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COLLEGE OF ARCHITECTURE AND PLANNING

DEPARTMENT OF BUILDING TECHNOLOGY

SAFETY PERFORMANCE OF BUILDING CONTRACTORS IN GHANA

KNUST

A Dissertation submitted to the Department of Building Technology in
Partial fulfillment of the requirements for the award of Master of Science (MSc) in
Construction Management

By

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CERTIFICATION

I hereby declare that this submission is my own work towards the MSc and that, to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

The construction industry is considered one of the most hazardous industries not only in developing countries like Ghana but also throughout the world due to its unique nature. For example Kumasi alone recorded 124 construction accident deaths from 1999 to 2014. The hazards for this industry make it very essential to pay more attention to construction safety and to improve the safety performance of building contractors. However, safety is not a luxury but a necessity, and may be considered an important function to be used against unnecessary loss. Very little research has been done in this field in Ghana. The aim was to empirically conduct an in-depth study into the safety performance of Building Contractors in Ghana. The objectives of this research are to identify factors that significantly influence the safety performance of building contractors in Ghana, to identify and adapt a standardised tool for evaluating the safety performance of building contractors and to evaluate the safety performance using the identified standardised tool. Seventy –five sub factors were identified and grouped into ten main factors. In this study, only K1D1 building contractors in Accra metropolis were considered. A field survey was conducted through a questionnaire for forty-six building contractors in Accra metropolis. The collected data was analysed to presents statistical measures by using SPSS software. Ranking of the factors were done using the mean score and standard deviation values. It was concluded that the main factors influencing safety performance of building contractors in Accra metropolis are; organizational safety awareness & commitment, development of safety policy, financial motivation to application of safety, productivity bonus payment and relation between worker and management on site. Three out of the selected companies were used for the

case study. The results of the case study shows that; relationship between worker and management on site should be cordial, government must make it compulsory for professional workers to join a professional body, productivity bonus for their workers and plans to allocate specific budgets for safety records and providing technical guidance in job performance for their workers need to be improved, the building contractors must implement a system for safety incentive for the workers, company management to conduct clear safety policy and periodically random safety inspections for technical works and the concerned government authorities to hire qualified, competent and certified engineers to conduct regular site inspections.



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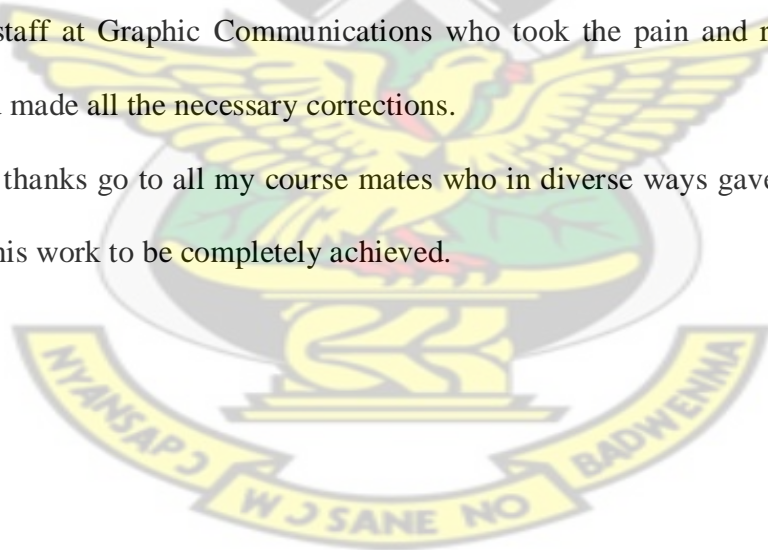
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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The construction industry plays an important role in any economy and its activities are also vital to the achievement of the socio-economic development goals of providing shelter, infrastructure and employment (Ofori, 2012).

Indeed, the interdependence of the construction sector and economic development has been addressed in all cases, there is evidence indicating a direct link between investment in construction and economic growth (Danso, 2010).

In Ghana, just like many other developing countries, construction industry plays a vital role in the achievement of the country's socio-economic development goals by providing shelter, infrastructure and employment.

However, despite this strategic importance of the Ghanaian construction industry is fraught with occupational health and safety issues (Fung et al, 2005). For example, it was reported that the construction industry recorded 902 accidents in 2000 and 846 non-fatal accidents.

Kumasi (the regional capital of Ashanti Region) alone recorded 124 construction accident deaths from 1999 to 2004 (Danso, 2010). Literature available on this subject indicates that the construction industry all over the world is among the leading cases of accidents.

To ensure health and safety at work, there is the need to follow correct safety procedures, obey all safety signs and symbols, be trained and authorized to do a job and also be skilled in using equipment (Daily Graphic, 2014).

As safety is very important to firms, it will be necessary to have reliable measures for performance. Safety performance measures should give an indication of how a construction project is doing in the area of safety (Hinze and Godfrey 2002). Companies that are proactive about safety are more likely to devise measures of safety performance than firms that are not as strong in promoting safety. As stated earlier by Hinze and Godfrey (2002), measures of safety performance are intended to give an indication of how a project is performing.

The purpose of this is to raise the level of health and safety in the construction workers.

It is in this light that researcher finds the chosen area of study as very relevant.

1.2 PROBLEM STATEMENT

All over the world, construction industries is one of the most hazardous industries due to its unique and dangerous nature. Safety has always been a persistent problem in the construction industry (Alaqqad, 2009).

In Ghana, just like many other developing countries, the construction industry is playing a vital role to achieve the country's socio-economic development goals by providing shelter, infrastructure and employment (Ofori, 2012). Despite this strategic importance of the Ghanaian construction industry and the world at large, it is on records that the construction industry is fraught with occupational health and safety issues (Danso, 2010). These challenges, among others, account for the numerous accidents at our construction sites.

Every accident leads to tragedies such as injury or death and damage to property and the environment, with all the associated direct and indirect costs. Economically and professionally, more important is the fact that accidents also lead to delays in the

construction process, and these undesirable repercussions affect the entire construction industry. These studies are among many others that show that the industry has a very poor safety performance record, (Chua and Goh 2004).

However, if the construction industry is to be well positioned to practice good safety measures, then the need for the evaluation of the safety performance in our construction industry must be examined because it is mandatory for all firms to provide a safe working environment for their workers and subcontractors (Mills, 2001).

1.3 THE AIM OF THE STUDY

The aim of this research was to empirically conduct an in-depth study into the safety performance of Building Contractors in Ghana, for the purpose of establishing the critical issues influencing the performance of safety and make the necessary recommendations to address these challenges.

1.4 RESEARCH OBJECTIVES

The following are the objectives for the research:

1. To identify factors that significantly influence the safety performance of building contractors in Ghana
2. To identify and adapt a standardised tool for evaluating the safety performance of building contractors in Ghana
3. To evaluate the safety performance of building contractors using the identified standardised tool.

1.5 RESEARCH QUESTIONS

The following are the primary research questions for the study:

- Which factors significantly influence the performance of safety for Building Contractors in Ghana?
- Which standardised tool is appropriate for evaluating the safety performance of the Building Contractors?

1.6 SIGNIFICANCE OF THE STUDY

This study aims at assessing the safety performance including physical and safety climate of the construction companies in Accra. It is to the benefit of construction companies to recognize the situation and identify the factors affecting the construction safety.

This will help them to take the necessary precautions to control these factors before they occur and be aware of them when they occur during construction, which will lead to improve the overall performance of the company. It also increases profitability in the construction industry by aiding tendering and winning more contracts.

1.7 SCOPE OF THE STUDY

The area for the study was in Accra, the capital of Ghana. The researcher focused the study only on large Building Construction Contractors (D1K1) because of their dominance and proper records.

1.8 BRIEF METHODOLOGY

The study methodology included steps, which can be summarized in the following points:

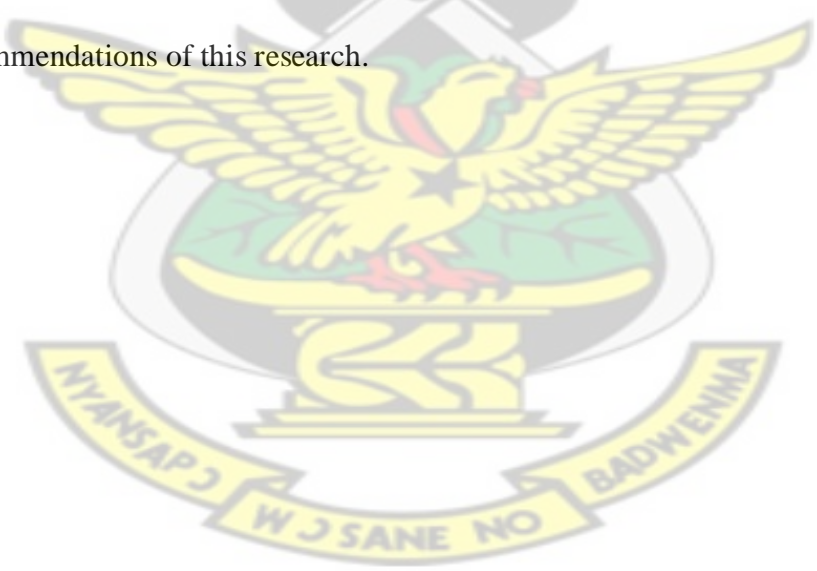
- Performed a review of literatures relating to the topic of this study. The objective of the review is to identify the factors that affect the safety performance in large construction companies and the methods of safety performance measurement.
- Collected data via a questionnaire survey to evaluate the factors that affect the safety performance identified in the literature review.
- Performed analysis of data using appropriate statistical techniques that is SPSS.
- Ranked the results according to their importance by using their mean and standard deviation values.
- Adapt a tool to assess the safety performance of construction companies.
- Reported and discussed results and major findings to introduce conclusions and recommendations.

1.9 ORGANISATION OF THE REPORT

This thesis is divided into five chapters, references and three appendixes. It includes the following:

- Chapter (1) presents an introduction to the research. It includes the problem statement, the objective, research questions, the scope and limitations, the significance, the methodology of the study and organisation of the report.

- Chapter (2) presents the literature review and the previous efforts and studies which have been made in the field of safety and the factors affecting the safety performance, tools for measuring safety performance and health and safety regulations in Ghana.
- Chapter (3) discusses the research methodology which includes the information about the research design, study population, research location, questionnaire design, questionnaire validity, questionnaire reliability, research structure and statistical data analysis.
- Chapter (4) presents and discusses data analysis, statistical methods used, tables and information deduced from statistical analysis and statistical results. The procedures for assessing and improving the safety performance and practice are discussed.
- Chapter (5) summarizes the results and major finding, to present the conclusions and recommendations of this research.



CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The construction industry is considered one of the most hazardous industries throughout the world. Accidents and injuries can bring great losses to individuals, organizations and societies (Fung et al, 2005).

Safety is not a luxury but a necessity, and can prevent unnecessary loss of property, injury, or death.

Safety can be considered as a common-sense approach to removing agents of injury. As cited by Sawacha et al (2010), Alaqad (2009) the word safety is the conditions of being safe freedom from danger or risks.

