HEALTH AND SAFETY MANAGEMENT PRACTICES BY BUILDING CONTRACTORS IN THE ASHANTI REGION

A Dissertation submitted to the Department of Building Technology, Kwame Nkrumah University of Science and Technology

In partial fulfillment of the requirements for the award of

MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT,

BY

KWASI YANKAH

FEBRUARY 2012

DECLARATION AND CERTIFICATION

I hereby declare that this submission is my own work towards the M. Sc. Construction Management 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.

Kwasi Yankah (ID: PG1074207)

(Student name and ID)

Certified by

Mr. J. C. Danku
(1st Supervisor)

Dr. T. Adjei Kumi
(2nd Supervisor)

Dr. Joshua Ayarkwa
Head of B. T. Dept.

ABSTRACT

Occupational Health and Safety (OHS) encompass the social, mental and physical well-being of workers, and for that matter the "whole person". In the world at large, more people die at work than in wars (ILO, 2004). Health and safety management in the building industry in Ghana is of major concern to stakeholders and government.

The aim of the study is to assess the level of Health and Safety Management practices of selected Building Contractors in Ashanti Region. Specific objectives include; document the pre-requisite conditions that support the operation of a Health and Safety Management system, document the current practices of selected construction firms in Occupational Health and Safety Management, identify the barriers to the operation of Occupational Health and Safety Management system in Ashanti Region and recommend measures to improve the operation of occupational health and safety management systems on construction sites

The research methodology was carried out over three phases. In the preliminary phase, background information on occupational health and safety were gathered from literature. This helped to capture key issues that helped in developing the questionnaire in the second phase. The third phase of the research methodology focused on the analysis of data collected, using statistical package for social sciences (SPSS V. 16).

The findings revealed that there exist formal health and safety programmes for employees on construction sites. The results also showed not much difference in the views of site managers and site operatives on how frequent health and safety trainings were organized on site.

The research made recommendations to further improve Health and Safety management.

DEDICATION

To God Almighty and my dear wife Rose Yankah (Mrs.) my mother Rev Agnes Othere and my son Jedidiah Kobina Yankah.

ACKNOWLEDGEMENT

My first gratitude goes to the Almighty God for not only the opportunity, but also the guidance and wisdom to go through this programme.

I owe a great deal of appreciation to my supervisors, Mr. J. C. Danku and Dr Theophilus Adjei Kumi, for their precious contribution and guidance. I also recognize with gratitude, the support Prof. Joshua Ayarkwa and the rest of the staff of the Department of Building Technology, KNUST, KUMASI.

I am most grateful to my wife, Mrs. Rose Yankah, who has gone a very long way to support me in diverse ways.

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CHAPTER ONE

1.0 GENERAL INTRODUCTION

1.1 Background of the study

In recent times, Occupational Health and Safety concerns have heightened in the wave of the globalization and the effect on labour standards, environment and public health (Quansah, 2008). According to Quansah (2008), Occupational Health and Safety (OHS) encompass the social, mental and physical well-being of workers, and for that matter the "whole person". In the world at large, more people die at work than in wars (ILO, 2004). The ILO estimates that each year about 2.3 million men and women die from work-related accidents and diseases including close to 360,000 fatal accidents and an estimated 1.95 million fatal work-related diseases.

Health and Safety management in the building and construction industry is generally considered poor. Construction workers are generally susceptible to fatality rates three times the national workplace average and injury rates 50% higher than those experienced in other sectors (Cole, 2003). Construction industry workers are 2.4 times more likely to be killed at work than those employed in any other industry (Cole, 2003). In 2002–2003, poor OHS accounted for 6.3% of Australian GDP (ABS, 2005). In economic terms, it is estimated that roughly four per cent of the annual global Gross Domestic Product, or US$1.25 trillion, is siphoned off by direct and indirect costs of occupational accidents and diseases such as lost working time, workers' compensation, the interruption of production and medical expenses (ILO, 2009). Data from a number of industrialized countries shows that construction workers are three to four times more likely than other workers to die from accidents at work (ILO, 2009)

According to the ILO (2001), the increase in the number of construction workers has led to the profound effect on occupational health and safety issues in the building construction industry. For example in Ghana, the bulk of labourers lack proper places to have their meals and they are often found eating outdoors, exposed to dust in the air, without dining tables or seats (Kheni, 2008). Apart from this, there have been a number of incidents where an employee was injured at a workplace resulting in pain and suffering for the worker and the worker's family (Victoria, 2002).

A Health and Safety Management System involves the introduction of processes designed to decrease the incidence of injury and illness in the employer's operation (Turkson, 2006). Successful implementation of the system requires management commitment to the system, effective allocation of resources, and a high level of employee participation. The scope and complexity of a Health and Safety Management System will vary according to the size and type of workplace (Turkson, 2006).

The overall impact of injuries and illnesses on the economy is significant when both the direct and indirect costs are considered and successful business leaders including building contractors recognise that Health and Safety Management Systems are a necessary part of doing business. The hidden, often unrecorded, *indirect* costs due to non implementation of Health and Safety programs will increase costs resulting from property and equipment damage, production delays, training for replacement workers, investigation time, downtime, missed deadlines, overtime costs and reduced employee morale (Turkson, 2006).

As stated earlier, lost time, insurance costs and other expenses can add up quickly and if an incident draws media coverage, the employer may also find their sales, image and reputation will suffer adverse effects. Of course, the true cost of human suffering cannot be accounted for completely. Implementation of an effective Health and Safety Management System is a proactive way to prevent injuries and illnesses. While it cannot guarantee that incidents will never occur on a work site, an effective Health and Safety Management System will minimize both the number and the severity of workplace incidents, and will help demonstrate due diligence and duty of care in the event that an incident does occur. It can also distinguish a building contractor as an employer of choice in a competitive market.

1.2 Problem Statement

While the promotion of occupational safety and health (OSH) has improved over the past decades, the level of workplace fatalities, injuries and illnesses still remains unacceptably high and takes an enormous toll on men, women and their families. Economies lose out as well; the cost of accidents and ill health amounts to an estimated 4 per cent of the world's GDP (ILO, 2009).

Health and safety management in the building industry in Ghana is of major concern to stakeholders and government. Building contractors, depending on their size, are characterized by smaller work force, using simple tools and most activities being manual. During project delivery, it is deemed essential that health and safety management is carried out throughout the various stages, from inception through to completion and operation of the project. This research topic is to focus on factors that affect the implementation of health and safety management at the

construction or building phase of a project. The reason for the study emanates from the desire to find out whether building contractors do implement health and safety management on site.

1.3 Objectives of the study

The aim of the study is to assess the level of Health and Safety Management practices of selected Building Contractors in Ashanti Region. Specific objectives include.

1. Document the pre-requisite conditions that support the operation of a Health and Safety Management system.
2. Document the current practices of selected construction firms in Occupational Health and Safety Management in Ashanti Region.
3. Identify the barriers to the operation of Occupational Health and Safety Management system in Ghana.
4. Recommend measures to improve the operation of occupational health and safety management systems on construction sites

1.4 Research Methodology

The research methodology was carried out over three phases. In the preliminary phase, background information on occupational health and safety were gathered from literature. This helped to capture key issues that helped in developing the questionnaire in the second phase. The third phase of the research methodology focused on the analysis, using statistical package for social sciences (SPSS V. 16). The methodology applied to this study has been predominantly

quantitative, due to the fact that findings were expressed in figures, tables, charts, graphs and the like directed at developing a deeper understanding of occupational health and safety management systems employed by construction organizations in Ashanti Region. The targeted respondents were site managers and site operatives were selected construction organizations. Questionnaires were distributed and retrieved in person, whiles SPSS was used to analyse the data by ranking some of the health and safety issues evolved from literature. One sample t-test and mean scores were used to rank some of the factors.

1.5 Significance of the Study

This research work on completion will be significant to both academia and the industrial sector as a whole. This study will increase the body of knowledge and literature on the Occupational Health and Safety by building contractors. Recommendations made at the end of this research will enable policy makers and management in the construction sector address issues in relating to Occupational Health and Safety in Ghana.

1.6 Organization of the Study

This study comprises five distinct chapters presented as follows:

Chapter one of this study comprises the introduction, the background of the study, the statement of problem, aim and objectives, significance of the study and finally the organization of the study.

Chapter two will comprise a review of the past and present literature on occupational health and safety by building contractors.

Chapter three of the study will describe the research methodology which will consists of the research design, population, sample and sample techniques, data collection procedure, data analysis, the software to be used, and the source of data used in the empirical analysis.

Chapter four will consists of data presentation, analysis and the discussion of findings.

The final chapter, chapter five, will contain the summary, conclusions drawn from the study and also contributions and recommendations.

1.7 Conclusion

This chapter introduced the thesis. After a brief background, the research problem was highlighted followed by the research aim and objectives. The chapter further described the research methodologies that were adopted and went on further to highlight the significant of the study. Finally, the outline of the thesis is highlighted.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter contains literature reviewed on Occupational Health and Safety in the construction industry. According to Bottomley (1999), several important factors have influenced organisations to adopt a more systematic approach to health and safety and some of the reasons are given below:

- The system based nature of occupational health and safety legislation has encouraged the use of a systematic approach.
- The models used in quality and environmental management have encouraged larger organisations to adopt a similar approach to managing occupational health and safety.

The response to major disasters in the 1980s focused on a greater role for managing safety rather than relegating occupational health and safety to a secondary function. Companies managing high-risk facilities with potential major impacts on the public were keen to demonstrate they had systems in place. The Health and Safety Executive (pg. 3) suggests that the sound principles of health and safety management are indistinguishable from the sound management practices advocated by proponents of quality and business excellence. They offer a model that covers six important elements of successful health and safety management. The elements are described briefly below:

- **Policy:** contributes to business performance

- **Organising:** establishing responsibilities and relationships which promote a positive health and safety culture
- **Planning and implementing:** planning is required to establish and maintain effective implementation of policy and procedures
- **Measuring performance:** essential to maintain and improve health and safety performance
- **Reviewing performance and Audits:** enable organisations to achieve high standards of health and safety management.

Schaechtel (2000) suggests that the health and safety management system is the way in which an organisation can best vie for the manager's time. Pollock (1995) states that the health and safety management system should be an integral part of the business and should join quality, productivity, customer focus and profitability as the way business is done.

2.2 Factors Affecting Health and Safety Management

2.2.1 A normal part of business

The costs associated with health and safety management are linked to legal requirements and financial aspects of a business. There is now great awareness of the role of health and safety management as a factor of business management (CBI, 1997). It is an undeniable fact that health and safety regulation and therefore, health and safety management, is a part of a business and costs associated with health and safety management are an important aspect to be considered.

According to Hoburg (1993), profit is the lifeblood of business and without it business would die, but he warns that if social regulations threaten ultimate profitability, businesses will not adapt to those regulations. Social regulations will be violated unless the enforcement raises the costs of non-compliance above the costs of adaptation. Industry is committed to the advancement of standards in health and safety and Asherson (1995) says that a case has to be proven that legislation and its associated costs are necessary and commensurate with the identified and real risk to the business. Similar thoughts are conveyed by Oi (1980) who informs us that public concern for safety is understandable, due to the nature of some of the tragic events, but safety at any cost is unacceptable, as this may ultimately place some companies out of business. He says that: *"Policies that reduce the frequency and severity of industrial accidents are desirable only if they can be demonstrated that industrial safety is presently below the socially optimal level which minimises the sum of accident prevention costs."*

According to Hawkins and Hutter (1993), construction is seen as riskier than large chemical sites and the reasons given are that construction sites are more noisy, dirty and untidy. They discuss the reasons for compliance with regulation and present the following:

- Whether or not compliance has a pay-off, its attainment can be costly.
- Many businesses comply because they think it is symbolically important to comply (a form of compliance occurring independently of the law).
- Business complies in recognition of the legitimacy of the law (it's not right to violate the law which requires you not to hazard your employees, whether or not you agree with the law).

