

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI

COLLEGE OF ARCHITECTURE AND PLANNING

DEPARTMENT OF BUILDING TECHNOLOGY

KNUST

INVESTIGATING THE MANAGEMENT OF HEALTH AND SAFETY BY ROAD

CONTRACTORS IN GHANA

A Master's Thesis Submitted to the Department of Building Technology of the Kwame Nkrumah University of Science and Technology in partial fulfillment of the requirements for the award of

MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT

GYANSAH DIANA

BSc. (Hons.) Building Technology

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SUPERVISOR

DR. E. ADINYIRA

REV. DR. F. D. K. FUGAR

DECLARATION

I declare that I wholly undertook this research under supervision and where other scholarly works have been used were duly acknowledged as such.

.....

Date.....

GYANSAH DIANA

(STUDENT)

KNUST

I declare that I have supervised the student in undertaking the research reported herein and I confirm that the student has effected all corrections suggested.

.....

Date.....

DR. E. ADINYIRA

.....

Date.....

REV. DR. F. D. K. FUGAR

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Date.....

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ABSTRACT

Health and safety have become a key component in the construction industry over the years. Appalling situation of health and safety on construction sites has left many incapacitated and resulted in loss of livelihood. Deteriorating health and safety situation caused the delay of many construction projects which have dire consequences for the national economy (chartered institute of building report 2009 and environmental protection agency report 2008). The road construction sector is one such area of operation in the construction industry that has witnessed numerous accidents and debilitating injuries to employees and third parties during operations. The phenomenon in the road construction sector does not auger well for the economy of Ghana as a result of the key roles of road networks in the development of Ghana. To help in addressing this trend, this study is designed to investigate the management of health and safety by road contractors in Ghana. To achieve the aim just advanced, a quantitative method was adopted using survey questionnaire as the main instrument for data collection. Survey questionnaires were administered to 50 respondents using purposive sampling which yielded a response rate of 92 per cent. The data collected were analysed basically with descriptive statistics. Key findings of the study include high rate of accidents in the road construction sector with the major cause being exposure to noise; and poor manual handling. Proposed criteria for curbing accidents include effective monitoring of road construction firms in the area of health and safety promotion. It is envisaged that when this study is adapted by stakeholders in the road construction sector, it will inure to the benefits of all by way of numerous benefits notably the improvement in health and safety of construction workers among others.

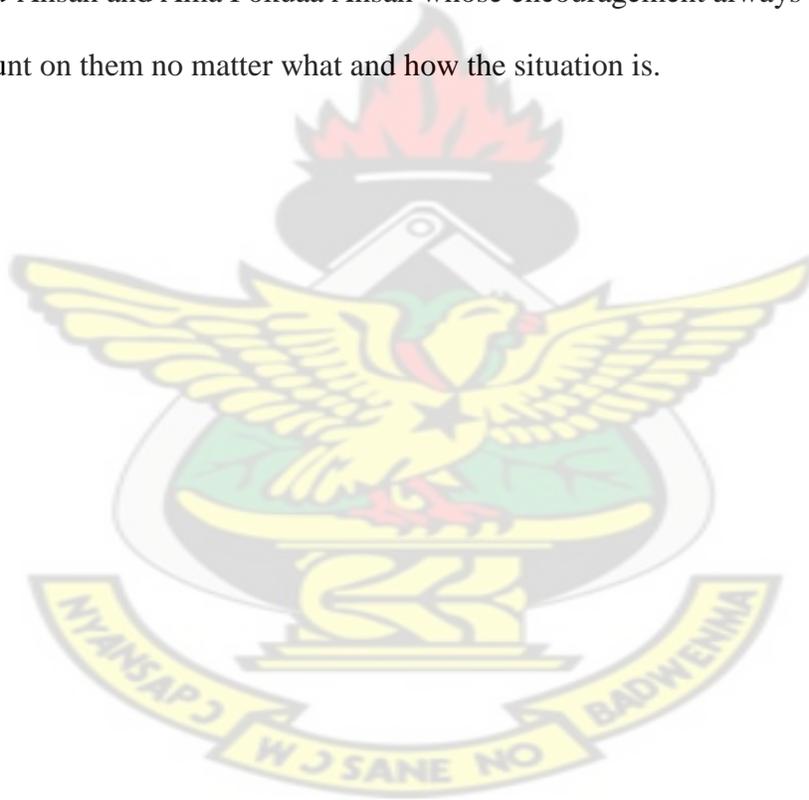
DEDICATION

My hope is built on nothing less than Jesus' blood and righteousness-Hymn 6 "Melodies of Praise".

This work is dedicated to my Mother Georgina Akua Birago whose tenderness and motherly advice and love caused me to persevere this far.

Late Mr. S.N Ansah, my dearest husband whose love made me strong up till now and my two kids Kofi Owusu-Ansah and Ama Pokuaa Ansah whose encouragement always gives me hope.

I will always count on them no matter what and how the situation is.



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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The construction industry around the world is plagued with poor health and safety conditions. Coles (2008), confirm that the industry is considered to be one of the poorest performing sectors in terms of health and safety. This is partly due to the irresponsible manner in which some of the players within the industry take issues concerning Health and Safety. According to Health and Safety Executive (HSE) for the past twenty five years (25), over 2800 people in UK have died from injuries they sustained as a result of construction (HSE, 2009).

HSE further stated that in the UK in comparison with other industries a much higher proportion of all reported injuries within construction are serious, that is the ratio of fatal and major injuries to 3-day injuries is higher in construction than most other industries. Over 3-day injuries refers to non-major injuries to workers that leads to absence from work, or inability to do their usual job for over three (3) days Chartered Institute of Builders (CIOB, 2009).

As a matter of concern for Health and Safety, the Ghana government has come out with laws and regulations for construction activities in order to reduce problems associated with construction accidents. These include the Labour Act which talk about Health and Safety, Factory, Offices and shop Act 1979 (Act 328), and Workman's Compensation law 1987 (labour Act 2007).

Also, parts of UK Health and Safety at work Act (HASWA, 1974) has been adopted by Ghanaian construction industry.

1.2 Problem Statement

In Ghana, construction sector (road) evidence suggests that the emphasis placed on health and safety is not sufficient. A typical example is the prequalification or assessment of contractors for construction projects, where health and safety management or similar issues are not given much attention. In some contract documents where health and safety issues are mentioned, the responsibility is put on the contractor and provisions are made for the contractors to charge some fees for the health and safety management.

However, consultants do not take the responsibility to see to it that the contractor complies and implements those measures. In the light of these and other inefficiencies in the management of health and safety in the road construction industry in Ghana, the researcher seeks to investigate the situation further to provide relevant information needed for practical and effective interventions.

1.3 Research Questions

- What is the rate of accident occurring in the road construction sector?
- What is the severity of injuries sustained by workers in the road construction sector?
- How effective are the health and safety regulations in curbing the occurrence of accidents in the road construction sector?

1.4 Aim of the Study

The aim of the study is to investigate the management of health and safety by road contractors in Ghana. This would lead to relevant data /information required to guide future interventions in health and safety management in the road sector of Ghana.

1.5 Objectives of the Study

- To review existing health and safety regulations for road construction project in Ghana;
- To determine the significant causes of accidents on road project; and
- To identify practical measures for curbing accidents in road construction.

1.6 Scope of the Study

With emphasis in the Brong-Ahafo and Ashanti Region, the study considered only A2 and B2 contractors who are actually in the majority dealing with road contractors in the region.

1.7 Brief Methodology of the Study

Primary and secondary sources of data were relied on for this study. Data was collected through mainly a questionnaire survey of good contractors in the region, interviews with relevant actors in road sectors of the regions and literature review of previous works in the area. Data collected was analysed basically using descriptive statistics of means and standard deviation and was presented with tables and charts.

1.8 Significance of the Study

The adaptation of the findings of this study is believed to improve the performance of road contractors in the construction sector (road). The adoption of this study in the road sector would curb the high rate of accident which occur frequently leading to operational delay on site which subsequently delay the early completion of work. In adopting the findings, especially the

recommendations of this study would turn round the late project completion phenomenon leading to improved release of road infrastructure to government to enhance economic activities in the country leading to considerable GDP growth. The study is also vital in the sense that it would contribute to the reduction of disability rate in the country as a result of the adoption of this study.

1.9 Organisation of the Study

Chapter one (1) gives the background of the research and outlines the aim and objectives. It will states the problem statement and gives the research questions. It also states the scope, significant/justification of the topic and a brief methodology of the study. Chapter two looks at the available literature on the exploring on construction health and safety especially road sector in Ghana. Chapter three of this study delved into the detailed aspects of the methodologies adopted while chapter four concentrated on data analysis and discussion of results. Finally chapter 5 dealt with the conclusion and recommendations from the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter firstly looks at the road construction sector and National Development, secondly, the effect of health and safety on road sector and the country at large. The Institutions responsible for Occupational Health and Safety in the country and the Acts or Regulations applicable to their work then follows. The chapter further examines the health and safety regulations applicable to road construction and the extent it assigns the health and safety responsibilities to the stakeholders in the industry. The chapter also talks about Trade Union Congress (TUC) which seeks to Champion the welfare of Ghanaian workers including road construction workers. The chapter then discusses what other stakeholders like Clients, Consultants, Contractor Operatives and even facility users are doing in relation to health and safety issues. Contractor selection and tender evaluation criteria are also discussed getting to the end of the chapter. Finally, the chapter highlights the issues arising from the literature chapter which will assist in preparing the questionnaire for the fieldwork.

2.2 Road Construction Sector in Ghana

The road construction sector in Ghana as a developing country plays a significant role in the physical development of the country and employs many people, in both formal and informal sectors. According to Anaman and Osei-Amposah (2007), Ghana's industry has potential as a driver of economic growth, although the government's commitment to improving productivity in the sector is low. The paper further stated that improving the health and safety performance of the sector is one means of enhancing the productivity of the construction sector in Ghana.

Hämäläinen et al (2006), also stated this to emphasize the poor state of Health and Safety in developing countries of which Ghana is included: *“in comparison with developed countries, road construction sites in developing countries are ten times more dangerous than in developed countries”*

The Government of Ghana in (1987) also added its voice to the risky and deplorable health and safety nature of the industry by stating that, the road construction industry of Ghana is the second most hazardous industry, after manufacturing. This was re-echoed in “2012 May day” celebration by the late President Mills and TUC Boss Dr Kofi Asamoah .The 2011 report at labor office in Brong-Ahafo, Ashanti, and Greater Accra Regions clearly stated that it is the leading source of employment in Ghana. In the early 80’s and late 70’s when Ghanaian road sector was so bad that no driver will accept going to the farming communities, the youth in rural areas were driven to the cities for greener pastures. But now the story is different because most of our existing roads are better than before. As compared to other sectors, the road sector is currently very vibrant today that as compared to other sectors. It is a leading sector in job creation and employment. Despite all the successes chopped it has its own short comings.

2.3 Road Construction and the National Development

Road construction is said to be on the top of the nation building since it employs all type of skilled and unskilled labor in the country (Factory Inspection Board Report 2009-2012 Environmental Protection Agency report 2008-2012) and Labour Department report (2010-2013) as a result government is doing its best to improve upon its survival in the country. Apart from employment, our roads need to be maintained, this could be done only by our road contractors.

(Factory Inspection Board Report 2010), Ghana Highways Authority Report 2010). A nation without good roads is always in shambles. For that reason roads in Ghana have important roles to play in National development by way of job creation, employment creation development of rural areas etc.