To address these challenges into detail, it has become necessary for this chapter to present overview of the general construction industry and limit it to the Ghanaian construction industry. It has also captioned factors that affect safety performance, standardised tools for evaluation of safety performance and safety regulations in the Ghanaian construction sites.

2.2 THE GENERAL CONSTRUCTION INDUSTRY

Construction is the term that is generally used to describe the activity of the creation of physical infrastructure, superstructure and related facilities (Wells, 2011). It therefore comprises all civil-engineering work and all types of new building projects (including housing but not restricted to it) as well as the maintenance and repair of existing facilities.

The construction industry is defined as a group of firms with closely related activities involved in the construction of real estates, building, private and public infrastructure (Danso, 2010). It also deals with all economic activities directed to the creation, renovation, repairs or extension of fixed assets in the form of buildings, land improvements of an engineering nature and other such engineering constructions such as roads, bridges, railways, ports and dams (Danso, 2010).

The construction industry plays an important role in any economy and its activities are also vital to the achievement of the socio – economic development goals of providing shelter, infrastructure and employment (Anaman and Osei Amponsah 2007).

Despite this strategic importance the construction industry is fraught with health and safety issues. For example, the ILO's global estimates for 2003 indicate that each year at least 60,000 fatal accidents occur on construction sites around the world or one fatal accident occurs every ten minutes.

The construction industry is important because of the output and outcomes of its activities. It contributes to national socio-economic development by providing the buildings which are used in the production of all goods in the economy.

2.2.1 THE CONSTRUCTION INDUSTRY IN GHANA

The construction industry roles of providing shelter, infrastructure and employment are not different in Ghana (Danso, 2010).

Apart from its economic reasons, the need for continuous action to improve the construction industry also stems from the nature of the industry. The construction industry is large, complex and geographically spread out. As stated by Ofori (2012), it is

also diverse, with many factors influencing its performance, well-being and prospects at many levels.

2.2.1.1 Classification of Building Contractors in Ghana

The Ghanaian building construction firms comprises a large number of enterprises of various sizes as registered and categorized by the Ministry of Water Resources, Works and Housing (MWRW & H) as D1K1, D2K2, D3K3, and D4K4. Based on factors such as annual turnover, equipment holding, personnel, the D1K1 class of contractors are termed as large firms, whereas D2K2 construction firms are medium and D3K3 and D4K4 are small firms (Danso, 2010).

The larger firms, according to MWRW & H are registered as financial class 1, capable of undertaking projects of any value.

2.3 HISTORY OF SAFETY

As man proceeded into the Middle Ages, more awareness of the link between the work that people did and the types of injuries and illnesses, which they suffered, was recognized. During this period the first unions began to be organized to try to protect workers from the hazards of the workplace. The only improvement in the 1800s was fire protection because of pressure from insurance companies (Reese, 2003).

During the first part of the 1900s, workers' compensation laws started appearing and were finally deemed constitutional by the Supreme Court in 1916. Prior to this most employers passed the blame and responsibility on to their workers for workplace incidents using what were called "the common laws" which stated:

1. The employer was not responsible when a fellow worker caused your injury due to negligence.

2. The employer was not responsible if the worker was injured due to his/her own negligence.
3. If an employee took a job and knew that it was risky, or knew of the inherent hazards of the work prior to taking the job and was injured, the employer was not responsible. Under the workers' compensation laws the employers assumed responsibilities for their workplaces' safety and health. They were required to provide and pay for medical care and lost wages due to on-the-job incidents.

As reported by Reese (2003), it was during this time that mining catastrophes continued to occur and more laws were passed to protect miners. When 2,000 workers or 50 percent of the workforce died from silica exposure at Gauley Bridge, West Virginia, the Walsh-Healey Act was passed that required safety and health measures for any employer receiving a government contract. Some companies then began to understand their moral responsibility.

When management found itself in the problem, by legislation, of having to pay for injuries on the job, it decided that it would be financially better to stop the injuries from happening. This decision by the industry all over the world gave birth to the organized industrial safety movement.

Management concentrated heavily, if not entirely, on correcting the hazardous physical conditions that exist in the workplace in the early years of the safety movement. This showed a significant decline in the death rate (deaths per million man-hours worked) during the first 20 years of the safety movement (Alaqqad, 2009).

2.4 IMPORTANCE OF SAFETY IN CONSTRUCTION INDUSTRY

As stated by Alaqqad (2009), safety is a very important element in the success of any construction project. It has a major impact on the contractor, owner, workers, and on the environment. In many countries a contractor safety sheet or performance record is considered one of the items that qualify a contractor for a bid.

Furthermore, many public agencies include safety standards as part of the construction contract documents, which then become a contractual obligation as well as a legal one, overall, the contractor must be concerned about the safety for the following reasons as cited by Bu Khamsin (1999) and Alaqqad (2009) :

- **Humanitarian Concern:**

The suffering as a result of an accident both to injured parties and their families cannot be measured in economic terms. The contractor should never disregard this, even when the injured parties have been adequately compensated by insurance.

- **Economic Considerations**

The contractor must realize that even with adequate insurance coverage, accidents will reduce company profits through the increased costs of future insurance premiums.

- **Legal Considerations**

OSHA requires that each employer provides to each of his employees a place of employment that is hazard- free.

- **Company Image**

A good safety record is a proven means of increasing worker morale and productivity.

This in turn improves the company's public image, and therefore improves the company's bargaining position for negotiating in future.

2.5 CONSTRUCTION SAFETY IN GHANA

As reported by Laryea and Mensah in (2010), the health and safety on construction sites in Ghana is in a poor state. The primary reasons are a lack of 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 (Laryea and Mensah, 2010). In 2000, the Labour Department (2000:22) reported that the construction industry in Ghana accounted for the highest rate of occupational deaths in comparison to other industrial sectors. According to the Labour Department (2000) report, 56 out of a total of 902 occupational accidents that occurred in construction in the year 2000 were fatal.

Kumasi (the regional capital of Ashanti Region) alone recorded 124 construction accident deaths from 1999 to 2004 (Danson, 2010). Literature available on this subject indicates that the construction industry all over the world is among the leading cases of accidents.

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

(Laryea and Mensah 2010). Hence there is a big problem with construction safety in Ghana.

2.6 FACTORS INFLUENCING SAFETY PERFORMANCE OF BUILDING CONTRACTORS

The interest in safety awareness among construction companies has greatly increased in the past decade. The ever-increasing cost of medical treatment and the potential for lawsuits can lead to higher insurance premiums (Abdul-Rashid et al. 2007).

In some countries, a contractor's safety performance record can be considered in contractor qualification. Moreover, the suffering as a result of an accident both to injured parties and their families cannot be measured in economic terms, even if the injured parties have been adequately compensated by insurance (Abdul-Rashid et al. 2007).

Factors influencing safety performance can be grouped into two (2): that is the Project Level and Organizational Level (Tam et al. 2002).

2.6.1 Project Level

In general, safety on construction sites is linked with historical, economical, psychological, technical, procedural, organisational and work environment issues (Sawacha et al. 2005).

The development of safety systems, safety practices and procedures; monitoring of safety compliance, establishment of safety committees at site level, communication of safety policies to site personnel, participation of safety officers, consultation between site staff and safety officers also affect the safety performance (Alaqqad, 2009).

In addition, to avoid accidents recurring on the same site, post-accident investigation

systems need to be carried out to establish their causes. Other recommendations for improving safety at project level include reducing the turnover of project management teams, devoting more time to site safety issues, increasing the number of formal safety meetings with supervisors and specialty contractors, increasing informal site safety inspections, increasing fines to workers with poor safety performances (Asaf et al. 2002).

The project-related factors influencing safety performance therefore are summarised below:

- Administration and management commitment
- Health and safety training
- Legislation, codes and standards
- Selection and control of subcontractors
- Safety Review
- Accident record

2.6.2 Organisational Level

The organisation's commitment to safety has a significant influence on cultivating a positive OHS culture with the most influential factor driving safety performance in the construction industry being the organisational safety policy.

Improvements in organisational structure, organisational importance of safety, safety responsibility and accountability, communication, management behaviour, employee involvement, and employee responses and behaviour can help improve safety performance (Sawacha et al. 2005).

This would involve the development of more detailed written safety programmes, greater expenditure on safety programmes, additional training to part-time safety coordinators, and better indoctrination of new staff on company policies and guidelines (Fung et al. 2005).

Safety systems, written safety policies and measurable safety targets, safety committees at company level, communication of safety, and policies to the various concerned parties are also said to be essential to construction safety while safety awards or incentive schemes, safety training schemes, safety committees and level of subcontracting are also recommended for consideration (Thomas et al. 2005). Organizational-level factors that influence safety performance are also summarized below:

- Project management commitment
- Hazard management
- Information, training and promotion
- Emergency procedures
- Recording, reporting and investigation
- Safety review

2.6.3 Factors influencing safety performance for large building contractors

Research was conducted to identify factors affecting safety performance in large construction companies in Egypt. Sixty-three factors were identified from international literature and grouped into twelve major categories (Abdul-Rashid et al. 2007).

A questionnaire survey was conducted and analysed. It was concluded that the most

important factors affecting safety performance are safety awareness of company's top management, safety awareness of project managers and safety inspections (Abdul-Rashid et al.2007).

The twelve grouped major factors affecting the safety performance are the following:

- Administrative and management commitment
- Role of government and engineering societies
- Project nature
- Historic, human psychological climate
- Organizational structure
- Safety inspections
- Safety meetings
- Safety records and reports
- Incentives
- Safety education and training
- Economic investment
- Medical facilities

Table 2.1 shows summary of researches relating to factors that influence safety performance

Literature	Factors affecting Safety Performance
Jaselskis, et al. (1996)	<p>Upper management support.</p> <p>Time devoted to safety issues for the company safety coordinator.</p> <p>Number of informal safety inspections made by the company safety coordinator.</p> <p>Meetings with the field safety representatives and craft workers.</p> <p>Length and detail of the company safety program.</p> <p>Safety training for new foremen and safety coordinators.</p> <p>Specialty contractor safety management.</p> <p>Company safety expenditures.</p> <p>Increased project manager experience level.</p> <p>More supportive upper management attitude towards safety.</p> <p>Reduced project team turnover (team stability).</p> <p>Increased time devoted to safety for the project safety representative.</p>

Table 2.1 continued

	<p>More formal meetings with supervisors and specialty contractors.</p> <p>More informal safety meetings with supervisors.</p> <p>A greater number of informal site safety inspections.</p> <p>Increased budget allocation to safety awards.</p>
Sawacha, et al. (1999)	<p>Management talks on safety.</p> <p>Provision of safety booklets.</p> <p>Provision of safety equipment.</p> <p>Provision of safe environment.</p> <p>Appointing a trained safety representative on site.</p>
Hinze and Gambatese (2003)	<p>minimizing worker turnover.</p> <p>Implementing employee drug testing with various factors initiating the testing.</p> <p>Training with the assistance of contractor associations.</p> <p>Growth in company size.</p> <p>Frequency of a crew's receiving safety inspection.</p> <p>Frequency of a foreman presence in safety meetings.</p> <p>Frequency of a foreman reporting safety- related matters to manager.</p>

Table 2.1 continued

	Frequency of a foreman announcing safety- related matters to workers.
	Frequency of a foreman correcting workers' unsafe actions.
	Frequency of workers smoking on the site.
	Frequency of workers breaking safety regulations.
	Hours of safety education per year that a worker receives.
	Frequency of a worker's partners reminding him of personal safety.
	Frequency of crew receiving notices of hazard removal.
Fang, et al. (200a)	Frequency of a crew's breaking safety regulations.)
	Frequency of a crew's suffering safety penalty.
	Frequency of project manager's presence in safety meetings.
	Frequency of project manager's hearing safety reports.
	Frequency of project manager's discussing safety matters with subcontractors.
	Days of safety education per year a safety officer receives.