2.2.2 Cost of accidents

The economic argument for safety has been around for some time and the first detailed study of the cost of occupational accidents came from Heinrich in 1959. Heinrich's work focused on the direct and indirect costs associated with accidents. The study stated that the indirect costs averaged around four times as much as the direct costs.

Many researchers have since been inspired to check the validity of the findings of (Davies and Teasdale 1994) but Heinrich emphasised that it was a purely statistical relationship. The results would differ between organisations, accident types and even departments of the same company. Further literature has extended this message and the cost of accidents to companies is raised by a leaflet produced for the Health and Safety Executive. The leaflet described, how much accidents cost, and what is deemed an accident. It stated that an accident also included damage to property, equipment, materials, as well as, delays in production, and services. The costs of accidents vary depending on the size and type of the company. The costs shown by a study undertaken by the Health and Safety Executive show the following summary from a selection of five case studies:
The same study gave comparison figures for four of the case studies where it was shown that uninsured costs were approximately between 8 and 36 times greater than the costs of insurance premiums paid.

To take the economic argument a step further, an article by Reinfort (1992) in Professional Safety stated the costs of on-the-job and off-the-job accidents are between approximately 2% - 6% of the gross domestic product of countries. This can amount to billions of pounds for some countries in the developed world. Larcher and Sohail (1999) state that health and safety costs

money and the financial, economic, environmental and social costs of deaths, injuries, disabilities and diseases to industry, in particular, and to society in general, is colossal. They advocate that organisations pay the financial costs of complying with legislation rather than suffering from economic or social loss associated with a lack of health and safety management.

In contrast to Larcher and Sohail, Laufer (1987) conducted a study of accident costs between Israel and the United States of America (USA) and concluded that the uninsured costs alone are not enough of an incentive to change attitudes to health and safety. He says that the ratio between indirect and direct costs is invalid and should be abolished. He quotes the uninsured costs in Israel to be 0.76% of labour costs, the equivalent to 0.14% of total project costs and in the USA he quotes 2% and 0.25% respectively.

2.2.3 Costs comparative to the risks encountered

The risks encountered by employees in their work situations vary according to the trade or occupation they are carrying out but are very real. According to Fiora and Specht (1992), the level of risk acceptable differs from company to company and job to job. The costs of health and safety measures to reduce those risks are harder to quantify but there is a lot of best practice in the industry to suggest that there can be some quantification of costs. The other major factor that can influence health and safety costs is of course the legal requirement to comply with legislation. Comparing the costs of health and safety to the risks encountered by organisations is a sound business decision. Grotewold (1997) states that health and safety involves financial principles. He goes on to explain that using financial principles is the best way to get health and safety implemented. He explains that you must identify what you spend your money on, compare it to the established standard, and therefore ensure compliance. This he explains ensures that not only do you protect the worker; you have a decrease in legal liabilities, legal fees and

settlements, a decrease in prosecutions and an increase in good will. Another example of economic analysis is given by Friend (1992) who explains how to allocate funds to protective measures when analyzing accidents. He looks at three scenarios and assesses the cost of each accident compared to the length of time the activity has been carried out. This is then given a probability loss factor. The loss factor is then multiplied by the cost of the accident and the result is the expected value of savings to the company by preventing the accident happening. You then have a figure to work with to implement measures.

2.2.4 Costs of health and safety during tender

Cost is considered to be a major resource when managing projects. UK Contract Research Report 45 (1992) identified from respondents three major problems with the costing and allocating of resources to a project:

- Safety issues are not addressed systematically at the tender stage. *"There was a difficulty in pricing safety aspects of a project, since in many cases such aspects are inextricably linked to the desired method of c*onstruction, rather than the provision of discrete safety items.

- Safety performance compromised because of inadequate tendering procedure. *"Anecdotal evidence suggested that subcontractors may under cost or otherwise under-resource the work. Where there is a chain of subcontracting, the current system does not explicitly provide a means whereby the safety requirements of subcontractors are necessarily incorporated in the bid to the main contractor."*

- Explicitly addressing safety would increase cost of tender. *"The most common point made by respondents related to the financial and commercial repercussions of explicitly including safety requirements at tender stage, unless these had been specifically requested by the client."*.

The Construction (Design and Management) Regulations of the UK 1994 emphasise the need to ensure adequate resources for project management. The three points highlighted in the 1992 report above are re-enforced in the Contract Research Report 179(1998 pg.82)43 which identified that:

"There was no obvious positive inducement for companies to give safety a high priority in business or project planning or tendering. Firms with a high safety profile were not necessarily placed at any commercial advantage, except for petrochemical clients. It would appear that selection of tenders is driven by commercial criteria, principally cost, with safety omitted at the tendering stage"

2.2.5 Health & safety costs during construction

Literature on the costs associated with health and safety management during construction is limited. The Construction (Design and Management) Regulations 1994 (CDM) of the UK addresses the question of adequate resourcing for a project. Regulation 9 requires that the duty holders such as the designers, planning supervisors and contractors will allocate adequate resources to carry out their duties under the CDM Regulations. In the Approved Code of Practice (ACoP pg.34)45 to the CDM Regulations, gives us a description of what resources might entail and they are:

- Plant
- Machinery
- Technical facilities
- Trained personnel
- Time

The research report of Whittington et al. (1992) although anecdotal, suggested that once construction has started certain decisions may be made to save costs due to the under assessment of health and safety during the tender period. A recent survey undertaken by the New Civil Engineer (2001) asked for a response to the following question and may support the findings of the Whittington report: Is enough being spent by contractors to manage health and safety efficiently on site? The response was as follows: 26% said yes, 70% said no. A report by Entec (2000 pg.42) suggests that cost pressures have led to design and build contracts becoming popular, and safety is less likely to be a priority in this type of project. Cost pressures can also lead to poor provision of services such as welfare facilities and low quality PPE.

2.2.6 Time

Time is a resource within the life cycle of a project and is controlled by many levels of manager, but ultimately by the client. Guidance (1998) issued by the Construction Industry Research and Information Association (CIRIA) on planning supervisors, and duties say it is important to consider the implication of .time. The ability to carry out the duties under the Construction (Design and Management) Regulations 1994 (CDM) in a proper manner will be affected by the programme. Time is needed both to plan and to execute duties. If a programme is tight, the duty holders will have to demonstrate that they have the capacity to respond. Whittington et al (1992)

carried out a survey on factors that undermine health and safety. Lack of time was high on the respondents ranking as one of the major factors. This piece of literature also identified that senior and site managers placed production before safety as time pressures often dictated that they did so. Inadequate time spent during the planning and programming stages were also cited as major factors. Tender periods may fail to consider safety issues effectively and this leads to under-resourcing of time. In the survey undertaken, when they asked a site manager if they decided not to take certain precautions or use particular equipment in order to reduce time or cost, 50% of them considered this happened frequently. Joyce (1995 pg. 36) tells us that the amount of time with which an appointer should be reasonably satisfied will depend on the planned durations for design and construction and the scale and complexity of the project.

Reason (1997 pg. 4) explains that production and protection are not equal. This is because those who manage the organisation possess productive rather than protective skills and partly because information relating to production is direct and continuous. By contrast, successful safety is measured by negative outcomes. Because of this, line managers and supervisors cut corners to make deadlines or other operational demands. The shortcuts, which includes saving of time for most part do not create unwanted effects and so become habitual and routine. This gradual erosion of the system's safety, make it increasingly vulnerable to accident causing combinations. Nichols and Armstrong (1973) concluded similar thoughts in their analysis of five accidents in depth. They concluded that illegal practices were normal everyday occurrences and supervisors were condoning safety rule breaches to keep production going.

The report by Entec (2000 pg. 41) for the Health and Safety Executive suggests that schedule pressures can cause health and safety to be overlooked. However, it is felt that even with tight budgets and time-scales good management provides control and ensures a project remains safe. Time pressures can lead to working excessive hours, which may cause health issues, including stress. Time-scales are getting shorter, with many jobs now being fast tracked, such that all contractors are on site at the same time, as opposed to traditionally completing civil work first and following this by M&E. Resource pressures can also lead to the sequencing of events as defined in the original plan being altered, and this movement to a flexible approach with inadequate planning and risk assessment, can lead to accidents (pg.42).

2.2.7 Integrated Health and Safety

According to Quinlan and Bohie (1991), the purpose of integrating health and safety into other management systems is the need for health and safety management to be central, rather than an add-on organisation objective. A similar position has been taken by Phillis (1990) with respect to the integration of health and safety management into strategic planning. Rahimi (1995) follows this strategic point of view and focuses on the integration of health and safety into the organisations overall missions and objectives. This notion of integrating health and safety management into other management systems has been investigated by institutions. The Construction Industry Research and Information Association (CIRIA 2000)56, and the British Standards Institute, give guidance on the production of an integrated management system. The former document purports to integrate health and safety management into quality systems and the latter gives guidance on integrating health and safety with environmental management.

Quality management, health &safety and environmental protection are generally perceived to be separate, and while this may serve specialists in these areas, it is not to the advantage of the industry as a whole.

Lorenzi (1994), states that businesses must strive for the integration of environmental, safety and health systems into business activities and strategies now, because the reporting of this information will become the norm. Curado (1997) says that businesses are committed to regulatory compliance and client requirements more than to implementing their own integrated systems. He questions the validity of health and safety being integrated into quality systems. Based on the pitfalls of existing quality systems he advocates the use of situational management for integrating health and safety. Situational management is used to control the hazards and risks relevant to each individual company. He concludes that health and safety management is currently seen as a necessary burden rather than a potential resource.

2.2.8 Client Pressure

Clients are the individuals, partnerships, corporations or public authorities for whom construction is carried out. McVitte (2000) says that the vast majority of construction is done under contractual arrangements. The procurement method used and the Clients own attitude to health and safety can have a profound effect on the project's health and safety performance. Some clients promote health and safety more than others. Petrochemical companies in particular make it clear that contractor safety performance is a key condition of the contract. The ACoP to the Construction (Design and Management) Regulations 1994 (2000pg. 23) tells us that the regulations are designed to promote a strategic approach to the management of health and safety

risks in construction. It goes on to say that Clients have a key role to play in this as they set the tone of a project and make decisions crucial to its development. Effective implementation of CDM can benefit clients. There is the potential for: Improved planning and control of projects;

(a) Improved communication between the key parties in the project;

(b) A reduction in accidents and ill-health among construction workers as a result of better risk management;

(c) Improved welfare facilities, which enhance the working environment;

(d) Safer, quicker, easier and cheaper construction, maintenance and cleaning work because the hazards, access requirements, etc. were considered as an integral aspect of the design resulting in reduced whole life-cycle costs;

(e) More effective management of future work on the building or structure because of the information in the health and safety file;

(f) Avoidance of bad publicity following accidents; and

A comprehensive report by Entec (2000 pg. 36) shows that the findings from UK consultation and international survey emphasize that Clients have significant influence over construction health and safety but are not using this influence to the full. The industry feels many Clients are ignorant of their role and are detached from their projects. Clients take a wide variety of approaches to health and safety. Some clients working in highly regulated areas such as the chemical industry or the prison service set high standards and expect these to be matched by other companies in the construction chain. The perception of health and safety standards then falls through the civil engineering sector to the house building sector, with Local Authorities

named frequently as a poor client due to inadequate provision of resources and setting unrealistic time-scales. Following the award of a contract, some Clients expect site work to start within a very short time (pg.41). The commitment level (pg. 52) of Clients is varied with the report suggesting while some Clients are demanding regarding safety standards. Most Clients place little importance on health and safety and they often do not see project safety as an issue to concern them. Poor awareness (pg.62) of site issues may mean that Clients do not appreciate issues such as:

- The effects that poor standards of welfare facilities have on the morale of the workforce, and hence the standard of work and levels of wastage;

- The way in which adverse weather conditions can slow work, such as an inability to work at height when exposed to high winds;

- Difficulties arising due to the short time between award of project and starting work on site;
- The effect of a change in project specification on project planning and implementation;
- The effects of working excessive overtime and night shifts to meet project deadline.

