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Challenges in Estimating Cost of Accident on Construction Site

By

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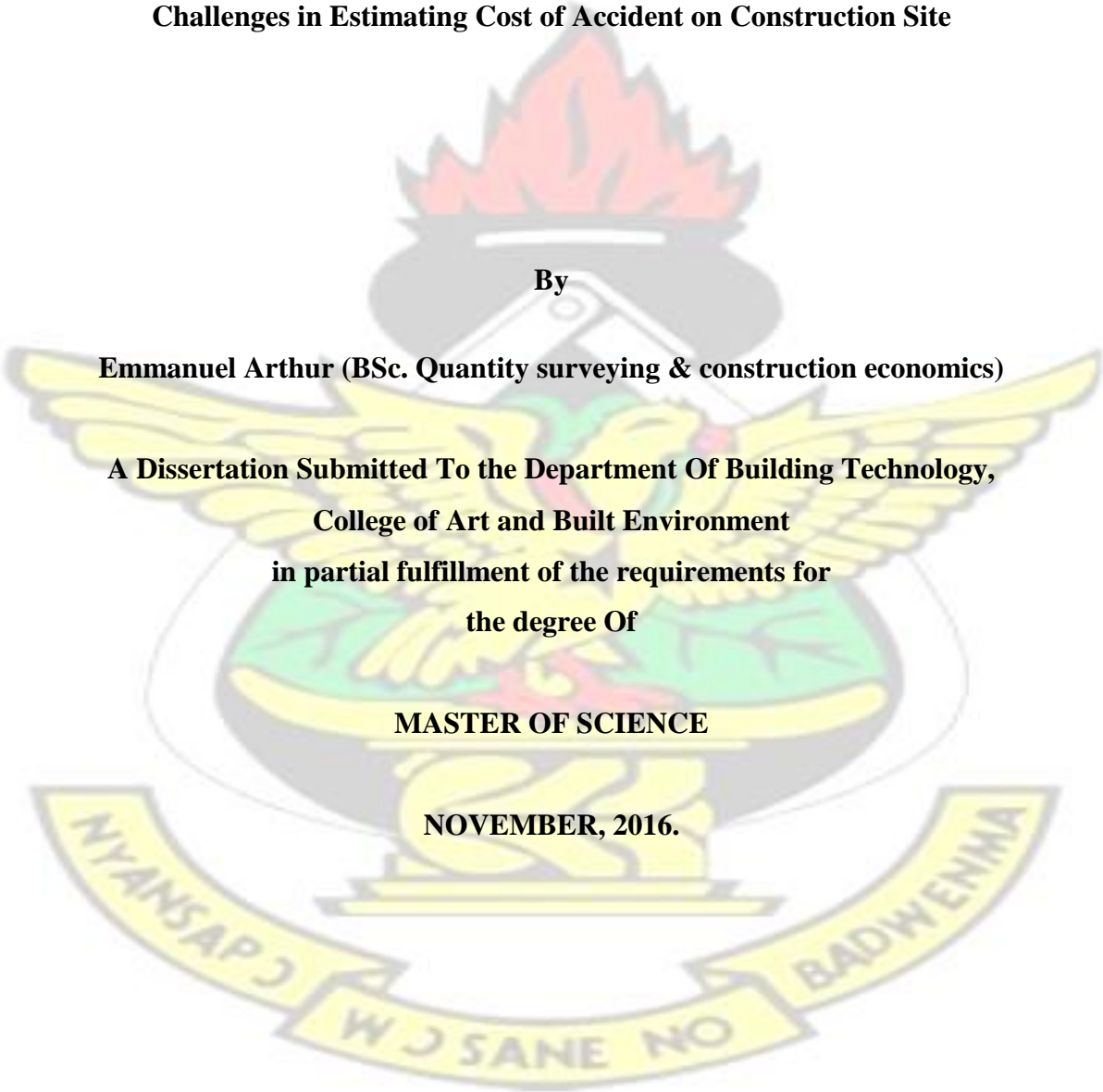
College of Art and Built Environment