Table 2.1 continued

	<p>Hours of safety education per year a foreman receives.</p> <p>Frequency of a foreman's reminding new workers of safety regulations.</p> <p>Ratio of workers whose occupational experience is less than 1 year to total workers on site.</p>
Fang, et al. (200b)	<p>Number of safety supervisors.</p> <p>Involvement of contractor with top management.</p> <p>Authority of safety supervisor.</p> <p>Authority of foremen.</p> <p>Size of the crew.</p> <p>Safety investment.</p> <p>Worker compensation insurance.</p> <p>Safety investment on personal protective equipment.</p> <p>Factors related to the relationship between management and labour on site.</p>
Tam, et al. (2004)	<p>Poor safety awareness of top management.</p> <p>Lack of training.</p> <p>Poor safety awareness of project managers.</p> <p>Reluctance to input resources to safety reckless operations.</p>

Table 2.1 continued

Ng, et al. (2005)	<p>Implementation of safety management system in accordance with legislation.</p> <p>Compliance with occupational safety and health legislation, codes and standards.</p> <p>Definition of safety responsibility.</p> <p>Development of safety policy.</p> <p>Provision of safe working environment.</p> <p>Development of emergency plan and procedures.</p> <p>Development of safety committee.</p> <p>Definition of safety responsibility to all site personnel.</p>
Fung, et al. (2005)	<p>Effective accident reporting.</p> <p>High line management commitment.</p> <p>Active supervisor's role.</p> <p>Active personal role.</p>

2.7 HEALTH AND SAFETY AT WORK ACT 1974

The principal legislation dealing with construction is Health and Safety at Work Act 1974 which defines duties and responsibilities of employers, controllers of premises, manufacturers and suppliers of equipment and employees. This Act is supported by the construction regulations together with other registration (Blake, 1998). Practical advice

on safety can be found elsewhere.

The object of the registration is to provide a safe place of work for operatives with safe means of entry and egress and a safe system of work. At the same time the safety of person outside the site must also be ensured (Blake, 1998).

By law, trenches must be supported properly and inspected regularly. Excavators used in the work can be used as cranes. Before work starts:

- Check ground conditions for hazards and sources of gas such as organic strata, refuse, sewers, gas mains, industrial pipelines and the interaction between carbonate and acid. (Particularly in chalk, limestone and greensands).
- Ensure personnel are fit and properly trained
- Ensure breathing apparatus, lifelines and safety equipment is available
- Check and ensure that gas and monitoring equipment are available and working.
- Continuously monitor the atmosphere
- Ensure space is properly ventilated
- Do not smoke
- Ensure all equipment are maintained in good order and properly used.

2.8 HEALTH AND SAFETY REGULATIONS IN GHANA

The safety regulations in Ghana that enforce health and safety in our various construction sites are the following:

2.8.1 National Labour Act 651 of 2003

2.8.2 Factories, Offices and Shop Act of 1970

2.8.1 NATIONAL LABOUR ACT 651 OF 2003

The National Labour Act 651 of 2003, section 118 talks about the general health and safety conditions of workers on sites. It requires the employer to ensure that every worker employed by him or her works under satisfactory, safe and healthy conditions.

This means the employer should provide and maintain the workplace and plant, and ensure that the work is safe and without risk to the health of all workers. Further, the employer should provide the necessary information, instructions, training and supervision, taking into account the age, literacy level and other circumstances of the worker to ensure, so far as is reasonably practicable, the health and safety at work of other workers engaged on the particular work.

Again, according to the Act, it is the duty of an employer to supply at no cost to the worker, adequate safety appliances and personal protective equipment. Additionally, the employer should provide separate, sufficient and suitable toilets, washing facilities, adequate facilities for the storage and drying of clothing for male and female workers on site. The employer should further provide adequate supply of clean drinking water at workplace.

Section 119 of Act 651 also gives opportunity to all workers on site to express their feelings without fear if their safety is threatened.

2.8.2 FACTORIES, OFFICES AND SHOP ACT OF 1970

The factories, offices and shop Act 1970 is deemed to be a preventive measure to safety in general. However, a certain salient clause is cited hereunder as rule:

2.8.2.1 Rule1-compliance

The rule is that every contractor or employer should comply with the requirements designed to ensure the health, safety and welfare of all persons engaged in building operations on building construction sites.

2.8.2.2 Rule 2-provision on welfare facilities

The provision under this Act makes it clear that adequate and suitable accommodation in the form of canteen must be provided by the contractor including benches for taking meals, with facilities for boiling water.

Where a contractor has more than ten persons in his employment on a site, adequate facilities for heating food must be provided. Further, the contractor must provide an adequate supply of wholesome water at convenient places or points, and these should be clearly marked “DRINKING WATER”.

2.8.2.3 Rule 3- provision on first aid

The rule is that employers are to provide first aid facility for every employee on a work site. It is required by law that employers are to provide first-aid room properly constructed and accessible for purpose of rest and treatment, and these should be operational during working hours.

This is applicable to contractors who employ 250 and more employees. There is also a legal requirement that obliges employers to draw compulsory insurance against injuries and fatal accidents that may occur at workplaces.

2.9 STANDARDISED TOOL TO EVALUATE SAFETY PERFORMANCE

As safety becomes important to a firm, it will be necessary to have a reliable measure for safety performance. Safety performance measures should give an indication of how well

a construction project is doing in the area of safety. Such a measure should also provide an indication of when the level of safety performance is changing (Jimmie and Raymond 2002).

Companies that are proactive about safety are more likely to devise measures of safety performance than firms that are not as strong in promoting safety. Measures of safety performance are intended to give an indication of how a project is performing Sawacha et al. (1999).

The ideal measure of safety should be able to measure performance at a point in time, predict trends, and quickly measure the impact of interventions to improve performance.

The safety measures currently used in the industry do not provide information that is sufficiently sensitive to be used in this way on most construction projects (Jimmie and Raymond 2002).

To be truly effective in safety management, most companies will need to resort to implementing several measures of safety performance.

This is how construction projects can improve their safety performance. It is largely based on personal on-site visits to construction sites, primarily industrial projects, where interviews were conducted with project safety representatives, project managers, and other personnel with managerial and supervisory responsibilities (Hinze and Gambatese 2003).

2.9.1 Measure of safety performance

There are several types of safety performance measures that can be utilized on a construction site. Some have been in wide usage in the construction industry, some have been recently introduced in the construction industry, and others are adapted to the needs

of individual projects. To better understand the merits of the different safety measures, the measures will first be defined (Jimmie and Raymond 2002).

2.9.1.1 Jobsite safety inspections

Inspections are made on jobsites to assess physical working conditions and also to evaluate worker safety behavior. The nature of the data collected will vary considerably from project to project.

These inspections might be made by a job superintendent, a safety committee, a safety representative, a consultant, and other company personnel from another project. The inspections may be completed in 30 minutes or they may take several days to complete. The data from the inspections may be in the form of a narrative description or it may be quantified through the use of an extensive checklist. Checklists rate various aspects of the physical conditions on the project and the quality of safe worker behavior (Jimmie and Raymond 2002).

2.9.1.2 Behaviour-based worker observations

Worker observations can be implemented in many ways. The most common is for a worker to function as an observer of another worker. The observation may take a few minutes or it could take a few hours. After the observation period, the observer will review the observations with the worker. Care is taken to compliment the worker on those tasks that were performed safely. The observer and the worker then discuss ways in which certain tasks could be performed more safely.

Behaviour-based worker observations are a relatively new approach to improving jobsite safety performance (Jimmie and Raymond 2002).

2.9.1.3 Worker safety perception surveys

One mechanism of obtaining generic data about the safety conditions on a jobsite is through the use of worker safety perception surveys. These surveys are conducted monthly, quarterly, or even annually. The intent of these surveys is to get a sense of how workers feel on the project.

Workers may be asked how safe they feel on the jobsite, how committed the foreman is to promoting safety, how committed the job superintendent is to promoting safety, how committed the company is to promoting safety, etc. Worker safety perception surveys are implemented on only a few jobsites at this time, but their use is growing as a means of improving jobsite safety. These measures each collect safety performance information of some type. There are obvious differences in the level of effort required to obtain the information.

2.10 SUMMARY

The literature regarding factors affecting safety performance have been fully reviewed, [Jaselskis, et al. (1996); Sawacha, et al. (1999); Hinze and Gambatese, et al. (2003); Fang, et al. (200a); Fang, et al. (200b); Tam, et al. (2004); Ng, et al. (2005); Fung, et al. (2005); Teo, et al. (2005)]. A summary of these factors are presented in Table 2.1.

Standardised tool to evaluate safety performance and health and safety regulations in Ghana has been also reviewed in this chapter.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the research procedure and the methods used to conduct the research in order to achieve the objectives that were highlighted in the first chapter. It contains research design, data required, study population, data-collection method, sampling technique used and data analysis method. The methods used in this research were predominantly quantitative.

The data collection methods adopted for this study is the questionnaire survey. The information or data gathered using questionnaires was analysed using mainly descriptive statistics.

3.2 RESEARCH DESIGN

The strategy or plan this research used followed the major steps of collection of data, analysis of data and interpretation of results. The first stage was to identify the aim of this dissertation, state the problem statement and to clearly state the research objectives. The next stage was to carry out extensive literature review on the selected topic for the study. Comprehensive literature review on the evaluation methods and tools and the factors affecting safety performance of building contractors were carried out.

The third stage was to use the purposive sampling approach to survey the building contractors and to distribute a minimum of fifty (50) questionnaires to these contractors to determine their knowledge on the importance factors affecting safety performance.

The next step was to sample the surveyed contractors and carry out a case study on three (3) of the resultant building contractors. This was then followed by the evaluation of their safety performance using the tools adapted from literature.

3.2.1 Research Style

This research used the survey and case study research methods. A survey in the form of questionnaires and interview was used to collect the information. The reasons behind this survey were to achieve objective (1) and two (2).

Objective one (1) is to identify factors that significantly influence the safety performance of building contractors in Ghana, while objective (2) is to identify and adapt a standardised tool for evaluating the safety performance.

A case study was done on three selected building contractors. The reason is to enable the researcher achieve objective (3). Objective three (3) is to evaluate the safety performance of building contractors, using the identified standardised tool.

3.2.2 Research Approach

The research approach was predominantly quantitative. Structured questionnaires were prepared and distributed to selected building contractors. The data used for the research were primary and secondary data.

Primary data was obtained from the selected building contractors located in the Accra Metropolis, using a well-structured close-ended questionnaire.

Secondary data was obtained from textbooks, journals, reports, newspapers and other materials related to site safety on building premises.

