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Integrating Health and Safety in Project Management: A Study of Selected Construction Projects in the Greater Accra Region

by

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DECLARATION

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

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ABSTRACT

One of the hazardous industries where workers are frequently involved in accidents. Major causes of accidents are related to the unique nature of the industry, the characteristics nature of construction sites, behaviour of workers, difficult site conditions, and poor safety management. Construction sites are widely noted to be extremely hazardous environment with the potential for multiple fatalities. The main goal of the study was to examine the various managerial concerns in integrating health and safety encountered in project management, construction site environment, and propose measures to mitigate those issues. Grounded on literature review, a questionnaire survey was conducted among building professionals who were purposively selected to elicit information pertaining to the study. In all forty-five (45) of the responses forms the analysis of the results. Using relative importance index, it was apparent that in undertaking a development in project management within a construction site increased health and safety concerns will unavoidably arise. Further, it clearly indicated that issues highlighted are various and diverse. It is however recommended that, if incorporated one or more of these strategies, it would aid the construction industry strive towards an unblemished healthy and safety record. Where on-site management incorporates the strategies documented, particularly in the case of integrating health and safety on construction site, reductions in accidents and incidents are achievable, with the possibility of increased productivity, reduced downtime and ultimately project success.

Keywords: Integrate, Health and Safety, Project management, Construction Site, Practices, Ghana

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DEDICATION

This entire project is dedicated to my family

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Construction is considered to be one of the most hazardous industries due to its unique nature around the world (Kines et al., 2007). Traditionally, safety (Carter and Smith, 2006) and quality (Jha and Iyer, 2006; Loushine et al., 2006) in the construction industry are always of grave concerns (Wyk et al., 2008). In recent years, the construction industry has also faced public pressures on environmental protection due to the pollution and hazards created by construction activities (Chen et al., 2004; Zeng et al, 2003). To improve this situation, many construction firms have implemented various management systems, including OHSAS 18001 for OHS management, ISO 14001 for environmental management and ISO 9001 for quality management. In practice, it is difficult to individually deal with these separate management systems and to align them with organizational strategies (Zeng et al., 2007). Hence, increasing interests from construction firms have begun to implement an integrated management system (IMS) (Labodova, 2004; Molina-Azorin et al., 2009). For achieving continuous improvement in implementing an IMS, the prerequisite is to manage and control the potential risks of OHS, environment and quality issues (Low and Tan, 2005; Zeng et al., 2007).

Failures, in general refers to the state or condition of not meeting a desirable or intended objective, are the cause for OHS, environmental and quality problems (Zavadskas and Vaidogas, 2008). Failure Modes and Effects Analysis (FMEA), which has been extensively applied in manufacturing (Tay & Lim, 2006; Teng & Ho, 1996), is a methodology for analysing potential risk problems so that actions can be taken to overcome them (Gandhi and Agrawal, 1992).

Smallwood (1999) advises that health and safety should be considered on all occasions commencing during the conceptual phase, and in particular when preparing project documentation, prequalifying contractors and evaluating tenders to ensure commitment and allocation of resources to health and safety and the engagement of healthy and safe contractors. When evaluating constructability, health and safety should be considered at all times to ensure that what is designed and detailed can not only be constructed, but constructed without affecting the health and safety of workers during the construction process and maintenance of the built environment.

Hales (2018) explained that project integration management is one of the ten project management knowledge areas and is the element that coordinates all aspects of a project. Project integration management touches all five phases of a project: initiating, planning, executing, monitoring and controlling, and closing. When properly performed, project integration management ensures smoothly run and integrated project processes. This study aims to use appropriate methodology designed for integrating health and safety in project management.

1.2 STATEMENT OF THE PROBLEM

(The Associated General Contractors of America (AGC), 1992) defines synergism as "the interaction of different entities so that the combined effect is greater than the sum of individual efforts." International literature unequivocally indicates that H&S engenders optimum cost, sustainability of the environment, productivity, quality, time performance, and client and worker satisfaction (Smallwood, 2001).

An activity or project cannot be said to be successful, if disabling injuries or fatalities have been incurred during the process. Various studies have realised differing ratios between the indirect and direct costs: 1.67 times for non-minor injuries and more than 5 times for minor injuries with direct costs less than US$50, and 20 times (D.

Grossman, 1991). Research indicates the total cost of accidents to constitute, inter alia, 6.5% of the value of completed construction (Business Roundtable, 1995) and approximately 8.5% of tender price (Anderson, 1997). Research conducted among PMs in South Africa investigated the impact of inadequate H&S on various project parameters. According to (Smallwood, 2002), productivity (87.2%) and quality (80.8%) predominated, followed by cost (72.3%), client perception (68.1%), environment (66%), and schedule (57.4%).

1.3 RESEARCH QUESTIONS

The thesis intends to answer the following questions:

1. What are the various challenges faced in integrating health and safety in project management in the construction industry.
2. What predominant design related practices and its frequency do project managers adapt on project sites.
3. What measures can be adapted to mitigate the challenges and also integrate health and safety by project management on construction site

1.4 AIM

This research proposes to study how to integrate health and safety in project management.

1.5 RESEARCH OBJECTIVES

The specific objectives of this thesis are as follows:

1. To identify the existence of health and safety system in project management
2. To identify the various challenges with integrating health and safety in project management in the construction industry.

3. To identify way of mitigating the challenges in integrating health and safety in project management.

1.6 RESEARCH METHODOLOGY

The researcher proposed to adopt the mixed research design in conducting the study, which is both qualitative and quantitative research design. According to Earl (2010), the quantitative methods emphasise objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques. On the contrary, the qualitative methods emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured [if measured at all] in terms of quantity, amount, intensity, or frequency (Denzin et. al., 2005).

Whereas primary data was sourced through structured questionnaires with close ended questions to project managers in selected construction firms, secondary data was gathered from literature online, books, journals, published and unpublished theses, and documents gathered from the construction firms that will involve in the study.

Because the study proposed to focus on project managers and health and safety officers, the researcher deems it fit to do non-random purposive sampling as a technique to identifying respondents for the study.

1.7 SIGNIFICANCE OF THE STUDY

This study is significant in a number of ways. Considering that managing workplace safety is an important goal that many corporations are still struggling to find an effective way to provide a better working environment for employees and to cut corporate costs, this study will benefit such corporate institutions and stakeholders in

the construction industry. As an academic document, this study has not only serve as a reference material for research students in the field of project management, but has also contributed to the enhancement of occupational health and safety in the management of projects, whether in construction, electrification, or any other infrastructure projects that has high safety risk.

1.8 SCOPE OF THE STUDY

The study focuses on:

1. The construction projects executed in the Greater Accra Region.
2. Respondents for the study are limited to project managers and health and safety officers in the construction firms selected
3. All ten (10) knowledge areas and the various project management processes were considered in attempting to investigate the aspect of project management likely to be affected by inadequate occupational health and safety considerations.
4. Both building and road projects will be considered for this study.

1.9 ORGANIZATION OF THE STUDY

There are five chapters in this thesis. The five chapters respectively are General Introduction, Literature Review, Methodology, Data Presentation and Analysis, and Conclusion and Recommendations. In the introductory chapter, the researcher produced a brief background to the study followed by statement of the problem, research aim and objectives, research questions, research methodology, significance of the study, scope and delimitation of the study. The second chapter sought to review books, articles, journals, thesis etc. that covered similar subject matter in relation to the topic under consideration. Critical to this section of the study is the identification of

research gaps from and the summary of the literature reviewed. The discussion of the research methodology done in Chapter Three explained what research approach, strategy, and method was implored in the research. Other aspects covered under the methodology included how the population was sampled and the primary and secondary data collected. Chapter Four provides a detailed presentation and analysis of the data collected. The last but not the least chapter summarises the entire work, including its findings and makes recommendations based on the result of the analysis.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews literature such as books, journals, theses, and reports related to the subject matter. The review is done thematically to cover the specific objective and give a general background to key terms so as to give the researcher a better understanding.

2.2 DEFINITION OF PROJECT

A project, simply put, is a piece of work to produce a specific, one-off product of some kind that is not part of routine work. Assembling a car on a production line is not a project because although the output (a car) is a product and it is specific; it is not a one-off. However, building a kit car in your garage is a project because it fulfils all three criteria. Using a university example, the annual cycle of recruitment and enrolment is a lot of essential, hard work, but it isn't a project because it is not one off. However building the new Business School was a project as we'll only ever build one such building (Levitan, 2013).

The Project Management Institute (PMI) defines a project as a temporary endeavour undertaken to create a unique product, service, or result. The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists (Watt 2014). Many people and organizations have defined what a project is, or should be, but probably the most authoritative definition is that given in BS 6079 'Guide to Project Management'. This states that a project is: 'A unique set of coordinated activities, with definite starting and finishing points, undertaken by an individual or organization to

meet specific objectives within defined schedule, cost and performance parameters **(**Project definition, n.d.)

Project definition is known to the construction industry as strategic facility planning, client briefing, needs assessment, requirements processing, and project programming as traditionally practiced by architects and planners. In the UK the project definition process is referred to as client briefing. There the briefing problem is the process of turning the client's desire for a built product into a clear brief for the project development team to implement (Winch et al. 1998). Project definition is also seen as the process prior to final investment decision making (Kähkönen, 1999).

The US-based Construction Industry Institute (CII) (1995) defines project definition as the process of developing sufficient strategic information for facility owners to address risk, and deciding to commit resources to maximize the chances of a successful project. The facility owner typically carries out various specialist studies to establish the project objectives and to test their feasibility. Feasibility tests determine whether or not the project objectives can be met with the available resources, and within the constraints of the operating environment. The strategic and tactical decisions made in the early stages of project development significantly influence the overall outcomes of the project development process, particularly as they determine the boundaries of the project. Downstream project changes become increasingly difficult to incorporate into the development process without increased resource investment and rework. Project definition is the process that understands and formalizes the relationships between the purpose of the organization and the purpose of the physical facility project. The facility needs of the construction client are tightly coupled with the clients' business case. For example, with respect to building facilities, the purpose of an education institution is to provide students and educators with a learning environment to support the education

mission. The purpose of a healthcare organization is to provide patients and healthcare professionals with an environment to support the healthcare mission (Watt, 2014)..