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the degree Of

MASTER OF SCIENCE

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DECLARATION

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

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ABSTRACT

The statistic of accidents at construction sites give us a picture that Ghanaian construction industry is one of the critical sectors that need a huge and fast overhaul from the current site safety practices. Most accidents result from a combination of contributing causes and one or more unsafe acts and unsafe conditions. When these accidents happen it is always a challenge on the contractor or the employer to estimate these costs of accident. Therefore, this study was conducted to identify the challenges of estimating cost of accident at construction sites. This study was started out by reviewing literature from journals, books and web pages. Then reported accidents cases kept by Ghanaian insurance companies were examined to investigate causes of accidents. Surveys using questionnaires were carried out to obtain data from respondents who were mainly contractors, labour force and insurance companies. The finding of this study revealed that challenges of estimating cost of accidents are the result of many contributing factors. Some of the critical factors are lack of accident records, lack of insurance, type of employment, unsafe method, human element, unsafe equipment, job site conditions, management, and unique nature of the industry. The challenges of estimating cost of accidents in Ghana were found to be similar to that mentioned in literature review. However, some of the causes are low in frequency of occurrence. The main cause of construction accidents found were the workers' negligence, failure of workers to obey work procedures, work at high elevation, operating equipment without safety devices, poor site management, harsh work operation, low knowledge and skill level of workers, failure to use personal protective equipment and poor workers attitude about safety improving safety performance. The costs of construction accidents are borne by the workers, employers. The study employed the quantitative and qualitative approach of data collection. Sixty five (65) questionnaires were sent out and thirty (30) questionnaires were received (from contractors, labours and insurance companies). Data collected were properly organized and analyzed using statistical package for social science (SPSS) analysis software. The data was in tables and figures. The research

findings show that construction accidents, especially the serious ones, can significantly impact the economic performance of a construction project. However, the expensive accident costs can be also considered as savings if the number of accidents can be effectively reduced through the investment into safety risk prevention programs. All these factors contribute to the challenges of estimating cost of accident at construction site. Based on the facts and opinions drawn from the study various recommendations have being stated. Contractors must be upgraded concerning the measures to put in place to mitigate the challenges of estimating the cost of accident.