3.3 STUDY POPULATION

The population the researcher used for the study was undefined. This is because there was no official list of registered contractors in Accra after the researcher had contacted the Ministry of Water Resources Works and Housing, Registrar General, Building Contractors Association of Accra and Trade Union Congress (TUC).

3.4 DATA COLLECTION METHOD

The data collection method used for this research was questionnaires. Purposive approach was used to distribute fifty (50) questionnaires to fifty building contractors in the Accra metropolis. Out of this, forty-six (46) representing ninety-two percent (92%) was received from the building contractors.

3.4.1 Questionnaire design

From the literature reviewed, relevant information that could aid the study objectives were collected and reviewed with the help of the supervisor.

The close-ended questionnaire approach was employed and this was made up of different sections to capture the objectives of the research. The questionnaire was provided with a covering letter which explained the purpose of the study, the method of responding, the aim of the research and the security of the information in order to encourage better response. The detailed of the questionnaire can be seen in Appendix one (1).

3.5 DATA MANAGEMENT

With the help of the supervisor the questionnaire was edited to ensure accuracy, uniformity and completeness. The data collected was then processed by numbering them and assigning codes to the responses. Coding is a convenient of way representing information so as to facilitate data entry and analysis. Data was analysed using the

Statistical package for social sciences (SPSS) to evaluate factors influencing safety performance for building contractors. Software and results regarding critical issues of the study were presented through frequency distribution tables and pie charts.

3.6 ETHICAL CONSIDERATIONS

The privacy and confidentiality of the respondents of this study was protected by keeping in secrecy the information collected. Deception was avoided by informing construction companies about the purpose of the research and its implications on the respondents. This helped the respondents to make informed decisions with respect to the questions asked. All sources of information were duly acknowledged.

3.7 DATA ANALYSIS METHOD

Ranking of the variables was done using the mean score and standard deviation values. The analysis takes into consideration the assumption that the higher the mean value, the more important the variables, and the lower the standard deviation value, the more important the variable.

After ranking the variables, those that recorded a mean score of 4.0 and above were considered to be the major factors that influence safety performance for building contractors in Accra metropolis for this study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents and discusses the analysis and results of the collected data. The chapter includes a description of respondents, the classification, experience, size and the safety situation of the respondents companies. It also includes the ranking of the factors affecting the safety performance of building contractors by using the mean and standard deviation values.

4.2 BACKGROUND OF RESPONDENTS

This section presents the description of the respondents who participated in this study. Results of the study were based upon the data collected from the questionnaire administered from the selected contractors.

In all, fifty (50) questionnaires were sent out and forty-six (46) representing 92% were received.

Fig 4.1 shows the distribution of positions in the companies. From the companies, Project Managers were 7%; others 13%; Foreman 30%, and Safety Officers were 50%. Since Safety Officers were 50%, it is a good sign of accident prevention in our construction companies. This is because it is assumed that enough safety training will be given to workers.

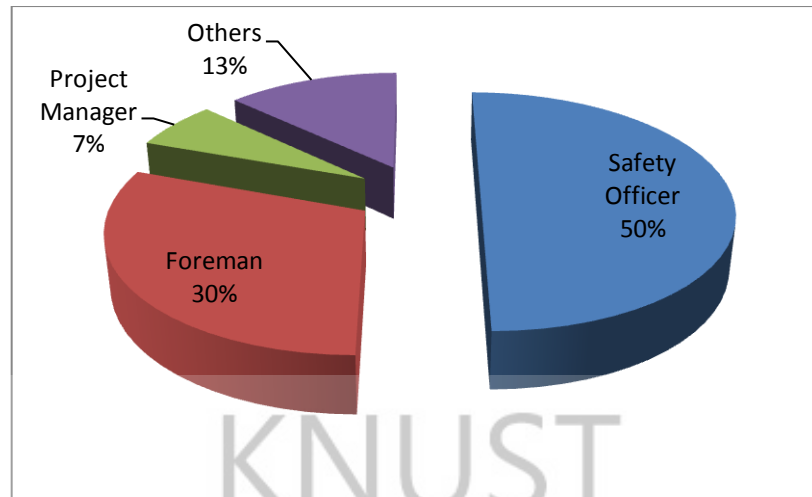


Fig 4.1 Respondents' positions in companies

Tab 4.1 shows respondents' highest qualifications. From the table, respondents with CTC were 2.2%; HND were 47.8%; BSc were 37.0%, and MSc were 4.3%. The educational level of respondents was not encouraging therefore companies should sponsor their workers for further studies to enrich their output.

It also shows the membership of respondent's professional body. That is 19.6% belong to GhIE, 21.7% belong to IET, 2.2% belong to GhIS, 2.2% belong to CIOB, 34.8% belong to other body and No response was 19.6%. More than 50% of the respondents do not belong to any professional body, which is not the best, so government and engineering societies should make it compulsory, especially for all engineering workers to belong to a professional body.

The table also shows the companies number of employees. The range from 0-20 is 6.5%, 21-50 is 10.9%, and 51-100 is 23.9% and 101 and above is 58.7%. It means that most companies visited have a high number of employees.

Moreover, the percentage for the number of year's respondents has operated their companies are the following: 0-5yrs is 11%; 6-10yrs is 22%; 11yrs and above is 65% and no response is 2%.

The range for the employee turnover for the companies are: the range from 0-5% represents 41.3%, 6-10% represents 21.7%; 11-15% represents 6.5%; 15-20% represents 4.3%; others represent 6.5% and No response represents 19.6%. It means that the employee turnover in the various companies was very low. The range from 0-5% represents 41.3%; 6-10% represents 21.7%; 11-15% represents 6.5%; 15-20% represents 4.3%; others represents 6.5% and No response represents 19.6%. It means that the employee turnover of various companies were very low.

It can be concluded from table 4.1 that the factors discussed so far indicates that the safety performance of companies in Accra metropolis will improve, because their employee turnover is very low therefore they will get more experience in safety for having stay in the company for longer period.

Educational levels of employees were very low this will not improve on their safety performance therefore were advice to attain higher education and were also advice to join a professional body.

Table 4.1 Background of Respondents.

Variable	Option	Frequency	Percentage (%)
Qualification	CTC	1	2.2
	HND	22	47.8
	BSc	17	37
	MSc	2	4.3
	Others	4	8.7
Professional Body	GhIE	9	19.6
	IET	10	21.7
	GhIS	1	2.18
	CIOB	1	2.18
	Others	16	34.8
	No Response	9	19.6
Number of Employees	0- 20	3	6.5
	21-50	5	10.6
	51-100	11	23.9
	101 and above	27	58.7
	No Response	-	-
No of Years in Operation	0-5yrs	5	11
	6-10yrs	10	22
	11 yrs and above	30	65
	No Response	1	2
Employee Turnover	0-5%	19	41.3
	6-10%	10	21.7
	11-15%	3	6.5
	16-20%	2	4.3
	Others	3	6.5
	No response	9	19.7

4.3 EVALUATION OF FACTORS INFLUENCING SAFETY PERFORMANCE FOR BUILDING CONTRACTORS.

Section (B) of the questionnaire includes the list of factors affecting safety performance of building contractors. It contains seventy-five (75) factors grouped into Ten (10). The groups were Organisational Level, Project Level, Safety Education and Training, Welfare facilities, Fire Prevention, Economic Factors, Medical Facilities, Role of Government and Engineering Societies, Historic, Human and Psychological Factors and lastly Technical Factors. The details can be seen from table 4.2 and 4.3.



A	ORGANISATIONAL LEVEL	MEAN	SD	RANK
	Organisational safety awareness & commitment	4.4783	1.02717	1
	Development of safety policy	4.4348	.93457	2
	Employment of safety officers	4.3261	.99005	3
	Conduction of organisational policy review	4.1556	.79646	4
	Top management checks of safety records	4.0217	1.02174	5
	Employment of certified skilled labour	4.0000	.96609	6
	Implement safety management system reference to legislation	3.9565	.94178	7
	More supportive upper management attitude towards safety.	3.9348	1.01985	8
	Authority of safety officer to stop site work after identified hazard	3.8696	1.06685	9
	Length and detail of the company safety program	3.8636	.87845	10
	Implementation of safety audit to safety management systems	3.8261	1.19823	11
	Development of safety committee.	3.6739	1.05524	12
	Punishments for bad safety habits	3.6304	1.06163	13
	Growth in company size.	3.6222	1.00654	14
	Minimizing worker turnover.	3.5909	.78705	15
	Incentives for good safety performance	3.5652	.98098	16
B	PROJECT LEVEL	MEAN	S D	RANK
	Project managers attend safety meetings	4.2955	1.00185	1
	Conducting site safety inspection and supervision	4.2826	.86057	2
	Workers attend safety meetings	4.0889	1.06221	3
	Keeping of daily safety records	4.0870	.72499	4

	Safety meetings for safety representatives	4.0652	1.01985	5
	Toolbox meetings	4.0000	1.24722	6
	Identification of unsafe practices on site	3.9565	.91788	7
	Conducting safety hazard review (safety audit)	3.8696	.83290	8
	Conducting accident investigation and analysis	3.8043	1.22238	9
	New technologies in the execution of specialty projects	3.6739	1.11663	10
	Identification of hazardous and dangerous activities	3.6522	1.09985	11
	Volume of project	3.6364	1.10160	12
	Definition of safety responsibility.	3.5000	.98319	13
	Tight control of hazardous activities on site	3.4348	1.14799	14
	System for accident recording and reporting	3.3913	1.16387	15
	Familiarity with methods and types of specialist contractors'	3.3696	1.18056	16
	Excessive overtime work for labour	3.1957	1.08770	17
C	SAFETY EDUCATION AND TRAINING	MEAN	SD	RANK
	Guidance and training of workers on safety	3.8478	1.01033	1
	Lack of training.	3.6889	.76343	2
	Safety posters	3.4783	1.09014	3
	Brochures and publications on safety	3.4348	1.04673	4
	Safety seminars held by the management of the project	3.4348	1.20466	5
	First aid training for all workers	3.2174	1.15303	6
D	WELFARE FACILITIES	MEAN	SD	RANK
	Provision of adequate facilities for first aid treatment	3.3261	.94409	1
	Provision of food and drinking water	3.0222	.91674	2

Table 4.2 continued

	Provision of adequate toilets	2.5000	1.19105	3
	Provision of special places for smoking	2.4348	1.34416	4
E	FIRE PREVENTION	MEAN	SD	RANK
	Availability of adequate fire extinguishers on site	3.1957	.98024	1
	Periodic maintenance of fire extinguishers on site	3.0870	1.09191	2
	Good storage of flammable liquids and combustible materials	2.3171	1.29304	3
F	ECONOMIC FACTORS	MEAN	SD	RANK
	Productivity bonus payment	4.4130	.65238	1
	Financial motivation to application of safety	4.3478	.99370	2
	Allocating specific budgets for safety requirements	4.1522	.86839	3
	Provision of safety clothing & equipment	2.9130	1.76164	4
	Buying workers' compensation insurance	2.5682	.99762	5
2	Paying for the medical expenses of injured workers	2.2703	1.09668	6
G	MEDICAL FACILITIES	MEAN	SD	RANK
	Periodic medical examination of workers	3.9130	1.17049	1
	Availability of medical service on site	3.7391	1.25494	2
H	ROLE OF GOVERNMENT & ENGINEERING SOCIETIES	MEAN	SD	RANK
	Issuing Laws, Standards, Regulations and Legislations on safety	4.2391	1.13890	1
	Supervision to Implement laws & standards on safety	3.9130	1.13188	2
J	HISTORIC, HUMAN, & PSYCHOLOGICAL FACTORS	MEAN	SD	RANK
	Relationship between worker and management on site	4.3261	.70093	1
	Relationship between workers and foremen on site	4.1778	1.15383	2
	Worker's accident's experience	3.9565	1.01009	3