A project has distinctive attributes that distinguish it from ongoing work or business operations. Projects are temporary in nature. They are not an everyday business process and have definitive start dates and end dates. This characteristic is important because a large part of the project effort is dedicated to ensuring that the project is completed at the appointed time. To do this, schedules are created showing when tasks should begin and end. Projects can last minutes, hours, days, weeks, months, or years. Projects exist to bring about a product or service that hasn't existed before. In this sense, a project is unique. Unique means that this is new; this has never been done before. Maybe it's been done in a very similar fashion before but never exactly in this way (Watt, 2014)..

In contrast with projects, operations are ongoing and repetitive. They involve work that is continuous without an ending date and with the same processes repeated to produce the same results. The purpose of operations is to keep the organization 20 functioning while the purpose of a project is to meet its goals and conclude. Therefore, operations are ongoing while projects are unique and temporary. A project is completed when its goals and objectives are accomplished. It is these goals that drive the project, and all the planning and implementation efforts undertaken to achieve them. Sometimes projects end when it is determined that the goals and objectives cannot be accomplished or when the product or service of the project is no longer needed and the project is cancelled (Watt, 2014).

In large multi-faceted organizations, ambiguity and uncertainty exist when attempting to realize the true purpose and expectations of project stakeholders, and it is difficult to distinguish real needs from wants or desires. Furthermore, stakeholders may not agree as a need for one may simply be a want for another. Therefore, it is difficult for project managers to set shared priorities for the project. It is imperative that this project

phase identifies what does each stakeholder really wants and needs. Secondly it is necessary to define the differences and dependencies between the wants and needs of various stakeholders, so as to develop a shared understanding of the problem, and to subsequently develop alternative project solutions. The ability to share individual needs can allow project groups to have an increased awareness of each other's interests and this in turn can increase the likelihood that a common purpose can be developed. There has been a growing acknowledgement of the significance of project definition by researchers and industry practitioners. Researchers (e.g., Kelly et al. 1992, Smith et al. 1998, CII 1999, Green 1994, 1999, and MacMillan et al. 2001) have highlighted the importance of early phase project planning and design. Initiatives for understanding the project definition process exist in various disciplines: process re-engineering, client requirements processing & briefing, strategic management, design methodology, value methodology, architectural theory and programming, collaborative planning theory, rational problem solving, behavioural decision making, and more recently innovation studies

2.3 CONCEPT OF THE PROJECT MANAGEMENT

An official definition of project management, courtesy of the Project Management Institute, defines the term as: "the application of knowledge, skills, tools and techniques to project activities to meet project requirements." A more tangible (but less interesting) description is that project management is everything you need to make a project happen on time and within budget to deliver the needed scope and quality (Williams, 2008).

According to Heerkens (2001), skills learned by your exposure to studying project management can be used in most careers as well as in your daily life. Strong planning skills, good communication, ability to implement a project to deliver the product or

service while also monitoring for risk and managing the resources will provide an edge toward your success. Project Managers can be seen in many industry sectors including agriculture and natural resources; arts, media, and entertainment; building trades and construction; energy and utilities; engineering and design; fashion and interiors; finance and business; health and human services; hospitality, tourism, and recreation; manufacturing and product development; public and private education services; public services; retail and wholesale trade; transportation; and information technology.

Project Managers are essentially jugglers. They must make sure that everything keeps to task, that potential issues are quickly eliminated and the project is delivered on time, all the while making sure everyone knows what is happening and the project quality and budget are acceptable.

The management of construction projects requires knowledge of modern management as well as an understanding of the design and construction process. Construction projects have a specific set of objectives and constraints such as a required time frame for completion. While the relevant technology, institutional arrangements or processes will differ, the management of such projects has much in common with the management of similar types of projects in other specialty or technology domains such as aerospace, pharmaceutical and energy developments. Generally, project management is distinguished from the general management of corporations by the mission-oriented nature of a project. A project organization will generally be terminated when the mission is accomplished.

According to the Project Management Institute, the discipline of project management can be defined as follows: Project management is the art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, cost, time, and quality and participation satisfaction. By contrast, the general management of business

and industrial corporations assumes a broader outlook with greater continuity of operations. Nevertheless, there are sufficient similarities as well as differences between the two so that modern management techniques developed for general management may be adapted for project management (Project Management Institute, 2000).

Halpin (1980) explained that a working knowledge of general management and familiarity with the special knowledge domain related to the project are indispensable. Supporting disciplines such as computer science and decision science may also play an important role. In fact, modern management practices and various special knowledge domains have absorbed various techniques or tools which were once identified only with the supporting disciplines. For example, computer-based information systems and decision support systems are now common-place tools for general management. Similarly, many operations research techniques such as linear programming and network analysis are now widely used in many knowledge or application domains.

Specifically, project management in construction encompasses a set of objectives which may be accomplished by implementing a series of operations subject to resource constraints. There are potential conflicts between the stated objectives with regard to scope, cost, time and quality, and the constraints imposed on human material and financial resources. These conflicts should be resolved at the onset of a project by making the necessary trade-offs or creating new alternatives. Subsequently, the functions of project management for construction generally include the following:

1. Specification of project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirements, and selecting project participants.
2. Maximization of efficient resource utilization through procurement of labour, materials and equipment according to the prescribed schedule and plan.
3. Implementation of various operations through proper coordination and control

of planning, design, estimating, contracting and construction in the entire process.

4. Development of effective communications and mechanisms for resolving conflicts among the various participants.

The Project Management Institute focuses on nine distinct areas requiring project manager knowledge and attention:

1. Project integration management to ensure that the various project elements are effectively coordinated.
2. Project scope management to ensure that all the work required (and only the required work) is included.
3. Project time management to provide an effective project schedule.
4. Project cost management to identify needed resources and maintain budget control.
5. Project quality management to ensure functional requirements are met.
6. Project human resource management to development and effectively employ project personnel.
7. Project communications management to ensure effective internal and external communications.
8. Project risk management to analyze and mitigate potential risks.
9. Project procurement management to obtain necessary resources from external sources. These nine areas form the basis of the Project Management Institute's certification program for project managers in any industry (Meredith & Mantel, 2009).

The process of planning and executing a piece of work from inception to completion to achieve safe achievement of objectives on time, within cost limits and to the specified standards of quality. The organising, planning, directing, coordinating and controlling of all project resources from inception to completion to achieve project

objectives on time, within cost, and to required quality standards. Most authors agree that project management is about achieving time, cost and quality targets, within the context of overall strategic and tactical client requirements, by using project resources. There is also general agreement that project management is concerned with the life cycle of the project: planning and controlling the project from inception to completion. Project resources are resources that are wholly or partly allocated to the project and under the control of the project manager (Nicolas and Steyn, 2014).

Nicolas and Steyn (2014) also explained further that another facet of project management involves choosing the optimum position in relation to the success criteria. The need for integrated planning and control procedures, together with a recent corresponding success of project management, is caused by the changing nature of industrial projects over the past fifty years. Generally, as industry has evolved, it has become more complex. Technological processes have become more complex and this has been coupled with more and more complicated organizational and administrative procedures. Technology and organizational processes, like plants and animals, tend to evolve over time into ever more complex and sophisticated structures.

They come in many different degrees of complexity, from launching a space mission to designing and printing a company newsletter, and across all projects they require the commitment of a wide range of resources and the application of a wide and varied range of skills by the project manager. Project management is therefore about deciding the various success and failure criteria of a project and then organizing and running the project as a single entity so that all the success criteria are met. This process involves setting up and managing a project team that may consist of a number of different individuals with different specializations. The project manager must weld this group of individuals into a team and then drive the team to perform successfully. The team itself, like the project, will only last a certain time. Once the project is completed, the project

team will probably be disbanded or be moved on to the next project. Along with the five phases of project management set forth by the Project Management Institute in the Project Management Body of Knowledge (PMBOK), project management also consists of nine knowledge areas. These knowledge areas represent the competencies that project managers must develop in order to be successful. A successful project manager will need to demonstrate the following skills consistently throughout the five phases of project management (Engineering minds).

2.4 HEALTH AND SAFETY IN WORKPLACES

Occupational safety and health (OSH) is generally defined as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment. This domain is necessarily vast, encompassing a large number of disciplines and numerous workplace and environmental hazards. A wide range of structures, skills, knowledge and analytical capacities are needed to coordinate and implement all of the "building blocks" that make up national OSH systems so that protection is extended to both workers and the environment. The scope of occupational safety and health has evolved gradually and continuously in response to social, political, technological and economic changes. In recent years, globalization of the world's economies and its repercussions have been perceived as the greatest force for change in the world of work, and consequently in the scope of occupational safety and health, in both positive and negative ways. Liberalization of world trade, rapid technological progress, significant developments in transport and communication, shifting patterns of employment, changes in work organization practices, the different employment patterns of men and women, and the size, structure and life cycles of enterprises and of new technologies

can all generate new types and patterns of hazards, exposures and risks. Demographic changes and population movements, and the consequent pressures on the global environment, can also affect safety and health in the world of work (Alli, 2008).

Safety and health principles are universal, but how much action is needed will depend on the size of the organisation, the hazards presented by its activities, the physical characteristics of the organisation, products or services, and the adequacy of its existing arrangements.

Many of the features of effective safety and health management are analogous to the sound management practices advocated by proponents of quality management, environmental protection, and business excellence. Commercially successful companies often excel at safety and health management as well, precisely because they apply the same efficient business expertise to safety and health as to all other aspects of their operations.

While the quality management of products or services and environmental protection principally protect physical phenomena, safety and health management in the workplace involves protecting people and developing a safety culture between employers and employees. However, there are considerable similarities between the approaches to safety and health described here and those advocated for effective quality management (ISO 9000 series of standards) or environmental protection (ISO 14000 series). Organisations that manage safety and health successfully invariably have a positive safety culture and active safety consultation programmes in place. Successful organisations can establish and maintain a culture that supports safety and health. Practical methods of designing, building, operating, and maintaining the appropriate systems are outlined in this guidance. In the following sections the similarities and strong links between total quality management, environmental protection and effective

safety and health management will become increasingly apparent. The key elements of a successful safety and health management system are as follows:

2.4.1 POLICY AND COMMITMENT

The organisation should prepare an occupational safety and health policy programme as part of the preparation of the Safety Statement required by section 20 of the 2005 Act. Effective safety and health policies should set a clear direction for the organisation to follow. They will contribute to all aspects of business performance as part of a demonstrable commitment to continuous improvement. Responsibilities to people and the working environment will be met in a way that fulfils the spirit and letter of the law. Cost-effective approaches to preserving and developing human and physical resources will reduce financial losses and liabilities. In a wider context, stakeholders' expectations, whether they are shareholders, employees or their representatives, customers or society at large, can be met.