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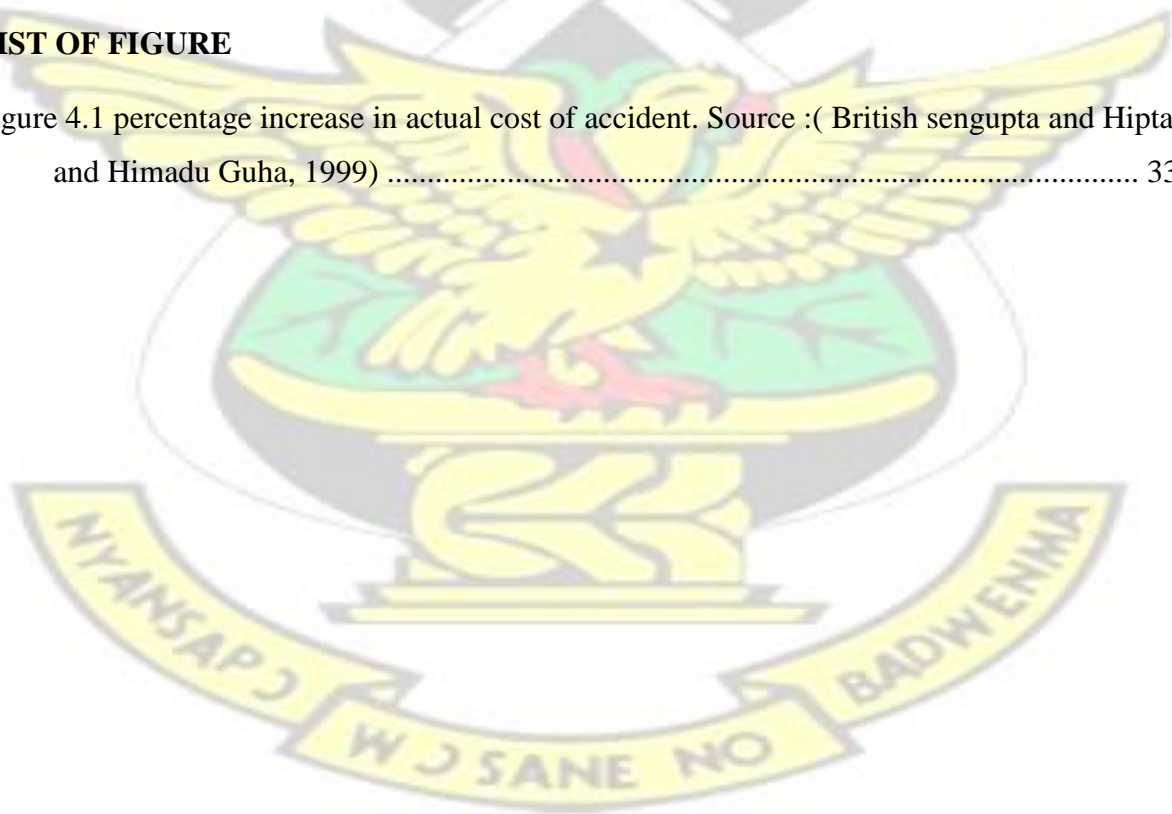
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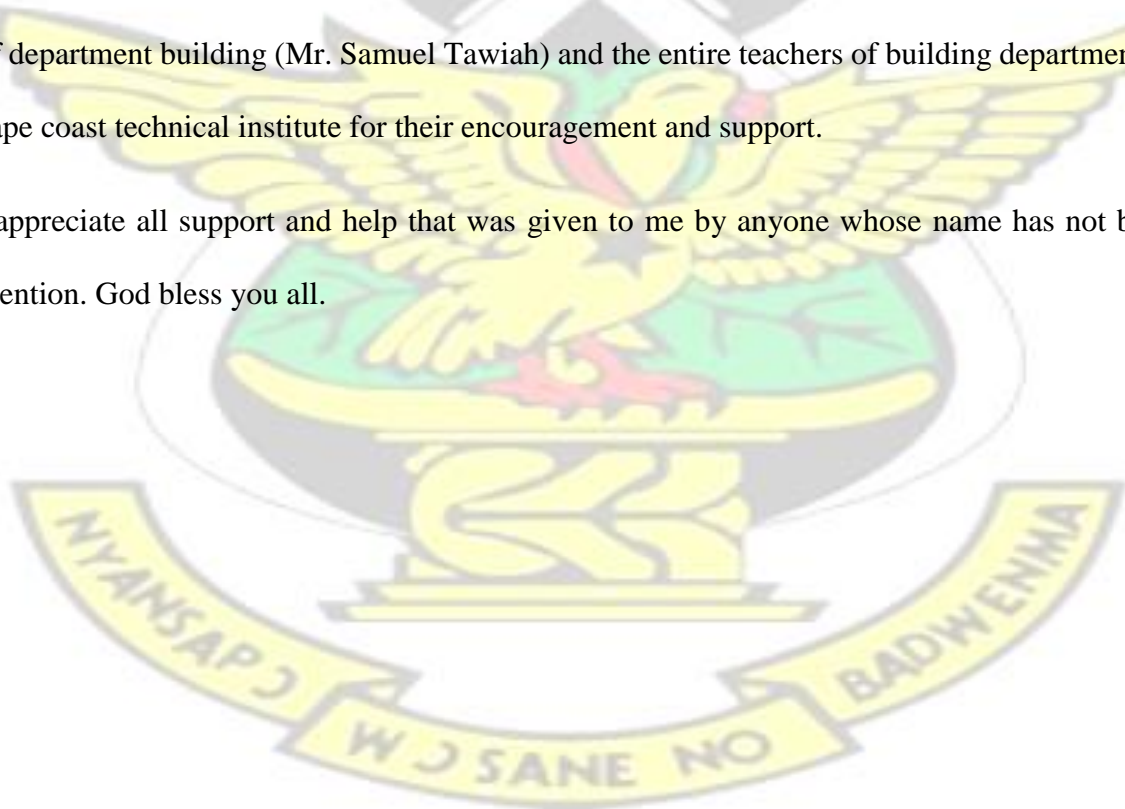
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DEDICATION

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CHAPTER ONE

GENERAL INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Accident in general opinion may be explained as something unpleasant, undesirable or damaging, that happen unexpectedly to a person, firm, company or any other thing, which has a damaging effect on it. This may result in disability, breakdown, or even death.