Table 4.2 continued

	Worker's experience	3.9545	.91384	4
	Worker's marital status	3.7826	1.11381	5
	Decreased work pressure on workers	3.7778	1.16558	6
	Worker's age	3.7391	1.18199	7
	Worker's safety awareness knowledge & involvement	3.7391	.85465	8
	Worker's ability to communicate with others	3.6522	1.17790	9
	Worker's cultural background	3.6087	1.12503	10
	Worker's education	3.5217	1.14967	11
	Interaction between workers on site	3.4348	1.22297	12
	Worker's safety training received	3.4186	.82325	13
K	TECHNICAL FACTORS	MEAN	SD	RANK
	Proper handling of tools, equipment and plant	4.2174	.66376	1
	Provision of technical guidance	4.0217	.93069	2
	Maintenance of tools, equipment and plant	3.8478	1.03209	3
	Protection of materials in storage and transit	3.8478	1.19196	4
	Poor equipment	3.7174	.71997	5
	Availability of maintenance policy	3.7174	.71997	6

Table 4.3 shows the ranking of the ten groups of factors

NO.	RANKING OF THE TEN GROUPS OF FACTORS	MEAN	SD	RANK
1	Role of government & engineering societies	4.0761	1.1354	1
2	Organisational level	3.9344	0.6185	2
3	Technical factors	3.8949	0.8764	3
4	Medical factors	3.8261	1.7980	4
5	Project level	3.7826	0.5229	5
6	Historic, Human & Psychological factors	3.5170	1.0447	6
7	Safety Education and Training	3.5170	1.0447	7
8	Economic factors	3.4441	1.0617	8
9	Fire Prevention	2.8667	1.1217	9
10	Welfare facilities	2.8208	1.0990	10

After the ranking of the ten groups of factors, Role of government & engineering societies was ranked first, followed by Organisational level, Technical factors, Medical factors, Project level, Historic, human & psychological and Welfare facilities were the lowest ranked factor. It means that Role of government & engineering societies was the leading factor that influences safety performance in the group.

4.3.1 Group 1: Organizational Level

Tab 4.3 shows that organizational level was the second in the group ranking. Tab 4.2 shows the respondents' opinion about this group affecting the safety performance of building contractors. The mean values range from 4.4783 to 3.5652. The organizational safety awareness and commitment has the highest mean value of 4.4783 in the group as well as all the seventy-five factors as can be seen from Tab. 4.2. This result is the same as with Thomas et al.. (2005) who found out that this factor is more important than all factors influencing safety performance.

Development of safety policy was the variable with second highest mean value of 4.4348, meaning the second most important factor in the table, as found by Ng; et al.. (2005).

Employment of safety officers is the third highest factor in the group and the fifth position in the overall groups. This means that safety officer is very important in every construction sites.

Conduct of organizational policy review is the fourth factor in the group and also the fourth most likely factor of influencing safety performance.

Top management checks on safety records were also ranked fifth (5th) in the group and 16th in the overall groups.

Employment of certified skilled labour was ranked sixth (6th) in the group.

4.3.2 Group 2: Project Level

Project Level was ranked fifth in the group ranking. Project managers attend safety meeting was ranked first in the group and eighth in the overall grouping as found by Ng et al. (2005).

Conducting site safety inspection and supervision was ranked second in the group. It means that it is an important factor influencing safety performance as found by Abdul-Rashid et al.2007.

Workers attend safety meetings as ranked third in the group and eleventh in the overall grouping. Abdul-Rashid et al. 2007 also found this factor to be a major influence in safety performance.

Keeping of daily safety records was fourth in the group.

Safety meetings for safety representative and toolbox meetings were ranked fifth and sixth respectively in the group.

4.3.3 Group 3: Safety education and training

Safety education and training were ranked seventh in the group ranking. The mean values in this group ranges from 3.8478 to 3.2174.

Guidance and training of workers on safety was ranked first in this group, followed by lack of training, safety posters, brochures and publication on safety, safety seminar held by the management of the project and first aid training for all workers. None of these factors in this group was as considered factors influencing safety performance for this study because their mean values were below 4.0.

4.3.4 Group 4: Welfare facilities

Welfare facilities were ranked tenth in the group ranking. Provision of adequate facilities for first aid treatment was ranked first in this group. None of the factors here were considered factors influencing safety performance for this study.

4.3.5 Group 5: Fire prevention

Fire prevention was ranked ninth in the group ranking. Availability of adequate fire extinguishers on site was ranked first in this group because all the factors in this group's mean values were below 4.0 and therefore none was considered factors for this study.

4.3.6 Group 6: Economic factors

Economic factors were ranked eighth in the group ranking. Productivity bonus payment is the first ranked factor in this group, and the third ranked position in the overall grouping. It means that this factor is very important.

Financial motivation to application of safety and allocating specific budgets safety requirements were ranked second and third in the group respectively.

4.3.7 Group 7: Medical facilities

Medical facilities were ranked fourth in the group ranking. Availability of medical service on site and periodic medical examination of workers were ranked first and second in the group. None of these factors were considered for this study.

4.3.8 Group 8: Role of Government and engineering societies

Role of government and engineering societies were ranked first in the group ranking. Issuing laws, standards, regulations and legislation on safety is the first in the group and ranked ninth in the overall groups.

4.3.9 Group 9: Historic, Human and psychological factors

Historic, human and psychological factors were ranked sixth in the group ranking. Relationship between workers and management on site was ranked first in the group and fifth in the overall groups.

Relationship between workers and foremen on site was also ranked second in the group. Worker's cultural background, education, interrelation between workers on site, and worker safety training were ranked low and therefore were not considered.

4.3.10 Group 10: Technical Factors

Technical factors were ranked third in the group ranking. Proper handling of tools, equipment and plant was ranked first in this group. Provision of technical guidance was also ranked second in the group.

The rest of the factors in this group were not considered as factors influencing safety performance for this study.

4.4 SELECTED FACTORS INFLUENCING SAFETY PERFORMANCE

After ranking the seventy-five (75) factors affecting safety performance for building contractors, those factors with a mean score below 4.0 were not considered as factors influencing safety performance for this study. Factors that were considered are found in table 4.4.

Tab 4.4 Major factors influencing safety performance.

A	ORGANISATIONAL LEVEL	MEAN	SD	RANK
1	Organisational safety awareness & commitment	4.4783	1.02717	1
2	Development of safety policy	4.4348	.93457	2
6	Employment of safety officers	4.3261	.99005	3
3	Conduction of organisational policy review	4.1556	.79646	4
5	Top management checks of safety records	4.0217	1.02174	5
7	Employment of certified skilled labour	4.0000	.96609	6
B	PROJECT LEVEL	MEAN	S D	
4	Project managers attend safety meetings	4.2955	1.00185	1
1	Conducting site safety inspection and supervision	4.2826	.86057	2
3	Workers attend safety meetings	4.0889	1.06221	3
7	Keeping of daily safety records	4.0870	.72499	4
5	Safety meetings for safety representatives	4.0652	1.01985	5
6	Toolbox meetings	4.0000	1.24722	6
F	ECONOMIC FACTORS	MEAN	SD	RANK
4	Productivity bonus payment	4.4130	.65238	1
5	Financial motivation to application of safety	4.3478	.99370	2

6	Allocating specific budgets for safety requirements	4.1522	.86839	3
H	ROLE OF GOVERNMENT & ENGINEERING SOCIETIES	MEAN	SD	RANK
1	Issuing laws, standards, regulations and Legislation on safety	4.2391	1.13890	1
J	HISTORIC, HUMAN, & PSYCHOLOGICAL FACTORS	MEAN	SD	RANK
1	Relationship between workers and management on site	4.3261	.70093	1
2	Relationship between workers and foremen on site	4.1778	1.15383	2
K	TECHNICAL FACTORS	MEAN	SD	RANK
1	Proper handling of tools, equipment and plant	4.2174	.66376	1
2	Provision of technical guidance	4.0217	.93069	2

In all twenty (20) factors were considered major factors positively affecting safety performance for building contractors in the Accra metropolis as can be seen from tab 4.4.

The results depicts that the five (5) most important factors positively affecting safety performance for building contractors in Accra metropolis are: organizational safety awareness & commitment, development of safety policy, financial motivation to application of safety , productivity bonus payment and relation between worker and management on site with mean values of 4.4783, 4.4348, 4.43478, 4.4130 and 4.3261.

On the other hand, results such as keeping of daily records, safety meetings for safety representatives, provision of technical guidance, toolbox meetings and employment of certified skilled labour were lowest factors positively affecting safety performance for building contractors in Accra metropolis with mean values of 4.0870, 4.0652, 4.0217, 4.000 and 4.000.

4.5 CASE STUDY

Three contractors were selected for this study. They are contractor A, B and C. They were assessed with the scale of 1-5 based on the selected factors for the survey. The scale interpretations were as follows;

5- In place, proven performance, up to date documentation, periodic audits.

4- In place, including documentation

3- In place but limited or little/No documentation

2- Currently not in place

1- Does not apply

4.6 PROFILE OF COMPANY A
Company A belongs to K1D1 Construction Company. It has been in operation over eleven years. Its number of employee is approximately One Hundred and Sixty (160). The employee turnover for the company is 0-5%, which is very good in terms of the company safety performance.

4.6.1 GROUP A: Organisational Level

1. Employee awareness of safety commitment of company

Company A has in place, proven performance, up to date documentation, periodic audits for creating awareness of safety commitment for their employees. On a scale of 1-5 they scored 5 which is very good in terms of their company safety performance.

2. Organizational Written safety policy

Company A had a score of 5 for this question. It means that they have in place, proven performance, up to date documentation, periodic audits for a written safety policy. Its written safety policy is very high and is good for the company.

3. Employment of certified skilled labour

With respect to employment of certified skilled labour, company A said they have in place, proven performance, up to date documentation, periodic audits which has a score of 5 on a scale preference which is very good.

4. Does the organization employ Safety Officers?

Company A answered this question with a score of 5. It means that this company has a high level of employing safety officers.

5. Are there checks of safety records from top management?

Company A has in place, proven performance, up to date documentation, periodic audits for checks of safety records from top management level which has a score of 5.

6. Is the organisation's upper management supportive in safety issues?

Company A had a score of 5. It means that upper management support for this company is very high.

7. Does your organisation conduct organisational policy review?

Company A answer has a score of 5. It means it is this company culture of conducting organisational policy review.

4.6.2 GROUP B: Project Level

1. Does your organization keep a daily safety records?

Company A said they have in place, proven performance, up to date documentation, periodic audits for keeping a daily safety records, which has a score of 5.