2.3 GENERAL RESPONSIBILITIES FOR SAFETY

According to Magid et al. (1982), employees at all levels are involved in accident prevention, but the main responsibilities rest with the directors and management who alone have the authority to issue orders and direct work. Provided however, that the correct orders are given, the actual time

required from top management may be quite small. More time and effort are required from the safety officers, the supervisors or foremen, the training department and the workers themselves, although once a hazard has been successfully eliminated, it should not reappear provided normal caution is exercised (Magid et al., 1982).

Management is responsible for controlling the unsafe acts of employees chiefly because the unsafe acts occur in the course of employment, which the management creates and directs. Management can control its employees by selection, training, instruction and supervision (Magid et al., 1982).

According to Magid et al. (1982), the responsibility of the directors and senior management at a company for safety are basically twofold.

i) Management is responsible for the safe mechanical and physical conditions in the work places of which it has charge.

ii) Management, because of its ability and opportunity, is responsible for preventing unsafe working practices by its employees.

2.4 SAFETY AND HEALTH MANAGEMENT

According to Peyton et al. (1991), safety and health management starts with a company's commitment to establish an effective working safety program. Planning translates that commitment into reality. To be effective, a safety program must be well organized. Planning and organization must involve all aspects of the company's business and must encourage the workers to actively participate within the safety effort.

Companies can take advantage of a multitude of basic safety program materials available and modify them to suit their particular needs.

2.5 MANAGEMENTSAFETY POLICY STATEMENT

There should be a company's management safety policy statement, which outlines the company's philosophy on safety and sets the tone for management's commitment to that safety effort. According to Peyton et al. (1991), policy must be a simple and concise statement of the assigned overall responsibilities for safety in all departments of the company and should be realistic and enforceable. To communicate the company's commitment to a safer workplace, this policy should be signed by the company's chief executive officer or the highest project management representative.

Davies and Tomasin (1999) suggest that the company policy statements issued by employers should be clearly understood by their employees. Policy statements should indicate how the company is organised with respect to the health and safety responsibilities of the management, and should further state the managers' commitment to providing safety information, training and advice to employees. It is very important to enhance the ability of the workers and the managers to anticipate possible hazards in the work place. However, according to Wilson (2000), companies with poor safety performance often leave safety training to site experience, and this may be inadequate to prevent occupational accidents. Nishgaki (1994) and Garza (1988) both recommended that educating workers about all aspects of work safety and giving them the skill to look after themselves is the right thing to do. Davies and Tomasin (1999) suggest that

effective training in the construction industry is one means by which safety can be improved and company management must be active in order to reduce the number of injuries and fatalities.

2.6 BASIC ELEMENTS OF AN EFFECTIVE SAFETY PROGRAMME

2.6.1 Management Commitment to Safety

According to Peyton et al. (1991), safety effort without the full support of the company's top management will meet with only limited success. A company should have a written safety policy that is clear and easy to understand. That policy should outline the company's belief that safety takes precedence over other job-site considerations. One accident can turn a small gain into a large loss through increased medical costs, insurance costs and litigation.

Nishgaki (1994) carried out an investigation of 35 cases of construction injuries that occurred between 1981 and 1985. During interviews with construction managers and workers, he found that "humanware" accounted for much of the underlying causes of occupational accident recurrence. He defined "humanware" as a function composed of leadership, fellowship, and the interaction between them. His research suggested that the major causes of OHS failures are; inadequate safety education, inadequate instruction, poor housekeeping and ``willful transgression''. According to Nishgaki's research, employers' and employees' attitudes play a major part in safety on site. Nishgaki's findings showed that management commitment is responsible for the majority of the "humanware" problem. Jaselskis (1996) commented that management needs to be more active in the safety program and where possible, superintendents should also play a significant role in determining the safety performances on their projects. Research by Dejoy (1985) showed that safety records reflect how upper management perceives the causes of safety performance. The safety program is most effective when it involves two-way

communication between workers and managers. However, high level management often has little firsthand experience on site; it is therefore difficult for them to relate to the needs of the workers. The wearing of protective clothing and the use of safety equipment is crucial in reducing the effects of accidents on construction sites. However, both Harper (1998) and Holmes (1999) suggested that management commitment is required to enforce the wearing of safety equipment. It is often the case that safety equipment is provided, but employees are reluctant, or neglect, to wear it. Consequently, the provision of safety equipment alone does not improve construction site safety, there also needs to be a corporate culture that encourages its use.

2.6.2 Safety Training

According to Peyton et al. (1991), safety training and orientation are necessary elements of an effective safety program. Supervisors and workers must understand the company's safety policy and procedures and the hazards associated with the work. When employees first arrive on site, a safety orientation training program should be provided. This training session can cover the company and project safety policies, safety regulations, site orientation, personal protective equipment and OSHA required training.

Periodic safety training sessions held with crew introduces new procedures and re-emphasizes safety training. On most construction sites, this is accomplished with a weekly toolbox talk meeting held by the crew supervisor. Supervisors need a periodic safety training to reinforce safety procedures. Additional training reaffirms the company's commitment to safety and allows a review and discussion of specific job site problems and concerns.

Whenever possible, management should make use of outside sources for additional training programs and sessions.

2.6.3 Periodic Safety Performance Review

A monthly review of the project safety record including accident statistics, reports of injuries and results of safety inspections is a valuable safety tool. Such a review focuses attention on the safety effort and can pinpoint those problem areas that need further safety attention. It is important to know the causes of accidents so that attention can be directed at controlling them. We must consider the cost of accidents when assigning safety resources.

2.7 UPPER MANAGEMENT AND SAFETY

Top management's commitment to safety or lack of commitment will set the tone for the rest of the company. Top management must take every opportunity to become involved in its company's safety effort (Peyton et al., 1991).

Analysis of companies with records and successful safety efforts shows the following common traits shared by the company are their commitment to the company safety effort. They work to remove bureaucracies between themselves and their employees that impede open communications.

2.7.1 Management Emphasizes the Safety Message

They take the opportunity to make comments about the company safety effort and the company's commitment to safety. Top management can increase safety awareness by taking the time to discuss safety along with costs and schedule concerns whenever they are on site. Awareness of top management's concern for safety reduces the tendency to place production concern above all else and lets employees know that the company considers safety and production equal partners. Successful safety managers also take the time to give positive and negative feedback to employees on safety performance and issues.

Top management in companies with exemplary safety efforts expects project managers to be knowledgeable about all aspects of their projects safety program and record. That expectation ensures that project managers will be informed of safety related issues and problems and be more safety conscious.

2.7.2 Safety Used as Part of Performance Evaluations

A company committed to safety uses safety performance as a measurement in employee performance evaluations. Employee promotion and other recognitions take into account the employee's record and attitude on safety as part of the overall evaluation process. This is because when a company gives lip service to safety and rewards employees for poor safety performance, it is ensuring that employees will not take safety seriously.

2.7.3 Separate Safety Budgets and Accident Costs

Companies with good safety efforts allocated safety expenditure at the corporate level and assess accident costs at the project level.

Assessing accident costs at the project level places the responsibility for safety performance with project management, those individuals with direct day-to-day impact on safety performance. It also serves to keep top management informed and to help pinpoint potential safety problems.

2.8 WORKER - MANAGEMENT PARTICIPATION GROUPS

According to Peyton et al. (1991), worker management safety participation groups encourage employees to report unsafe conditions. The use of the employee's craft and work-site knowledge can be expanded to involve employee's participation in:

- Job safety analysis
- Revision of job safety rules and procedures
- New employees safety orientation and on the job safety monitoring and training
- Emergency response teams
- Safety committees
- Accident and claims review committees

Employers who encourage worker participation in the safety process and provide a forum for workers to express their concerns to top management are viewed as more safety conscious and more concerned with their employees.

Most construction employers already practice an open door policy related to workers safety concerns. When employers ensure that these concerns are acted upon, they reinforce their company's commitment to safety. When employers take the time to tap worker creativity and harness worker energy in solving safety problems, they make safety a collective team and concern.

- *Safety committee*

Employees tend to be more aware of hazards in the work place than employers and therefore should be involved in the safety program. They can relate more easily to the safety program if they are involved. It has been shown that regular meetings held on site help to find OHS problems and solutions and improve accident prevention (Hinze, 1988). A safety committee often consists of representatives of the employer, worker and subcontractor. This encourages interaction between the parties and helps improve trust and communication and the expertise of each party can be put to use. Safety committees have proved to be effective in discovering unsafe practices and problems. Nishgaki (1994) suggested that regular inspection of the site by safety patrols promotes good job safety. Similarly, Hinze (1988) found the more site visits by the upper managers the better the site safety. Pre-construction site reviews help establish areas of concern and later "tool box" meetings give the chance for the employee to be involved (Harper, 1998). A safety committee helps to promote accident prevention and safe working habits by the employees. Nishgaki (1994) revealed that management commitment should be backed up with means such as hardware (safety equipment) and the continued enforcement by software (standard work procedures, safety regulations). Lingard and Rowlinson (1994) found that more sophisticated scheduling methods improve OHS standards, but often they can only be carried out with larger companies because of their expertise and resources.

2.9 PARTICIPATIVE MANAGEMENT

According to Delle et al. (1961), participative management is a method of involving every member of the organization in the decision making process. Top management retains the right of final decision making authority. However, the line workers opinions are welcomed and valued. The type of information and access to the information available to each level of the organization is important.

Participative management in the safety realm is a wonderful idea. The intent of participative management in the safety area is to have the employees, most affected by the dangers to suggest corrective measures. The workers are exposed to many risks and dangers; therefore they should be able to best describe what the hazards are and how they will best be abated. Involving the line workers in the decision making process will develop, in these individuals, a sense of ownership for the system. They will take pride in knowing that what they have suggested is now being placed into action. In addition, they will experience a definite satisfaction in understanding that what they helped develop will prevent others from being injured or killed. It may be necessary to educate the employees as to whom and what will be affected by their decisions. Management will be receptive any time they are presented with an alternative that will improve safety without a loss in production.

2.9.1 Employee Motivation

According to Peyton et al. (1991), it was realized that factors that motivate employee safety are:

1. A good safety orientation program
2. A good safety program
3. Overtime
4. Good craft relations
5. Solicited employee suggestion
6. Well planned projects
7. Pay packet
8. Recognition
9. Defined goals

2.9.2 Safety Standard Practice Procedure

Every construction firm should have their set of safety standards and standard practice procedure, copies of which can be reproduced in sufficient numbers to supply all new key employees and supervisory staff. This instruction must not supersede safety codes of governmental authorities (Deatherage et al., 1964).

A careful check-up on the cause of accidents in industry shows that seven out of every ten are preventable by mechanical means. The remaining three can be prevented by education of the worker in safer habits and practice. No hard and fast rules will ensure safety on a construction job. It can be secured only by constant and careful attention on the part of the superintendent and foremen, with the cooperation of the workmen (Deatherage et al., 1964).

The actual work must be done on the job and the foreman is the key to the situation. It is up to the foreman on this work to guide the workmen into safe practices and so to conduct the operations under his charge to reduce hazards to a minimum (Deatherage et al., 1964).

2.10 LEGISLATIONS AND POLICIES OF OCCUPATIONAL HEALTH AND SAFETY IN THE CONSTRUCTION INDUSTRY

This section acknowledges the international legislations and policies of occupational health and safety (OHS) in the construction industry in relation to labour. The international legislations and polices are important because most of the National laws and regulations on labour are often based on international conventions, agreements, declarations.

2.10.1 What is Occupational Health and Safety?

Health is a sound state of the body and mind of people from illness resulting from the materials, processes or procedures used in the workplace, while safety is the protection of people from physical injury (Hughes et al., 2008). Thus occupational health and safety (OHS) can be seen to concern the physical and mental well-being of the individual at a place of work. Workplace in the construction industry is most often than not referred to as construction site. Therefore, occupational health and safety issues become a primary concern to governments, employers, employees, and project participants alike, as construction activities are likely to adversely affect the health of both construction workers and other persons on construction sites.