However, cost is the amount of money spent, on something (accident victim) in an attempt to remedy, maintain the value of it and to prevent future occurrence of these effect.

The cost of accident can therefore be referred to as the total sum of money that management and construction firms at large spend on, accident victims, breakdown of plants, collapse of structures, on the other hand a trained expert who is involved in an accident during production may either be admitted in the hospital or even die. These may affect the firm working hours, these of expert. (skillful mason who lays only blocks, painters, electricians etc.). All these effects of accident on site should be properly checked so as to reduce the cost of accident in order to increase productivity in the construction industry (Jaselskis, et al, 1996).

The construction accidents in Ghana when compared with other sectors were more prevalent and costs greater (Hinze, 2006). Construction accident do not affect only the good record of the industry but affect skilled labour and have financial impact on small and medium construction companies.

It's always a challenge for the industry or the company to determine the cost of such accident and is a challenge for the contractor to reverse or recoup such losses (Lancaster *et al.*, 2003).

Construction accident cost can also be quantified in terms of the financial losses to the Ghanaian contractor and is a challenge for the contractor to reverse or recoup such losses. These are all important issues contributing to challenges in estimating cost of construction accident when it occur on site (Oxenburg and Marlow, 2005).

1.2 PROBLEM STATEMENT

Various activities go on before completion of the project and construction site is an accident prone area. When such accidents occur, it is always a challenge for the stakeholders (especially the contractor) involved to estimate the actual cost of the accident (HSE, 2005; Ferret and Hughes, 2007; BERR, 2008).

Construction industry started far back in centuries and is one of the oldest industry or organization in the world, it started with cavity of caves, that is caves are created in stones to make construction which involves one to make construction which involves or employed the use of timber, bamboo, grass, strings, mud etc. using manual and unskilled labourers. This construction method was developed over the years up to the high methods of construction that are available today. Due to the high level of technology in construction, there has being a severe accidents occurring compared to traditional methods of construction where accidents occurred is of minor nature.

This is because all the activities were carried out manually or using hand.

However, with the advent of modernization and technology, the use of plants/machines, equipment and power hand tools became common on construction sites or firms. Accidents, therefore took a different dimension, which is relatively severe, serious and costly.

Unfortunately, some challenges contractors go through is that, they seems not to appreciate the severity of these accidents as a result of that, conscious effort are not made by these

contractors to find a concrete or variable solution to this problem, especially in Ghana. Central region (Cape Coast metropolis).

Some contractors suggest that accidents on site are inevitable as far as construction works are concerned. Hence funds are made available to cater for site accidents, and inconveniences.

However, measures are hardly taken to prevent future occurrence of accidents on site.

1.3 AIM AND OBJECTIVES OF THE STUDY

The aim of the study is to assess the challenges of estimating cost of accidents on the construction site.

1.3.1 OBJECTIVES OF THE STUDY

The specific objectives are;

1. Identify the various forms of accident on sites;
2. Identify the methods used in estimating the cost of the key forms of accidents;
3. Determine the challenges involved in estimating the cost of the accidents; and
4. Identify measures taken to mitigate the challenges.

1.5 JUSTIFICATION

The construction sector had gained notoriety as one of the high-risk industries that record excessive accident and fatality incidents almost every day (Department of Labour, 2008). The construction industry has unfortunately become stereotyped as an accident-prone sector. The industry continued to rank third after mining and transport with respect to fatalities, with a total of approximately 25,500 per annum. By their very nature construction has an accident economic burden to employers, employees and society as a whole. It is therefore a challenge for the contractor to estimate these undesirable events (accident) in the construction industry.

1.6 SIGNIFICANCE FOR THE STUDY

Construction site is accident prone- area and this research seeks to enlighten the reader on cost of accident to the contractor and the methods used to evaluate these accident costs as well as their challenges to the contractor.

These accidents always result in costs and is a challenge for the construction company to estimate these accident cost.

