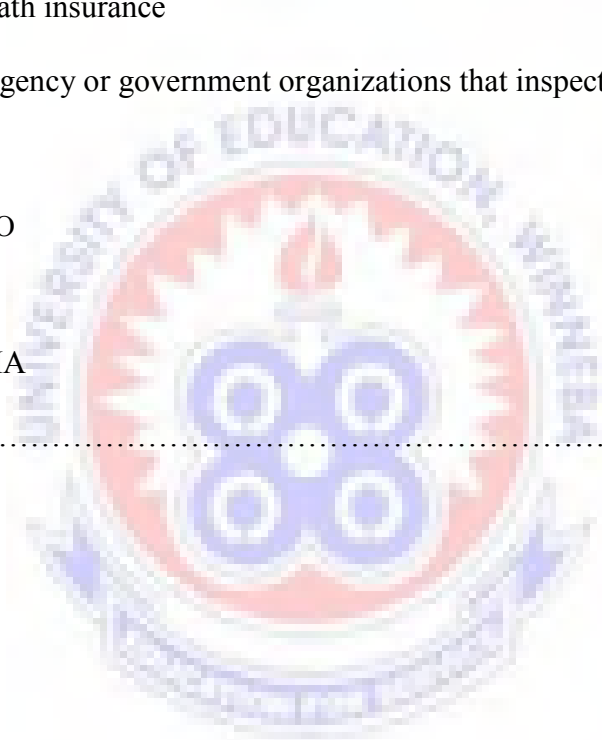
32. Is there any agency or government organizations that inspect construction site's safety?

[1] NGO

[2] EPA

[3] AMA

Others (specify).....



SECTION F

OBSERVATION OF SAFETY MEASURES BY PERSONNEL ON SITE

Please tick [√] to indicate your level of agreement or disagreement in the following statement

NO	Statement	Strongly disagree [1]	Disagree [2]	Not sure [3]	Agree [4]	Strongly agree [5]
33	Personnel on site normally use helmet					
34	Personnel on site always wear safety boot.					
35	Operator's wear goggles					
36	Operator's use protective clothing other than those mentioned above.					
37	Operators ask for permission before using any equipment and machine.					

38	Personnel always use first aid kits when injured.					
39	Official visitor use safety clothing's					
40	Inspection of tools and equipment are done before usage.					
41	Site layout dimension is properly arrange to all department					

42. In what can the safety practices of construction firms be improved at the Accra Metropolis?

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