2.11 OVERVIEW OF THE INTERNATIONAL LABOUR ORGANIZATION

The International Labour Organization (ILO) is a specialized agency of the United Nations. It was established in 1919 with the principal objective of protecting Human Rights of workers and to promote decent work for all races. The organization drafts and adopts conventions, with its recommendations to all member states that have accepted the ILO conventions, and are in pursuance of its aims and objectives. The ILO combines standard-setting, among other things, to all member states who have adopted, pledged to respect and promote human rights.

To this effect, in 1988, the Health and Safety in Construction Convention (No. 167) and its associated Recommendations (No. 175) were adopted to serve as a blue print upon which legislations and polices of member states' health and safety issues would be built on. The enactment of the law on occupational health and safety in the construction industry was necessary to reflect the broad approach in tackling the health and safety problems in the construction industry. Complementing this law is the ILO Code of Practice on Health and Safety on Construction sites which was also approved in 1992.

2.12 THE CODE OF PRACTICE ON HEALTH AND SAFETY ON CONSTRUCTION SITES (ILO, 1992)

Generally, a code of practice is a set of rules according to which people in a particular profession are expected to behave or practice. The ILO's Code of Practice on Health and Safety on Construction site provides guidelines in the implementation of the Health and Safety practice on construction sites for all workers including casual workers. The document outline the steps that have to be taken, among others to provide adequate welfare facilities, personal protective equipment appropriate for a job and provision and maintenance of safe working environment to

all workers on site. Salient portions of the code relevant to this study are explained and presented below.

2.12.1 Welfare Facilities

Under the general provisions of welfare facilities, it writes "at or within reasonable access of every construction site, the following facilities should, depending on the number of workers and the duration of the work, be provided, kept clean and maintained:

• Sanitary and washing facilities or showers;

• Facilities for changing and for the storage and drying of clothing;

• Accommodation for taking meals and for taking shelter during interruption of work due to adverse weather conditions"

2.12.2 Sanitary Facilities

The Sanitary facilities are defined to include toilet, privies, chemical closet. The understanding from the document is that, the provision, the construction and the installation of these facilities should comply with the requirements of the authorities (laws of the land). Further, no toilet other than a water flush toilet should be installed in any building containing sleeping, eating or other living accommodation, and should be adequately ventilated and not open directly into occupied rooms. Adequate washing facilities should be provided as near as practicable to toilet facilities.

2.12.3 Washing facilities

The rules governing washing facilities (e.g. shower-bath) are that, the number and the standard of construction and maintenance of washing facilities should comply with the requirements of

the authorities. Washing facilities should not be used for any other purpose and where workers are likely to be exposed to skin contamination by poisonous, infectious or irritating substances, or oil, grease or dust, there should be a sufficient number of appropriate washing facilities or shower-baths supplied with hot and cold water.

2.12.4 Cloakrooms

A cloakroom, or sometimes referred to as coatroom, is by definition a room where coats and other articles may be left temporarily (Harris, **2005)**. On construction site, the cloakroom is normally part of the site accommodation provided by the main contractor and it should be provided for all workers at easily accessible places and not be used for any other purpose. Cloakrooms should be provided with suitable facilities for drying wet clothes and for hanging clothing. Where necessary the contamination of the room should be avoided. Suitable lockers separating working from street clothes must be provided. Suitable arrangements should also be made for disinfecting cloakrooms and lockers in conformity with the requirements of the authorities.

2.12.5 Drinking Water

The code requires that, contractors must provide enough water for all workers and the treatment of the drinking water will be as follows. All drinking water should be from a source approved by the authorities. Where such water is not available, the authorities should ensure that the necessary steps are taken to make any water to be used for drinking fit for human consumption. Drinking water for should be stored in closed containers only, from which the water should be dispensed through taps or cocks. If drinking water has to be transported to the worksite, the transport arrangements should be approved by the authorities. The transport tanks, storage tanks

and dispensing container should be designed, used, cleaned and disinfected at suitable intervals in a manner approved by the authorities. Water that is unfit to drink should be conspicuously indicated by notices prohibiting workers from drinking it. A supply of drinking water should never be connected to a supply of water that is unfit to drink.

2.12.6 Facilities for Food and Drink

Contractors are required in appropriate cases, depending on the number of workers, the duration of the work and its location, adequate facilities for obtaining or preparing food and drink at or near a construction site should be provided, if not otherwise available. The facilities should be hygienic and located in hygienic environment.

2.12.7 Living Accommodation

The code of practice requires that suitable living accommodation should be made available for all the workers at construction sites which are remote from their homes. Adequate transportation between the site and their homes should be provided, and where this is not possible other suitable living accommodation should be provided. Men and women workers should be provided with separate sanitary, washing and sleeping facilities.

2.12.8 Personal Protective Equipment and Protective Clothing

Under this provision, employers were to note that suitable personal protective equipment and protective clothing, having regard to the type of work and risks, should be provided and maintained by them without cost to the workers. Also under this provision, personal protective equipment and protective clothing should comply with standards set by the authorities, taking into account as far as possible the ergonomic principles. Further, employers should provide the

workers with the appropriate training to enable them to use the individual protective equipment, and should require and ensure its proper use.

2.12.8.1 Types of Protective Equipment and Protective Clothing

Employers are required by law to provide all workers including casual workers with the following personal protective equipment and protective clothing on site.

- safety helmets or hard hats to protect the head from injury due to falling or flying objects, or due to striking against objects or structures;
- clear or coloured goggles, a screen, a face shield or other suitable device where workers are likely to be exposed to eye or face injury from airborne dust or flying particles, dangerous substances, harmful heat, light or other radiation, and in particular during welding, flame cutting, rock drilling, concrete mixing or other hazardous work;
- protective gloves or gauntlets, appropriate barrier creams and suitable protective clothing to protect hands or the whole body as required, against heat radiation or while handling hot, hazardous or other substances which might cause injury to the skin;
- footwear of an appropriate type when employed at places where there is the likelihood of exposure to adverse weather conditions, or of injury from falling or crushing objects, hot or hazardous substances, sharp-edged tools or nails and slippery or ice- covered surfaces;
- respiratory protective equipment, suitable for a particular environment, where workers can be protected against airborne dust, fumes, vapours or gases by ventilation or other means;
- a suitable air line or self-contained breathing apparatus when employed in places likely to have an oxygen deficiency;

- respirators, overalls, head coverings, gloves, tight-fitting boiler suits, impermeable footwear and aprons appropriate to the risks of radioactive contamination in areas where unsealed radioactive sources are prepared or used; and
- waterproof clothing and head coverings when working in adverse weather conditions

From the above section, it can be concluded that the legal framework (i.e. the ILO's Code of Practice on Health and Safety on Construction site) for construction workers in general is adequate to protect them. This legal framework covers both permanent and casual workers.

Baah et al (2006) indicated that Ghana has so far ratified 46 ILO Conventions including Convention No. 167 and its associated Recommendation No. 175. However, it appears that Ghana has not been able to develop a comprehensive separate legislation and policies (in the context of OHS) for her construction workers, but rather it appears the industry depends on the National labour Act 651 of 2003, Factories, Offices and Shop Act of 1970 and Workmen compensation Act 1987 and Building Regulation.

2.13 OCCUPATIONAL HEALTH AND SAFETY IN AFRICA

The need to strengthen the field of occupational hazard prevention and control in Africa is urgent, as the current neglect carries a heavy burden of disease and disability (Goldstein &.Eijkemans, 2000) According to Goldstein and Eijkemans (2000), safer and healthier work conditions can make an important contribution to poverty alleviation and sustainable development in Africa. In addition efficient application of available knowledge to practical solutions to overcome the "knowledge application gap" is more important than generating new theoretical knowledge.

In the majority of African countries, the informal sector of the economy is an employment refuge for workers who fall out from the formal sector, and provides a safety net for poor households' income. Small enterprises and the informal sector are becoming the de facto mainstream, and the realm of employment for the majority of urban dwellers in developing countries (Goldstein &.Eijkemans, 2000). Occupational health services and supporting legislation require refocusing, revision and strengthening to respond to this reality. Often basic preventive measures including education and training for health and safety are overlooked. The informal sector includes many women and children; they are usually not covered by legislation, and do not have access to occupational health services (Goldstein &.Eijkemans, 2000).

2.13.1 A Planning and Implementation Framework for the African Initiative on Occupational Safety and Health.

The "African Initiative" on Occupational Health and Safety, was launched in South Africa in 2000. This initiative brought together local, national and international/regional components to set a common agenda on improving health of workers in the African Region. It currently serves as a fund raising platform for the projects and activities for occupational health in Africa (Goldstein &Eijkemans, 2000). The Initiative promotes policies for health at work, a healthy work environment, healthy work practices, occupational health services (including ergonomics, industrial hygiene, and safety), support services, occupational health standards, human resource development, collection of data as evidence for policy, information and awareness, strengthening of research, and collaboration with other services.

Regionally and internationally the initiative has raised the profile of occupational health and safety as a vital aspect of poverty alleviation and sustainable development in Africa, to support local initiatives as an integral part of development activities in many sectors. In November 2000 the initiative was presented to the Southern African Development Community (SADC), comprising Angola, Botswana, DR Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe (Goldstein &. Eijkemans, 2000).

WHO's Occupational Health programme works in the area of Workers' Health promotion and protection, for the most vulnerable groups of workers in Africa: workers of the informal sector, women and children. The Cities project proposed by WHO aims at pulling together several resources in the different countries. It builds on existing experiences and projects, such as the African Healthy City approach, the PACE (Prevention and Control Exchange) project.

In the first instance, five cities in Anglophone Africa are identified for the development of materials and the model has been expanded to other cities and other language groups. These cities are Johannesburg and Cape Town in South Africa, Dar es Salaam in Tanzania, Yaoundé in Cameroon and Harare in Zimbabwe. After a first identification mission in April 2000 to South Africa and Zimbabwe, important partners and opportunities have been identified. In order to jumpstart the project, all stakeholders were involved in the planning meeting in South Africa in October 2000. In order to raise awareness in different countries in the world on the importance of improving the working conditions and health of workers in small scale enterprises and the informal sector, WHO prepared a document for decision makers to be implemented in the various countries (Goldstein & Eijkemans, 2000).

2.13.2 Occupational Health and Safety in Ghana

The Occupational Health and Safety (OHS) of persons employed in the industrial sector in Ghana are regulated by the Department of Factories Inspectorate. The Inspectorate is responsible for the promotion and enforcement of regulatory measures to give effect to the provisions of the Factories Offices and Shops Act (FOSA) 1970 Act 328. There are other agencies such as the Radiation Protective board of Ghana Atomic Energy Commission, The Ministry of Health and Mines Department which play complementary role in the promotion, but not enforcement of O.H.S measures.

The diversity of the agencies involved in this programme underscores essentially the multidisciplinary and inter-sectoral approach to the promotion of O.H.S. The fragmentation of such implementing agencies detracts from the main stream focus and direction necessary for effective prevention of occupational accidents and work related diseases.

The Department of Factories Inspectorate of the Ministry of Employment is the national agency responsible for the prevention of occupational accidents and work-related illnesses because of its recognition by the International Labour Organization as the focal institution. According to Bruce (2006), there is the need for tripartite role of government, workers and employers as a basis for any effective O.H.S programme at the national level. Bruce (2006) emphasis that there is the need to recognize the important role of management and workers who are expected to show commitment and to participate actively in O.H.S programmes Ghana.