Accidents cost construction industry immensely and at the end of this research the industry or the firm will derive an increase in productivity and profitability by improving the challenges of estimating cost of accident at the construction site.

Also both larger and smaller scale construction firms and companies will benefit from this study by adhering to the recommendations that have been stated.

Lastly this report will benefit researchers to understand challenges of estimating cost of accident on construction site as well as ways to mitigate it.

1.7 METHODOLOGY

The method that was employed for the collection of data for this study were as follows:

Primary sources: these are related to the field study that comes with assessment of the existing construction sites, interviews of labour force and other personal observation that were made.

Secondary sources: this mode included library materials such as textbooks, journals, articles from newspapers and thesis related to the thesis topic and other relevant information from the internet

1.8 SCOPE OF THE STUDY

This study was restricted to building firms, construction companies or construction sites in Ghana, specifically cape coast metropolis by selecting specific construction firms, for the analysis to give a general over view of the problem. Currently there has been a number of projects going on in cape coast (eg; the sports stadium, kotokraba market etc.) and all construction contracts allocate cost between owners and contractors. Hence the scope under study would better inform the contractors in terms of challenges in estimating construction accident cost.

1.9 LIMITATION OF STUDY

Construction of projects in the public sector has assumed significant functions, hence the need for assessment on the challenges of estimating cost of accidents in construction projects in order to achieve overall project objectives. The industry accident and its cost data were very difficult to ascertain, therefore data collection and analysis was limited to the data received from contractors, project engineers, insurance companies and workers in the field of project construction.

1.10 SUMMARY OF CHAPTER

As noted in the previous section this chapter discussed the challenges of estimating cost of accident on construction site. The objectives sort to determine various forms of accidents on sites, method used to estimates the cost of the key forms of accident, the challenges involved in estimating the cost of accidents and finally recommendations to mitigate such challenges. The area of study will be mainly Central Region (cape coast) where lots of construction works are on-going. The research would benefit the readers, contractors, project managers, labourers and Insurance companies. Both the qualitative and quantitative method were used.

The research is divided into five chapters; General Introduction, literature review, Research methodology, findings and chapter five includes the discussions as well as well as result. This is followed by the appendix which illustrates references and figures.

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CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Accident may occur prior to putting up a structure or after the construction activity has been completed. It is therefore a challenge for most Ghanaian construction firms or companies to estimate the number of accidents and the costs that they entails. Research has shown that, about 80% of accident cases on site involves unsafe act by workers. Therefore, as a researcher (into challenges of estimating cost of accident on construction site), there is the need to take all initiatives and precautions to review information in the construction industry with regard to safety measures (G. Foster, 1986).

In the construction industry, clients, contractors and all stakeholders have the obligation to provide a safe site working environment and their neglecting environment which may cause accidents and economic loss to contractor and the Nation as a whole. When such accidents happen the construction company has to go through a lot of challenges in estimating cost of the accident or injury. Some of the challenges the contractors go through is that they lose large amount of capital and many (workers) suffer from undesirable pain (Laufer, 1987).

2.2 COMMON TYPES OF CONSTRUCTION ACCIDENT

Construction accidents can be caused by plant failure, poor design working in haste and Act of God etc. The common types of construction accident can be Labour accident, project accident, heavy equipment accident, Building component accident etc.

Table 2.1: shows some examples of construction accidents

classification	Labour type (accident)	Project type (accident)	Heavy equipment (accident)	Building component (accident)	Others (accident)
Category of Accident	Painter Plumber Steel bender Bricklayer Maintenance worker Union worker Etc.	Tunnel Excavation Highway Construction Residential Building site Bridge Collapse Demolition Etc.	Crane and truck Welding equipment Ladder Scaffolding Elevator Power tool Cable and rope etc.	Ceiling collapse Wall collapse Window installation failure Slab failures Etc.	Falling object Fire and explosions Etc.

Source: [http:// www. Haafety.on/article](http://www.Haafety.on/article)

2.3 ACCIDENT COST

The cost of an accident has two main parts that is Direct and indirect.