2.4.2 PLANNING

The organisation should formulate a plan to fulfil its safety and health policy as set out in the Safety Statement. An effective management structure and arrangements should be put in place for delivering the policy. Safety and health objectives and targets should be set for all managers and employees.

2.4.3 IMPLEMENTATION AND OPERATION

For effective implementation, the organisation should develop the capabilities and support mechanisms necessary to achieve its safety and health policy, objectives and targets. All staff should be motivated and empowered to work safely and to protect their long-term health, not simply to avoid accidents. The arrangements should be:

1. underpinned by effective staff involvement and participation through appropriate consultation, the use of the safety committee where it exists, and representation systems;

2. Sustained by effective communication and the promotion of competence which allows all employees and their representatives to make a responsible and informed contribution to the safety and health effort.

There should be a planned and systematic approach to implementing the safety and health policy through an effective safety and health management system. The aim should be to minimise risks. Risk assessment methods should be used to determine priorities and set objectives for eliminating hazards and reducing risks. Wherever possible, risks should be eliminated through the selection and design of facilities, equipment and processes. If risks cannot be eliminated, they should be minimised by the use of physical controls and safe systems of work or, as a last resort, through the provision of personal protective equipment. Performance standards should be established and used for measuring achievement. Specific actions to promote a positive safety and health culture should be identified. There should be a shared common understanding of the organisation's vision, values and beliefs. The visible and active leadership of senior managers fosters a positive safety and health culture.

2.4.4 MEASURING PERFORMANCE

The organisation should measure, monitor and evaluate its safety and health performance. Performance can be measured against agreed standards to reveal when and where improvement is needed. Active self-monitoring reveals how effectively the health and safety management system is functioning. Self-monitoring looks at both hardware (premises, plant and substances) and software (people, procedures and systems, including individual behaviour and performance). If controls fail, reactive monitoring should find out why they failed, by investigating the accidents, ill-health or incidents that could have caused harm or loss. The objectives of active and reactive monitoring are:

1. to determine the immediate causes of substandard performance;

2. to identify any underlying causes and implications for the design and operation of the safety and health management system. Longer-term objectives should also be monitored.

2.4.5 AUDITING AND REVIEWING PERFORMANCE

The organisation should review and improve its safety and health management system continuously, so that its overall safety and health performance improves constantly. The organisation can learn from relevant experience and apply the lessons. There should be a systematic review of performance based on data from monitoring and from independent audits of the whole safety and health management system. These form the basis of complying with the organisation's responsibilities under the 2005 Act and other statutory provisions. There should be a strong commitment to continuous improvement involving the development of policies, systems and techniques of risk control. Performance should be assessed by:

1. internal reference to key performance indicators;
2. external comparison with the performance of business competitors and best practice in the organisation's employment sector.

Many companies now report on how well they have performed on worker safety and health in their annual reports and how they have fulfilled their responsibilities with regard to preparing and implementing their safety statements. In addition, employers have greater responsibilities under section 80 of the 2005 Act on 'Liability of Directors and officers of undertakings' which requires them to be in a position to prove they have proactively managed the safety and health of their workers. Data from this 'Auditing and Reviewing Performance' process should be used for these purposes.

The concern for health and safety is legitimate in every context of human enterprise. In schools for instance, for teaching staff's safety to be guaranteed, the equipment

available should be properly maintained and installation for non-existent ones done according to the health and safety policies. This makes it difficult for the teaching staff to take responsibility for their own safety. Employee health and safety programs should be a major priority for management because they save lives, increase productivity, and reduce costs. These health and safety programs should stress employee involvement, continued monitoring, and an overall wellness component (Anthony et al., 2007). Work safety requires that safe working conditions should not create significant risk of people being rendered unfit to perform their work. Health and safety at work is therefore aimed at creating conditions, capabilities, and habits that enable the worker and his/her organization to carry out their work efficiently and in a way that avoids events which could cause them harm (Garcia-Herrero et al., 2012). It is clear that safe working conditions have an effect on the habits of workers, which in turn impacts on efficiency. This implies that employees working in a safe condition are likely to perform in a way that will not cause them harm.

Robens (1972) offers a challenge to the traditional approach to safety in the workplace, known as the 'careless worker' model. In this model, employers assumed that most of the accidents were due to the employee's failure to take safety seriously, or failing to protect themselves. In his report, he recognized that the 'careless worker' model does not explain occupational ill-health caused by toxic substances, noise and badly designed and unsafe systems of work. A new approach to occupational health and safety, the 'shared responsibility' model assumes that the best way to reduce levels of occupational accidents and disease relies on the cooperation of both employers and employees (Bratton & Gold, 1999). In order to maintain a safe and healthy workplace, workers and supervisors must be taught to keep a health and safety mindset. Such mindedness does not always accompany the acquisition of skill or knowledge on equipment operation. Most persons learn how to drive an automobile, for example, with

relatively little difficulty. An attitude of maturity is however, necessary (Siegel, 1962). Though employers are required to design and maintain a safe and healthy systems of work, the concomitant duty of the employee is to behave in a manner that safeguards his or her own health and that of his/her co-workers (Bratton & Gold, 1999).

A research carried out at The Research Centre Design and Technology of the Saxion University of Applied sciences on "Safety at work" concluded that personal safety, a safe environment and safe behaviour were important components that employers need to ensure their availability within their organizations. According to this research, enforcing safety by adjusting the environment people have to work in and detecting risks at work so that workers can avoid dangerous situations is key (Ynze Houten (ed)., 2012). Hints from statistics in the UK that are compiled every year reveal that the education sector as a whole produces a significant number of four to five deaths over the last six years and more than 3000 injuries. This means that a teacher or a classroom assistant could be at risk (HSE, 2001/2004). Part two of the Canadian Labour Code stipulates the duties of both the employer and employee. These duties have a goal of preventing occupational related injuries and disease. Employees have a responsibility to take all reasonable and necessary precautions to ensure their health and safety, and that of anyone else who may be affected by their work or activities. They are required to use all materials, equipment, devices and clothing that are provided by the employer (Canadian Labour Code, 2015).

2.5 INTEGRATING HEALTH AND SAFETY WITH PROJECT MANAGEMENT

Most of industrial companies use the concept of project management to plan, organize, execute, and control the progress of their projects in order to achieve satisfactory completion. In fact, the main reasons for project management are to satisfy the

stakeholders within a specified timescale, scope, budget, and specified quality (Althaqafi & Elssy, 2015). However, occupational fatalities, injuries and diseases also contribute to the variability of resources, which increases project risk. Such risk can manifest itself in occupational accidents, damage to the environment, reduced productivity, nonconformance of quality standards and time overruns, and ultimately in an increase in the costs of project and delays of schedule (Smallwood & Venter, 2002). Taking into account that the elimination of occupational and environmental risks contributes to the success of industrial projects, it's always more advantageous when introduced at the definition stage of a project, but also when all involved parts remain mindful of it at all stages to the completion of a project (Badri, Gbodossou, & Nadeau, 2012).

Integration of HSE principles into project management involves challenges that must be approached using a variety of disciplines (technological, managerial and sociological) (Badri, 2015). Risk analysis and risk assessment is viewed as a crucial step and plays a major role in integration of HSE principles throughout project life cycle. Implementation of early HSE analysis allows identifying project – specific HSE challenges and to select appropriate risk identification and control methods (Integrate Health, Safety and Environment into Engineering Projects, 2013).

HSE risks may be those which are directly linked with the health and safety of workers and staff of project site. Moreover, those risks may also adversely impact on the environment. HSE risk comprises the threat of accidents, personal injuries, occupational illnesses and environmental damage. Risk is directly proportional to probability and consequence/ impact. Risk = f (probability, consequence/impact on Health, Safety and Environment) (Mubin, Shah, & Yunus, 2014) Risk assessment consists of risk identification, risk analysis (frequency evaluation + consequence evaluation), and risk evaluation (assessment of tolerability of risk to people,

environment, assets and reputation by comparing risk level with the relevant tolerability criteria) (Paramonov, 2016). In order to interpret HSE risk means of measurement of risk are required, such as: injuries/fatalities/ occupational illness per year, emissions in the water, air, soil, financial losses per year. Qualitative assessment remains essential in prioritizing HSE risk (e.g. collecting data, modeling techniques and expert opinion). The purpose of this evaluation is to prioritize risks in terms of the likelihood of their occurrence and their impact on the project goals. Qualitative assessment is often supplemented by a quantitative review to the extent possible. Subsequent risk assessment, the process is completed by adopting a risk control action plan integrated into the project management process as an indicator measuring the effectiveness of the approach (Badri, et al., 2012; A Guide to the Project Management Body of Knowledge, 2008). Risk is also directly proportional to the hazard but indirectly proportional to the protection and preventive measures. However, with proper assessment and mitigation techniques risk can be reduce to an acceptable level. In order to identify and manage HSE risks associated with a project, a company requires involvement and participation of the project manager, the risk management team, the project team members, customers, experts, end users, stakeholders and the specialists in risk analysis. Finally, integration of HSE in engineering project management depends on communication, culture, worker attitudes, motivation, skill, health and physical condition (Gibb, Haslam, Gyi, Hide, & Duff, 2006). Other risk factors are linked to the management of projects, the culture prevailing with respect to safety, environment and risk management and the economic climate in which a company operates. However, implementation of measures into the management of industrial projects, for example, the level of care required at the design and all stages of project lifecycle and the degree of commitment on the part of the companies involved. Figure 2 illustrates integration of HSE risk management into project management.