2.4 Effect of Health and Safety in the Construction Industry

A healthy mind they say lies in a healthy body, for this reason workers health and safety is paramount. The workers are the main drivers of the construction industry. Therefore, if not well catered for will not help smooth execution of project. This may lead to delay, poor work and sometimes abundant of projects. For that reason, workers health and safety must be the top priority in the industry. It is also important to establish measures which will serve as a guide to all workers. Most research done into health and safety has shown that the high rates of injury are primarily due to inadequate or non-existent OHS systems. Therefore, the application of an “effective management” can lead to safer systems of construction and reduce incidence of injuries and related diseases (EPA, FIB) Environmental Protection Agency and Factory Inspection Board reports (2009-2012). Injuries as a results of poor Occupational Health and Safety policy Occupational Health and Safety (OHS) has led to many disabilities in our communities leading to poverty and other social vices. This is so because their dependences may be disabled as a results of accident they suffered at the construction site. This can lead to very high poverty rate, in such situation, high rate of school drop outs; teenage pregnancy, theft, drug addiction etc will be high. Improper management of health and safety can also affect the growth of the country as a whole.

2.5 Institutions Responsible for Occupational Health and Safety in the Country

According to Kheni et al (2008), occupational health and safety administration evolved from instructional and legal frameworks developed by colonial administrations to manage the safety, health and welfare aspects of industrial settings at a time. In Ghana, a labour department, established in 1938, was responsible for implementing the Factories Ordinance passed in 1952, to provide a code of protection for factory workers (Visano and Bastine, 2003). The institutions which deal with health and safety at workplaces comprises of government departments and agencies, consultants, employer's organizations and trade union.

Government departments and agencies which in one way, or another have responsibility for enforcing health and safety standards on construction sites are shown in the implementation of health and safety legislation table.

Table 2.1: Implementation of safety and health legislation

Government Department/agency	Health and safety law Mandated to implement	Summary of applicability to Construction sites
Factory Inspectorate Department	Factories, Offices and Shops Act 1970	Sections 57, 6-8, 10-12, 19, 20, 25-31, 33-40, 43-54 and civil engineering works
Labour Department	Labour Act 2003 Workmen's Compensation Law 1987	Part XV of the Labour Act concerns health safety and applies to workplaces including construction businesses Workmen's Compensation Law 1987 is applicable to construction businesses
Environmental Protection Agency	Environmental Protection Agency Act (Act 490) pesticides Control and Management Act (Act 528)	Both Acts are applicable to building and civil engineering works and therefore of relevance to construction businesses

Mines Department	Mining Regulations 1970	Building and civil engineering works carried out under the ambit of mining companies are affected by the regulations
Town and country Department	Planning and Building Regulations	Applicable to all physical development.
National Road Safety Commission	National Safety Commission Act (Act 567)	Applicable to road construction works
National Occupational Health Unit	Ghana Health Service and Teaching Hospital Act (Act 526)	Applicable to all occupations including

Source: Kheni et al, (2008).

2.7 Health and Safety Legislation Applicable to Construction

The main health and safety law applicable to construction in Ghana is the Factories, Offices and Shop Act 1970 (Act 328). The Safety and Health concerns of building works and civil engineering construction are covered under the Act. Laws such as the Labour Act (2003), the Environmental Protection Agency Act (Act 490) and the Workmen's Compensation Law (1987) have specific provisions for health and safety which are applicable to construction. Other laws that also have provisions related to health and safety on construction sites; include the Mines Regulations (1970) and the Road Safety Commission Act (567). Much health and safety legislation in Ghana has not been regularly revised to bring it up to date with prevailing socio-economic conditions in the country (Kheni *et al.*, 2008).

To confirm that the Factories, Offices and shops Act (1970) is the main Health and Safety document being used in the country by government agencies and departments, is what a booklet from the Factory Inspectorate Division entitled "A *Short Guide To The Factories, Offices and*

Shops Act, 1970” has to say in its preface: “*The main provisions of the factories, offices and shops Act, 1970 relating to factories are for the most part, a re-statement of the requirements of the Factories Ordinance 1952, with the necessary improvement to bring it in line with internationally accepted standards employed in factories. The scope of the Act has also been widened, thus extending the basic protection and welfare requirements of the law to offices and shops, dock work, building operations and Works of Engineering Construction. The primary objective being to reduce the risk of injury and the health of all persons employed in all premises covered by the Act. It is published in order to provide general guidance to the rules governing safety, health and welfare in factories, offices and shops and other premises to which the Act applies which must be obeyed and sets out in simple language the principles and general lines of the Act for the benefit of all concerned*”.

The pamphlet draws attentions to the sections of the Act which concerns health, safety and Welfare of employees and workplace safety. The Labour Department is also one of the government agencies to see to the welfare, health and safety of employees. The current Act being used by the Labour Department is the Labour Act 2003 (LA, 2003) and Workmen’s Compensation Law 1987.

Employers are to ensure that their employees work under satisfactory, safe and healthy conditions (Labor act 2003). The employers are also to provide amongst other things the following; provide and maintain at workplace, plant and system of work that are safe and without risks to health; to provide the necessary information, instruction, training and supervision having regard to the age, educational level and other circumstance of the worker to ensure that workers

health and safety are protected. It is also an obligation of the employer by law to provide all the workers the necessary safety working equipment including personal protective equipment (PPE's) and create conducive or safe working conditions. On the other hand, the employers will not be held liable for injury suffered by a worker fails to use safety appliances, personal protective equipment and similar items provided by the employer. The law also allows a worker to remove himself/herself from workplace where he/she has a reasonable cause to believe that, there is serious danger to his/her life, safety or health (Labor Act 2003).

The employee is expected to report such conditions to his/her immediate supervisor. When such action is taken by the worker, the employer does not have the right by law to terminate the employment of the worker or withhold any remuneration to him/her. The employers are also in the same vein to report any occupational accidents and diseases which occur in the workplace to the appropriate government agency. The (LA, 2003) also sees to the provision of appliances, fire-fighting equipment and personal protective equipment provided by the employer in compliance with the employer's instructions.

2.7 Occupational Health and Safety

Ghana always depends on her colonial masters for most of her rules and regulations of which health and safety is no exception. Now it has become necessary to have one on her own hence the occupational health and safety policy. Occupational health and safety is a new policy for construction, factory office and shop workers. According to Factory Inspectorate Board, the policy is NOT yet approved officially but it is in use .This is to replace Factory Office and Shop ACT (328) which was established in 1970.The policy will be guaranteed by Article 36 (10).

2.8 Various Interventions towards Health and Safety Globally

The construction industry around the world is plagued by poor health and safety at Work. The H & S at Work Act 1974 is the backbone or basis for most health and safety regulation in Ghana the UK and other countries in the world. Many other regulation have come out since the 1974 Act, and include; Health and Safety (first Aid) Regulations 1981; Electricity at Work Regulations 1989; Construction (Head Protection) Regulations 1992, the Management of Health and Safety at Work Regulations 1999 and many others. The 1974 Act is a framework Act which allows subsequent regulations to be made from time to time. In addition to above regulations and others which were not mentioned, the Construction (Design and Management) Regulations 1994 became one of the key pieces of legislation for construction safety together with its Code of practice. The Code became very useful guidance on health and safety in the construction industry till 2007 when new Construction (Design and Management) Regulation s 2007 and its associated Code of Practice came into force. CDM 2007 replaced not only CDM 1994, but the CHSWR 1996.

2.9 Measures to Improve Health and Safety for Construction Workers

This section looks into the various interventions made to improve health and safety in terms of the law and the regulations by the UK government which is also in use in Ghana since we always adopt from them. It also examines the responsibilities of the stakeholders under 1974 Health and Safety at Work Act which provides the basis for almost all the subsequent health and safety regulations including the Management of Health and Safety at work Regulations 1999, which in part, stress the responsibilities of the employers/clients. The section then looks into Construction

(Design and Management) Regulations 2007 which spelt out the responsibilities of client, the CDM Co-ordinate, Designers, Contractors and even the end users of the facility towards health and safety. Some important elements in CDM 2007 like pre-production information, the construction phase health and safety plan and the safety file are also considered.

The section further discusses the management roles towards health and safety, its corporate responsibilities and how the Corporate Manslaughter and Corporate Homicide Act 2008 affect the organizations management system and activities in terms of safety of its employees. In addition, the section discusses the need for auditing, monitoring and performance measurement within the management of health and safety, therefore contractor selection and tender evaluation criteria will be examined. The causes and effects of accidents, including brief statistics of construction accidents can also be found in this chapter.

2.10 Health and Safety at Work Act 1974

The 1974 Act has provided a framework (or umbrella) under which virtually all subsequent health safety regulations have been made (Coles, 2009).

The objectives of the Act are:

- To secure the health, safety and welfare of persons at work
- To protect persons other than person at work against the risks to their health and safety arising out of work activities
- To control the emission of noxious and offensive substances
- To achieve the stated objectives, the Act lays general duties on Employers, Employees, and the self- employed, Occupiers of workplaces, manufactures and Suppliers. Clarke

(1999) outlined some of the duties imposed by the Act on the above stakeholders as follows:

2.11 Employer

- To ensure the health, safety and welfare of all employees.
- To provide a safe place of work
- To provide a safe access and egress to the place of work.
- To provide a safe work environment.
- To provide adequate welfare facilities
- To provide safe plant and equipment for use at work
- To maintain safe plant and equipment for use at work.
- To provide safe work systems
- To maintain safe work systems.
- To ensure there is no risk in material or substance handling
- To ensure that risk in material or substance handling is eliminated, reduced or controlled.
- To provide information or work activity risks to employees
- To provide adequate supervision
- Where there are five or more employees in a workplace provide a written safety policy.
- To provide a written report on health and safety activities in the shareholder's report"
- To provide a written report on health and safety activities in the shareholders' report".

Clarke (1999)

2.12 Employees

- To take reasonable care of their own health and safety
- Take reasonable care of the health and safety of others who may be affected by their acts.
- Co-operate with the employer
- Do not miss- use or mistreat work equipment”. (Clark 1999)

2.13 Self-employed Person’s Duties

“Self-employed persons can have the duties of both employers and employees; much depends upon the way in which the self-employed persons are employed.

In addition, they should conduct their work in such a way as to ensure that they and other persons are not exposed to health and safety”. (Clark 1999)

2.14 Manufactures, Designers, Importers and Suppliers

“A general duty is placed on manufacturers, designers, importers and suppliers in respect of any article, materials or substances for use at work. The duty is to ensure, so far as is reasonably practicable, that articles and substances are safe and without risks to health when being used, set, cleaned or maintained by persons at work”. (Clarke 1999).Maintenance, alterations, refurbishment and demolition to be carried out safely. Information in the file should alert those carrying out such work to risks and should help them to decide how to work safely. It is the client’s duty to ensure that the file is prepared and kept available for inspection in the event of work described above. The scope, structure and format for the file should be agreed between the client and CDM Co-coordinator at the start of a project and should be user-friendly. The CDM Co-ordinator needs to compile the file and the information should be obtained from the

contractors while the work is going on. The Co-coordinator has to agree with contractors in advance for the information that they are to supply and the required form upon information that would be useful for the work described earlier. (CDM and Approved Code of Practice, 2007)

The file is useful for the client, the Designers, CDM Co-ordinator, Principal Contractor and Contractors preparing to carry out, or to manage such work.

All the stakeholders listed above have legal duties in respect of the health and safety file.

Their duties are as follows:

- CDM coordinators must prepare, review, amend or add to the file as the project progresses, and give it to the client at the end of project;
- Clients, designers, principal contractors and other contractors must supply the information necessary for compiling or updating the file;
- Clients must keep the file to assist with future construction work; and
- Everyone providing information should make sure that it is accurate, and provided promptly.