Direct cost is made up of workers compensation, medical bills etc. whiles the indirect cost consists of liability claims, insurance and other hidden or unforeseen cost. a recent study of if indirect cost for a construction industry includes an estimates of liability cost \$100,000.00 claims per 20 restricted – activities/cost- work days cases and \$20,000 claim per 100 medical cases.

Another study reveals that, hidden cost of 49 accident in some construction companies showed that the resulting indirect costs for a single accident ranged from \$ 442 to \$16,254.

This difference indicate how much accident can vary in their indirect cost (Hinze Appelgate 1991).

2.3.1 METHODS USED TO ESTIMATE THE COST OF AN ACCIDENT.

Contractors always find it difficult to estimate cost of construction accidents and that brings a great challenge on the industry and the contractor when accidents occur.

Accident cost may be so high that, it affects the duration or early completion of the project. This often leads to legal actions taken against the contractor for the delay caused.

Unexpected cost that contractors often incur strain their budget as well. When analyzing the costs of accidents it has been a common practice to present the mathematical relationship between different types of costs, or iceberg model (Rikhardsson and Impgaard, 2004)

The iceberg model by Heinrich's conceals much of the hidden and often indeterminate financial implications (Hjalte, et al., 2003).

Often contractors must re-plan to achieve their budget and delays as well as repair affected plants/machine and work and give necessary attention to the accidents victims. Economists have usually argued for the assessment of estimating cost of accidents in health and safety on the basis of cost-benefit analysis.

Construction accidents cost the construction industry and national economy a great deal annually. This is always a problem on the contractor to overcome such a definitive cost of accident on the construction site (Griffith and Howarth, 2000).

2.3.2 WCI PREMIUM CALCULATION

In gathering information for this study, it became apparent that few contractors understand the details of how WCI premiums are calculated. WCI is the single largest controllable accident cost for contractors working in the U.S.

When contractors realize they are paying for their own losses and are effectively selfinsuring, it may be that their safety performance have been improved by increasing workers incentives.

By Law all contractors are required to provide WCI for their workers. In evaluating the cost of accident by WCI the experience of individual insured with the average insured compared based on individual accident records and that may increase or decrease individual accident premium.

All employers are required by law to provide some type of WCI for their employees. The vast majority of WCI premium dollars come from experience rated plans (Workers Compensation Premium, 1991). The object of experience rated plans is to recognize differences between individual insureds. It does this by comparing the experience of individual insureds with the average insured in the same classification, based on individual accident records, which may increase or decrease premium" (Manual, 1992). WCI Standard Premium is based on the formula:

$$\text{Standard Premium} = \text{Manual Rate} \times \text{Payroll Units} \times \text{EMR} (1)$$

2.3.3 ACCOUNTING FOR ACCIDENT COST

- a) The first step in estimating cost of accidents is to make accident cost visible on construction projects and hold managers at all levels accountable for these cost.
- b) A very effective method for making project management teams immediately aware of accident cost is the stand-find accident cost accounting system.
- c) The most widely used measures of accident cost incidence, is a ratio of the total claims cost for the employees supervised divided by the number of hours worked by these employees



Table 2.2: Stand – ford accident cost matrix 1993 (cost in dollars) adopted from Robbinson (1979)

Body part		Amputation	Strain, sprain Smash, Crush mash		Fracture		Cut, puncture laceration			Burns	Bruises Abrasion		Others
		lost & non lost Time	non lost time	lost time	non lost time	lost time	non lost time	lost time	non lost time	lost time	non lost time	lost time	non lost time
head, face EYE(S)	1	NA 90,000	NA	NA	1400	16,000	500	6000	15,000	500	2000	700	12000
neck & shoulders	2	290,000	-	-	-	-	-	-	-	-	-	-	-
arms & elbows	1	NA 380000	700	14000	3000	16000	500	6000	650	10000	500	4000	600
wrist & hands	2	500000	-	-	-	-	-	-	-	-	-	-	-
backs, chests & lower trunk	1	-104000	550	5000	1400	18000	500	6000	650	10000	500	8000	7000
wrist	2	500000	-	-	-	-	-	-	-	-	-	-	-
wrist & knees		NA	400	2000	NA	20000	500	6000	650	15000	650	10000	7000
foots & ankles		NA	900	8000	NA	NA	500	16000	650	10000	500	6000	600
noes		NA	700	2000	900	8000	NA	NA	650	10000	700	6000	900
thumbs & fingers		178000	NA	7000	900	24000	400	6000	650	10000	700	10000	700
Hemin rupture	1	880000	750	8000	1000	3000	500	6000	650	10000	500	6000	600
Heart attack	2	180000	600	5000	900	18000	400	6000	600	6000	560	2000	700
hearing loss		140000 up to 80000	-	-	-	-	-	-	-	-	-	-	-
Death		16000	500	5000	700	10000	500	6000	400	10000	400	6000	400