Several studies related to safety and project management have suggested that having full integration between safety management and project management is essential to reduce gaps and confusions in the workplace of projects. They found that most organisations implement their safety plans just to avoid government fines, and the implementation of safety plans is seen as an extra activity. However, they realized that safety management must be integrated with project planning and control. Saurin et al presented a model for safety planning and control to be carried out in industrial construction projects. They found that the model delivered a significant contribution to the projects by improving safety performance. They also identified that having a systematic integration of safety management into the core processes of project management (such as design, cost management, procurement, and cost management) is essential to improve occupational health and safety. Haslam et al. [23] investigated and studied 100 individual construction accidents in order to identify the key factors of the accidents. At the end of their research they point out that "Safety needs to be owned and integrated across the project team, from designers and engineers through to skilled trade personnel and operatives." Previous research clearly indicates the need for an effective system for the integration of OHS into management planning, therefore, this research will focus on enhancing safety management in projects by proposing a model of integration safety management processes into project management processes.

When the UK's Health and Safety Executive (HSE) implemented the Construction Design and Management Regulations 1994 (CDM), they intended them to "encourage the integration of health and safety into project management" (HSE 2001). Almost ten years on these very regulations are under review as many in the industry still struggle to properly integrate the management of health and safety throughout the planning lifecycle of construction projects. In construction, planning can cover a vast number of activities from pre-project planning, through design, to planning specific site activities

(CIOB 1991). It is estimated that up to 90% of accidents could be prevented (HSE 1988). Recent studies have found that planning and control failures were related to 45.4% of accidents (Duff and Suraji 2000), and designers could have contributed to the prevention of up to 47% of accidents investigated as part of an HSE research project (HSE 2003). Effective planning for Health and Safety (H&S) is therefore essential if projects are to be delivered on time, without cost overrun, and without experiencing accidents or damaging the environment or the health of site personnel (CIOB 2002; Teo, et al. 2005). For projects in the UK, the initial planning has to also consider the needs of those maintaining and cleaning the structure (HSE 2001). These are not easy objectives as construction sites are busy places where time pressures are always present and the work environment ever changing (HSE 2002). Today's construction project planning seriously challenges the old triangular model of time/cost/quality trade-off, which suggested that an improvement in one must lead to deterioration in at least one of the others (Atkinson 1999; Westerveld 2003). It now extends the total quality management philosophy that quality is free (Crosby 1979) and embraces the premise that delivery in one area, safety, can actually lead to benefits in other areas, such as time and cost (Hinze and Parker 1978). The importance of effective construction planning and control in the communication and avoidance of health and safety risks cannot be overstated but the fundamental premise postulated by the authors is that this need not, and should not, be a separate exercise aimed solely at health and safety. Effective management will embrace all production objectives, as an integrated process, and deliver construction which satisfies all these objectives and not one at the expense of the others.

Studies in construction accidents suggest many accidents on construction sites could be prevented by taking appropriate steps in all phases of the project life. Thus, participants in a project have a role to play in improving the health and safety

performance of construction sites and completed projects. Current thought on health and safety in construction put emphasis on integrating health and safety management into the entire construction process. This view of health and safety management is, at least to some extent, largely driven by developments in health and safety legislation in Europe and USA.

This view of integration of health and safety management into construction processes requires responsibility for health and safety to be equitably shared between the key participants in a construction project. This view therefore requires project participants to "think health and safety" throughout the phases of a project. As Hinze (1998) has emphasized, addressing the safety of construction workers in the design phase involves recognizing the potential impact designers' decisions can have on the health and safety of construction site workers. Similarly, owners' involvement in construction safety could reduce the cost of safety to minimum. In the UK and other countries which are members of the European Union, the European Directive on Temporary and Mobile Construction Sites calls for health and safety to be considered during the early stages of a project. However, maximum benefits can be derived from considering health and safety at the early stages of project if procurement routes are adopted which facilitate coordination and team spirit (Kheni and Gibb 2006).Integration of health and safety into project planning has been promoted by authors such as Kartam (1997), Cameron and Duff (2002), Murray (2002), Saurin et al. (2004), Pavitt et al.(2004), Gibb and Pendlebury (2005) and Hare et al. (2006). The work of these authors have each sought to explore avenues for managing health and safety as an integral aspect of project planning during one or more of the phases of project execution. For instance, one of the most recent studies, Hare et al. (2006) investigated the integration of health and safety with the pre-construction phase of projects. The authors highlighted the importance of effective teams and effective two way flow of information for successful

integration. In developing countries, this shift in focus of health and safety management from actual site processes to overall management of projects requires, first of all, commitment on the part of governments. This will create an enabling environment for the participation of clients, designers and health and safety stakeholders in health and safety management (Coble and Haupt 1999).

2.6 CHALLENGES IN INTEGRATING HEALTH AND SAFETY IN PROJECT MANAGEMENT IN THE CONSTRUCTION INDUSTRY

Some of the major challenges in the management of health and safety in the constructions sites noted by the survey included but not limited to; inadequate personal and protective equipment, poor maintenance of personal protective gear, lack of top management support in the management of health and safety in construction sites, inadequate enforcement mechanisms, inadequate welfare facilities, absence of safety and health committees, unawareness of health and safety matters among the workers and lack of equipped first aid kits on the construction sites. Welfare facilities were also noted as a big challenge since they are not adequately provided as well as personal protective equipment. Some site supervisors indicated that lack of adequate funds, lack of monitoring and evaluation, lack of personal protective equipment implementation programs among others as some of the factors that give rise to the above challenges. The site supervisory staff and construction workers suggested that the provision of protective gear, formation of safety committees, inspections by the government, and training and education as measures to mitigate some of the major challenges encountered in the construction sites However due to lack of enforcement mechanisms such as site inspections to check adherence to health and safety requirements on the various measures the suggestions still remain unimplemented.

Anecdotal evidence suggests the implementation of health and safety standards in the construction industry is problematic because of their particular characteristics. A survey conducted by Baldock et al., (2005) revealed marked variations in firms' health and safety practices. External factors found in the study which influenced the businesses' decisions to improve the health and safety included; regulatory enforcement activity, use of external assistance on health and safety and membership of trade associations. Internally, the size of construction firms (number of employees and turnover), growth performance and management experience were found to correlate with propensity to adopt health and safety improvement measures. A study by Champoux and Brun (2002) also suggests small business characteristics are associated with health and management within SMEs. Areas of operation have also been found to relate to adoption of health and safety management practices; even where businesses operate in the same industry, there can be marked variation in their health and safety practices depending on the nature of their products or services they render. Birchall and Finlayson (1996) found that, in the construction sector, the effectiveness of health and safety management systems varies with organizational size and type of business activity. The huge numbers of construction SMEs in the economy of any country makes it difficult for enforcing agencies to reach them. Additionally, most SMEs are "invisible", making it difficult for safety inspectors to locate them. Locating construction SMEs is even the more difficult because of the particular characteristics of the industry. For instance, the need for permanent office accommodation become increasingly apparent as the construction business expands its operations and takes bigger contracts. Some owner/managers of SMEs may therefore choose to operate from their homes. Also, construction sites are dispersed and temporary. Government regulation of the sector can contribute to difficulties in the management of health and safety. Construction SMEs, generally speaking, are saddled with regulatory burden

when compared with large businesses because of their size. Evidence exists which indicates the cost of compliance with regulation in SMEs is disproportional and greater in SMEs than in larger businesses (Bannock and Peacock 1989, BRT 2000). Thus, complying with health and safety regulations can be seen as costly and a burden by owner/managers. In developed countries there is ample evidence that health and safety performance of SMEs is poorer than larger businesses (Cully et al. 1999, MORI 1998, Nichols 1997:154, 161-168, Nichols et al. 1995, Stevens 1999, Walters 2001:81-86). In the face of scarce resources, SMEs are unlikely to commit sufficient amounts and the right type of resources in the management of health and safety. This is the truer of construction SMEs in developing countries where access to finance is a major problem. To manage health and safety effectively, it is essential that owner/managers have the right attitude and perceptions about hazards on construction sites. Unfortunately, this is not the case in construction SMEs where health and safety risks are often wrongly perceived to be low (Champoux and Brun 2002). Most owner/managers misconceive the risk levels of their businesses and rarely involve their workers in decision-making relating to health and safety matters. The Health and Safety Commission in the UK (Department of Environment Transport and the Regions (DETR) 2000) for instance, has identified ignorance amongst other factors preventing construction SMEs from taking the opportunity to improve their competitive position through better health and safety management. SMEs have a preference for informal procedures over formal procedures and may therefore find it difficult adopting formal management procedures developed for large businesses. Health and safety management systems and practices successfully applied in large firms will therefore be unsuitable for SMEs unless they are modified to take into account, the informal culture of SMEs.

In the field of industrial project management, formal integration of occupational health (OHS) risk evaluation and monitoring has been found inadequate, indeed absent in

many cases (Badri et al (2012); Fung et al (2010); Pal & Dewan (2009)). Problems affecting the safety and reliability of industrial processes are common manifestations of this inadequacy. This situation is generally due to poor knowledge of OHS principles in business organizations and among project team members (Charvolin & Duchet, 2006). Although risk management tools are put to good use in many industrial sectors, many major projects have run into difficulty because of a failure to integrate OHS. Industrial projects often contain hidden risks that can lead to poor decision-making. Several types of OHS risks potentially exist, and these change in frequency and gravity depending on the dynamic context. Despite the level of hazards, the literature is not unanimous on the subject of risk management processes that organizations should put in place. In spite of the heightened risks and uncertainties associated with such projects, the number of published studies on the systematic management of risks as a whole remains small (Badri et al (2012); Fung et al (2010); Petrone et al (2010)).

Among the reasons cited for this situation are gaps in the data and knowledge that would be required in order to identify and evaluate correctly all of the risks involved. The complexity of some projects introduces additional constraints on the consideration of OHS in the management of potential risks (Badri et al (2011, 2013)). This article puts into perspective the complexity of the challenge of integrating OHS into industrial project risk management. This challenge will be more understood once its principal aspects have been clearly defined. Given the interdisciplinary nature of the problem, research in this field must start with this exercise. A conceptual and methodological approach is proposed to guide future research focused on meeting this challenge. The approach is based on applying multi-disciplinary research modes to a complex industrial context in order to identify all scenarios likely to contain threats to humans or the environment. A case study is used to illustrate the potential of the proposed approach for application and its contribution to meeting the challenge of taking OHS

into consideration. On-site researchers were able to develop a new approach that helped mining companies to achieve successful integration of OHS into expansion projects.