The information that the file should contain is the description of the work carried out; any residual hazards which remain and how they have been dealt with; key structural principles; health and safety information about equipment provided for cleaning or maintaining the structure and many others. The file should be kept, or retained for as long as it is relevant, normally the life time of the structure and needs to be kept up to date for it to be useful (CDM and Approved Code of Practices, 2007).

2.15 Management Roles towards Health and Safety in Organisation

2.15.1 Management and health and safety

(Thompson et al 1998), suggests that senior managers support safety through indirect means such as establishing safety policies and procedures, setting production goals etc. while supervisors act as the link between management and shop floor, they monitor worker compliance to safety and provide feedback to workers concerning their behavior. Research has also shown that management commitment influences the success of safety initiatives. Marsh et al. (1998) found that the success of behavioral safety interventions implemented in building sites across the UK were strongly influenced by management commitment. (Cox et al. 1998) in a study of the UK manufacturing industry found that the main influence on employees' safety commitment was how workers perceived management actions for safety.

Griffin and Neal (2000) in a study amongst Australian manufacturing companies identified how managers view safety in the workplace as a key factor to the safety climate within an organization.

Sawacha et al. (1999) tried to identify factors which influence safety on construction sites. They found "top" management's attitudes toward safety were found to be a significant factor in safety performance as measured by their accident record. The role of management as a factor influencing the under reporting of accidents was identified by Clark (1998a). Lord Cullen (2001), suggested that there was "no substitute for personal contacts" and that the organizational policy of rail companies should ensure that senior management spends adequate time on safety issues with front line employees.

Cullen further suggested that senior executives should formally schedule at least one hour per week for concentrating on safety with employees. Middle managers should spend at least one hour per day and first line managers 30% of their time on this issue. This is not a construction based report, but there is substance that could be derived since it emphasizes how management influences workplace safety.

According to Peterson (1993), the key to positive safety culture lies in achieving agreement within organization on how to implement a safety element within the company. Such an agreement must have senior management support, supervisors' accountability and the active involvement of middle managers. Cooper (1998) also states that, safety committees could be established in an organization and they can serve as an indirect measure of management's commitment towards safety as well as a measure of the extent to which safety communication flows between the workers and the management. According to Factory Inspection Board Boss Ghana always depend on UK for all Act, Laws, Policies set for now since OHS is not yet legally implemented.

2.15.2 Company Structure of Responsibility for Health and Safety

In a typical construction company, health and safety responsibilities are shared among all, including the key personnel as suggested by Davies and Tomasin (1996). They include Chief Director(s), Construction Manager, Site manager, health and Safety Adviser, etc.

2.15.3 Company Director

The company's Director Responsibility towards health and safety in the organization is to draw or come out with the health and safety policy.

2.15.4 Safety Director

The safety director in Construction Company is expected to ensure, so far as it is reasonably practicable, that the company meets its legal obligations with respect to health, safety and welfare of its employees and of all the others who may be affected by its construction work, in accordance with the company's health and safety policy.

The safety director also does the following:

- Administer a safe organization, appoint appropriate safety staff and provide them with employment terms of reference.
- Ensure appropriate information, instruction and training for all staff and all operatives.

Provide facilities for first aid and welfare.

- Prepare annual budget estimates for safety, health and welfare facilities and manage the allocation of the funds accordingly.
- Be responsible for reporting injuries, diseases and dangerous occurrences and keep the Board of Directors regularly informed of such events.
- Ensure the adequate provision of time and costs of safety measures in all design, construction and related activities.
- Ensure that any safety committees proposed by the staff or the operatives are properly constituted, attended by management at the appropriate level, that accurate records of

meetings are made and kept, and that the resolutions put forward by the employee safety representatives are acted on to the safety. (Davies and Tomasin, 1996)

2.15.5 Principal Contractor

According to Davies and Tomasin (1996), the principal contractor when appointed by the company has the following additional site management health and safety duties and include the need to:-

Develop and implement the construction phase health and safety plan.

- Ensure the co-ordination and the co-operation between all the supply chains on site and see that they have all the information about any special risks.
- Obtain sub-contractors' risk assessments
- Monitor sub-contractor's safety performance.
- Make sure only authorized people are allowed on site.
- Pass information to the Planning Supervisor for the health and safety file
- Ensure that notification particulars under CDM Regulations are displayed in a readable condition and in a position where they can be seen by anyone concerned with construction of the project.

2.15.6 Safety Adviser in Principal Contractor Organization

The safety adviser is expected to do the following:

- Advise management on its duties under the health, safety and welfare legislation and any revisions to it.
- Report on the fulfillment of the objectives of the company's health safety policy.

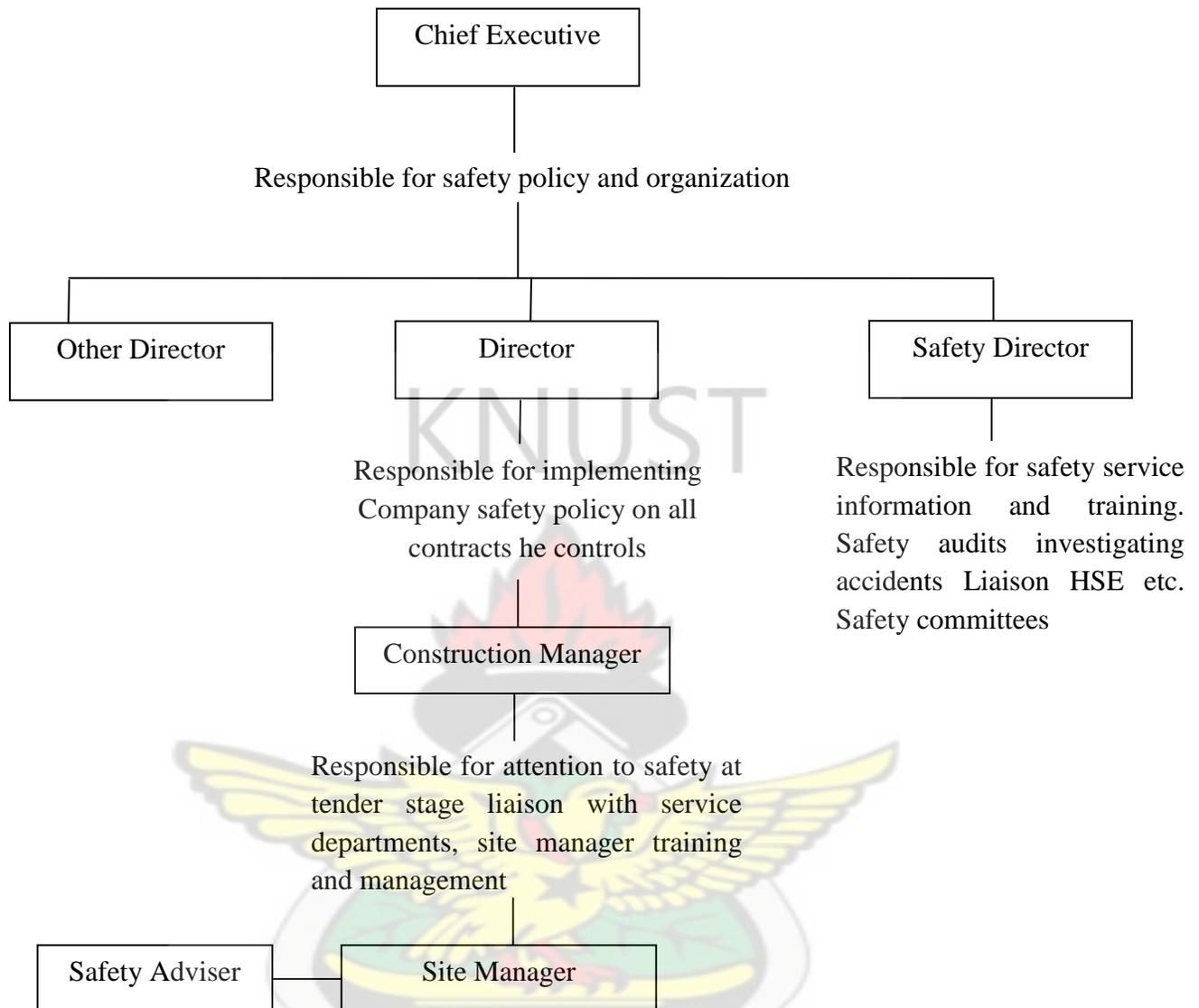
- Advice on safe working practices, the safety of plant and equipment, environmental health problems, protective clothing and permit-to-work procedures.
- Advise on the implementation of the CDM Regulations in so far as they apply to the principal contractor and sub-contractors, etc.
- Prepare and circulate safety memoranda, guidance notes, posters and other printed information.
- Organize safety training courses for all staff and all operatives.
- Carry out site safety, health and welfare audits.
- Take responsibility for the company's accident record book, investigate and report on all accidents and recommend measures to prevent their recurrence.
- Advise on special problem of sub-contractors and self-employed operatives on the company sites.
- Attend safety committees as required and give advice to managers in their consultations with employee representatives.
- Act as the (HSE) and all the professional bodies specializing in safety and accident prevention. (Davies and Tomasin, 1996).

2.15.7 Site Manager

Site manager being somebody who is directly on the projects at site level, is expected to organize the construction site in such a manner that it is safe both for company employees and for all other persons who may be affected. In addition, he should be able to:-

- Comply with the HSWA 1974 and the regulations concerning construction.

- Appoint the necessary support site management staff to carry responsibility for site safety and welfare and to provide them with the authority to act.
- Complete the statutory notices and liaise with HSE and the chief Officer of the local fire brigade and ambulance service.
- Provide the time and the funds for safety measures.
- Carry out written risk assessments and implement the necessary controls.
- Co-operate with the ‘principal contractor’ and provide information required under the CDM Regulations including RIDDOR reports.
- Ensure that all staff and operatives have the necessary training and following correct working procedures.
- Provide protective clothing and safety equipment where necessary and see that it is used.
- Arrange or the company safety adviser to set up a site audit.
- Ensure that the procedures to be adopted in the event of an accident are clearly understood.
- Make arrangements to supervise the safety of sub-contractors’ work and self-employed staff and other operatives.



Primarily responsible for all health and safety matters on site.

Figure 2.1: Company structure of responsibility for Health and Safety

Source: Davices and Tomasin (1996)

Organizations found guilty of corporate manslaughter or corporate homicide face an unlimited fine, although judicial guidelines suggest a fine of between 2.5%-10% of the annual (group) turnover.

To avoid unpleasant consequences under the Act, the organizations have to examine their Health and Safety management systems carefully, to see whether they are complying with health and safety regulations, which the construction industry amongst others, mandated to follow.

2.16 Health and Safety Management-Auditing/Monitoring/Measuring Performance

Constructing Excellence (2004) states that *“health and safety systems, in common with other management processes, can deteriorate over time, because working methods, materials, plant and equipment, or people, can change. The aim of regularly auditing health and safety is to establish whether existing control measures are still relevant and to identify where additional, or revised measures are needed”*.

The purpose of auditing/monitoring/measuring performance is therefore to:-

- Maintain performance
- Ensure current relevance and effectiveness.

Auditing/measuring performance/monitoring should be a line management responsibility and the arrangements should cover the whole range of health and safety performance standards which have been established.

2.17 Measuring Performance

Measurement is a very important aspect of health and safety management. According to Hughes and Ferrett (2008), measurement is an accepted part of the ‘plan-do-check-act’ management process. Measuring performance is as much a part of health and safety management system as financial, production or services delivering management. The HSG65 framework for managing

health and safety is illustrated in the diagram below illustrate where measuring performance fits within the overall health and safety management system.