Source: Levitt and Sanelson (1993)

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2.3.4 HOW TO USE THE ACCIDENT COST MATRIX

When there is an accident on a job, the part of the body injured and the type of injury will be known. If the person returns to work the following working day, the accident is non- lost time otherwise it is considered lost time.

Suppose a scaffold plank falls and fractures a carpenter's hand, seriously enough to require staying away from work the next day. The predicted cost impact of this injury on the company can then be obtained by reading down the cost matrix to wrist (s) and hand(s) and then reading across to fracture.

Since the carpenter did not return to work the next day, it is a lost-time accident and therefore the second value is the actual estimated cost (\$ 18,000) for that particular accident.

The minimum net saving to be expected from introducing these tested management method is four percent (4%) of direct costs.

Effective safety management also creates high quality construction work and moral in workers (Foster.G, 1986)

2.3.5 CHALLENGES INVOLVE IN ESTIMATING COST OF CONSTRUCTION ACCIDENTS

Despite the several efforts to deal with the occurrence of accident on site, the challenge of construction site safety, accidents continue to occur due to both the nature of the work itself and the variety of hazards faced by construction workers. These hazards can include falls from scaffolds and other elevations.

The method of estimating cost of accident in developing countries is poorer than developed countries and that is a big challenge for the developing countries (Hämäläinen, et al., 2006).

According to Mitullah and Wachira (2003) many construction operatives are employed on temporary and casual basis and therefore the employment conditions are not properly defined thus offering little protection on workers' health and safety and that affects their claims or estimate for accident when accidents happen on construction site. Accident cost construction industry immensely and at the end of this research, the industry or construction firm will derive an increase in productivity, profitability and improve the method of estimating the cost of accident on construction.

According to Hinze (2006) it is always a challenge for management to define true cost of construction accident.

Many researchers have echoed these sentiments. It is therefore fundamental that an understanding of the true costs of construction accidents is obtained in order to properly inform management and management policies as well as ways of overcoming difficulties in estimating cost of accident (Klen, 1989). Some researchers have argued that studies on the cost of accidents and its challenges would motivate more dynamic efforts at accident prevention by employers and claims by employees (Haefeli et al., 2005).

An inherent limitation to conducting challenges in estimating cost of construction accident costing studies in Ghana results from inadequate costing data being available. Systematic and dependable information on the costs of accidents at work is typically not available from company administrative statistical data sources or from the Ghana Department of Labour.

It is the duty of the contractors to discover how to estimate cost of accident and reduce accident at the construction site by developing effective safety management on site by developing effective safety management methods (G. Foster., 1986)

2.4. OCCURRENCE OF ACCIDENT

Occurrence of accident is through factors such as;

1. The non – existence of warning notices, giving restriction to places of dangers and hazards, and this can result in accidents.
2. Inadequate and improper supervision and inspection of scaffold, lifting appliance etc. before workers operate them.
3. The poor dissemination of information and improper channel of communication from top management to various operatives thereby leading to accident occurring on site.
4. Negligence by labourers for not observing site safety precaution thereby falling into accident.

1. Lack of safety rules and regulation on site can result in accident which at the end cost a lot of money to retain personnel and cater for the affected person or one"s etc.