These main actors according to Bruce (2006) should be more familiar with the material elements of work including workplaces, working environment tools, materials, equipment, substances among others. They do the purchasing of the means of production and work with them. It should

therefore be expected that they can more-effectively evolve systems and organizations to improve their safety performance. However, they can only do this if they are properly informed to be able to identify the hazards in the work environment, the mode of avoidance or prevention of these hazards and the need, especially having regard to the dangers involved, to avoid these hazards. There is the need for periodic and continuous education and training of our stakeholders (Bruce, 2006).

Ghana as at now has no national policy on O.H.S. A draft policy document prepared in 2004 has not been processed for adoption, even though article 4 of the ILO convention 155 –Occupational Safety and Health Convention, 1981 requires the nation to give effect to the provisions of this convention (Bruce, 2006). The aim of this policy according to Bruce (2006) is to prevent injury to health arising out of or linked with or occurring in the course of work. It requires each member state to formulate, implement and periodically review a coherent national policy on occupational health and safety the working environment (651). The current national labour Act 651 does not include any comprehensive provisions on occupational health and safety.

Chemicals that are banned, restricted or strictly monitored in Europe America and some other developed countries are commonly used in the industrial sector in Ghana (Bruce, 2006). Persons with requisite technical knowledge and expertise in the design, fabrication and installation of safety guards and dangerous moving parts of machinery are either not available or scarce in the country.

In spite of the blatant obstacles to the effective management of occupational health and safety, a progressive process of legal reform has been initiated to bring our national occupational safety and health laws in line with current thoughts and developments in OSH, and to ensure as far as

possible, Ghana's compliance with ratified ILO convention and to strengthen and make more effective the enforcement powers of the factories inspectorate (Bruce, 2006).

A new bill "Occupational Health and Safety, Bill" has been amended to replace the Factories Offices and Shops Act presently in operation. The amendment of the Act is intended to reflect its possible applications to premises and other activities, and places of work which are not necessarily factories, offices and shops. The bill seeks to protect the public from risks to safety and health arising out of activities of persons employed in factories, offices and shops and other premises and activities to which the provisions of the Bill may be extended. It seeks to extend and strengthen the provisions of the FOSA to deal with additional hazards and to give greater powers of enforcement to factory inspectors. The bill which was drafted in 1995 is yet to be promulgated.

The Bill Seeks to protect the public from risks to safety and health arising out of activities of persons employed in factories, offices and shops and other premises and activities to which the provisions of the Bill may be extended. It seeks to extend and strengthen the provisions of the FOSA to deal with additional hazards and to give greater powers of enforcement to factory inspectors.

One major strategy adopted in strategically managing occupational health and safety in Ghana is Safe Place Strategy, which is based on the assumption that the material elements of work (equipment, machinery, substances, working environment etc.) are safe and without risk of injury to health and safety especially having regard to acceptable occupational health and safety standards (Bruce, 2006).This requires direct practical action to be taken to eliminate or control the hazards at source.

However, there are limitations to this strategy due to the dynamic nature of the condition of the elements of work (machinery, equipment, substances etc) and the human interaction with these elements (Bruce, 2006). A machine with a relatively safe noise level may become noisy and unsafe in a matter of minutes or days due to worn out or defective bearing. Dust free working environment may suddenly become dusty due to defective dust filter in a ventilation system. A fixed guard may be removed and not fixed back in position. Where the safety of the elements of work cannot be assured, the normal action is to protect the persons employed from excessive exposure to the risk by the provision of Personal Protective Equipment (PPE). The intention is to make the person safe by isolating him from the hazard. This is used as a temporary measure because of the incompetence of protection.

The problems associated with PPE according to Bruce, (2006) are:

- Maintenance of Equipment
- Poor fitting due to anthropometric characteristics, which may be different from the country of origin of PPE. (This may be a source of leakage or contamination)
- Keeping in place PPE – while exposed to hazards in working environment (climatic conditions discomfort).
- Proper selection of PPE – usually from the open market – without any technical data regarding nominal protection factor and threshold limit values.

2.14 Conclusion

This chapter reviewed literature on occupational health and safety management programme, legislations and policies of occupational health and safety in the construction industry, factors

affecting health and safety management, general responsibilities for safety, management safety policy statement and basic elements of an effective safety programme.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Introduction

This research investigates health and safety management by selected building contractors in Ashanti Region. The findings will build on existing research and provide knowledge that will assist building contractors to effectively management health and safety issues on site. The relevant information/data will be obtained and how it will be obtained is contained in this chapter. This chapter discusses the research design, the sampling method, data collection and data analysis method.

3.2 Research design

The research procedure is initially an extensive literature search on existing work on Health and Safety management in the Building Construction industry and later a survey using self-administered questionnaire approach. Statistical techniques will then be used to analyse the information gathered.

Below is a summary of the procedure for the research;

1. Searching for literature at libraries, on the internet, from journals, magazines, publications, research thesis and relevant textbooks on Health and Safety Management.
2. Questionnaire survey using sampling methods on building site managers and operatives of building construction companies
3. Analysis of questionnaire using statistical techniques.

3.3 Sample Selection

According to information received from the Ashanti Regional branch of the Association of Building and Civil Engineering Contractors of Ghana (ABCECG), the number of building contractors in the region is about 2,400. This according to the Association forms about 12% of the number of contractors in the country.

3.3.1 Sample Size

To determine the minimum sample size of these registered contractors in the Ashanti Region, Kish (1965) formulated a formula:

$n = k /(1+(k / N))$

Where:

n = Sample Size

$k = S^2 / V^2$

N = Population Size

S = Maximum standard deviation in the population element (total error = 0.1 at a confidence level of 95%)

V = Standard error of sampling distribution = 0.05

P = the population elements.

$S^2 = P (1-P) = 0.5(1-0.5) = 0.25$

Therefore in determining the minimum sample size of contractors in Ashanti region given that

N = 2400

$k = S^2 / V^2$

$= 0.25/ 0.05$

$= 100$

n = k/ (1+(k/N))

= 100 / (1+ (100/2400))

= 96

n = 96 means that, the sample size of building contractors in Ashanti Region is approximately 96 and this is the number to which the questionnaires will be sent. Assuming that there is high response rate and all 96 completed questionnaires were retrieved, then the data would be large enough for the sampling distribution of the proportion to have a normal distribution. However, Ahadzie (2007) asserted, given that it is highly uncommon to achieve a survey response of 100%, an appropriate sample size would have to be adopted that would help achieve the target of 96 as far as possible. To this effect, 48 contractors was decided on, based on the fact that Hammond et al (2006) cited by Ahadzie (2007) affirmed that, for a typical survey undertaken in Ghana, it is always best to assume a 50% response rate for the sampling distribution of the proportion to have a normal distribution. Hence, the minimum expected questionnaires to be retrieved from contractors are 48.

3.3.2 Sample Selection Method

The sample selection method used in this study is the random sample selection of the respondents. The list of respondents was entered on to a computer and the selection of firms was done by programming the computer to select firms at regular intervals on the list.

3.4 Characteristics of the Respondents

Out of the 100 questionnaires distributed, a total 65 questionnaires were retrieved representing about 65% response rate. The 65% response rate achieved was good enough for one to draw reasonably firm conclusions, thus Hammond et al (2006) advices that, for a typical survey undertaking in Ghana, it is always best to assume a 50% response rate for the sampling

distribution of the proportion to have a normal distribution. The table below shows the characteristics of the respondents

Table 3.1: Characteristics of the Respondents

Category	Frequency	Percent	Valid Percent
Managers	27	41.54	41.54
Operatives	38	58.46	58.46
Total	65		

(Source: Author)

From table 3.1, out of 65 respondents, 27 were contractors-i.e. owners of companies, project managers and site supervisors representing 41.54% and 38 were operatives representing 58.46%.

3.5 Design of Research Instrument

In order to achieve the aim and objectives of the study, well structured close-ended questionnaires were designed to gather information from building construction sites in Ashanti Region Metropolis. These questions were ethical and feasible questions that measure knowledge and were without biased wording, questions with multiple options which gave the respondents the opportunity of presenting their ideas by way of selecting from the options provided.

Close-ended questionnaires were used because, Glasow (2005) has indicated that these types of questions are easy for respondents to answer and for researchers to analyze the data. According to

Salant et al. (1994),closed-ended questions with ordered choices, for example multiple choice questions are useful for ranking items in order of preference. Further, Fowler (1995) suggested that close-ended questionnaires are used to gauge the respondents' ability to provide informed responses or to identify respondents who believe they are informed and compare their responses to those who do not believe they are informed.

3.5.1 Structure of questionnaire

The questionnaire was in five sections. The first section sought information on the background of respondents; the names of their companies, locations, class of contractor types they belonged to, their genders, their number of years of experience in the construction industry, and their educational backgrounds. The section sought to document conditions that support the operation of occupational health and safety management systems in their industries. They were asked to indicate whether they had any formal health and safety programmes for their employees. They were also asked to indicate how frequently their companies undertook health and safety trainings for their employees based on a Likert scale of 1 to 5, where "1= Highly Infrequent" and "5= Highly Frequent". They were further asked to indicate on a Likert scale how frequent their companies kept records on accidents on the construction site. Finally, they were asked to indicate how frequently incentives were provided for good safety performance on site.

The first part of the third section of the questionnaire asked the respondents to indicate whether some selected practices were performed on site in order to meet occupational health and safety requirements based on a Likert scale of 1 to 5, where "1=not performed at all" and "5=Highly performed". The second part of the third section sought to find out their perceptions of the level of contribution of some selected factors to health hazards on construction sites. These factors

were ranked based on a Likert scale of 1 to 5 where "1=Very low contribution" and "5= Very high contribution".

The section four asked the respondents to rank based on a Likert scale of 1 to 5 influential barriers that hinder the operation of occupation health and safety management systems, where "1=Not Influential" and "5= Highly Influential".

Finally, section 5 asked respondents to rank the level of importance of measures that can improve the operation of occupational health and safety management systems on construction sites based on a Likert scale of 1 to 5, where "1= Highly Unimportant" and "5=Highly Important".

3.6 ANALYSIS OF DATA

The completed questionnaires were edited to ensure completeness, consistency and readability. Once the data had been checked, they were arranged in a format that enabled easy analysis. Quantifiable data from the questionnaires was coded into the software for analysis. Statistical Package for Social Sciences (SPSS 16.0) was selected because it was considered to be user-friendly. The following statistical techniques were then employed to analyze the data collected from the survey:

- Mean Score Rankings and
- One Sample t-test

3.6.1 Mean Score

The mean is utilized as a measure of central tendency. A high mean relevance rating would mean that the factor under consideration is important (Hoe, 2006; Sprinthall, 1987). The mean scores were obtained by the following formula

$$\mu = \frac{\sum_{i=1}^{5} i.f_i}{\sum_{i=1}^{5} f_i}$$

Where, *f* is the frequency of score *i* for the factor concerned

3.6.2 One Sample t-test

The one sample t-test was used to determine whether the barriers to implementation of occupational health and safety management systems were significantly severe or not. The test statistics were obtained from the formula

$$t = \frac{\sqrt{n}(X - \mu_X)}{s}$$

Where X is the sample mean, μ_x the population mean, S the sample standard deviation, and n the sample size.

3.7 Conclusion

The research methodology used in this study was discussed as above. A description of how the questionnaire was administered and the various sections in the questionnaire were highlighted. Subsequently, the statistical tools for data analysis were discussed. With this background, statistical results obtained from the data are discussed in chapter four.

CHAPTER 4

4.0 RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter reports and discusses the survey findings. After the questionnaire survey was carried out, statistical analyses were undertaken on the responses using various methods described in the research methodology.