It means keeping of daily safety records for this company is a routine activity.

2. Is there a system that allows workers to attend safety meetings?

Company A said yes there is a system in place, proven performance, up to date documentation, periodic audits for their company which score was 5. It means there is a high level of workers attending safety meetings.

3. Does the company conduct site safety inspections and inspection supervision?

Company A said yes there is a system in place, proven performance, up to date documentation, periodic audits for their company which score was 5. It means safety inspections are routine activities for the company.

4. Does your organization hold toolbox meetings?

Company A answered that there is in place, proven performance, up to date documentation, periodic audits for their company to organize toolbox meetings.

5. Are projects managers mandated to attend safety meetings?

Company A answered that there is in place, proven performance, up to date documentation, periodic audits for their company to organize toolbox meetings.

6. Do workers attend safety meetings in your organization?

Company A answered that there is in place, proven performance, up to date documentation, periodic audits for their company to allow workers attend safety meetings.

7. Do you allow safety representatives to attend safety meetings?

Company A said that there is in place, including documentation for their safety representative to attend safety meetings. The score on the scale was 4 which is good.

4.6.3 Group C: Economic Factors

1. Does your organization give productivity bonus payment?

Company A said they have in place but limited or little/No documentation for their organization to give productivity bonus payment to their workers. The score on the scale preference was 3 and is not the best.

2. Does your organization allocate specific budgets for safety?

Company A said they have in place but limited or little/No documentation for their organization to allocate specific budgets for safety to their workers. The score on the scale preference was 3 and needs to be improved.

3. Does your organization have a program in place for motivating excellent safety performance by individuals?

Company A said that there is in place, including documentation for their company to motivate excellent safety performance by individuals.

4.6.4 Group D: Role of Government & Engineering societies

1. Does the company's corporate safety culture conform to international and Local laws, standards, regulations and legislation?

Company A answered that there is in place, proven performance, up to date documentation, periodic audits for their company's corporate safety culture to conform to international and local laws, standards, regulations and legislation.

4.6.5 Group E: Historic, Human & Psychological factors

1. Does the organisation ensure there is friendly and affectionate relationship between worker and management on site.

Company A has in place, including documentation to ensure there is friendly and affectionate relationship between worker and management on site.

2. Does the organisation ensures there is cordial interrelation between worker and Worker and foremen/supervisors on site?

Company A has in place, including documentation to ensure there is cordial interrelation between worker and foremen/supervisors on site

4.6.6 Group F: Technical Factors

1. Does your organisation train workers on proper handling of tools, equipment and plant?

Company A has in place, including documentation to train workers on proper handling of tools, equipment and plant.

2. Does the company provide technical guidance in job performance for workers?

Company A has in place, including documentation to provide technical guidance in job performance for workers.

4.7 PROFILE OF COMPANY B

Company B belongs to K1D1 Construction Company. It has been in operation over fourteen years. Its number of employee is approximately One Hundred and forty (140). The employee turnover for the company is 6-10%.

4.7.1 GROUP A: Organisational Level

1. Are the employees aware of the safety commitment of the company?

Company B has in place, including documentation, for creating awareness of safety commitment for their employees.

2. Does your organization have a written safety policy?

Company B had a score of 4 for this question. It means that they have in place, including documentation for a written safety policy.

3. Does the organization employ certified skilled labour?

With respect to employment of certified skilled labour, company B said they have in place, including documentation, which has a score of 4 on a scale preference and is good.

4. Does the organization employ Safety Officers?

Company B answered this question with a score of 4. It means that this company has a high level of employing safety officers and is very good for this company to achieve the best safety performance.

5. Are there checks of safety records from top management?

Company B said yes, they have in place, including documentation for checks of safety records from top management level which has a score of 4.

6. Is the organisation's upper management supportive in safety issues?

Company B had a score of 4. It means that upper management support for this company is very high.

8. Does your organisation conduct organisational policy review?

Company B answer has a score of 4. It means this company culture of conducting organisational policy review is good.

4.7.2 GROUP B: Project Level

1. Does your organization keep a daily safety records?

Company B said they have in place, including documentation for keeping a daily safety records. It means keeping of daily safety records for this company is a routine activity and is good for the company safety performance.

2. Is there a system that allows workers to attend safety meetings?

Company B said yes there is a system in place, proven performance, up to date documentation, periodic audits for their company which score was 5. It means there is a high level of workers attending safety meetings.

3. Does the company conduct site safety inspections and inspection supervision?

Company B said yes there is a system in place, including documentation for their company. It means safety inspections are routine activity for the company.

4. Does your organization hold toolbox meetings?

Company B answered that there is in place, proven performance, up to date documentation, periodic audits for their company to organize toolbox meetings.

5. Are projects managers mandated to attend safety meetings?

Company B answered that there is in place, including documentation for their company to organize toolbox meetings.

6. Do workers attend safety meetings in your organization?

Company B has in place, including documentation for their company to allow Workers to attend safety meetings.

7. Do you allow safety representatives to attend safety meetings?

Company B said that there is in place, including documentation for their safety representative to attend safety meetings. The score on the scale was 4 which is good.

4.7.3 Group C: Economic Factors

4. Does your organization give productivity bonus payment?

Company B said they have in place, including documentation for their organization to give productivity bonus payment to their workers.

5. Does your organization allocate specific budgets for safety?

Company B said they have in place, including documentation for their organization to allocate specific budgets for safety to their workers.

6. Does your organization have a program in place for motivating excellent safety performance by individuals?

Company B said that there is in place, including documentation for their company To motivate excellent safety performance by individuals.

4.7.4 Group D: Role of Government & Engineering societies

1. Does the company's corporate safety culture conform to international and Local laws, standards, regulations and legislation?

Company B answered that there is in place, including documentation for their company's corporate safety culture to conform to international and local laws, standards, regulations and legislation.

4.7.5 Group E: Historic, Human & Psychological factors

1. Does the organisation ensure there is friendly and affectionate relationship between worker and management on site.

Company B has in place, including documentation to ensure there is friendly and affectionate relationship between worker and management on site.

2. Does the organisation ensures there is cordial interrelation between worker and Worker and foremen/supervisors on site?

Company B has in place, including documentation to ensure there is cordial interrelation between worker and foremen/supervisors on site.

4.7.6 Group F: Technical Factors

1. Does your organisation train workers on proper handling of tools, equipment and plant?

Company B has in place, including documentation to train workers on proper handling of tools, equipment and plant.

2. Does the company provide technical guidance in job performance for workers?

Company B has in place, including documentation to provide technical guidance in job performance for workers.

4.8 PROFILE OF COMPANY C

Company C belongs to K1D1 Construction Company. It has been in operation over twelve years. Its number of employee is approximately One Hundred and twenty-five (125). The employee turnover for the company is 0-5%.

4.8.1 GROUP A: Organisational Level

1. Are the employees aware of the safety commitment of the company?

Company C has in place, including documentation, for creating awareness of safety commitment for their employees.

2. Does your organization have a written safety policy?

Company C had a score of 4 for this question. It means that they have in place, including documentation for a written safety policy.

3. Does the organization employ certified skilled labour?

With respect to employment of certified skilled labour, company C said they have in place, proven performance, up to date documentation, periodic audits which has a score of 5 on a scale preference and is very good.

4. Does the organization employ Safety Officers?

Company C answered this question with a score of 4. It means that this company has a high level of employing safety officers and is very good for this company to achieve the best safety performance.

5. Are there checks of safety records from top management?

Company C said yes, in place but limited or little/No documentation for checks of safety records from top management level which has a score of 3.

6. Is the organisation's upper management supportive in safety issues?

Company C had a score of 4. It means that upper management support for this company is very high.

9. Does your organisation conduct organisational policy review?

Company C answer has a score of 4. It means this company culture of conducting organisational policy review is good.

4.8.2 GROUP B: Project Level

1. Does your organization keep a daily safety records?

Company C said they have in place but limited or little/No documentation for keeping a daily safety records. It means keeping of daily safety records for this company must be improved.

2. Is there a system that allows workers to attend safety meetings?

Company C said yes there is in place, including documentation for their company workers to attend safety meetings. It means there is a high level of workers attending safety meetings.

3. Does the company conduct site safety inspections and inspection supervision?

Company C said yes there is a system in place, including documentation for their company. It means safety inspections are routine activity for the company.

4. Does your organization hold toolbox meetings?

Company C answered that there is in place, proven performance, up to date documentation, periodic audits for their company to organize toolbox meetings.

5. Are projects managers mandated to attend safety meetings?

Company C answered there is in place, including documentation for the project manager to attend safety meetings.

6. Do workers attend safety meetings in your organization?

Company C has in place, including documentation for their workers to attend safety meetings.

7. Do you allow safety representatives to attend safety meetings?

Company C said that there is in place, including documentation for their safety representative to attend safety meetings.

4.8.3 Group C: Economic Factors

7. Does your organization give productivity bonus payment?

Company C said they have in place but limited or little/No documentation for their organization to give productivity bonus payment to their workers.

8. Does your organization allocate specific budgets for safety?

Company C said they have in place but limited or little/No documentation for their organization to allocate specific budgets for safety to their workers.

9. Does your organization have a program in place for motivating excellent safety performance by individuals?

Company C said that there is in place but limited or little/No documentation for their company to motivate excellent safety performance by individuals.

4.8.4 Group D: Role of Government & Engineering societies

1. Does the company's corporate safety culture conform to international and Local laws, standards, regulations and legislation?

Company C answered that there is in place, including documentation for their company's corporate safety culture to conform to international and local laws, standards, regulations and legislation.

4.8.5 Group E: Historic, Human & Psychological factors

1. Does the organisation ensure there is friendly and affectionate relationship between worker and management on site?

Company C has in place, including documentation to ensure there is friendly and affectionate relationship between worker and management on site.

2. Does the organisation ensures there is cordial interrelation between worker and Worker and foremen/supervisors on site?

Company C has in place, including documentation to ensure there is cordial interrelation between worker and foremen/supervisors on site.

4.8.6 Group F: Technical Factors

1. Does your organisation train workers on proper handling of tools, equipment and plant?

Company C has in place, including documentation to train workers on proper handling of tools, equipment and plant.

2. Does the company provide technical guidance in job performance for workers?

Company C has in place but limited or little/No documentation to provide technical guidance in job performance for workers.

4.9 COMPARISON OF SAFETY PERFORMANCE FOR THE THREE COMPANIES

4.9.1 GROUP A: Organisational Level

1. Are the employees aware of the safety commitment of the company?

Company A said they have in place, including documentation for creating awareness for employee's safety commitment. With a scale of 1-5, they had 4 which are very good for the company safety performance.

Company B and C also has the same score of 4. Combining the scores for the three companies it is 12 out of 15 which is very good. It means that the three companies' creation of awareness for safety commitment for its employees is high.

2. Does your organization have a written safety policy?

Company A had a score of 5 for this question. It means that they have in place, proven performance, up to date documentation, periodic audits for a written safety policy. Company B and C also scored 4 each. Meaning they also have in place, including documentations for a written safety policy. In all the three companies scored 13 out of 15 which is very high and is good for the company safety performance for its employees.