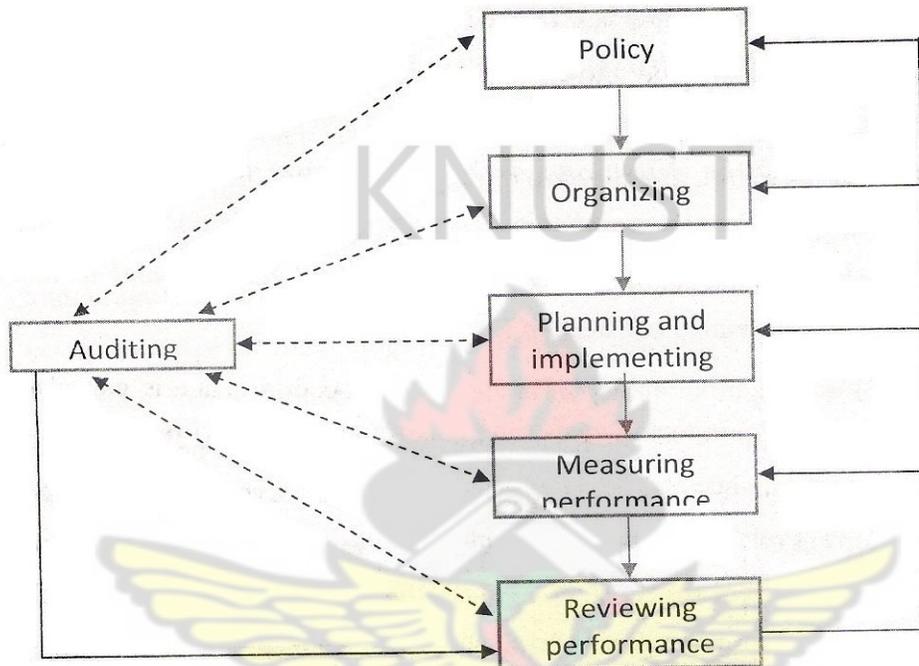


Figure 2.2: The health and safety management system

Source: HSG65 framework for managing health and safety as quoted in Hughes and Ferrett (2008).

2.18 Safety Audit

According to (Gadd et al 2002), audits are a useful tool to gauge the extent to which the organization’s policies and procedures are being followed and to determine how they might be improved. They provide the organization with feedback which enables organization to maintain, reinforce and develop its ability to manage and reduce risks. To be effective, audits should be carried out by competent people, who have received relevant training, either working

individually, or as part of a team. Those doing the audit should be independent of the area being audited.

The auditing process involves: collating information about the health and safety management system and judging whether it is adequate. Ideally the audit should follow the key elements highlighted in the Health and Safety Executive's guidance "Successful Health and safety Management" (HSG65) (HSE, 2000). The elements consist of policy, organizing, planning and implementation, measuring, auditing and review (POPMAR) the safety culture of an organization can influence the effectiveness of a safety audit in the following ways (Glendon and McKenna, 1995), namely:

- The willingness of management to undertake a safety audit in the place;
- Adequate resources devoted to the auditing process, for example auditor training and time;
- The involvement of both employee representatives and line managers in the audit'
- Findings from the audit are upon;
- Commitment by the organization to auditing over the long term.

In addition to examining a company's policies and procedures, audits can also be used to look at the human factor element within a company's safety system. By incorporating human factors in the working environment an organization can improve efficiency, productivity and reduce workplace risks to health and safety. This will be achieved by reducing or eliminating opportunities for workers to make errors within the work system. There are factor to as increase or decrease the chance of human errors occurring these are sometimes referred to as "performance influencing factors". These factors include:

- Corporate factors – these include financial pressure, management and safety audits.
- Process factors – these include workplace hazards and technology.
- Human and machine interface factors – these include design of control system, displays etc.
- Environmental factors – these include PPE, tools etc.
- Individual factors – including workers previous experience, training, health etc.

The 'management safety behavior audit' attempts to measure management's commitment to safety (e.g. Cameron and Duff, 2000). This audit, developed for the construction industry, identifies the fact that safety is an important management role and recognizes that some managers do not acknowledge this (Cameron and Duff, 2000). The audit is based on the assumption that employees learn from the behavior of others, it is therefore designed to measure the ways in which managers communicate safety to workers. Thus, the framework includes question on induction training, safety committees and records of safety procedures e.g. risk assessments. The audit also incorporates an 'operative safety behavior inventory' which combines management audit and operative inventory scores, approximates a 'measure of safety culture'.

2.19 Monitoring

According to Hughes and Ferrett (2008), measurement is a key step in any management process and forms the basis of continuous improvement. If measurement is not carried out correctly, the effectiveness of the health and safety management system is undermined and there is no reliable information to show managers how well the health and safety risks are controlled. Managers

should ask key questions to ensure that arrangements for health and safety risk control are in place, comply with the law as a minimum and operate effectively. There are two basic types of monitoring; Active monitoring system and Reactive monitoring systems (Coles, 2009).

2.20 Active Monitoring Systems

Active monitoring provides essential feedback on performance before an accident, ill health or an incident. It involves checking compliance with performance standards and the achievement of specific objectives. Its primary purpose is to measure success and reinforce positive achievement by rewarding good work, not to penalize failure. Managers should be given the responsibility for monitoring the achievement of those objectives and measuring compliance with those standards for which they and their subordinates are responsible. Active monitoring should provide the basis for decision making about improvements as well as providing a basis for rewarding good health and safety performance. Such reinforcement increases motivation to achieve continued improvements in performed (Coles, 2009).

Reactive systems monitor accidents, ill health and incidents. They require the recognition and reporting of:

- Injuries and cases of ill health;
- Other loss events, e.g. damage to property;
- Incidents (including all those which had the potential to causes injury, ill health or loss);
- Hazard
- Weaknesses or omissions in performance standards.

In successful organizations the reporting of all events promoted by:

- Training which clarifies the underlying objectives and reason for identifying all relevant events;
- A culture which emphasizes an observant and responsive approach and the critical importance of improving systems of control before harm occurs, and which encourages open honest communication;
- Cross referencing and checking first-aid treatments, health records, maintenance reports, fire reports and insurance claims, to identify any otherwise unreported events.

Information from both active and reactive monitoring systems must be evaluated promptly to identify immediate risks and to ensure that appropriate remedial action is taken without delay (Coles, 2009).

2.21 Accidents in Construction Industry

According to HSE as cited in (Coles, 2009), accident is viewed as “any event where there is a risk of harm, and which damages property, equipment or materials, or delays production”

2.21.1 Causes of Accidents

Accidents are, for the most part, avoidable! So where does it all begin? It must, surely, begin with people and the way in which they behave. Questions that should be asked of people are:-

Do they know their job?

- Are they aware of possible hazards?
- How much do they know about any safety procedures that exist?
- How much do they care?

In other words, it all begins with people's attitudes. Unsafe people create conditions which cause accidents. Reference to Appendix 3.

Some common causes of accidents are therefore:

- Not knowing or not using the safe method of work
- Not creating the means of testing, inspection and maintenance
- Unsafe manual handling
- Working too fast or cutting corners
- Overloading equipment
- Not using:
 - Guards
 - Scaffolds
 - Platforms, etc
- Ignoring or disregarding:
 - Warning signs
 - Statutory notices
- Untidiness or carelessness
- Horseplay.

2.21.2 The Probable Consequences/Cost of Accidents.

To the victim:

- Pain and suffering
- Loss of earnings and extra expense
- Continuing disability

- Incapacity for the same job or incapacity for other activities
- The effects on dependants and friends.

To the firm:

- Lost working time by the victim and others
- Sympathizers

Investigators

Those engaged in re-organization of work

- Possible damage to equipment
- Increased insurance costs
- Prosecution or civil action.

To those responsible:

- Worry, stress recriminations and guilt
- Extra work, reports, replacement of staff
- Loss of credibility.

To the working group

- Shock and personal grief
- Low morale

2.23 Issues Arising from the Chapter

There are a lot issues coming out of this chapter which would serve as a basis for further investigation, especially health and safety in the Ghanaian construction industry. The literature shows that the UK seems to be doing more to improve health and safety in the construction

industry as compare to their counterparts in Ghana. Apart from the Ghanaian Factories, Offices and Shops Act 1970, which serves a framework for most current, or subsequent regulations, there have been some numerous regulations which seeks to improve safety situation of the construction worker. The latest one is the UK's Construction (Design and Management) Regulations 2007, which is known to be better than the previous ones because all the stakeholders in the industry get their fair share of the health and safety responsibilities. Even some of its elements like pre-production information, construction phase health and safety plan and safety file set the tone for effective health and safety management throughout the construction project and its use as a building.

There are also regulations, and the latest one is the Corporate Manslaughter and Corporate Homicide Act 2008 which implicates the whole organization in the case of the death of an employee on a construction site HSC/HSE is responsible for implementation and monitoring compliance of health and safety regulations. Notwithstanding the positive measures, accidents are not totally eliminated and falling height seems to be the highest causes of accidents in the UK construction industry. Health and Safety is now considered to be of equal importance as the conventional cost, time and quality issues/objectives and for that matter in determining the competency of contractors, in terms of health and safety are parts of the assessment criteria.

How such initial information or management of health and safety in the Ghanaian construction industry especially road construction sector is very much lacking hence the need to this study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter consists of the research design and methodology. It discusses the procedure adopted for collecting data for the study. It deals with issue of the population and sampling frame; questionnaire design and administration of instrument. The chapter also provides vivid details of survey instrument administration to respondents.

3.2 Study Type and Focus

The study type adopted was survey method to investigate the level of health & safety management in road construction industry and how contractors are implementing laws and the existing regulations. The research was based on expert information through the administration of carefully structured questionnaire and personal interviews. This study was carried out on both the public and private sector clients and contractors in road construction in the Brong-Ahafo and Ashanti Regions.

3.3 Research Design and Methodology

Research strategy is about how research objectives are approached. Naoum (1998) identified the three main strategies as quantitative, qualitative, and triangulation. The decision to opt for any of the strategies is dependent on the purpose of the study, the type and availability of information for the research (Naoum and Coles, 1997).

The overall objective of research methodologies and design is to provide insight to the planning and execution of the research study. The research design is concerned with the framework for data collection and analysis; the structure that guides the execution of the technique for collection and analysis of data, which provides the connection between empirical data to its conclusions, in a logical sequence to the initial research question of the study (Bryman, 2004, 1992); and includes experimental, survey, action research, and case study (Baiden, 2006). The methodology is thus a blueprint for conducting the study (Burns and Grove, 1999). These methods describe in detail how the study is to be conducted. According to (Burns and Grove 1999), methodology includes design, setting, sample, methodological limitation and data collection and analysis techniques in a study. Research process on the other hand addresses data collection instruments, methods, and procedures. It provides detailed explanations to each of the methods employed and how the methods adopted are used to address the aims, objectives and research questions.

This study adopted both the quantitative and qualitative approach in its conduct. The quantitative aspect intends to use numbers and graphs to represent the perception of respondents. The researcher believed that some phenomenon on health and safety can better be represented quantitatively. However, the qualitative approach is suitable for certain aspects of the research study to uncover the reasons and processes of certain phenomenon regarding health and safety issues in the Ghanaian road construction industry

3.3.1 Population of the Study

The area chosen for the research work were Brong-Ahafo and Ashanti Region. (Ghana High Ways Authority, Department of Urban Roads, Department of Feeder Roads, Department of Factory Inspection, Labour Department and Environmental Protection Agency). The experts to whom the questionnaires were administered include Engineers, Quantity Surveyors, Contractors, Clients, Workers at site and if possible the community where the project is being executed.