4.2 Respondents' profile

Table 4.1 Respondents' Profile

RESPONDENTS' CHARACTERISTICS	SITE MANAGERS		SITE OPERATIVES	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
Gender				
Male	25	93	36	95
Female	2	7	2	5
TOTAL	**27**	**100**	**38**	**100**
Years of Experience				
5-10yrs	18	67	27	71
10-15 yrs	5	19	6	16
15-20 yrs	3	11	3	8
Over 20 yrs	1	3	2	5
TOTAL	**27**	**100**	**38**	**100**
Educational Qualification				
Diploma	4	15	3	8
Bachelor's Degree	5	19	-	-
Masters Degree	6	22	-	-
Technician Certificate	12	44	2	5
Craft Certificate	-	-	4	11
Senior High School	-	-	6	16
National Vocational Training	-	-	7	18
Basic Education Certificate	-	-	16	42
TOTAL	**27**	**100**	**38**	**100**

(Source: Author)

Construction is one of the most male-dominated industries in the world. Men dominate both craft trades, professional and managerial positions within the sector. This is clearly evident from the results in Table 4.1 in which males constitute 93% and females constitute 7% of the site managers interviewed. A Similar result was obtained from the site operatives in which males constitute 95% and females constitute 5%.The average years of experience of the firms surveyed in the construction market are between 10 and 20 years (Table 4.1).This implies that all the firms have significant experience in the building industry to ensure reliability and accuracy of data. With educational background, 15% of site managers and 8% of site operatives held Diploma certificates (Table 4.1). Nineteen percent of site managers held Bachelor's degree with no bachelor degree holder from the site operatives (Table 4.1). Twenty two percent of site managers held masters degree with no master's degree holder from site operatives (Table 4.1). Technician certificate holders involved 44% of site managers and 5% of site operatives (Table 4.1). Other site operatives held craft certificates (11%), senior high school certificates (16%), national vocational training certificates (18%) and basic education certificates (42%) (Table 4.1).

4.3 Documentation of pre-requisite conditions that support the operation of a Health and SafetyManagement System

4.3.1 Formal Health and Safety Programmes for Employees

Top management's commitment to safety or lack of commitment will set the tone for the rest of the company. Top management must take every opportunity to become involved in its company's safety effort (Peyton et al., 1991).

Respondents were asked to indicate whether they have any formal health and safety programmes for their employees. The results are shown in Figures 4.1 and 4.2.

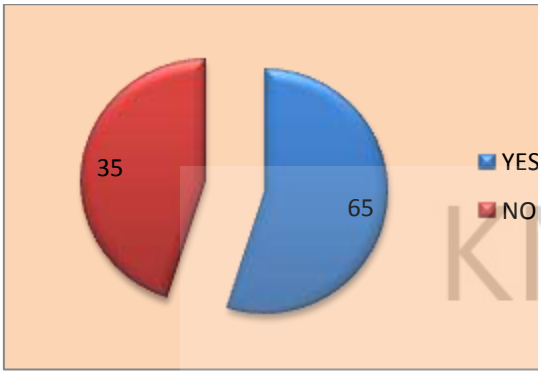

Fig.4.1 Views of site managers on health and safety programmes

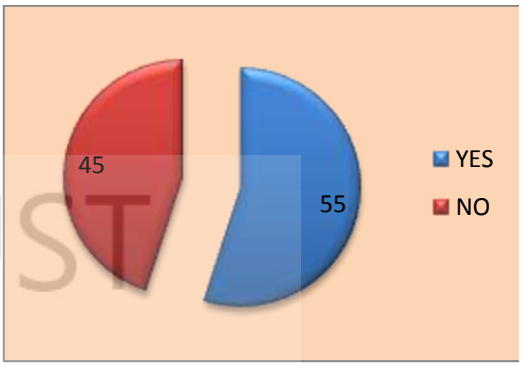

Fig. 4.2 Views of site operatives on health and safety programmes

(Source: Author)

Formal health and safety programmes are essential for ensuring that health and safety regulations are complied with on construction sites. The results from figure 1 shows that site managers are confident about having formal health and safety programmes for their employees. This was realized from the fact that 65% of the site managers responded 'yes' when they were asked to indicate whether they had the programme. The results of the site managers were confirmed when 55% of the site operatives (Fig 2) attested to the fact that there are health and safety programmes prepared for employees on site.

4.3.2 Health and Safety Trainings

Again respondents were asked to indicate how health and safety trainings were conducted on the construction sites. The results from site managers and site operatives are shown in figures 4.3 and 4.4 respectively.

Fig 4.3 Views of site managers on the frequency of training

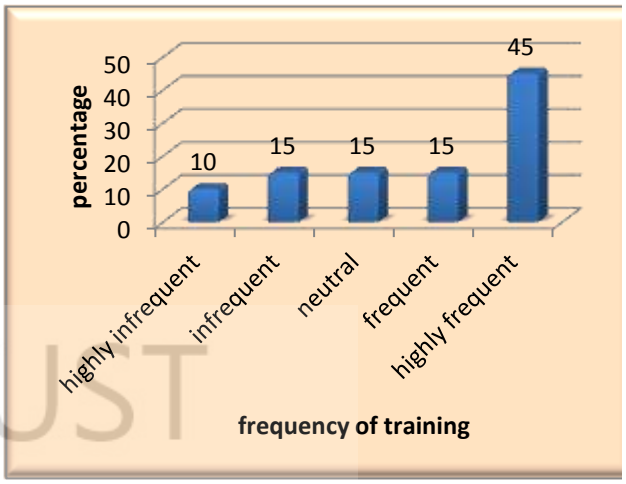

Fig 4.4 Views of site operatives on the frequency of training

(Source: Author)

According to Peyton et al. (1991), safety training and orientation are necessary elements of an effective safety program. Supervisors and workers must understand the company's safety policy and procedures and the hazards associated with the work. When employees first arrive on site, a safety orientation training program should be provided. This training session can cover the company and project safety policies, safety regulations, site orientation, personal protective equipment and OSHA required training.

The results show not much difference in the views of site managers and site operatives on how frequent health and safety trainings are organized on site. The site managers are of the view that health and safety trainings are frequently organized for employees (65%) (Fig 4.3), site operatives are of the view that adequate time is dedicated to safety trainings on construction sites (60%)(Fig 4.4). Companies with poor safety performance often leave safety training to site experience, and this may be inadequate to prevent occupational accidents (Wilson, 2000).

According to Davies and Tomasin (1999), effective training in the construction industry is one means by which safety can be improved and company management must be active in order to reduce the number of injuries and fatalities.

4.3.3 Frequent keeping of records of accidents on construction sites

A monthly review of the project safety record including accident statistics, reports of injuries and results of safety inspections is a valuable safety tool. Such a review focuses attention on the safety effort and can pinpoint those problem areas that need further safety attention. It is important to know the causes of accidents so that attention can be directed at controlling them.

Respondents were asked to indicate how frequent records were kept on accidents on construction sites. Figures 4.5 and 4.6 depict the views of site managers and site operatives on record keeping of accidents on construction sites respectively.

Results from Figures 4.5 and 4.6 show that records of accidents are frequently kept on site. This is demonstrated in the fact that 60% of site managers and 60% of site operatives attest to that fact.

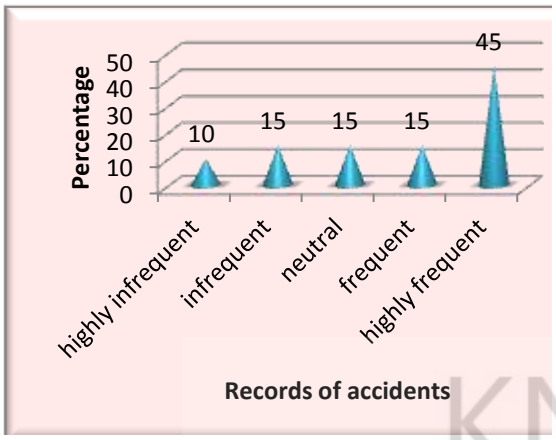

Fig 4.5 Views of site managers on records of accidents

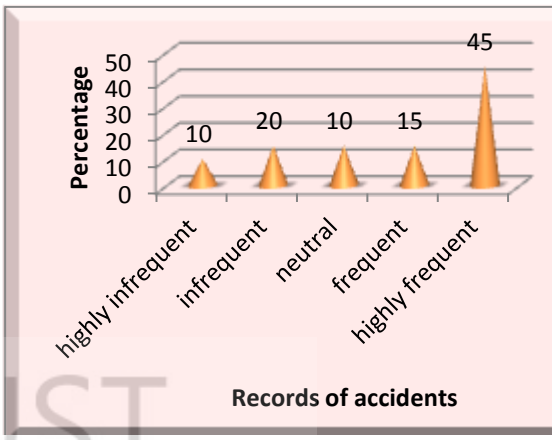

Fig 4.6 Views of site operatives on records of accidents

(Source: Author)

4.3.4 Provision of Incentives on Site for Good Safety Performance

Incentives motivate staff to work harder, therefore it is expected that employees are provided with incentives in various forms. Site managers were asked how frequently incentives were provided to employees and site operatives were also asked how frequent they were provided with incentives on site. Figures 4.7 and 4.8 depict the views of site managers and site operatives on how frequently incentives are provided on site.

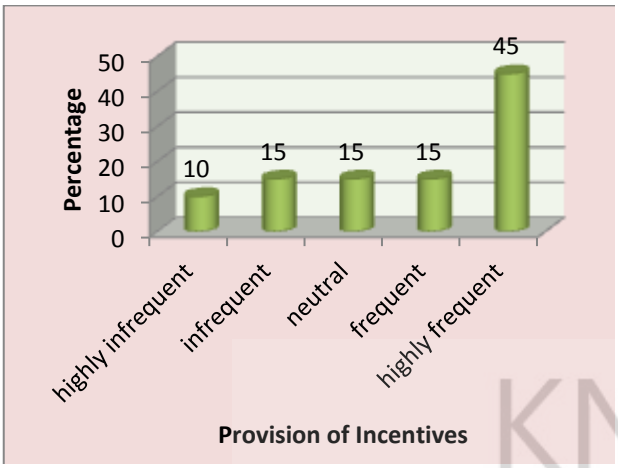

Fig 4.7 Views of site managers on the provision of incentives

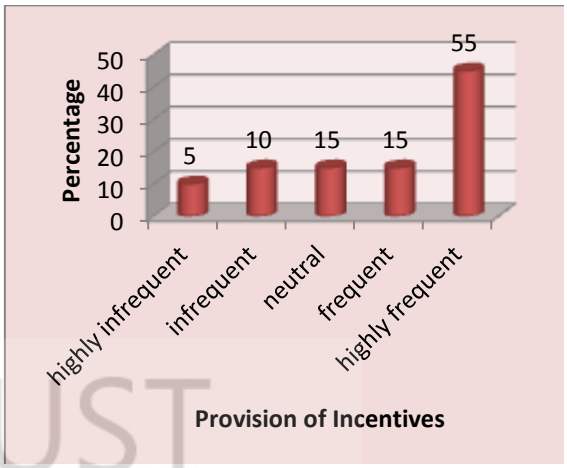

Fig 4.8 Views of site managers on the provision of incentives

(Source: Author)

From the results it could be seen that the provision of incentives on the part of the site managers (Fig 4.7) and the provision of incentives to employees on the part of the site operatives (Fig 4.8) is frequent. This is evident from Fig 4.7 in which 60% of site managers attested to the fact that there is frequent supply of incentives to help in the operation of health and safety management systems.

4.4 Practices that comply with Occupational Health and Safety Requirements

Employers are required by law to provide all workers including casual workers with the following personal protective equipment and protective clothing on site (ILO, 1991).

- safety helmets or hard hats to protect the head from injury due to falling or flying objects, or due to striking against objects or structures;
- clear or coloured goggles, a screen, a face shield or other suitable device where workers are likely to be exposed to eye or face injury from airborne dust or flying particles,

dangerous substances, harmful heat, light or other radiation, and in particular during welding, flame cutting, rock drilling, concrete mixing or other hazardous work;

- protective gloves or gauntlets, appropriate barrier creams and suitable protective clothing to protect hands or the whole body as required, against heat radiation or while handling hot, hazardous or other substances which might cause injury to the skin;
- footwear of an appropriate type when employed at places where there is the likelihood of exposure to adverse weather conditions, or of injury from falling or crushing objects, hot or hazardous substances, sharp-edged tools or nails and slippery or ice- covered surfaces;
- respiratory protective equipment, suitable for a particular environment, where workers can be protected against airborne dust, fumes, vapours or gases by ventilation or other means;
- a suitable air line or self-contained breathing apparatus when employed in places likely to have an oxygen deficiency;
- respirators, overalls, head coverings, gloves, tight-fitting boiler suits, impermeable footwear and aprons appropriate to the risks of radioactive contamination in areas where unsealed radioactive sources are prepared or used; and waterproof clothing and head coverings when working in adverse weather conditions.