3. Does the organization employ certified skilled labour?

With respect to employment of certified skilled labour, company A said they have in place, proven performance, up to date documentation, periodic audits which has a score of 5. Company B also had a score of 4 and company C a score of 5. Combining each score for the three companies is 14. It means that their score is 14 out of 15 which is very high and is good for the company.

4. Does the organization employ Safety Officers?

Company A answered this question with a score of 5. Company B had a score of 4 and company C also had 4. In all it is 13 out of 15 which is high and will help these companies, because safety officers helps prevent accidents on construction sites.

5. Are there checks of safety records from top management?

Company A said yes, they have in place, proven performance, up to date documentation, periodic audits for checks of safety records from top management level which has a score of 5. Company B and C has a score of 4 and 3 respectively. Therefore the total score for the companies are 12 out of 15 which is also high and good for the company.

6. Is the organisation's upper management supportive in safety issues?

Company A had a score of 5. Companies B and C had scores of 4 each. The total scores for the three companies are 13. Therefore 13 out of 15 on a scale are very high.

7. Does your organisation conduct organisational policy review?

Company A answered has a score of 5. Company B has a score of 4 and C also had 4. The total score is 13. The total score of 13 out of 15 is very high and is very good for these companies in terms of their organisational policy review.

4.9.2 GROUP B: Project Level

1. Does your organization keep a daily safety records?

Company A said they have in place, proven performance, up to date documentation, periodic audits for keeping a daily safety records. Company B also said they have in place, including documentation for keeping a daily safety records with a score of 4 and Company C also said they have in place but limited or little/No documentation with a score of 3.

The total score for the companies are 13. Therefore 13 out of 15 are high and will enhance the companies' safety issues.

2. Is there a system that allows workers to attend safety meetings?

Company A and B said yes there is a system in place, proven performance, up to date documentation, periodic audits in their companies. And company C also said they have in place, including documentation which scores is also 4. The total scores for these companies are 14. So 14 out of 15 are very high which means that these companies more often allow their workers to attend safety meetings. This will give more knowledge on

safety to the workers and prevent accidents on sites and reduce companies' expenditure on accident victims.

3. Does the company conduct site safety inspections and inspection supervision?

Company A had a score of 5. Company B and C also has scores of 4. The total score for the three companies are 13. The company's total score of 13 out 15 which is high.

4. Does your organization hold toolbox meetings?

All the three companies A, B and C said they have in place, proven performance, up to date documentation, periodic audits for holding toolbox meetings with a score of 5. The total score for the companies are 15 out of 15 which is very high and company's safety performance will improve a lot.

5. Are projects managers mandated to attend safety meetings?

Company A said they have in place, proven performance, up to date documentation, periodic audits for project managers to attend safety meetings with a score of 5 on a scale. Company B and C also said they have in place, including documentations for projects managers to attend safety meetings with a score of 4. The total score for the companies are 13 out of 15 in a scale preference. The total score is very high which means that project manager attendance at safety meetings is very good.

6. Do workers attend safety meetings in your organization?

Company A score 5. Companies B score 4 and company C also score 4. The total score is 13 which is high and will improve the companies' safety performance

7. Do you allow safety representatives to attend safety meetings?

Companies A, B, and C said they have in place, including documentation to allow safety representatives to attend safety meetings. Both companies score 4 each on a scale preference. The total score were 12 out of 15 which is good for the company.

4.9.3 Group C: Economic Factors

1. Does your organization give productivity bonus payment?

Company A and C said they have in place but limited or little/No documentation for their organization to give productivity bonus payment to their workers which score 3 points each. Company B said they have in place, including documentation for their organization to give productivity bonus payment with a score of 4. Therefore the total score is 10 which needs to be improved especially company A and C.

2. Does your organization allocate specific budgets for safety?

Company A and C score 3 each. Company B also score 4. The total score for the companies are 10 which need to be improved a lot. More especially companies A and C must improve their specific budgets for safety.

3. Does your organization have a program in place for motivating excellent safety performance by individual?

Company A and B score 4 each. Company C score 3. The total score for the three companies are 11 which need to be improved. Company C score needs to be improved by management.

4.9.4 Group C: Role of Government & Engineering Societies

1. Does the company's corporate safety culture conform to international Local Laws, Standards, Regulations and Legislation?

Company A scores 5. Company B and C also scored 4. The total score for the three companies were 13. It means that they have a strong safety culture that conforms to local laws, standards, regulations and legislation in their companies.

4.9.4 Historic, Human & Psychological factors

1. Does the organization ensure there is friendly and affectionate relationship between worker and management on site?

The three companies A, B and C said they have in place, including documentation a friendly and affectionate relationship between worker and management. Each company has a score of 4. The total score for the companies were 12 which are high and good for the company.

2. Does the organization ensure there is cordial interrelationship between worker and foremen/supervisors on site?

Company A, B and C said there is in place, including documentation a cordial interrelationship between worker and foremen/supervisors on site. The companies score 4 each on the scale. The total marks for the companies are 12 which are very high and are good for the company safety.

4.9.5 Technical Factors

1. Does your organization train workers on proper handling of tools, equipment and plants?

Company A, B and C has in place, including documentation training programme for all workers on proper handling of tools, equipment and plants. The companies have a score of 4 each. The total score is 12 which are high and good for the companies.

2. Does the company provide technical guidance in job performance for workers?

The three companies have in place, including documentation to provide technical guidance in job performance for workers. In all they have a total score of 12 which is very high for the company safety performance.

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CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

A literature review was performed to find factors influencing safety performance for building contractors and also to measure their construction safety. The objectives of this research are to identify the factors that significantly influence the safety performance, to identify and adapt a standardised tool for evaluating the safety performance and to evaluate the safety performance using the identified standardized tool for the building contractors. The research was conducted in Accra metropolis.

Seventy-five factors were identified and grouped into ten. These factors were introduced via a questionnaire which was carefully designed to achieve the research objectives. The degree of impact of the factors on safety performance in the respondents company was evaluated base on a five-point Likert scale.

The gathered data through the questionnaires were statistically analyzed using the mean score and standard deviation. After this a study on three selected contractors visited previously were also analysed.

5.2 SUMMARY OF FINDINGS

The objectives for this study are the following;

1. To identify factors that significantly influences the safety performance of building contractors in Ghana
2. To identify and adapt a standardised tool for evaluating the safety performance of building contractors
3. To evaluate the safety performance using the identified standardised tool.

❖ The following five most important factors that influence safety performance of building contractors were the findings for objective one:

- organizational safety awareness & commitment
- development of safety policy
- financial motivation to application of safety
- productivity bonus payment
- relation between worker and management on site

❖ The adapted standardised tool use to evaluate the safety performance of building contractors was the results obtained from objective two (2). This evaluation tool can be seen in Appendix two (2).

❖ The following are the findings obtained from objective three (3):

1. Majority of the companies that were analysed have professional safety officers.
2. More than fifty percent of the workers do not belong to professional bodies.
3. The employee turnover for the greater number of companies visited were very low.
4. The most important groups factors affecting safety performance agreed by building contractors in Accra metropolis are; Role of government and engineering societies, Organizational level, Technical factors, medical facilities, project level, and Historic, Human and Psychological order.
5. Productivity bonus payment for their workers and plans to allocate specific budgets for safety workers were very low.

6. Checks of safety records from top management, keeping of daily safety records and finally providing technical guidance in job performance for their workers were not seriously practiced.

5.3 CONCLUSIONS

The following are the conclusion for the research:

1. The following factors were found to be major factors significantly affecting safety performance of building contractors in Ghana:

- Organisational safety awareness and commitment
- Development of safety policy
- Productivity bonus payment
- Relationship between workers and management on site
- Financial motivation to application of safety
- Employment of safety officers
- Conduction of organisational policy review
- Top management checks of safety records
- Employment of certified skilled labour
- Project managers attend safety meetings
- Keeping of daily safety records
- Safety meetings for safety representatives
- Toolbox meetings
- Allocating of specific budgets for safety requirements
- Issuing laws, standards, regulations and legislation on safety
- Relationship between workers and foremen on site

- Proper handling of tools, equipment and plant
- Provision of technical guidance.
- Conducting site safety inspection and supervision
- Workers attend safety meetings

The results depicts that the five(5) most important factors positively affecting safety performance are organizational safety awareness and commitment, development of safety policy, financial motivation to application of safety, productivity bonus payment and relation between worker and management.

2. The adapted standardised tool used to evaluate the safety performance of building contractors can be seen in Appendix 2.

After the evaluation of the building contractors it was found out that:

- Productivity bonus payment for their workers and plans to allocate specific budgets
- Checks of safety records from top management, keeping of daily safety records and finally providing technical guidance in job performance for their workers were not seriously practiced.

5.4 RECOMMENDATIONS

Based on the findings and conclusion identified previously the following recommendations has been made;

1. Government must make it compulsory for professional workers to join a professional body.

2. Productivity bonus for their workers and plans to allocate specific budgets for safety records and providing technical guidance in job performance for their workers need to be improved.
3. It is recommended for the building contractors to implement a system for safety incentive for their workers.
4. It is recommended for the company's management to conduct clear safety policy and periodically random safety inspections for technical works.
5. It is recommended for the concerned government authorities to hire qualified, competent and certified engineers to conduct regular site inspections.



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KNUST



APPENDIX 1

SAMPLE OF QUESTIONNAIRES USED FOR SURVEY

College of Architecture &
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Department of Building Technology
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SURVEY QUESTIONNAIRES

AN EVALUATION OF THE SAFETY PERFORMANCE OF SELECTED BUILDING CONTRACTORS IN ACCRA, GHANA

Dear Sir,

This questionnaire forms part of an MSc. Construction Management research project which aims to **evaluate the safety performance of selected building contractors in Accra, Ghana.**

I would be grateful if you would complete the attached set of questionnaire to help promote construction safety in Ghana.

I appreciate that you are already busy and that participating in this survey will be another task to add to a busy schedule, but by contributing you will be providing important information to aid in completing this study. **All data held are purely for research purposes and will be treated as strictly confidential.**

Thank you.

Isaac Ofori

(MSc Candidate)

Tel. 0243666717

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SUPERVISOR

Emmanuel Adinyira (PhD)

eadinyira.feds@knust.edu.gh

SECTION A: PERSONAL AND COMPANY INFORMATION

Please tick the appropriate answer or provide a suitable response of your own by highlighting the answer in red colour. An example is: What is your sex? a) **Male** () b) Female (). The answer in this example is **Male (✓)**

1. Position in company:

- a) Safety Manager/Engineer ()
- (b) Foreman ()
- (c) Project Manager ()
- (d) Others (Specify.....)

2. Kindly state your highest qualification

- (a) CTC ()
- (b) HND ()
- (c) Bsc ()
- (d) MSc ()
- (e) Others specify.....

3. Please tick the appropriate professional body you belong to.

- (a) GhIE ()
- (b) IET ()
- (c) GhIS ()
- (d) CIOB ()
- (e) Others, Specify (.....)

4. Please state your professional qualifications if any

.....