3.3.2 Sampling and Sample Size Determination

The main population of the study is the stakeholders in the construction industry namely clients, consultants, contractors, project managers/ site engineers, clerk of works and the operatives. Clients are mostly represented by the Consultants and personnel in the Estate Offices of some of the Organizations. The following key personnel are said to be in the consultants' organization (Engineers and Quantity Surveyors). The focus on the Consultants in the administration of the questionnaire were due to the key role Consultant play in the management of construction projects as the main client's agent. Site engineers and clerks of work were also selected because of their role of supervising and managing projects on behalf of the consultants and the contractors. The operatives were selected because of the important role they play in the realization of construction project.

In the sampling of respondents for the questionnaire, non-probability sampling method was used. Three consultancy firms, four public owners, five contracting firms, Professionals and Lecturers from six institutions namely: Kwame Nkrumah University of Science and Technology, Building and Road Research Institute (BRRI) and the following polytechnics, Kumasi and Sunyani were

selected for the study. In the consultancy firms, both public and private, two personnel each were selected; the Quantity Surveyors and Engineers were selected. Personnel at the managerial level from the contracting firms including fifteen operatives, amounting to nineteen personnel. Other professionals were taken from Estate Department of Sunyani Polytechnic and Regional Health Services, Sunyani. All the above respondents were conveniently selected from the large population. In all the survey population for the study comprised of five (5) Estate officers; five (5) Engineers; five (5) Quantity Surveyors ten (10) Operatives on road construction sites; five (5) staff from BRRI; five (5) personnel from the Ghana Health Service; and five Lecturers from KNUST who are experts in health and safety issues in the construction industry. The sum of the above composition of the respondents gave a survey population of 45. The purposive sampling was adopted for selecting the sample for the study. The purposive sampling was used because there are few people who are experts in health and safety issues hence the need to target them directly. It is envisaged that a survey population of 50 is manageable in using purposive sampling hence the sample size is 50.

3.4 Data Collection

For the purpose of this study, primary and secondary data were collected and used for the analysis to make conclusions. Primary data was collected through the use of questionnaires and interviews with the appropriate authorities. Secondary data (information) for the research was collected by making use of the school journals and other published materials. These are present as literature review in chapter 2.

3.4.1 Questionnaire Design

Well-structured open-ended or closed-ended questions were used and these questions were set in line with the literature review, specific objectives and the aim of the research questions. Moreover, some interviews were conducted among the respondents and this gave them flexibility to express their opinions on related issues concerning the topic.

The format of the questionnaire was guided by considerations of appeal to respondents, ease of reading and supplying the required data so that the research participants' time were not wasted during the data collection. The questionnaire was designed to include; closed-ended question, and scaled-response questions. The type of questions and the way in which questions are articulated and presented influences the quality of the responses and response rate. It was therefore important to ensure that the right questions are asked, well understood and asked in the right way (Wahab, 1996). Questionnaires were used to obtain data/information from the stakeholders in a non-threatening way; this will be supported by informal interviews. In all, fifty (50), questionnaires were given to clients, contractors and their representative, Lectures and other Professionals in the Construction Industry as already stated. The questionnaire consisted of one (1) set of closed –ended objectives questions. There were, however, a few outside optional answers. The total number of the questions within the three sets of questions were (10).

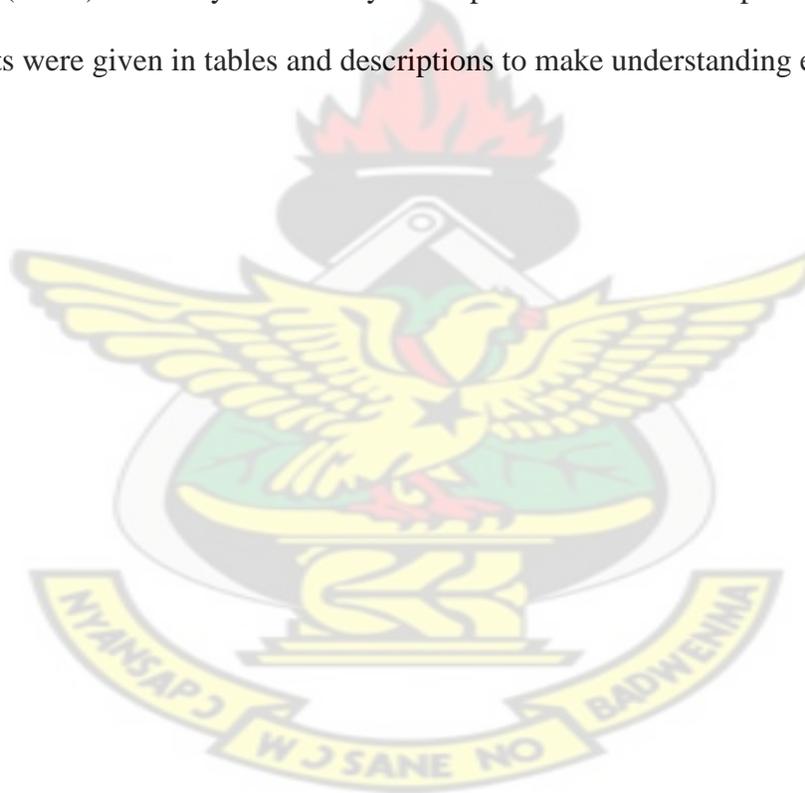
3.5 Instrument Administration

The questionnaire was distributed in such a way that the total respondents would be a fair representative of the total population. The researcher personally administered the questionnaire to respondents who have enough background on health and safety issues in the road construction

sub sector. The questionnaire was administered in one week. It took the researcher two weeks to retrieve the administered questionnaires from respondents. In all 50 questionnaires were administered and 46 questionnaires were successfully retrieved which gave a response rate of 94 per cent.

3.6 Data Preparation and Statistical Tool for Analysis

The retrieved questionnaires were coded and entered into the Microsoft Software Programme for Social Sciences (SPSS) for analysis. Notably descriptive statistics were performed on the data collected. Results were given in tables and descriptions to make understanding easier.



CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter focuses on the presentation, analysis of data and discussion of results. The chapter delved into the profile of respondents ranging from their educational and professional background to their work experience. Other key aspects of this chapter include an exposition on the nature of accident in road construction; safety rules and regulations for curbing road construction accidents; causes of accidents and measures for curbing the rate of accidents in road construction.

4.2 Respondents Profile

4.2.1 Educational Background of Respondents

The table 4.1 presents the distribution of the educational qualification of the respondents at the managerial position. From the table 26% are Master Degree Holders, 61% are Bachelor Degree, 11% are Higher National Diploma Holders and 2% are Construction Technician Course. See the bar chart in fig. 4.1 for the summary distribution of qualification. The professional status of respondents involved in the study revealed that 66% of them are quantity surveyors; 20% are civil engineers. In terms of experience, majority of respondents representing 70% had experience in the road construction industry ranging from 11-15 years while 9% had 16-20 years of experience as demonstrated in Table 4.1. Similarly, 65% of respondents had work experience between 11-15 years in their current road construction firms.

Table 4.1: Profile of Respondents

Respondents Profile	Type	Frequencies	Percentages
<i>Educational qualification</i>	MSC	12	26.0
	BSC	28	61.0
	HND	5	11.0
	CTC	1	2.0
<i>Professional Status</i>	Construction Client Manager/Director	2	5.0
	Quantity Surveyor	29	66.0
	Civil Engineer	9	20.0
	Contractor Manager/Director	2	5.0
	Building technologist	2	5.0
<i>Period in construction Industry</i>	less than 5 years	3	6.0
	5-10 years	2	4.0
	11-15 years	32	70.0
	16-20 years	4	9.0
	More than 20 years	5	11.0
<i>Number of years in current construction firm</i>	less than 5 years	4	9.0
	5-10 years	4	9.0
	11-15 years	30	65.0
	16-20 years	2	4.0
	More than 20 years	6	13.0

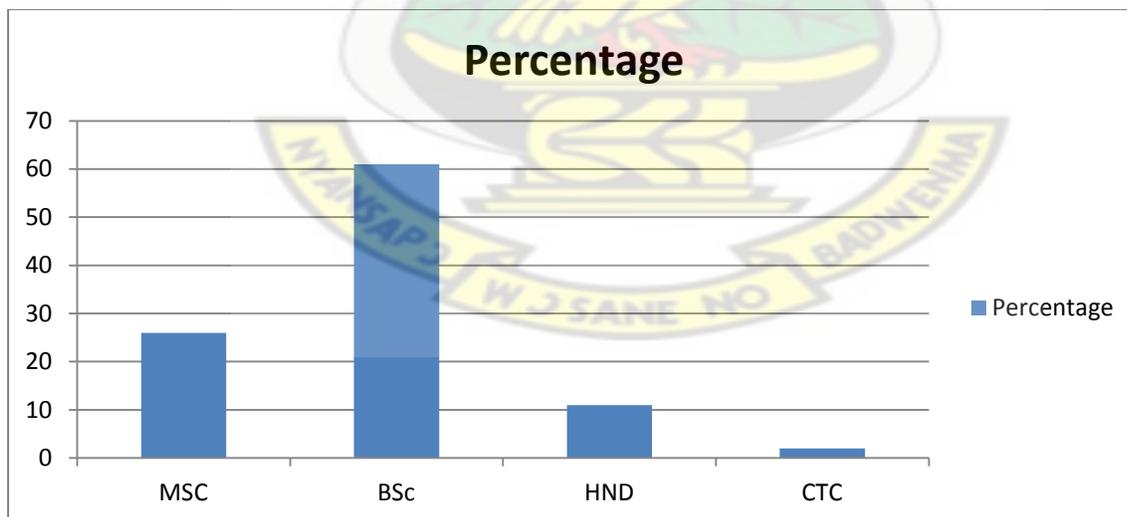


Figure 4.1: Distribution of Educational Qualification of Respondents.

4.1.2 Professional Qualification of Respondents

Different Professionals were contacted for this research dissertation. The distribution of respondents is clearly shown on the table 4.1. From the table 4.1 and a pie chart in fig. 4.2, five (5) major professional areas namely; Construction Client Manager/Director, Contractor Manager/Director, Building Technologist and Quantity Surveyor (as a professional was highest with 66% members who participated in the research). Civil Engineer was the second largest profession with 20% members. The distribution of the respondents are further illustrated by the pie chart at fig. 4.2.