Respondents were asked to indicate which practices performed most comply with occupational health and safety requirements.

Table 4.2 shows that the mean scores of four out of seven factors are greater than 2.5 for the respondents (site managers and site operatives). This means that these are the four practices performed by site managers and site operatives and which conform to occupational health and safety requirements. The results further show that “provision of hand gloves”, “provision of

safety overall", "provision of hard hats" and "provision of safety boots" are the four major practices mostly performed and which comply with health and safety requirements. The results further reveal that the least performed practices which comply with health and safety requirements are "provision of ear muffs", "provision of safety goggles" and "provision of safety belts and lifelines".

Table 4.2 Compliance with Occupational Health and Safety Requirements

FACTOR	MEAN	STANDARD DEVIATION	RANKING
Provision of hand gloves	3.778	0.892	1
Provision of Safety overall	3.296	1.203	2
Provision of Hard hats	2.852	0.907	3
Provision of Safety boots	2.704	1.382	4
Provision of Ear muffs	2.148	0.907	5
Provision of Safety goggles	1.444	0.506	6
Provision of Safety belts and lifelines	1.423	0.503	7

(Source: Author)

From the findings (Table4.2), it could be seen that only four of these requirements which include "provision of hand gloves", "provision of safety overall", "provision of hard hats" and "provision of safety boots" are met. This results show that much more need to be done concerning the provision and utilization of protective equipment on construction sites.

4.5 Level of Contribution of Factors to Health Hazards

Respondents were asked to indicate which hazards contribute to health hazards on construction sites. Table 4.3 shows that the mean scores of 12 out of 17 factors are greater than 2.5 for all the respondents (site managers and site operatives).

The results in Table 4.3 below reveal that "untimbered trenches that are more than 1.2m deep", "exposure to fumes", "poorly maintained tools" and "exposure to vibration" are the first four major factors that contribute to health hazards on construction sites. Other equally important factors include "ladders not properly placed", "waste material littered on construction site", "falling objects from working platform, hoist and scaffolds", "unguarded openings in floors, walls and stairways", "exposure to high level of noise", "manual lifting of heavy weights", "machines that are not properly fenced" and "failure of platforms and scaffolds". Among the factors which least contribute to health hazards on construction sites are "unguarded edges of platforms", "movement of mobile construction plant on construction sites" among others.

Table 4.3 Factors that Contribute to Health Hazards on Construction Sites

FACTORS	MEAN	STANDARD DEVIATION	RANKING
Untimbered trenches that are more than 1.2m deep	4.704	0.465	1
Exposure to fumes	4.556	0.506	2
Poorly maintained tools	3.963	0.854	3
Exposure to vibration	3.741	0.656	4
Ladders not properly placed	3.556	0.506	5
Waste material littered on construction site	3.556	0.801	6
Falling objects from working platform, hoist and scaffolds	3.444	0.506	7
Unguarded openings in floors, walls and stairways	3.444	0.577	8
Exposure to high level of noise	3.296	0.465	9
Manual lifting of heavy weights	3.160	0.840	10
Machines that are not properly fenced	3.010	0.990	11
Failure of platforms and scaffolds	2.630	0.492	12
Unguarded edges of platforms	2.446	0.554	13
Movement of mobile construction plant on construction sites	2.444	0.506	14
Exposure to underground and overhead live cables	2.111	0.700	15
Exposure to dust	2.074	0.675	16
Untidy construction site	2.037	0.649	17

(Source: Author)

4.6Barriers to the operation of occupational health and safety management systems

The major barriers to the operation of occupational health and safety management systems according to the respondents (site managers and site operatives) include "type of health and safety management system", "internal organizational factors", "contractor relations" and "nature of organization" (Table 4.4)

Table 4.4 .Barriers to the operation of occupational health and safety management systems

BARRIER	MEAN SCORES OF WASTE SOURCES	STANDARD DEVIATION	t- value	Sig	RANKING
Type of health and safety management system	4.277	0.625	16.467	0.000	1
Internal organizational factors	4.262	0.776	13.104	0.000	2
Contractor relations	4.185	0.863	14.495	0.000	3
Nature of organization	4.031	0.637	13.054	0.000	4

(Source: Author)

Mean scores of all the barriers evaluated are significantly greater than the neutral score of 3 *(p=0.05)* when the t-test was applied. Thus, all the factors listed in Table 4.4 are potential barriers that hinder the operation of occupational health and safety management systems.

4.6.1 Type of health and safety management system

The type of health and safety management systems was broken down into sub barriers that hinder occupational health and safety management systems on construction sites.

Respondents were asked to indicate which factors were considered to be occupational health and safety management barriers. Table 4.5 shows that the mean scores of all the two factors evaluated are greater than 2.5 for the respondents. This means that all the occupational health and safety system barriers are potential in hindering occupational health and safety management systems on site. The results (Table 4.5) further show that "system imposed by senior management without consultation" and "off-the-shelf system imposed without modification" are

the occupational health and safety management system barriers that hinder the operation of health and safety management systems on construction sites.

Table 4.5 Safety Management System Barriers

SAFETY MANAGEMENT SYSTEM	MEAN	STANDARD DEVIATION	RANKING
System imposed by senior management without consultation	4.169	0.651	1
Off-the-shelf system imposed without modification	4.046	0.874	2

(Source: Author)

4.6.2 Internal Organizational factors

Respondents were asked to indicate which factors were considered to be internal organizational barriers that hinder the operation of health and safety management systems. Table 4.6 shows that the mean scores of all the 7 factors evaluated are greater than 2.5 for the respondents. This means that all the internal organizational barriers are potential in hindering occupational health and safety management systems on site. The results (Table 4.6) further reveal that "words unsupported by practice", "health and safety activities restricted to technical experts", "extensive casual and part time workforce", "high labour turnover", "inadequate resources", "inadequate training of employees in health and safety" and "limited accountability mechanisms" are the internal organizational barriers that hinder the operation of occupational health and safety management system on site.

Table 4.6 Internal Organizational Barriers

INTERNAL ORGANIZATIONAL FACTORS	MEAN	STANDARD DEVIATION	RANKING
Words unsupported by practice	4.354	0.598	1
Health and safety activities restricted to technical experts	4.292	0.785	2
Extensive casual and part time workforce	4.185	0.727	3
High labour turnover	4.154	0.755	4
Inadequate resources	4.123	0.718	5
Inadequate training of employees in health and safety	3.939	0.788	6
Limited accountability mechanisms	3.908	0.879	7

(Source: Author)

The results in Table 4.6 above corroborates findings in literature in which according to Aronsson (1999), non-permanent workers have less knowledge about safety issues. Fixed term and short term employees have also been identified as having significantly higher levels of work place injuries than permanent employees on construction sites (Isaksson et al., 2000; Francois, 1995).

4.6.3 Nature of Organization

From Table 4.7, the mean scores of all the three organizational barriers evaluated are greater than 2.5 for all the respondents. This is an indication that all the organizational barriers are potential in hindering the operation of occupational health and safety management systems on construction sites. Furthermore, "disorganization of work associated with presence of labour-hire employees and contractors", "labour hire company with employees working between multiple client sites" and "small firm with limited resources and unfamiliar with systems concept" are organizational barriers hindering the operation of occupational health and safety hazards on construction sites.

Table 4.7 Barriers Resulting From Nature of Organization

NATURE OF ORGANIZATION	MEAN	STANDARD DEVIATION	RANKING
Disorganization of work associated with presence of labour hire employees and contractors	3.939	0.788	1
Labour hire company with employees working between multiple client sites	3.923	0.973	2
Small firm with limited resources and unfamiliar with systems concept	3.831	0.801	3

(Source: Author)

The above results in Table 4.7 agree with findings from literature. A number of overseas studies have identified a limited capacity for small firms to adapt to self-regulation in occupational health and safety and to develop occupational health and safety management systems. Dawson et al. (1988) found the capacity for self regulation to be limited where the firm was small.

4.6.4 Contractor Relations

Respondents were asked to indicate which contractor relationship barriers hinder the implementation of occupational health and safety management systems in the construction industry. Table 4.8 shows that the mean scores of all the barriers evaluated are greater than 2.5 for all the respondents. This indicates that all barriers have the potential of hindering the operation of occupation health and safety management systems on construction sites. The results further reveal that "principal contractor simply requiring sub-contractor to have health and safety management system", "principal contractor simply imposing their health and safety management system on sub-contractor" and "subcontractor's health and safety management system inconsistent with principal contractor's" are the contractor relations barriers that hinder the operation of occupational health and safety management systems.

Table 4.8 Barriers Resulting From Contractor Relations

CONTRACTOR RELATIONS BARRIERS	MEAN	STANDARD DEVIATION	RANKING
Principal contractor simply requires sub-contractor to have health and safety management system	4.292	0.785	1
Principal contractor simply imposes their health and safety management system on sub-contractor	4.154	0.755	2
Subcontractor's health and safety management system inconsistent with principal contractor's	4.062	0.609	3

(Source: Author)

The results in Table 4.8 above confirm findings from literature. Most occupational health and safety management systems tools refer to contractors in varying degrees, however, consultations has raised a number of significant problems in relation to occupational health and safety management systems and contractors. At times, principal contractors impose their occupational health and safety management systems upon sub contractors without taking steps to explain the system. This practice is generally met with cynicism, lacking the essential preconditions for a system to be effective (Gallagher et al., 2001).

4.7 Measures to improve occupational health and safety management systems on construction sites

The respondents were asked to evaluate 11 measures of improving occupational health and safety management systems on construction sites. Table 4.9 presents mean scores, standard deviations and rankings of the 11 measures.

All the 11 measures have mean ratings of 2.5 or higher and therefore considered significant (Table 4.9). The results show that the five most significant measures to improve occupational health and safety management system on construction sites are "providing for fire prevention and

fire fighting during construction of a facility", "establishing safety training and orientation for site operatives", "top management commitment to worker safety", "keeping construction site tidy" and "informing factories inspectorates of the location of new construction sites". Other equally important measures include "setting safety guidelines into the body of conditions of contract for a project", "accident investigation and record keeping on construction sites", "assignment of safety responsibility to all levels of management and workers" among others.

Table 4.9: Proposed measures to improve occupational health and safety management systems on construction sites

FACTOR	MEAN	STANDARD DEVIATION	RANKING
Providing for fire prevention and fire fighting during construction of a facility	4.407	0.572	1
Establishing safety training and orientation for site operatives	4.370	0.688	2
Top management commitment to worker safety	4.296	0.669	3
Keeping construction site tidy	4.259	0.984	4
Informing factories inspectorates of the location of new construction sites	4.222	0.801	5
Setting safety guidelines into the body of conditions of contract for a project	4.185	0.736	6
Accident investigation and record keeping on construction sites	4.148	0.662	7
Assignment of safety responsibility to all levels of management and workers	4.148	0.907	8
Motivation of construction operatives by instituting safety awards	4.111	0.700	9
Safety auditing by safety committees	4.000	0.34	10
Taking into consideration health and safety matters during the design face of a facility	3.333	1.44	11

(Source: Author)

4.8 Conclusion

This chapter presented results from the quantitative analysis. Results have been presented on the pre-requisite conditions that support the operation of a Health and Safety Management System, practices that comply with Occupational Health and Safety Requirements, level of Contribution of Factors to Health Hazards and barriers to the operation of occupational health and safety management systems.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes the findings of the study and concludes by making recommendations based on the findings. The objectives of this study were to:

1. Document the pre-requisite conditions that support the operation of a Health and Safety Management system.
2. Document the current practices of selected construction firms in Occupational Health and Safety Management in Ashanti Region.
3. Identify the barriers to the operation of Occupational Health and Safety Management system in Ghana.
4. Recommend measures to improve the operation of occupational health and safety management systems on construction sites

5.1 Conclusions

The conclusions are drawn based on each objective.