2.7 DESIGN PRACTICES ADAPTED IN THE INTEGRATION OF HEALTH AND SAFETY IN PROJECT MANAGEMENT

Seventy to ninety per cent of accidents are caused by unsafe behaviour. A number of theories have linked accidents to the failure of persons (by their actions or omissions) in the accident chain to avert accidents (Adams 1976, Bird 1974, Haslam et al. 2003, Suraji et al. 2001). These explanations have therefore formed the basis of psychological approaches to health and safety management which have as their aim, the modification of behaviour so as to break the chain of events leading to most accidents. Duff et al. (1994) reported on behavioural modification procedures used in improving construction site safety. The authors of the study used a combination of goal-setting and feedback to influence the behaviour of site operatives. The findings of the study suggest goal setting and feedback can greatly enhance health and safety performance. Duff (1998) has pointed out that behavioural methods should not be restricted to site operatives but could be extended to include site management staff and senior corporate management. Lingard and Rowlinson (1994) examined the effectiveness of the goal-setting and feedback approach in the Honk Kong construction industry. It was found that labour commitments to the group and to the organisation are intervening variables in the application of behavioural techniques. Workers need to behave on site in a manner that will not expose them or their colleagues to hazard, particularly workers need to: a. report incidences to their employers; b. take care of their own health and safety; c. abstain from alcohol and drugs that would otherwise increase their exposure to hazards; d. take care to avoid adversely affecting the health and safety of fellow

workers and persons likely to be adversely affected by their actions and omissions; e. follow health and safety rules on site; and, f. use PPE when provided.

2.8 IMPACT OF INTEGRATING HEALTH AND SAFETY WITH PROJECT MANAGEMENT ON THE PERFORMANCE OF PROJECTS

Construction industry is a high-risk industry owing to severe accident occurrence in construction sites and accidental deaths or work-related injuries is considered an issue. Construction managers concentrate principally on profitability as far as cost, quality and time, though development tasks can never accomplish their targets unless experts end up noticeably mindful of the safety-related issues (Smith, 1999) As indicated by Health and Safety Executive, demonstrate the quantity of laborers fatally harmed in 2015/16 is 144, and relates to a rate of deadly damage of 0.46 deaths for every 100,000 labourers. Over the most recent 20-year era there has been a descending pattern in the rate of fatal injury (Workplace fatal injuries in Great Britain 2018, 2018). Health and Safety are related to ensuring the welfare of the laborers through protection in their separate work. Security of laborers is extremely crucial in especially in high risk industries such as the construction industry in light of the fact that the fundamental power behind any site is the labourer. It is discovered that without wellbeing, the dangers and risks at an extremely risky place like construction sites can get individuals harmed, hurt or even executed and appropriately this can cause any development site deferrals and additional consumptions. Health and safety are ensured to both the employees and employers since bosses can’t get a decent result if their workers are becoming ill and harmed constantly (Shamsuddin, Ani, Ismail & Ibrahim, 2015). Occupational Health and Safety Management System can be explained to be part of the whole management framework that encourages the administration of the Occupational Safety and Health dangers related to the business of any organizational structure,

planning of the activities and any other practices and processes in order to continually keep the OS&H policy of an association and continual improvement directed towards the abatement of occupational hazards in the workplace, (OSH). The main objective of the Occupational Health and Safety Management System (OHSMS) to be certified is to empower the awareness of employees in safety through safety work practices, and higher safety standards are promoted in the construction industry, (Teo, Ling & Chong, 2005). It is argued by Smallwood (2002), that accidents are inescapable in the construction industry since the business is known to be naturally unsafe. The high rates of injury are essentially because of deficient or non-presence of OSH administration frameworks (Zolfagharian, Ressang, Irizarry, Nourbakhsh & Zin, 2011). Health and safety issues are not bound to the construction phase of a project yet happen all through a project. Huge numbers of health and safety problems experienced during construction could be avoided if efforts are made during the project brief and design phases, (Haywood, 2004). (Hare, Cameron & Roy Duff, 2006) and (Saurin & Fermoso, 2004) explored health and safety integrate with pre construction phase, thus suggested to future researches to develop the whole model for construction project management. This paper aims to present a literature review on root causes of construction accidents, factors affecting safety in construction sites, what is meant by occupational safety and health management system. The paper then discusses what the pre-construction stage is and effects of implementing occupational safety and health in the inception feasibility, design & tendering pre-construction stage then implementation of occupational health and safety practices at construction sites will be discussed. Previous research suggested that early introduction of occupational safety & health management systems (OHSMS) and elements within the project implementation, is an important asset in decision-making as it directs towards the abatement of occupational hazards in the workplace.

Hinze and Raymond (2003), instigated that the occurrence of injuries is a major concern since the incidence of such lost is a negative parameter. Helander (1991), posited that the cost associated with construction worksite accidents constitutes over 6% of construction costs. These costs should therefore provide some monetary incentives to construction managers to implement construction safety policies and also encourage contractors to invest in health and safety practices. Cascio (2001), observed that effective management of health and safety will ensure the mitigation of cost associated with the occurrence of accidents. Such costs include;

a) Overtime cost
b) Cost of repairing or replacing damaged equipment
c) Cost of recruiting new workers to fill the position of injured workers
d) Cost of time lost in dealing with issues of accidents.
e) Cost involved in compensating injured workers.
f) Cost of medication that are unexpected and unbudgeted for by the company

Rudin (2005), identified the benefits of incorporating health and safety measures in construction organizations as follows:

1. Likely reduction in the occurrence of injuries, illness, or death at the jobsite;
2. Promote sound and cordial working environment;
3. Increase the morale and work quality of employees;
4. Enhance effective communication at the construction site.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The research will investigate health and safety management by selecting building contractors in Greater-Accra 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. This chapter discusses the research design, research strategy, research method, and research data, the sampling method, data collection and data analysis method.

3.2 DESIGN OF THE STUDY

3.2.1 Research Design

Leedy (1997:195) defines research design as a plan for a study, providing the overall framework for collecting data. MacMillan and Schumacher (2001:166) define it as a plan for selecting subjects, research sites, and data collection procedures to answer the research question(s). They further indicate that the goal of a sound research design is to provide results that are judged to be credible. For Durrheim (2004:29), research design is a strategic framework for action that serves as a bridge between research questions and the execution, or implementation of the research strategy.

3.2.1.1 Descriptive Design

Descriptive design is a type of research design that provides an accurate and valid representation of (encapsulate), the factors or variables that pertain / are relevant to the research question (Wyk, 2019). Descriptive design renders to analysis using statistical tools. A descriptive study is systematic, fixed format and structured (Churchill & Iacobucci, 2005). According to Kinnear & Taylor (1996), “descriptive research is appropriate when the research objectives include portraying the characteristics of

marketing phenomena and 144 determine the frequency of occurrence, determining the degree to which marketing variables are associated and making predictions regarding occurrence of marketing phenomena".

3.2.1.2 Correlational Design

Correlational design is a type of research design that is concerned with establishing relationships between two or more variables in the same population or between the same variables in two populations (Leedy & Ormrod 2010). A correlational study is a type of research design where a researcher seeks to understand what kind of relationships naturally occurring variables have with one another. In simple terms, correlational research seeks to figure out if two or more variables are related and, if so, in what way (Cheprasov, 2013).

3.2.1.3 Design Adopted

The Research design adopted for the study is the descriptive and correlational research design. Research design denotes the structure and plan of the investigation used purposely for the attainment of the research objectives.

3.2.2 Research Strategy

3.2.2.1 Survey

Pinsonneault and Kraemer (1993) defined a survey as a "means for gathering information about the characteristics, actions, or opinions of a large group of people" (p. 77). Surveys can also be used to assess needs, evaluate demand, and examine impact (Salant & Dillman, 1994, p. 2). The term survey instrument is often used to distinguish the survey tool from the survey research that it is designed to support.

3.2.2.2 Case Study

A case study is an in-depth study of a particular research problem rather than a sweeping statistical survey or comprehensive comparative inquiry. It is often used to narrow down a very broad field of research into one or a few easily researchable

examples. The case study research design is also useful for testing whether a specific theory and model actually applies to phenomena in the real world. It is a useful design when not much is known about an issue or phenomenon (University of Southern California Libraries, 2016).

3.2.2.3 Observational

This type of research strategy draws a conclusion by comparing subjects against a control group, in cases where the researcher has no control over the experiment. There are two general types of observational designs. In direct observations, people know that you are watching them. Unobtrusive measures involve any method for studying behavior where individuals do not know they are being observed. An observational study allows a useful insight into a phenomenon and avoids the ethical and practical difficulties of setting up a large and cumbersome research project (University of Southern California Libraries, 2016).

3.2.2.4 Research Strategy Adopted

This study employed survey as its research design. The survey research design was adopted to emphasize the intensive examination of the setting.

3.2.3 Research Method

3.2.3.1 Qualitative

Qualitative research, according to Van der Merwe (cited by Garbers, 1996) is a research approach aimed at the development of theories and understanding. Denzin and Lincoln (2005) define qualitative research as a situated activity which locates the observer in the world. It involves an interpretive, naturalistic approach to the world, i.e. qualitative researchers study phenomena in their natural settings, attempting to make sense of, or interpreting phenomena in terms of the meanings people bring to them. Qualitative research implies an emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured (Denzin & Lincoln, 2005:10).

3.2.3.2 Quantitative

Quantitative research, according to Van der Merwe (1996), is a research approach aimed at testing theories, determining facts, demonstrating relationships between variables, and predicting outcomes. Quantitative research uses methods from the natural sciences that are designed to ensure objectivity, generalizability and reliability (Weinreich, 2009). The techniques used in quantitative research include random selection of research participants from the study population in an unbiased manner, the standardized questionnaire or intervention they receive, and statistical methods used to test predetermined hypotheses regarding the relationship between specific variables. The researcher in quantitative research, unlike in the qualitative paradigm where he/she is regarded as a great research instrument due to his/her active participation in the research process, is considered as being external to the actual research, and results are expected to be replicable, no matter who conducts the research.

3.2.3.3 Mixed/Triangulation

Kemper, Springfield and Teddlie (2003) define mixed/ triangulation methods design as a method that includes both qualitative and quantitative data collection and analysis in parallel form (concurrent mixed method design in which two types of data are collected and analyzed in sequential form). Bazely (2003) defines this method as the use of mixed data (numerical and text) and alternative tools (statistics and analysis), but apply the same method. It is a type of research in which a researcher uses the qualitative research paradigm for one phase of a study and a quantitative research paradigm for another phase of the study.