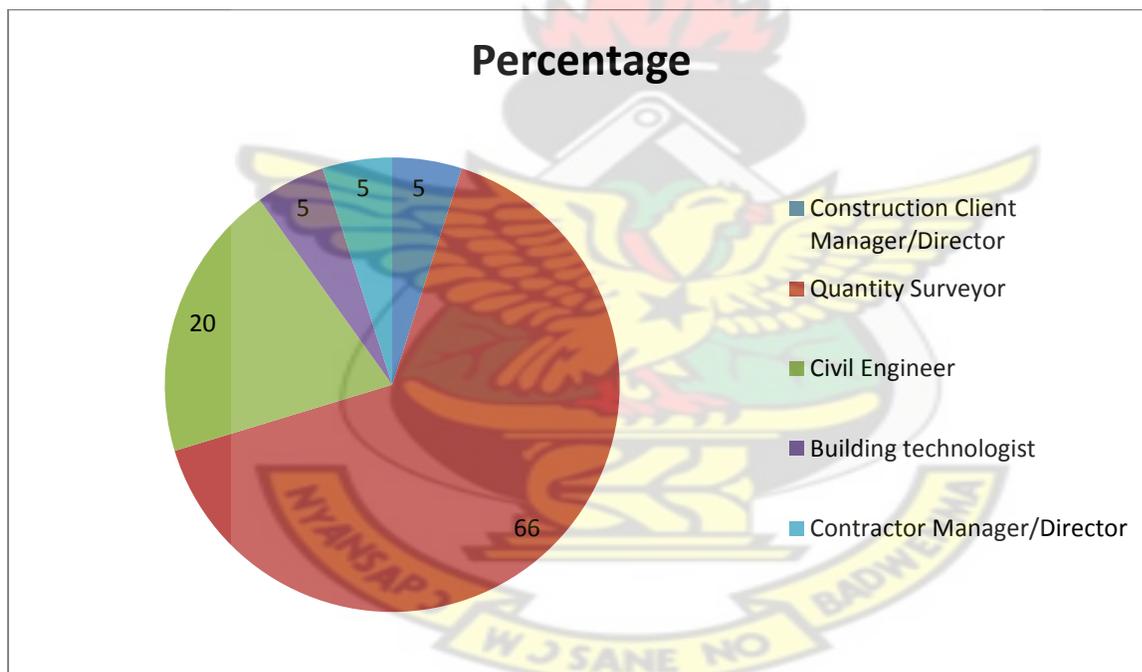


Figure 4.2 Professional background of Respondents

In spite of the fact that Quantity Surveyors were of greater percentage among the various professional group, they were from different organizations. Hence, their responses did not have undue influence on the study.

4.1.3 Work Experience of Respondents

Preliminary research conducted and the literature review in section 2.3 showed that there are a lot of the professionals who have been in the road construction industry for more than five years. Against this background that a question was asked to find out from the respondents how long they have been in the construction industry. Quite a large number representing 70% answered there have been there from 5-10 years and 11% said they have been there from between 7-15 years, 9% have been there from 16-20 years and for that matter it has given them clear meaning to health and safety to the road construction industry hence they have good experience in it management.

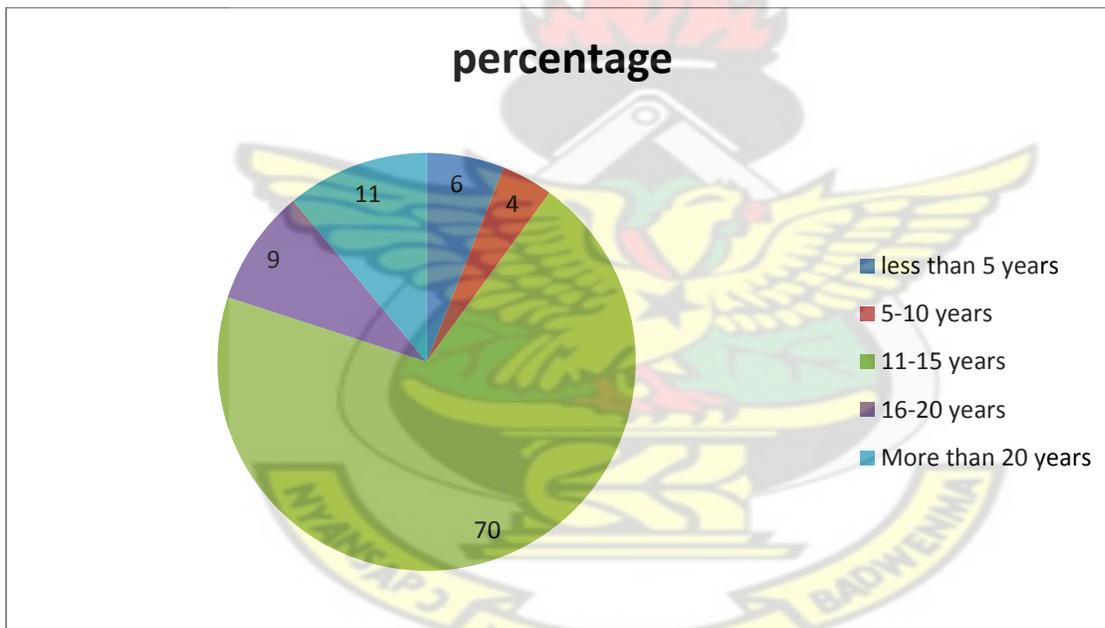


Figure 4.3 *Work Experience of respondents in the road construction industry.*

4.2 Effectiveness of Health and Safety regulations

It could be read from figure 4.4 that, 72% of the respondent said is moderately effective, 15% also agreed that health and safety is less effective and 13% stated that health and safety is

effective. Each respondent is entitled to his/her view but through careful examination of the laws and regulations and the responses from the majority of the respondents, as well as the CDM 2007 Model that the extent at which current laws/regulations spells out duties on the stakeholders in Ghanaian construction industry are not enough. It requires a second look if the industry wants to compete with their counterpart elsewhere. The figure 4.4 presents the responses from the respondents to the above question.

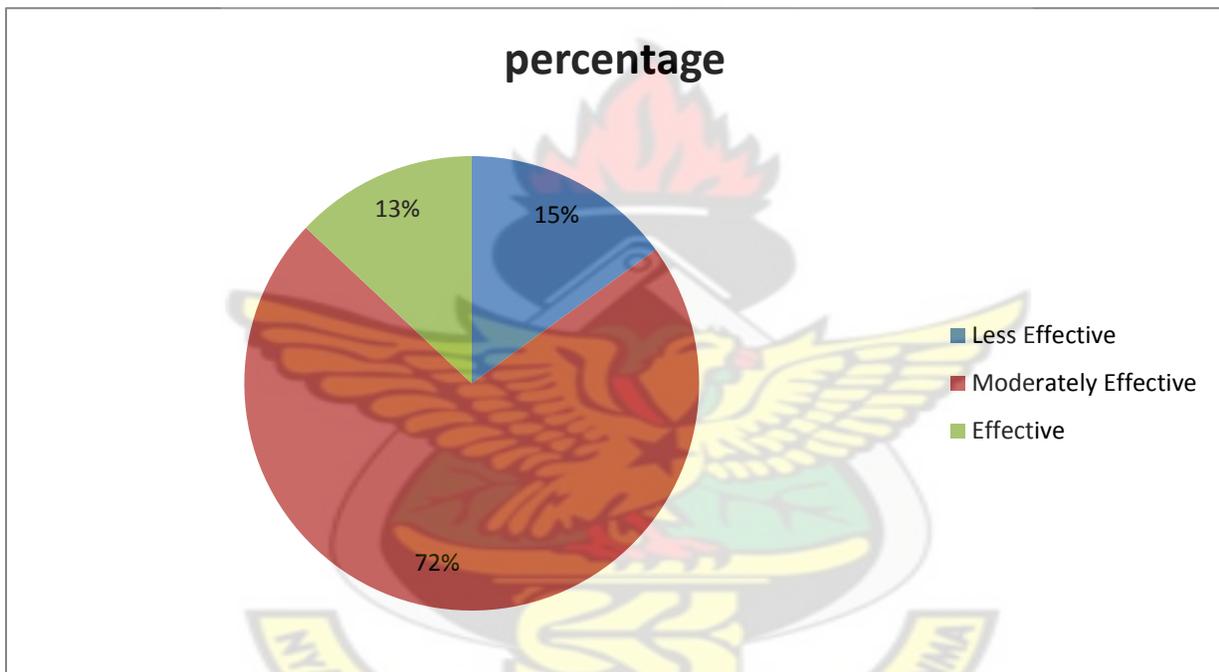


Figure 4.4 Distribution of Respondents on Health and Safety on Stakeholders.

4.3 Rate of accident in road construction sector

From the data gathered, 69% of respondents rate it relatively high, 18% of the respondents also say's is not high, 9% of the respondents say's is high and 4% say's is very high, but department of factory inspection report agree with the 69% which is relatively high. The figure 4.5 represents the responses from the respondents to the above question.

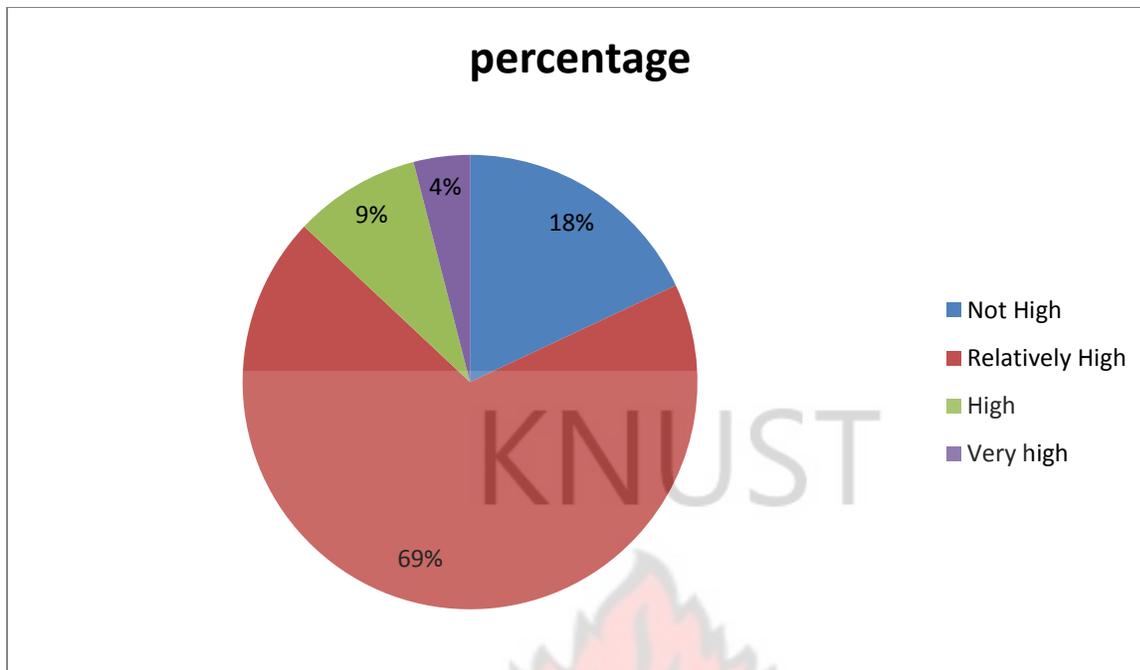


Figure 4.5: Rate of accident in road construction sector

4.5 Severity of injuries sustained during road construction

From the data gathered, 76% responded that injuries sustained by workers are moderately severe, 11% responded that is less severe, 9% responded that is severe while 4% said is not severe. But according to HASWA, 76% are views of the injuries sustained by workers in road construction are severe conforming to their statistic.

4.6 Causes of accidents in road construction sector

The main causes of accident in road construction sectors are exposure to noise and vibrating work environment. Other causes which are potential road construction site accidents are poor manual handling practices and exposure to hazardous substances such as solvent, fumes, dust and cement. In referring to the Table 4.2, exposure to noise and vibrating work equipment is the most dominant cause of accident in the road construction sector.

Table 4.2: Causes of Accident in the road construction sector

Causes of Accidents	N	Mean	Standard Deviation	Ranking
1.Exposure to noise, and vibrating work equipment	45	3.8	0.726	1 st
2.Poor manual handling practices	45	2.87	0.661	2 nd
3.Exposure to hazardous substances, such as solvents, fumes, dust and cement	44	2.68	1.116	3 rd
4.Transport, vehicles, construction machinery;	45	2.36	0.712	4 th
5.Lack of coordination among different groups or gangs working on site	45	2.33	0.739	5 th
6.Poor site planning and management	45	2.29	0.695	6 th
7.Falling objects, equipment and structures	45	2.2	0.757	7 th
8.Rock slides and contacts with masses in movement	45	2.07	0.654	8 th
9.Falls from ladders, scaffolds	45	1.91	0.633	9 th

Source: Field Study, 2014

4.7 Criteria for assessing the health and safety performance of road construction firms

Variables for assessing health and safety performance were ranked important as shown in table 4.4. The first three performance criteria were training and competence; incident investigation and emergency preparedness. Drawing on from Table 4.3, it has been demonstrated that the performance criteria for assessing the safety and health performance of road construction firms are significant since these criteria have their means above 3.5. This result therefore implies that the criteria for assessing health and safety performance in the road construction industry derived from the literature review are significant.