5.1.1 Documentation of pre-requisite conditions that support the operation of a Health and Safety Management System

The findings revealed that both site managers and site operatives are confident that there exist formal health and safety programmes for employees on construction sites. This was realized from the fact that 65% of the site managers responded 'yes' when they were asked to indicate

whether they had the programme. The results of the site managers were confirmed when 55% of the site operatives (Fig 2) attested to the fact that there are health and safety programmes prepared for employees on site.

On the issue of health and safety trainings, the results did not show much difference in the views of site managers and site operatives on how frequent health and safety trainings were organized on site. The site managers were of the view that health and safety trainings are frequently organized for employees (65%) (Fig 4.3), site operatives were of the view that adequate time was allocated to safety trainings on construction sites (60%) (Fig 4.4).

The findings also revealed that records of accidents were frequently kept on site(Figures 4.5 and 4.6). This was demonstrated when 60% of site managers and 60% of site operatives attested to that fact.

The results further revealed that there is frequent provision of incentives to enhance the operation of health and safety management systems on construction sites. This was evident in Figures 4.7 and 4.8 when 60% of site managers indicated that incentives were provided for the operation of occupational health and safety management systems on construction sites.

5.1.2 Practices that comply with Occupational Health and Safety Requirements

The results revealed that four out of seven factors that comply with occupational health and safety requirements were practiced. The results further showed that “provision of hand gloves”, “provision of safety overall”, “provision of hard hats” and “provision of safety boots” were the four major practices mostly performed and which comply with health and safety requirements.

The results further revealed that the least performed practices which comply with health and safety requirements were "provision of ear muffs", "provision of safety goggles" and "provision of safety belts and lifelines".

5.1.3 Level of Contribution of Factors to Health Hazards

The results revealed that "untimbered trenches that are more than 1.2m deep", "exposure to fumes", "poorly maintained tools" and "exposure to vibration" are the first four major factors that contribute to health hazards on construction sites. Other equally important factors include "ladders not properly placed", "waste material littered on construction site", "falling objects from working platform, hoist and scaffolds", "unguarded openings in floors, walls and stairways", "exposure to high level of noise", "manual lifting of heavy weights", "machines that are not properly fenced", "failure of platforms and scaffolds". Among the factors which least contribute to health hazards on construction sites are "unguarded edges of platforms", "movement of mobile construction plant on construction sites" among others.

5.1.4 Barriers to the operation of occupational health and safety management systems

From the results, the major barriers that hinder the operation of occupational health and safety management systems include "type of health and safety management system", "internal organizational factors", "contractor relations" and "nature of organization" (Table 4.4).

5.1.4.1 Type of health and safety management system

The results (Table 4.5) revealed that "system imposed by senior management without consultation" and "off-the-shelf system imposed without modification" are the two sub-barriers

of the type of safety management system that hinder the operation of health and safety management systems on construction sites.

5.1.4.*2 Internal Organizational factors*

The results (Table 4.6) revealed that "words unsupported by practice", "health and safety activities restricted to technical experts", "extensive casual and part time workforce", "high labour turnover", "inadequate resources", "inadequate training of employees in health and safety consultation" and "limited accountability mechanisms" are internal organizational factors that hinder the operation of occupational health and safety management system on site.

5.1.4.3 *Nature of Organization*

The results showed that "disorganization of work associated with presence of labour hire employees and contractors", "labour hire company with employees working between multiple client sites" and "small firm with limited resources and unfamiliar with systems concept" are organizational barriers hindering the operation of occupational health and safety hazards on construction sites.

5.1.4.4 *Contractor Relations*

It was revealed from the results that "principal contractor simply requiring sub-contractor to have health and safety management system", "principal contractor simply imposing their health and safety management system on sub-contractor" and "subcontractor's health and safety management system inconsistent with principal contractor's" are contractor relationship barriers that hinder the operation of occupational health and safety management systems.

5.1.5 **Measures to improve occupational health and safety management systems on construction sites**

The results revealed that all 11 measures had mean ratings of 2.5 or higher and therefore considered significant (Table 4.9). The results further showed that the five most significant measures to improve occupational health and safety measures on construction sites are "providing for fire prevention and fire fighting during construction of a facility", "establishing safety training and orientation for site operatives", "top management commitment to worker safety", "keeping construction site tidy" and "informing factories inspectorates of the location of new construction sites". Other equally important measures include "setting safety guidelines into the body of conditions of contract for a project", "accident investigation and record keeping on construction sites", "assignment of safety responsibility to all levels of management and workers" among others.

5.2 Recommendations

Implementation of occupational health and safety management systems are important on construction sites to ensure that accidents and risks are minimized. To help improve upon the operation of occupational health and safety management systems in the construction industry, it is recommended that;

- Top management should be committed to workers safety through the establishment of safety training and orientation for employees.
- Clients, employers or the Procurement authority should ensure that safety guidelines are set into the body of conditions of contract for projects.

- Safety responsibilities should be assigned to all levels of management and workers in the construction industry.
- Consultants or designers should take into consideration health and safety matters during the design face of a facility.
- Employers should institute Safety Award Schemes to motivate construction site operatives to observe high level health and safety standards
- Safety committees should be set up to conduct periodic safety auditing

5.4 Limitations

1. Due to the fact that the study was conducted among building contractors in Ashanti Region Metropolis, it is possible that inference made from this study may not apply to all construction companies in the country.
2. In discussing the issues of health and safety with workers, some employers thought that the researcher was exciting them and therefore accorded him cold reception.
3. Considerable travel time and financial resources were employed as some of the sites were far apart.
4. Uncooperative behaviour of some secretaries to managers was very frustrating, the researcher had to learn to accommodate.
5. Time was a limiting factor as the researcher had to combine academic studies with data collection and analysis which was a strain on academic work.

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APPENDIX 1

Questionnaire for site managers

(Please tick [√] or fill as appropriate)

SECTION 1 – BACKGROUND OF COMPANY AND RESPONDENT

Name of Company ……

Address (Location) ……

Tel. No. ……. e-mail address ……

Job title of respondent ……..

Please provide the following personal data:

1. Gender: Male [ ] Female [ ]

2. How many years of experience do you have in the construction industry?

Less than 0- 5 yrs [ ] 5-10 yrs [ ] 10-15 yrs [ ] 0ver 15 yrs [ ]

3. Please tick [ ] your educational qualifications

Level

Technician Certificate	[ ]
Diploma	[ ]
Bachelor's degree	[ ]
Masters degree	[ ]

SECTION 2- Conditions that support the operation of health and safety management systems

4. Does your company have a formal health and safety programme for employees?

Yes [ ] No [ ]

5. Rank on a Likert scale of 1 to 5 how frequently your company undertake health and safety trainings for workers

1	2	3	4	5
Highly infrequent	Infrequent	Neutral	Frequent	Highly frequent

6. Rank on a Likert scale of 1 to 5 how frequently your company keeps records of accidents on site.

1	2	3	4	5
Highly infrequent	Infrequent	Neutral	Frequent	Highly frequent

7. How frequently are incentives provided on site for good safety performance?

1	2	3	4	5
Highly infrequent	Infrequent	Neutral	Frequent	Highly frequent

SECTION 3- Practices that comply with Occupational Health and Safety Requirements

8. Below are some practices that comply with occupational health and safety requirements on construction sites. Rank on a scale of 1 to 5 which of these practices are performed most on your sites.

1	2	3	4	5
Not performed at all	slightly performed	Neutral	Performed	Highly performed

Practice	1	2	3	4	5
Provision of hard Hats					
Provision of ear muffs					
Respiratory protection					
Provision of hand gloves					
Provision of safety overall					
Provision of safety goggles					
Provision of safety boots					
Provision of safety belts and lifelines					

9. Indicate on the Likert scale of 1 to 5 the level of contribution of the following factors to health hazards on your construction sites in the last five years

1	2	3	4	5
Very low contribution	Low contribution	Neutral	High contribution	Very high contribution

FACTOR	1	2	3	4	5
Exposure to dust					
exposure to fumes					
Exposure to vibration					
Exposure to high level of noise					
Manual lifting of heavy weights					
Untidy construction site					
Poorly maintained tools					
falling objects from working platform, hoist and scaffolds					
Failure of platforms and scaffolds					
Unguarded edges of platforms					
Unguarded openings in floors, walls and stairways					
Untimbered trenches that are more than 1.2m deep					
Ladders not properly placed					
Exposure to underground and overhead live cables					
Waste materials littered on construction site					
Machines that are not properly fenced					
Movement of mobile construction plant on construction site.					

SECTION 4-Barriers to the operation of occupational health and safety management systems

10. Below are barriers that hinder the operation of occupational health and safety management on construction sites. Rank on a Likert scale of 1 to 5 which barrier is the most influential.

1	2	3	4	5
Not influential	Less influential	Quite influential	Influential	Very influential

Barrier	1	2	3	4	5
Type of health and safety management system					
Internal organizational factors					
Nature of organization					
Contractor relations					

11. Indicate on a Likert scale of 1 to 5 which factor under each barrier has a high level of influence on the operation of occupational health and safety management system on construction sites.

Barrier	1	2	3	4	5
Safety Management System					
Off-the-shelf system imposed without modification					
System imposed by senior management without consultation					
Internal Organizational Factors					
Inadequate resources					
Limited accountability mechanisms					
Words unsupported by practice					
Health and safety activities restricted to technical experts					
Inadequate training of employees in health and safety consultation					
High labour turnover					
Extensive casual and part time workforce					

Barrier	1	2	3	4	5
Nature of Organization					
Small firm with limited resources and unfamiliar with systems concept					
Labour hire company with employees working between multiple client sites					
Disorganization of work associated with presence of labour hire employees and contractors.					
Contractor Relations					
Principal contractor simply requires sub-contractor to have health and safety management system					
Principal contractor simply imposes their health and safety management system on sub-contractor					
Subcontractor's health and safety management system inconsistent with principal contractor's					

SECTION 5- measures to improve occupational health and safety management systems on construction sites

Rank on a scale of 1 to 5 the level of importance of each of the following measures in improving health and safety on site

1	2	3	4	5
Highly unimportant	Unimportant	Neutral	Important	Highly important

measures	1	2	3	4	5
Establishing safety training and orientation for site operatives					
Assignment of safety responsibility to all levels of management and workers					
Motivation of construction operatives by instituting safety awards					
Top management commitment to worker safety					
Informing factories inspectorate of the location of new construction sites					
Setting safety guidelines into the body of conditions of contract for a project.					
Safety auditing by safety committees					
Accident investigation and record keeping on construction sites					
Providing for fire prevention and fire fighting during construction of a facility					
Maintaining construction site tidy					
Taking into consideration health and safety matters during the design phase of a facility					

Site operatives

SECTION 1 - Personal Data

(Please tick [√] as appropriate)

1. GenderMale [ ] Female [ ]

2. What is your educational attainment?

Middle school leaving certificate [ ]

Basic education certificate [ ]

Senior High School [ ]

National Vocational Training [ ]

City and Guilds craft certificate [ ]

City and Guilds advanced craft certificate [ ]

City and Guilds technician certificate [ ]

Higher National Diploma [ ]

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Untimbered trenches that are more than 1.2m deep					
Ladders not properly placed					
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Movement of mobile construction plant on construction site.					

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Providing for fire prevention and fire fighting during construction of a facility					
Maintaining construction site tidy					
Taking into consideration health and safety matters during the design phase of a facility					