3.2.3.4 Research Method Adopted

The research study adopted the quantitative research approach making use of survey questionnaire. Quantitative research is more precise and result oriented. It is also geared towards meeting the objectives of the study. Quantitative research involves the

gathering of numerical data to elucidate, envisage, and/or control phenomena of research interest. Quantitative research assumes a positivist philosophy that emphasizes objectivity quantification of phenomena (Casley and Kumar, 1988). After vividly explaining the above methods, the quantitative approach was chosen as the research strategy, the researcher found it viable to combine it with the survey design.

3.3 RESEARCH DATA

3.3.1 Type of Data

3.3.1.1 Observational Data

Observational data is a data captured in real-time, usually irreplaceable. For example, sensor data, survey data, sample data, neuro images

3.3.1.2 Experimental Data

Experimental data are usually data from lab equipment, often reproducible, but can be expensive. For example, gene sequences, chromatograms, toroid magnetic field data

3.3.1.3 Simulation Data

Simulation data is generated from test models where model and metadata are more important than output data. For example, climate models, economic models.

3.3.1.4 Derived / Compiled Data

Derived or compiled data is data that is reproducible but expensive. For example, text and data mining, compiled database, 3D models.

3.3.1.5 Type of Data Used

After vividly explaining the above types of Data, the observational type was chosen as the type of Data used, the researcher found it viable to combine it with the survey design.

3.3.2 DATA SOURCE

3.3.2.1 Primary Source

Data that has been collected from first-hand-experience is known as primary source. Primary source has not been published yet and is more reliable, authentic and objective. Primary data has not been changed or altered by human beings

3.3.2.2 Secondary source

Data collected from a source that has already been published in any form is called as secondary source. The review of literature in any research is based on secondary source. It is collected by someone else for some other purpose (but being utilized by the investigator for another purpose. Example of secondary source includes: Books, Records, Biographies, Newspapers, Published censuses or other statistical data, Data archives, Internet articles, Research articles by other researchers (journals), Databases, etc.

3.3.2.3 Data Source Adopted

The study used both primary and secondary sources of data which are expected to enhance the quality of the study. The essence of this is to have a wide range of information in terms of what has been collected for some purpose other than solving the present problem and other which is collected specially to address specific research objectives.

3.3.3 DATA COLLECTION

3.3.4 DATA ANALYSIS

The data collected were organized and coded and subjected to analysis using Statistical Package for Social Scientists, version 19. The study utilized both descriptive and inferential statistics in analyzing the data and conclusions were drawn from them.

3.3.4.1 QUESTIONNAIRE DESIGN

The questions were made up of open-ended and closed-ended questions. Closed-ended questions used the Likert scale type and the open-ended type questions allowed for free expression of employees' views and comments. The questionnaires were distributed to the sampled staff and given to some to fill at their convenience. The questionnaires were administered to all categories of staff.

3.4 ISSUES OF SAMPLING

3.4.1 POPULATION OF STUDY

The target population includes workers (i.e. Health and safety officers, Engineers, Supervisors, and Artisans)

3.4.2 Sample Size

The researcher has not cited any document indicating the total or approximate number of health and safety officers, project managers, civil Engineers, quantity surveyors, architects, and site supervisors in Ghana out of which the researcher could determine the sample size using an appropriate sample size formula. The researcher therefore proposes administer a minimum of 100 questionnaires.

3.4.3 SAMPLING TECHNIQUE

The researcher contacted the most visible and easy to reach construction professionals in the Greater-Accra Region for the questionnaire administration. The purposive and snowball sampling method is used to identify respondents with rich information that are relevant to the study. The process will continue till representative sample sizes of hundred (100) respondents were obtained.

3.5 ETHICAL ISSUES

Every research requires that the researcher gives attention to appropriate research ethics and this study is not exemption. Voluntarily, respondents were allowed to participate in the study based on their free will. The researcher also assured prospective respondents that the study result will not place any respondents at risk of criminal or civil liability nor damage respondents‟ financial standing, employability or reputation. Anonymity and personal information of respondents were treated with confidentiality.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

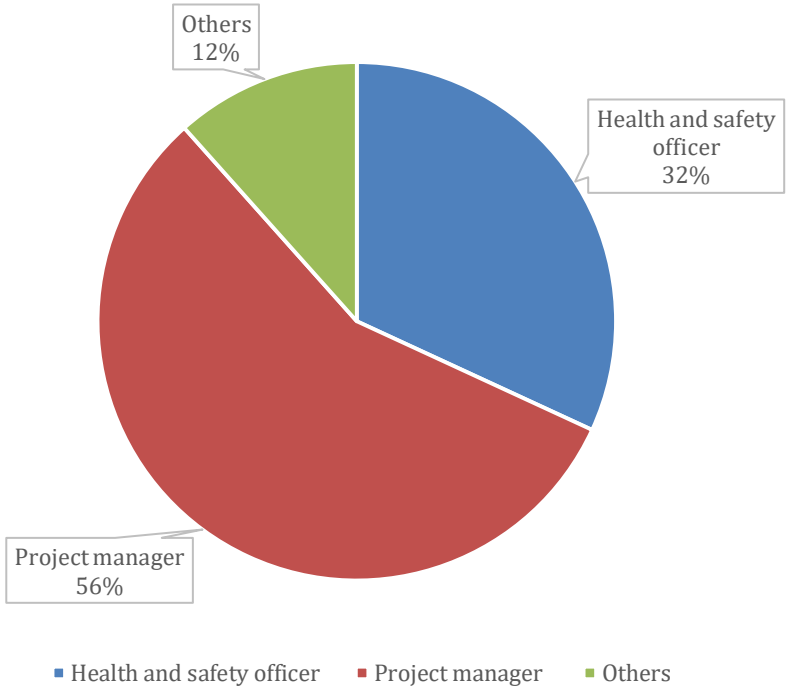
This section contains discussions on the findings of the study. The findings are analysed in line with objectives that were out in the study.

A total number of eighty-three (83) questionnaires were administered, out of which sixty-nine (69) were obtained and used for data analysis. These valid questionnaires used for the analysis yielded 83% of response rate. The data from each response was entered into an SPSS software and used for analysis. This indicates that, the response was quite high and reflects the views of the entire population. The questionnaires for survey and evaluation was developed based on extensive literature on Safety management practices. Also included were some demographic questions of the respondents relating to the age, experience in the construction industry and the stage of involvement of project execution.

4.2 BACKGROUND INFORMATION OF RESPONDENTS

4.2.1 Profession of Respondents

Fig 4.2 shows that the profession of the respondents, 32% of the respondents were health and safety officers, 57% were project managers, whilst the remaining 12% comprised civil Engineers, quantity surveyors, architects, and site supervisors. The findings show that majority of the respondents were project managers, and health and safety officers. Considering the theme of this study to be integrating health and safety in project management, this depicts that the results of the research is fairly reliable and valid. It was also found that the other respondents comprising engineers, quantity surveyors, etc., had a good sense of health and safety issues as well as project management practices.

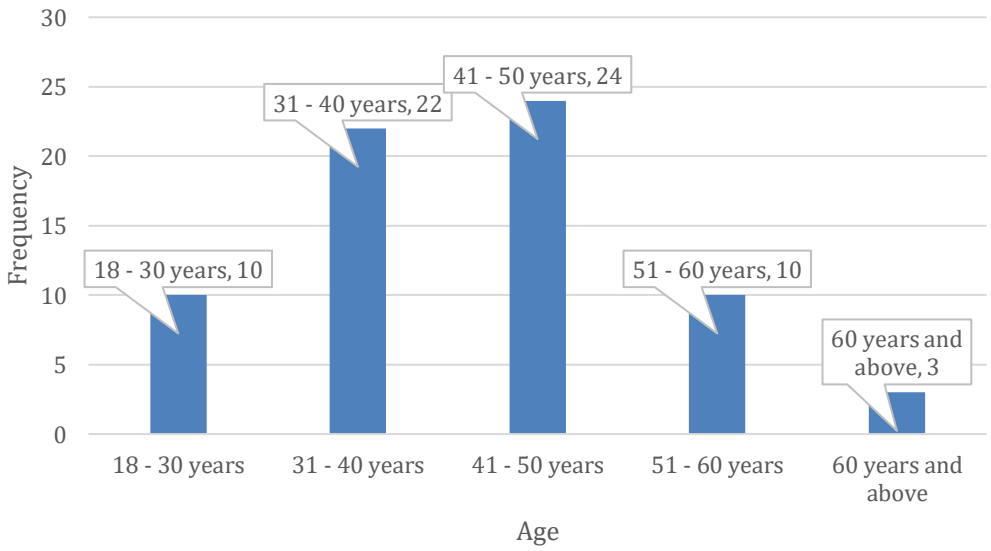


(Source: Field survey, 2016)

Figure 4.1 Profession of respondents

4.2.2 Age of Respondents

The figure below shows the ages of the respondents. It shows that greater percentage of the respondents were aged above thirty (30) showing indicating some sense of maturity in their ages.