5. Approximate number of employees in your company

(a) 0-20 ()

(b) 21-50 ()

(c) 51- 100 ()

(d) 101 ()

(e)above ()

6. How long has your company been operating

(a) 0 -5yrs ()

(b) 6-10yrs ()

(c)11yrs & above ()

7. From the answer in question 3 above, what has been the employee turnover?

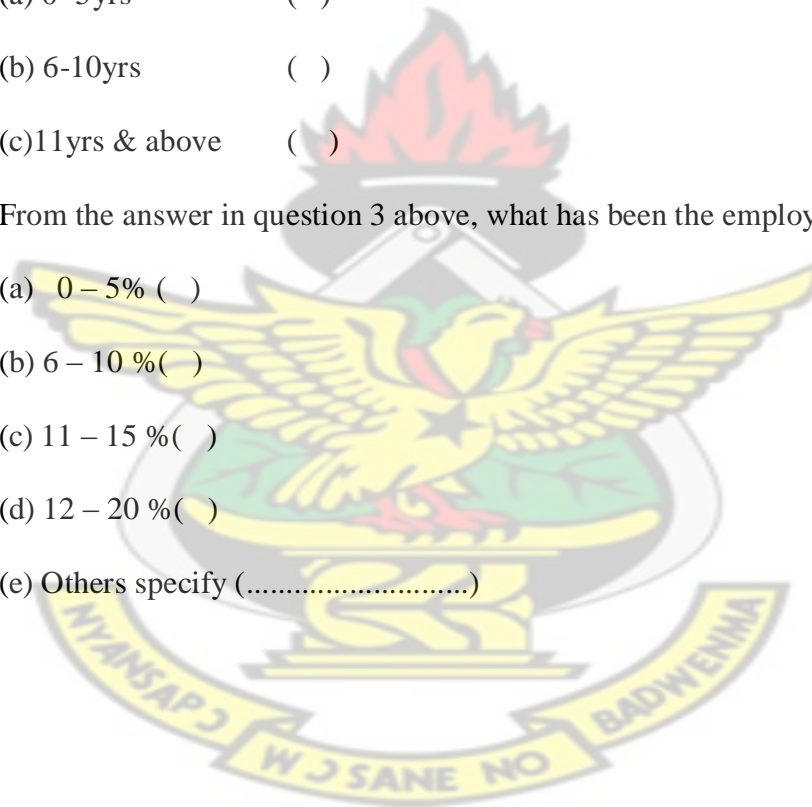
(a) 0 – 5% ()

(b) 6 – 10 %()

(c) 11 – 15 %()

(d) 12 – 20 %()

(e) Others specify (.....)



SECTION B:

FACTORS AFFECTING SAFETY PERFORMANCE OF BUILDING CONTRACTORS

The list below includes the factors affecting the safety performance of building contractors. For each of these factors kindly select the appropriate answer by providing a tick [√] in the box provided. Please tick to indicate the level of importance you attach to each factor on safety performance of building contractors.

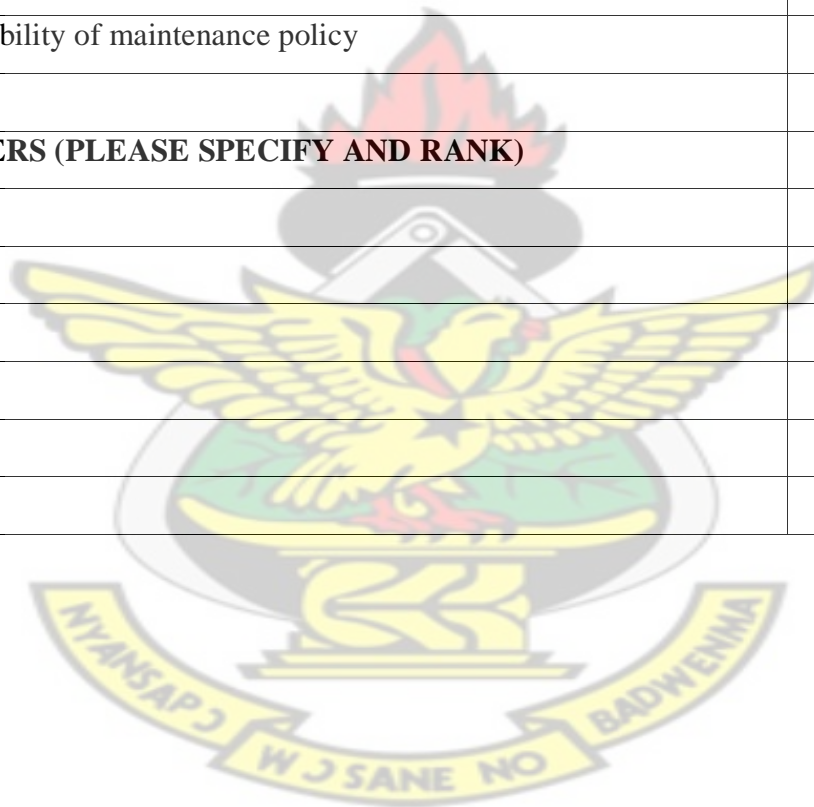
Very Important = 5, Important = 4, Neutral = 3, Not Important = 2, Absolutely not Important = 1.

	Description of factors	Degree of Importance				
A	ORGANISATION LEVEL	5	4	3	2	1
1	Organisational safety awareness & commitment					
2	Development of safety policy					
3	Conduction of organisational policy review					
4	Implementation of safety audit to safety management systems					
5	Top management checks of safety records					
6	Employment of safety officers					
7	Employment of certified skilled labour					
8	Authority of safety officer to stop site work after identified hazard					
9	Length and detail of the company safety program.					
10	Punishments for bad safety habits					
11	Incentives for good safety performance					
12	Incentives for good safety performance					
13	More supportive upper management attitude towards safety.					
14	Minimizing worker turnover.					
15	Growth in company size.					
16	Implement safety management system reference to legislation					

17	Development of safety committee.					
No	Description of factors	Degree of Importance				
B	PROJECT LEVEL					
1	Conducting site safety inspection and supervision					
2	Familiarity with methods and types of building contractors' work					
3	Workers attend safety meetings					
4	Project managers attend safety meetings					
5	Safety meetings for safety representatives					
6	Toolbox meetings					
7	Keeping of daily safety records					
8	Conduction of accident investigation and analysis					
9	Conduction of safety hazard review (safety audit)					
10	Identification of unsafe practices on site					
11	Definition of safety responsibility.					
12	Identification of hazardous and dangerous activities					
13	Tight control of hazardous activities on site					
14	Excessive overtime work for labour					
15	Volume of project					
16	New technologies in the execution of building projects					
17	System for accident recording and reporting					
C	SAFETY EDUCATION AND TRAINING					
1	Guidance and training of workers on safety					
2	Brochures and publications on safety					
3	Safety seminars held by the management of the project					
4	Safety posters					
5	Lack of training.					
6	First aid training for all workers					
D	WELFARE FACILITIES					
1	Provision of food and drinking water					
2	Provision of adequate facilities for first aid treatment					
3	Provision of special places for smoking					
4	Provision adequate toilets					

No	Description of factors	Degree of Importance				
E	FIRE PREVENTION					
1	Availability of adequate fire extinguishers on site					
2	Good storage of flammable liquids and combustible materials					
3	Periodic maintenance of fire extinguishers on site					
F	ECONOMIC FACTORS					
1	Buying workers' compensation insurance					
2	Paying for the medical expenses of injured workers					
3	Provision of safety clothing & equipment					
4	Productivity bonus payment					
5	Financial motivation to application of safety					
6	Allocating specific budgets for safety requirements					
G	MEDICAL FACILITIES					
1	Availability of medical service on site					
2	Periodic medical examination of workers					
H	ROLE OF GOVERNMENT & ENGINEERING SOCIETIES					
1	Issuing Laws, Standards, Regulations and Legislations on safety					
2	Supervision to Implement laws & standards on safety					
J	HISTORIC, HUMAN & PSYCHOLOGICAL FACTORS					
1	Worker age					
2	Worker experience					
3	Worker education					
4	Worker culture background					
5	Worker marital status					
6	Worker safety training received					
7	Worker safety awareness knowledge & involvement					
8	Worker accident's experience					
9	Worker ability to communicate with others					
10	Relation between worker and management on site					
No	Description of factors	Degree of Importance				
J	HISTORIC, HUMAN & PSYCHOLOGICAL FACTORS					

11	Interrelation between workers on site					
12	Decrease work pressure on workers					
13	Relation between workers and foremen on site					
K	TECHNICAL FACTORS					
1	Provision of technical guidance					
2	Protection of materials in storage and transit					
3	Proper handling of tools, equipment and plant					
4	Maintenance of tools, equipment and plant					
5	Poor equipment					
6	Availability of maintenance policy					
	OTHERS (PLEASE SPECIFY AND RANK)					



APPENDIX 2 - EVALUATION TOOL FOR CASE STUDY

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SUPERVISOR

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SECTION A:

FACTORS AFFECTING SAFETY PERFORMANCE OF BUILDING CONTRACTORS

The list below includes the factors affecting the safety performance of building contractors. For each of these factors kindly select the appropriate answer by providing a tick [√] in the box provided.

5- In place, proven performance, up to date documentation, periodic audits

4- In place, including documentation

3- In place but limited or little/No documentation

2- Currently not in place

1 – Does not apply

A	ORGANISATIONAL LEVEL	5	4	3	2	1
1	Are the employees aware of the safety commitment of the company (Safety corporate culture)?					
2	Does your organisation have a written safety policy					
3	Does the organisation employ certified skilled labour					
4	Does the organisation employ safety officers?					
5	Are there checks of safety records from top management					
6	Is the organisation's upper management supportive in safety issues					
7	Does your organisation conduct organisational policy review					

B	PROJECT LEVEL					
1	Does your organisation keep a daily safety records?					
2	Is there a system that allows workers to attend safety meetings?					
3	Does the company conduct site safety inspections and inspection supervision?					
4	Does your organisation hold toolbox meetings?					
5	Are projects managers mandated to attend safety meetings?					
6	Do workers attend safety meetings in your organisation?					
7	Do you allow safety representatives to attend safety meetings?					
C	ECONOMIC FACTORS					
1	Does your organisation give productivity bonus payment?					
2	Does your organisation allocate specific budgets for safety?					
3	Does your organization have a program in place for motivating excellent safety performance by individuals?					
D	ROLE OF GOVERNMENT & ENGINEERING SOCIETIES					
1	Does the company's corporate safety culture conform to International and Local Laws, Standards, Regulations and Legislation?					
E	HISTORIC, HUMAN & PSYCHOLOGICAL FACTORS					

1	Does the organisation ensure there is friendly and affectionate relationship between worker and management on site?					
2	Does the organisation ensures there is cordial interrelation between worker and foremen/supervisors on site?					
F	TECHNICAL FACTORS					
1	Does your organisation train workers on proper handling of tools, equipment and plant?					
2	Does the company provide technical guidance in job performance for workers?					



APPENDIX 3

IMAGES SHOWING GOOD SAFETY PRACTICES OF SOME CONSTRUCTION SITES VISITED

	<p>Canteen, table + chairs</p>
	<p>10 Toilets and washbasins</p>
	<p>Showers + Toilets + Washbasins</p>



Various containers for evacuations were installed on site in order to evacuate waste.

	<p>General HSE induction</p>
	<p>Erosion control: Slope protection by Geotextiles</p>
	<p>Runoff filter around the site fence.</p>