Table 4.3: Performance Criteria and Rate of Accident Occurrence

Performance Criteria	N	Mean	StdDev	Ranking
1. Emergency Preparedness	43	4.37	0.976	1 st
2. Incident Investigation	43	4.49	0.856	2 nd
3. Leadership and Personal Commitment	43	3.77	0.841	3 rd
4. Training and Competence	43	4.53	0.827	4 th
5. Risk Management	43	3.95	0.688	5 th
6. Performance measurement and assessment	43	3.86	0.675	6 th
7. Contractor controls	43	3.79	0.675	7 th
8. Health and wellness	43	3.72	0.666	8 th
9. Operational controls an procedures	45	3.91	0.61	9 th

Source: Field Study, 2014

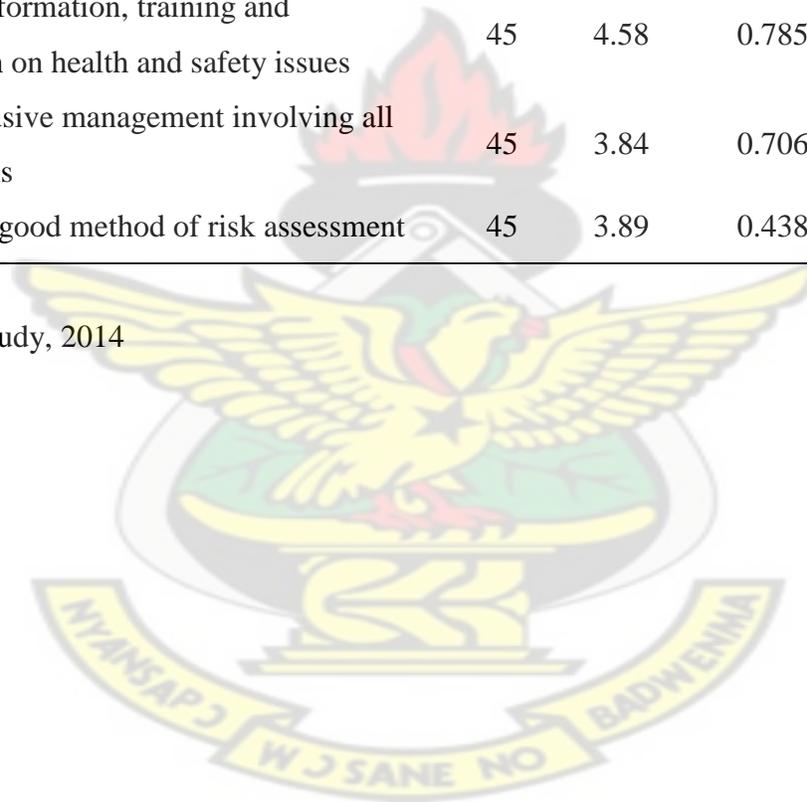
4.8 Measures to curb accidents in road construction

It is necessary to devise measures to curb the causes of accidents identified in Table 4.2 above. The study therefore examines six main measures for mitigating the causes of accident in the road construction sector. Referring to Table 4.4, it has been demonstrated that all the measures explored are significant for mitigating road construction accident in Ghana as these variables have mean scores above 3.5 and low standard deviation below 1.

Table 4.4: Measures to Curb Accidents in Road Construction

Causes of Accident	N	Mean	Standard Deviation	Ranking
1. Effective monitoring health and safety performance on site	45	4.51	0.895	1 st
2. Ensuring effective implementation of all prevention systems	45	3.56	0.841	2 nd
3. Recognizing the importance of health and safety at the design phase	45	4.56	0.841	3 rd
4. Providing information, training and communication on health and safety issues	45	4.58	0.785	4 th
5. Having inclusive management involving all relevant persons	45	3.84	0.706	5 th
6. Instituting a good method of risk assessment	45	3.89	0.438	6 th

Source: Field Study, 2014



CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Scope of the Chapter

The aim of this research has been to investigate the management of health and safety by Ghanaian road Contractors and causes of accidents in road construction project and to accomplish this aim a number of objectives which were being guided by the research questions were set. In this chapter, the research questions and the objectives are revisited to bring into light the extent to which the aim of the study has been achieved throughout the various phases of the study. The chapter also presents recommendations of the researcher based on the findings of the study and state the difficulties that were encountered throughout the study.

The main aim of the study was to investigate the management of health and safety by road contractors in Ghana. The specific objectives of the study outlined in the proposal include the following;

- To review the existing Health and Safety Regulations for road construction projects in Ghana,
- To determine significance causes of accidents on road projects.
- To identify the measures for curbing accidents in road construction.
- What is the rate of accident occurring in the road construction sector?
- What is the severity of injuries sustained by workers in the road construction sector?

- How effective are the health and safety regulations in curbing the occurrence of accidents in the road construction sector?

5.2 Research Findings

In an attempt to investigate current health and safety management by road contractors in Ghana and cases of accident on road construction project and its compliance by the stakeholders in the industry, various literature were read. It came to light that there are some laws/regulations which govern the activities of various occupations in Ghana including road construction. The most prominent department or agency mandated to implement the law is the Factory Inspectorate Department. The sections of the Act which are applicable to building and civil engineering works are 57, 6-8, 10-12, 19, 20,25-31, 33-40, 43-54 and 60-87 as discussed in the literature review. It gives the general guidelines to what are expected from prospective developers who want to build factories, shops, offices and similar project.

In addition, it stresses on what the employers and employees are expected to do with regard to health, safety and welfare. Under the Act the employers are expected to provide things that would secure the health, safety or welfare of employees and the employed person must not willfully interfere with or misuse anything provided by the employer covering safety. In addition it stated that, no employee must willfully and without reasonable cause, do anything liable to endanger him and others. Labours Act 2003 and Workmen's Compensation Law 1978 which Labour Department is mandated to implement also have a section governing the activities of construction industry. Part XV of the Labour Act as well as some sections of Workmen Compensation Law concern health and safety and applies to workplaces including construction

business. Both Environmental Protection Agency Act (Act 490), Pesticides Control and Management Act (Act 528) are applicable to building and civil engineering works and are therefore of relevance to construction business in terms of health and safety.

International Labour Organization (ILO) which Ghana is a signatory to, also spells out health and safety duties on employers and employees of which both parties expected to comply with the client taking employees safety as paramount concern.

Considering the above laws and others stated in the literature which seeks to regulate activities of various occupations, construction though numerous, they do not go to the extent that CDM 2007 Regulations deals with health and safety issues in the construction industry in UK, but if they are fully complied with health and safety practices in Ghana would have been better than it is now.

In view of the above, some questions were raised in the questionnaire for both management members and the operatives to help deal with that objectives. Questions 4, 5 of questionnaire on experience in the road construction sector and practice. 6, 7 severity of the injuries and effectiveness of health and safety regulations in curbing the occurrence of accidents. Concerning causes of accidents, study revealed that, majority of the respondents, about 64% responded in the affirmative and mentioned some of the causes as fall from ladder, scaffolds, transport, vehicles, and construction machinery. Nevertheless, quite an appreciable number of thirty – for percent stated that they do not have any idea on the question. Again as part of the evaluation exercise, management were asked to rate causes of accidents in the road construction sector. It was interesting to note that large number of the respondents representing 70% agreed that site planning and management by contractors are not enough. The operatives response on

management's responsibility of providing health and safety materials as are not supplied, especially if the terms and conditions of the contract is silent on the compliance of health and safety regulations. Sixty –two percent (62%) of the respondents' (operatives) stated that managements often do not even provide them with any common personal protective equipment (PPE's). About one third of the respondents describe health and safety culture in their organization as not satisfactory. Another 64% of course, the largest of the respondents described the entire health and safety culture of their organization as somehow satisfactory. Since these respondents are in the midway, they could be added to the 33% and conclude that health and safety culture in their organizations are not satisfactory. These emphasis the point that, compliances to health and safety laws and safety laws and regulations in the system is deficient.

To investigate the management of health and safety by road contractors in Ghana, Current laws and regulations on health and safety in the country though not up to UKs standard could address health and safety problem in Ghana to some appreciable level, but one of the biggest problems, is the enforcement and compliance which of course has something to do with the people attitude, behavior as well as their perceptions.

In the definition of safety culture given by HSG 65, it stated that ;The safety culture of an organization is the product of individual and group values, attitude, perceptions, competencies and patterns of behavior that determine commitment to and the style and the proficiency of an organizations health and safety management; The definition by HSG 65 emphasizes the need for developing positive behavior, perception and attitude by the stakeholders in the industry to

establish sound safety culture which in turn promote health and safety practices. This is the way forward to the road construction sector in Ghana.

5.3 Recommendations

The following recommendations have been made based on finding and conclusion drawn from the study to improve health and safety practices in the Ghanaian road construction industry.

The professional bodies such as Chartered institute of Builders (CIOB-Ghana), Ghana Institution of Construction (GIOC), the Ghana Institution of Surveyors (GhIS), Ghana Institution of Engineers (GhIE) should expose their members to the “Golden Square” concept where health and safety is equally rated as conventional cost, time and quality of project through some form of continuing professional development programmes. This will address the problem of low familiarity of members or the stakeholders with the best practice with regard to health and safety.

The following recommendations were made based on the findings from the study:

1. There is the need to have well defined organization for health and safety practices in the Ghanaian road construction industry. Meanwhile the operations of the current organizations such Labour Department, Environmental Protection Agency, Factory Inspectorate Department, Building Inspectorate Division of the District, Municipal and Metropolitan Assemblies should be viewed in the direction of improving their services to help fight poor health and safety conditions in most firms in the Ghanaian construction industry. The assemblies as a local Authority with power to make by-laws should strengthen the Building and road construction Inspectorate Divisions within their outfit and add the checking of compliance of health and safety rules and regulations by

the employers and employees who execute their projects and other construction activities that may be going on in their jurisdiction. This would call for recruitment of additional personnel, training and supply of adequate resources to equip them for such assignment.

2. Newmont Ghana, a Foreign Gold Mining Company in Brong-Ahafo is using local contractors for most of its roads construction projects, but these contractors are required to meet the company's health and safety requirement or standard including safety programme and other similar documents. Local Contractors working for the company are able to comply. This is a positive sign that if health and safety issues are included in contractor selection, tender evaluation and other project execution processes, it will perfectly work in the Ghanaian road construction industry. The professional bodies and construction project consultants can learn from Newmont Ghana Limited.
3. With regards to the possible adoption of CDM 2007 regulations, the above mentioned professional bodies should get the entire document and carefully acquaint themselves of the concept, educate its members on them and when convinced of its adoption, seek permission from UK government. This is not a matter of lifting the entire regulation but rather it should serve as a guide so that it could be designed to suit the local conditions by dwelling much on how the roles and responsibilities concerning health and safety of stakeholders in the industry are spelt out.
4. The stakeholders in the industry must develop positive attitude, perception and behavior toward health and safety practices in order to contribute effectively to the socio-economic development of the country.