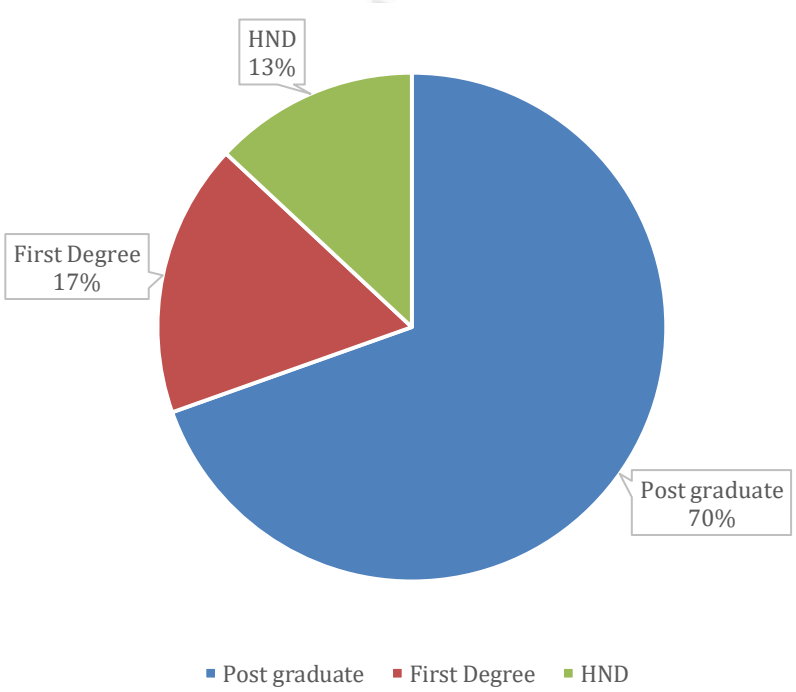


(Source: Field survey, 2016)

Figure 4.2 Ages of respondents

4.2.3 Educational Qualification

The figure above indicates that, all the respondents selected were educated, this was not unusual since the respondents were already working in the department and also in the construction industry which needed some minimum qualification. The findings showed a greater majority of the respondents had acquired Bachelor of Science (B.Sc.) which represents 70%, postgraduate respondents represented 17% and HND/Diploma holders represented 13%. The respondents have demonstrated knowledge in the safety practices during construction works.



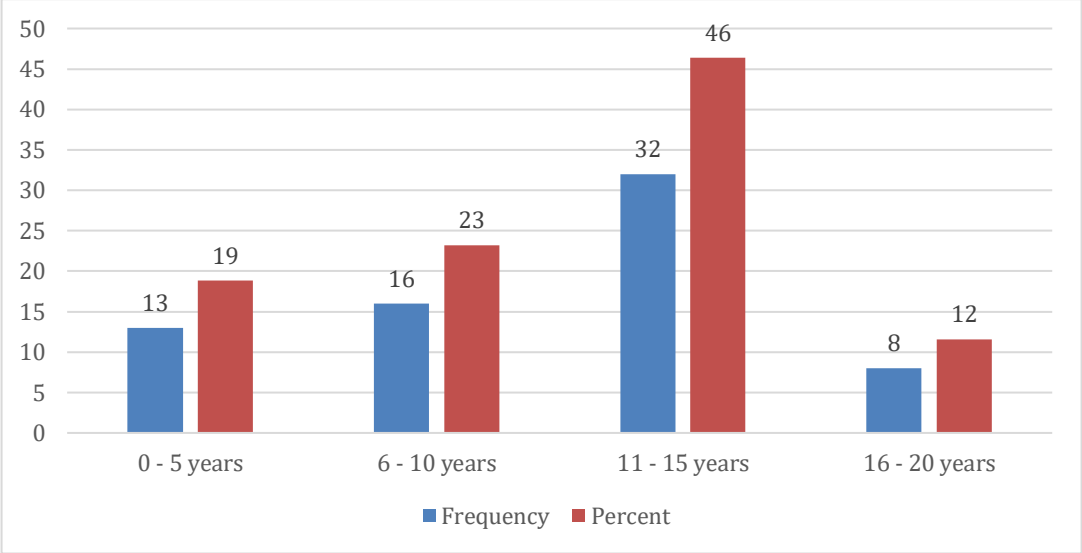
(Source: Field survey, 2016)

Figure 4.3 Educational qualification of respondents

4.2.4 Experience in the Industry

According to the table below, the survey conducted indicated that most of the respondents had worked between the periods of 11-15 years in the road construction industry representing 46%, 6-10 years working experience were 23%, 0-5 years working experience were 19% and those who had worked more than 16-20 years working experience had a representation of 11%. Majority of respondents had extensive working experience and hence gives the findings more reliability. It implies

that they are capable, experienced and good at giving clear judgment.



(Source: Field survey, 2016)

Figure 4.4 Years of experience in the road construction industry of respondents

4.3 DEVELOPMENT OF RELATIVE IMPORTANCE INDEX

Respondents were asked to rank influences of the safety management practice on the performance of their construction company based on their personal experience in the construction of road projects. The rating involved the respondents deciding on how they employed the various safety management practices and had to choose from 'never,' 'sometimes,' 'little,' 'often,' and 'always'. Respondents' attitudes were measured on a five-point Likert-type scale and the resulting data were analysed using the relative importance index (RII) method. RII is computed as:

$$RII = \frac{\Sigma W}{A*N}$$

Where: W – the weight given to each factor by the respondents and ranges from 1 to 5; A – the highest response integer (5); and N – the total number of respondents.

4.4 CHALLENGES IN INTEGRATING HEALTH AND SAFETY IN PROJECT MANAGEMENT IN THE CONSTRUCTION INDUSTRY

This section gave the respondents the opportunity to rank the challenges in integrating health and safety in project management in the construction industry. The respondents to the questionnaires were asked to respond on a five-point Likert scale of Not important (1), fairly Important (2), Not Sure (3), Important (4), and Very Important (5) on how they perceive the changes based on their experience. The table below shows the responses of the respondents.

Table 4.1 Challenges in integrating health and safety in project management in the construction industry

Challenges in Integrating Health and Safety in Project Management in the Construction Industry	**ΣW**	**RII**	**Rank**
lack of top management support in the management of health and safety in construction sites	299	0.867	1st
inadequate enforcement mechanisms	287	0.832	2nd
absence of safety and health committees	274	0.794	3rd
inadequate welfare facilities	262	0.759	4th
inadequate personal and protective equipment	258	0.748	5th
Difficulty in controlling hazardous materials and equipment on site	229	0.664	6th
Difficulty in the management of on-site traffic	208	0.603	7th
poor maintenance of personal protective gear	207	0.600	8th
lack of equipped first aid kits on the construction sites	187	0.542	9th
Close proximity of individuals to operation of large plant and machinery.	168	0.487	10th
unawareness of health and safety matters among the workers	152	0.441	11th

(Source: Field survey, 2019)

The Table 4.1 above summaries the results of the analyses. The table indicates that for all the challenges in integrating health and safety in project management in the construction industry posed to the respondents, 'lack of top management support in the management of health and safety in construction sites' was ranked the highest with an RII of 0.867. This could be due to a number of reasons including the fact that departments/companies do not feel it is part of the contract execution activity and do not want to expend time and resources to support health and safety matter which might in the long run serve as extra cost not originally part of the original bill of quantities. Departments or companies will always want a return of their investment in the execution of construction activities. The table 4.1 further indicated the respondents ranked 'inadequate enforcement mechanisms' as the second highest challenge with an RII of 0.832. 'Absence of safety and health committees' was ranked third with a percentage an RII of 0.794 and the fourth 'inadequate welfare facilities' had an RII of 0.748. This is likely to be largely due to the lack of proper understanding for the need for safety.

4.5 THE EXISTENCE OF HEALTH AND SAFETY SYSTEMS IN PROJECT MANAGEMENT

Table 4.2 Identify the existence of health and safety systems in project management

Identify the existence of health and safety systems in project management	**ΣW**	RII	**Rank**
Lack of enforcement mechanisms	289	0.838	1st
Government regulation of the sector	285	0.826	2nd
Sufficient equipment is made available to do the job safely	284	0.823	3rd
First Aid facilities is available on site	270	0.783	4th
Poor knowledge of OHS principles in business organizations	262	0.759	5th
Welfare facilities	258	0.748	6th
Safety rules and procedures are strictly followed by workers.	231	0.670	7th
Company has an effective system for the issuance/inspection/replacement of PPE	208	0.603	8th
Lack of personal protective equipment implementation programs	207	0.600	9th
Health and Safety training is not provided to employees of subcontractors.	191	0.554	10th
Field engineer, supervisor, and safety officer encourage reporting of hazards	187	0.542	11th
Safety posters and sign boards are used at the important places for worker' awareness in English	168	0.487	12th

(Source: Field survey, 2019)

Table 4.2 above indicates in rank the order of the safety management practices that significantly affect the construction of road projects. The variables with relative importance index of 0.80 and above were considered to have high ratings and therefore highly significant in influencing the safety management practices on construction sites. The limits of definition used for the RII were 0< RII<1 for all factors with0< RII<0.20 indicating a very low significance factor, 0.20< RII<0.40 for

a low significance factor, 40< RII<60 for a moderate significance factor 0.60< RII<0.80 for a high significance factor and 0.80< RII<1 for a very high significance factor. This is consistent with the findings of Donkor (2011) and Badu and Owusu (2013). From table 4.2 above, Lack of enforcement mechanisms came first with a relative importance index of 0.838. This was followed by Government regulation of the sector with an index of 0.826. Sufficient equipment is made available to do the job safely was third with an index of 0.823.

4.6 TO IDENTIFY WAYS TO MITIGATE THE CHALLENGES IN INTEGRATING HEALTH AND SAFETY IN PROJECT MANAGEMENT

The factors identified in Literature that could influence safety management practices on construction sites were tabulated in a form of questionnaires and distributed to respondents to measure the degree of significance of impact of the safety management practice in the construction of road works. Table 4.2 shows the findings of the research.

Table 4.3: To identify ways of mitigating the challenges in integrating health and safety in project management.

Ways of mitigating the challenges in integrating health and safety in project management	**ΣW**	RII	**Rank**
Employ "Safe System of Work Plans" to mitigate personnel health and safety issues.	290	0.841	1st
Increase the morale and work quality of employees	283	0.820	2nd
Enhance effective communication at the construction site	283	0.820	3rd
Use personnel hoists to aid personnel workflow throughout the site.	271	0.786	4th
Cost of recruiting new workers to fill the position of injured workers	269	0.780	5th
Cost of repairing or replacing damaged equipment	261	0.757	6th
Use signage to aid the movement of personnel in and around site	261	0.757	7th
Cost of medication that are unexpected and unbudgeted for by the company	227	0.658	8th
Likely reduction in the occurrence of injuries, illness, or death at the jobsite	205	0.594	9th
Promote sound and cordial working environment;	197	0.571	10th
Cost of time lost in dealing with issues of accidents.	189	0.548	11th
Cost involved in compensating injured workers.	184	0.533	12th

This is consistent with the findings of Donkor (2011) and Ayegba (2013). From the table Employ "Safe System of Work Plans" to mitigate personnel health and safety issues was ranked as the top most challenging factor with a relative importance index of 0.841. The second topmost factor was Increase the morale and work quality of employees with a relative importance index of 0.820, followed by enhance effective communication at the construction site with the same rank.