5. Management members must champion the crusade of good health and safety practices and motivate the employees through their visible leadership by wearing the personal protective equipment, wherever they are at the road construction site.
6. Each employee should cultivate a culture of being his brother's keeper so that whenever there are any practices that can result in injury or accident by a colleague, they quickly prompt them or the authorities for the necessary action to be taken to save the situation.
7. While waiting for the future adoption of CDM 2007 regulations or the industry coming out with similar health and safety regulations in the road construction industry, the current health and safety situation could be greatly improved by the government strengthening or imposing legal duties for health and safety on the companies' directors. These directors have the financial and organizational capabilities to set up in a manner that gives greater consideration to safety alongside profits which are considered as prime objective of most organization.
8. Compliance with the existing health and safety laws must be monitored regularly and effectively, and breaches of it should be taken much more seriously than it is at present. This means that there should be a body with well-defined responsibilities to be responsible for construction workers' health and safety than it is sparsely done now.
9. Management of the road construction firms should organize regular meetings with the operatives and educate them on the importance of good safety practices that will serve as a means of instilling safety culture into them. Such health and safety educational programmes should be designed such that, it would take individual cultural aspirations into construction to try shape them to suit the organizational safety culture.

10. Another way by which health and safety situation in Ghanaian road construction industry can be improved is through the government's intervention. The government should task the organizations like the Factory Inspectorate Department or the Labour Department in conjunction with the professional bodies preferably Ghana Institution of Engineers, Ghana Institute of Construction (GIOC) and others to develop health and safety Code of practice to supplement the safety laws and regulations so that roles and responsibilities of each stakeholder would be clearly spelt out. After the Code of Practice has been developed, the stakeholders would then be required to serve as watchdog for effective implementation/usage of the code. The organizations should do all they could to own the health and safety programme.
11. . It is highly recommended that Supervisors should regularly check their operatives with regard to compliance with the health and safety regulations, and also that operative should constantly check themselves. It is also recommended that Consultants should have their eyes on contractors and their representatives as health and safety regulation compliance is concerned. Finally, well defined bodies that are charged with the responsibility with regard to implementation, compliance and enforcement of health and safety regulations should ensure that all stakeholders in the Ghanaian construction industry play their roles very effectively in order to ensure a safe work environment for both management and operatives.
12. It is also recommended that, further research should be conducted to establish the modalities that the government can adopt to have Approved Code of Practice for Health and Safety in the Ghanaian road construction industry

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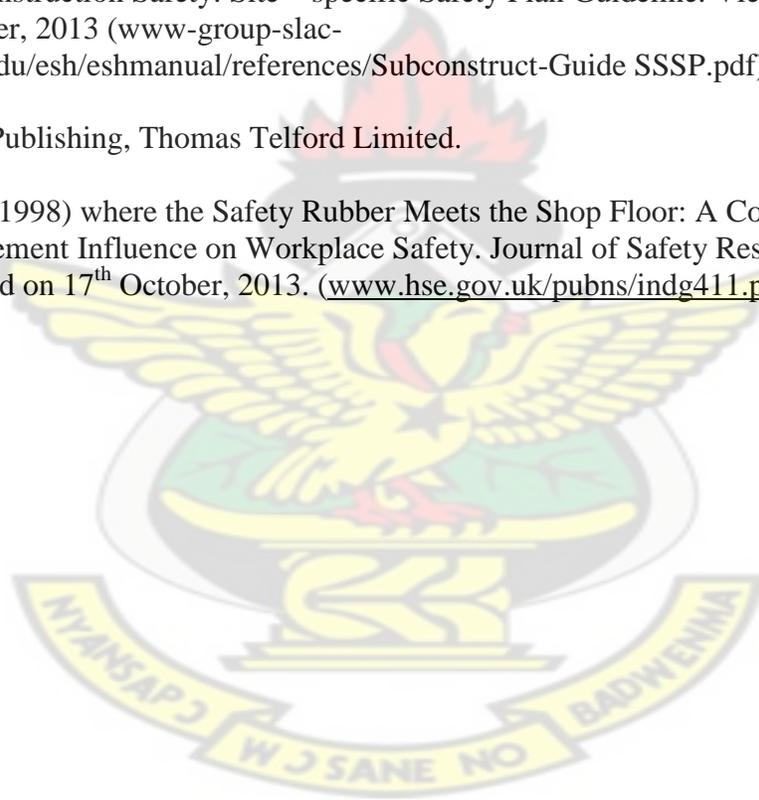
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APPENDIX 1

**Department Of Building Technology
Kwame Nkrumah University of Science and Technology
University Post Bag**

**SURVEY QUESTIONNAIRES
INVESTIGATING THE MANAGEMENT OF HEALTH AND SAFETY BY ROAD
CONTRACTORS IN GHANA**

Dear Sir/Madam,

This questionnaires forms part of an MSc. research project which aims to the exploring the management of health and safety by road contractors in Ghana for the purpose of highlighting the critical issues affecting the overall welfare and safety of road construction workers on construction sites. It is expected that this research will help to improve the conditions of these workers on sites and protect their rights. I would like to invite you to participate in the above project. Completion of the questionnaire is completely voluntary and returning the completed questionnaire will be considered as your consent to participate in the survey. The questionnaire will take you about 5 minutes to complete. 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. **All data held are purely for research purposes and will be treated as strictly confidential.** If you wish to receive feedback on the research findings, please complete the slip below and return it together with your questionnaire. In the event of questions or queries, please do not hesitate to contact us. Thank you for your time and valid contribution in advance.

Yours faithfully,

Diana Gyansah BSc
MSc Researcher
Email– adwoa1961@yahoo.com
Mobile: 0243137457

Dr. E Adinyira and Rev. Dr. F.D.K Fugar
Supervisors of MSc Research

X.....X.....X

I wish to receive feedback on the research findings, please find my contact details below:

Name:	Email:
Tel:	Fax:
Address:	

APPENDIX 2

FACULTY OF ARCHITECTURE AND BUILDING TECHNOLOGY COLLEGE OF ARCHITECTURE AND PLANNING KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

QUESTIONNAIRE

This research is a Postgraduate level research entitled “Evaluating the Management of Health and Safety by Road Contractors in Ghana” and intends to ensure the proper implantation of health and safety regulations in the road construction sector. **Please, kindly respond to the questions by ticking (√) the appropriate box for each item. Please note that all information provided will be strictly treated as confidential as this work is for academic purposes.**

Respondents Profile

1. Kindly indicate your highest level of educational qualification

PhD MSC BSC HND CTC All

2. What is your Professional Status?

Construction Client Manager/Director

Quantity Surveyor

Civil Engineer

Building Technologist

Contractor Manager/Director-

Others please specify:

3. How long have you been in road construction industry?

Less than 5years 5-10years 11-15years 16-20years More than 20years.

4. How long have you been working in this firm?

Less than 5 years 5-10 years 11- 15 years 16- 20 years More than 20 years

KNUST

5. What would you say about the rate of accident occurring in the road construction sector?

Not high relatively high High Very high

6. What would you say about the severity of injuries sustained by workers in the road construction sector?

Not severe Less severe moderately severe Severe Very severe

7. How effective are the health and safety regulations in curbing the occurrence of accidents in the road construction sector?

Not effective Less effective moderately effective Effective

Very effective

8. How would you rate the following causes of accidents in the road construction sector? Use the scale: 1= Not frequent 2= Less frequent 3= Moderately frequent 4= Frequent 5= Very frequent

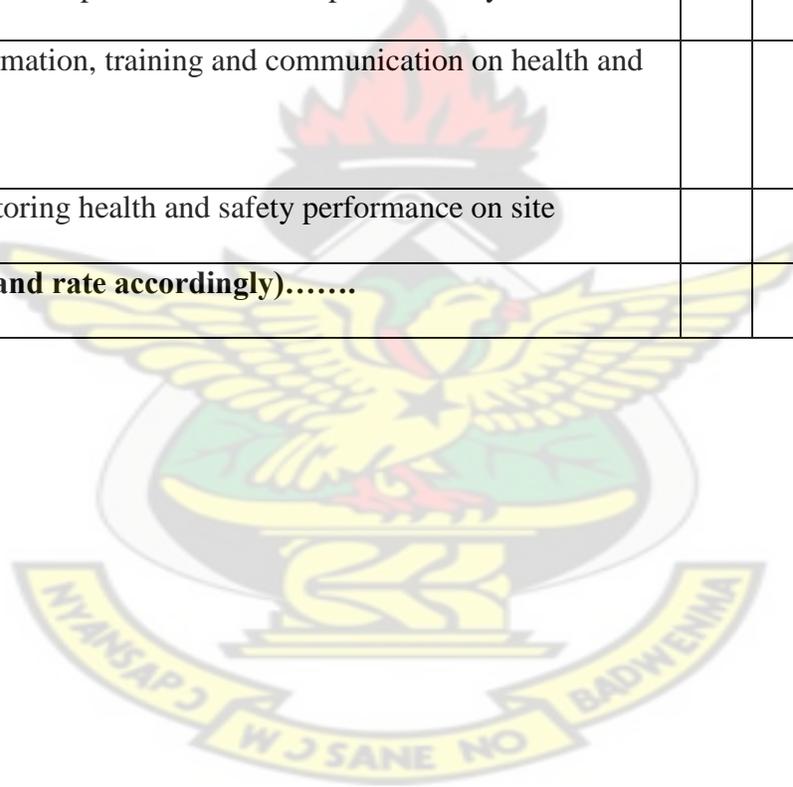
<i>Causes of accidents in road construction sector</i>	1	2	3	4	5
1. Falls from ladders, scaffolds					
2. Transport, vehicles, construction machinery;					
3. Rock slides and contacts with masses in movement					
4. Falling objects, equipment and structures					
5. Poor manual handling practices					
6. Exposure to noise, and vibrating work equipment					
7. Exposure to hazardous substances, such as solvents, fumes, dust and Cement					
8. Lack of coordination among different groups or gangs working on site					
9. Poor site planning and management					
Others (Specify and rate accordingly).....					

9. How important are the following health and safety criteria in assessing the health and safety performance of road contractors. Use the scale: 1= Not important 2= Less important 3= Moderately important 4= Important 5= Very important

Performance criteria	1	2	3	4	5
1. Leadership and Personal Commitment					
2. Training and Competence					
3. Risk Management					
4. Operational Controls and Procedures					
5. Health and Wellness					
6. Contractor Controls					
7. Incident Investigation					
8. Emergency Preparedness					
9. Performance Measurement and Assessment					
Others (Specify and rate accordingly).....					

10. What would you say about the importance of the following measures to curb accidents in the road construction sector?

Measures to curb accidents in road construction	1	2	3	4	5
1. Recognizing the importance of health and safety at the design phase					
2. Having inclusive management, involving all relevant persons					
3. Instituting a good method of risk assessment					
4. Ensuring effective implementation of all prevention systems					
5. Providing information, training and communication on health and safety issues					
6. Effective monitoring health and safety performance on site					
Others (Specify and rate accordingly).....					



APPENDIX 3



Working in a trench without earthwork support



Working in unsupported earth which can cave in



A worker well protected



Workers without safety gloves but wearing some PE while earthwork is not properly supported



A worker well wearing PE but working in unsupported trench



Workers well protected



Unsupported earth that can cave in on a worker in PE



Third party not protected in a pit (see arrow)



A worker well protected in a trench supported



A poorly arranged work area which can cause accident



A worker not wearing PE



A worker without proper protection



Working under risk environment



Poor working environment



Workers well protected but fourth party not protected



Well protected workers



Working under risk situation



Proper health management



A worker wearing PE, but the second party not protected



Workers at site without proper PE



Working without PE



Pedestrians not protected