CHAPTER FIVE

FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter of the research focuses on key findings of the study. The research work was on the integration of health and safety with project management in Ghana with focus on selected construction firms in Greater Accra Region. It also draws out the main conclusion from the study and provides recommendations for integration of safety management practices with project management based on the findings. Chapter one of this study presented a brief background to the topic under study. Chapter two studied and reviewed existing literature with discussion for which reason the analysis and interpretation of the research data was formulated. In chapter three, the appropriate research approaches were adopted to address the objectives of the research. Chapter four gave a whole view of the analysis and discussions made on the results obtained. Finally, this chapter of the research is brought to an end with a summary of what had been done and how it was done to address the aim and objectives of the work.

5.2 HOW THE RESEARCH OBJECTIVES WERE ADDRESSED

This research was initiated with the primary aim to evaluate safety management practices used in the construction of road works in the public sector. In order to attain the specified aim, four research objectives were made:

1. To identify the existence of health and safety system in project management
2. To identify the various challenges in integrating health and safety in project management in the construction industry.
3. To mitigate the challenges in integrating health and safety in project management

5.2.1 To identify the existence of health and safety system with project management

This research objective was achieved mainly through the existing literature reviews and conducting of survey questions. This include eleven (11) lack of top management support in the management of health and safety in construction sites; inadequate enforcement mechanisms; absence of safety and health committees; inadequate welfare facilities; inadequate personal and protective equipment; Difficulty in controlling hazardous materials and equipment on site; Difficulty in the management of on-site traffic; poor maintenance of personal protective gear; lack of equipped first aid kits on the construction sites; Close proximity of individuals to operation of large plant and machinery; and, unawareness of health and safety matters among the workers.

5.2.2 To identify the various challenges in integrating health and safety in project management in the construction industry

The second objective of the study was to identify the various challenges in integrating health and safety in project management in the construction industry. Through existing literature, twelve (12) challenges were identified. These challenges are: lack of enforcement mechanisms; government regulation of the sector; sufficient equipment is made available to do the job safely; first aid facilities is available on site; poor knowledge of OHS principles in business organizations; welfare facilities; safety rules and procedures are strictly followed by workers; company has an effective system for the issuance/inspection/replacement of PPE; lack of personal protective equipment implementation programs; health and safety training is not provided to employees of subcontractors; field engineer, supervisor, and safety officer encourage reporting of hazards; and, safety posters and sign boards are used

at the important places for worker' awareness in English.

5.2.3 To identify ways of mitigating the challenges in integrating health and safety in project management

The third objective of the study was to identify ways to mitigate the challenges in integrating health and safety in project management. Through existing literature, twelve (12) factors were identified that could significantly influence safety management practices on construction sites. The mitigating factors are: employ "safe system of work plans" to mitigate personnel health and safety issues; increase the morale and work quality of employees; enhance effective communication at the construction site; use personnel hoists to aid personnel workflow throughout the site; cost of recruiting new workers to fill the position of injured workers; cost of repairing or replacing damaged equipment; use signage to aid the movement of personnel in and around site; cost of medication that are unexpected and unbudgeted for by the company; likely reduction in the occurrence of injuries, illness, or death at the jobsite; promote sound and cordial working environment; cost of time lost in dealing with issues of accidents; and, cost involved in compensating injured workers.

5.3 CONCLUSION

Safety management practices are integral part of a well-planned project construction and hence it's important for a good understanding of its implementation to ensure a successful project completion. The following recommendations are therefore measures that could be adopted to integrate safety management practices in project management.

1. Project managers and safety personnel should as a matter of dire need stress the need prioritise the safety measures from the planning stage of project

development to closure or termination of any project irrespective of size and cost.

2. In order to enhance more support from upper management towards safety, the provision should be made legal to integrate safety programs with project management. In essence, project managers and the entire management team must be involved in drafting the safety programmes such that responsibilities are assigns to stakeholders before the commencement of project works.
3. Management should evaluate potential risks, hazards and dangers that employees are likely to be exposed to and indicate the safety measures to put in place to mitigate its effects in consonance with project management practices.

5.4 RECOMMENDATIONS

This study is primarily limited to time and cost constraints. The research instrument used to gather data for this study is limited to questionnaires because of time constraints. Further studies should adopt both site observations and interviews and into the scope of work. Secondly, the study focused on integrating health and safety in project management: a study of selected construction projects in the greater Accra region. Further studies could cover at least the major cities in Ghana other than just Accra.

5.5 LIMITATIONS OF THE RESEARCH

The study revealed that there is a great need to integrate health and safety in project management. The study also established that the most significant factor influencing the performance of safety management practices is the lack of safety policy and

training for supervisors and senior management and the most challenging factor affecting the implementation of safety management practices are inadequate safety training and education for workers, and lack of provision of appropriate resources and logistics for performance of safety management practices.

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APPENDIX

APPENDIX I: INTRODUCTORY LETTER

TOPIC: INTEGRATING OF HEALTH AND SAFETY IN PROJECT MANAGEMENT: A STUDY OF SELECTED CONSTRUCTION PROJECT SITES IN THE GREATER ACCRA REGION.

Dear Respondent

This questionnaire forms part of an MSc research being undertaken at the Kwame Nkrumah University of Science and Technology. The purpose of the questionnare is to enable the achievement of the following research objectives:

1. To identify the various challenges in integrating health and safety in project management in the construction industry.
2. To identify the existence of health and safety system in project management
3. To identify and mitigate the challenges in integrating health and safety in project management.

I will be grateful if you will spare me your time in answering this questionnaire to aid the study. For each question please, kindly respond by clicking/kicking (√) in the appropriate box for each item. Below is my contact should you need any assistance in filling the questionnaire.

Thank You.

Mr. Joseph Adamah (Research Student)

APPENDIX II: QUESTIONNAIRE

SECTION A – DEMOGRAPHIC QUESTIONS

Below are some demographic questions. Kindly respond appropriately by ticking.

1. What is your age?

[ ] 18-30 yrs. [ ] 31-40 yrs. [ ] 41-50 yrs. [ ] above 50 Yrs.

2. What is your sex?

[ ] Male [ ] Female

3. What is the highest level of education you have attained?

[ ] PhD [ ] M.Sc. [ ] B.Sc. [ ] Diploma

Others, please specify……

4. How would you describe your current employment status?

Safety Officer Project Manager

5. Years of Experience?

[ ] 0-4 yrs.[ ] 5-10 yrs. [ ] 11-15yrs [ ] Above 15 yrs.

6. How conversant are you when it comes to Integrating Health and Safety in Project Management?

[ ] Very Conversant [ ] Conversant [ ] Not Sure [ ] Fairly Conversant [ ] Not Conversant

SECTION B: Challenges in Integrating Health and Safety in Project Management in the Construction Industry

7. Below are some challenges in integrating health and safety in project management in the construction industry. From your experience, kindly express your opinion on (how important) they are by ticking the appropriate cell. Use the following Likert scale:

1 Not Important 2 Fairly Important 3 Not Sure 4 Important 5 Very Important

CHALLENGES IN INTEGRATING HEALTH AND SAFETY IN PROJECT MANAGEMENT IN THE CONSTRUCTION INDUSTRY		Level of Influence				
		1	2	3	4	5
1.	inadequate personal and protective equipment					
2.	poor maintenance of personal protective gear					
3.	lack of top management support in the management of health and safety in construction sites					
4.	inadequate enforcement mechanisms					
5.	inadequate welfare facilities					
6.	absence of safety and health committees					
7.	unawareness of health and safety matters among the workers					
8.	lack of equipped first aid kits on the construction sites					
9.	Difficulty in controlling hazardous materials and equipment on site					
10.	Difficulty in the management of on-site traffic					
11.	Close proximity of individuals to operation of large plant and machinery.					
	Others (please specify)					

SECTION C: Identify the existence of health and safety systems in project management.

8. Please from your experience; express your opinion on the extent to which you agree or not concerning the existence of health and safety systems in project management. Use the following Likert scale:

1 Strongly Disagree 2 Disagree 3 Not Sure 4 Agree 5 Strongly Agree

IDENTIFY THE EXISTANCE OF HEALTH AND SAFETY SYSTEMS WITH PROJECT MANAGEMENT.		Level of Influence				
		1	2	3	4	5
1.	Welfare facilities					
2.	lack of personal protective equipment implementation programs					
3.	lack of enforcement mechanisms					
4.	Government regulation of the sector					
5.	poor knowledge of OHS principles in business organizations					
6.	First Aid facilities is available on site					
7.	Health and Safety training is not provided to employees of subcontractors.					
8.	Field engineer, supervisor, and safety officer encourage reporting of hazards					
9.	Safety rules and procedures are strictly followed by workers.					
10.	Company has an effective system for the issuance/inspection/replacement of PPE					
11.	Safety posters and sign boards are used at the important places for worker' awareness in English					
12.	Sufficient equipment is made available to do the job safely					
	Others (Please specify)					

SECTION D – To identify and mitigate the challenges in integrating health and safety in project management.

9. Below are measures to identify and mitigate the challenges in integrating health and safety in project management. From your experience, kindly express your opinion on (how important) they are by ticking the appropriate cell. Use the following Likert scale:

1 Not Important 2 Fairly Important 3 Not Sure 4 Important 5 Very Important

TO IDENTIFY WAYS OF MITIGATING THE CHALLENGES IN INTEGRATING HEALTH AND SAFETY IN PROJECT MANAGEMENT.		Level of Influence				
		1	2	3	4	5
1.	Employ "Safe System of Work Plans" to mitigate personnel health and safety issues.					
2.	Cost of repairing or replacing damaged equipment					
3.	Cost of recruiting new workers to fill the position of injured workers					
4.	Cost of time lost in dealing with issues of accidents.					
5.	Cost involved in compensating injured workers.					
6.	Cost of medication that are unexpected and unbudgeted for by the company					
7.	Likely reduction in the occurrence of injuries, illness, or death at the jobsite;					
8.	Promote sound and cordial working environment;					
9.	Increase the morale and work quality of employees					
10.	Enhance effective communication at the construction site					
11.	Use signage to aid the movement of personnel in and around site					
12.	Use personnel hoists to aid personnel workflow throughout the site.					

Thank you.