(Miller, and Galbraith, 1995)

2.5. FACTORS INFLUENCING CHALLENGES IN ESTIMATING COST OF ACCIDENT ON CONSTRUCTION SITE

1. Not developing accident Prevention Program for the company.
2. Supervisors not giving adequate safety training and health and safety not been part of annual review plan.
3. Not holding regular safety meetings on site.
4. Lack of relationship between Hospital or Clinic that participate in insurance company"s medical provider Network (MPN).
5. Nonpayment of accident claims due to employment status.
6. Not developing a post-accident response protocol and know what to do in response to a labour accident.

7. Not implementing a transitional duty Return to Work Program.
8. Lack of document claims to cater for treatment labour injury on site.
9. Improper understanding and managing the workers Experience Modification factor.
10. The entire staff not knowing where to go in the event of accident.

(Miller, and Galbraith, 1995)

Many employers put little emphasis on safety cost reduction and cost avoidance, focusing on topics that bring money into the organization such as manufacturing, sales and service, because they are not aware of the huge potential for loss that accident costs pose. They affect the bottom line in estimating accident cost in several ways:

1. Increased insurance premiums
2. Increased Workers' Compensation payments
3. Damage to equipment, machinery, facility, company name
4. Production downtime
5. Loss of product or services (spoilage, defects, damage, etc.)
6. Additional overtime needed to compensate for injured worker(s)
7. Hiring and training costs to replace severely injured workers
8. Lost time by fellow employees
9. Overhead costs while work was disrupted
10. Supervisor lost productive hour due to the labour injury (inspections, meetings, reports, etc.) (Miller, and Galbraith, 1995)

2.5.1 POTENTIAL FAILURES THAT COULD PREVENT ACCIDENT COST TO BE ESTIMATED

- a. Failure to report accident to management due to workers employment status and nonrecognition.
- b. Workers not absenting themselves from work due to loss of daily wages and pressure to maintain the job even through the accident justifies absence.
- c. Inability of workers to seek medical care and lack of company insuring workers to be covered for treatment when accident occur.
- d. Lack of contractor's knowledge regarding insurance and compensable system which may affect the reimbursing medical expenses for the employee.
- e. Lack of company's accident record books.
- f. Labour not qualifying for accident insurance scheme due to contractor's employment status (Leigh et al., 2000),

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This section discusses the methods of data collection and the reasons why the respective method of research were used. It also outlines the methodology used for collecting data on the challenges of estimating cost of accidents on construction sites in central region-Cape Coast.

The highlights on the methodology are research strategy, survey target, research method, sources of data and collection, sampling frame, design of questionnaire, demographic data, data analysis as well as summary of the chapter.

3.2 RESEARCH STRATEGY

Nauom (1998) has defined research strategy as the means by which the objectives of a study can be questioned. The research type adopted for this study was the quantitative and qualitative method. The quantitative approach is used to gather factual data and to study the relationships that exist between facts and how those facts and relationships relate to findings of a previous study. The qualitative approach on the other hand seeks to gain understanding into the perception of people of „the world“ whether as individuals or a group (Fellow and Liu, 1997).

For this study the quantitative approach was used to comprehend the collective group perspectives of professionals regarding the challenges of estimating cost of construction accident in Ghana.

3.3 SURVEY TARGET

The researcher targeted existing construction sites in central region (cape coast) where project or construction works were on going. The target population has basic and concrete ideas about the issue or topic under consideration.

3.4 RESEARCH METHOD

The target group were asked questions to gather information to meet the agenda of this research. The data collected from the respondents were interpreted and evaluated. Both qualitative and quantitative methods were adopted to have data from the respondent.

Subsequently, self – administered structured questionnaire were distributed to collect primary data from the field.

3.5 SOURCES OF DATA

Various sources such as construction sites, interviews, textbooks, journals and internet were used to get reliable information for the research.

3.6 DATA COLLECTION

The research method adopted for data collection were as follows:

Primary or direct data collection method: information were collected through site surveys observation, face to face questions and interviews. These were adopted to meet the objectives of the study.

Secondary data collection method: Information related to the problem “challenges of estimating cost of accident on construction site” were collected from the books, journals and internet from various countries.

3.7 SAMPLING FRAME

The targeted respondents were drawn from contractors, site engineers, and labourers from construction companies as well as insurance companies in Central region – cape coast.

3.8 SAMPLE SIZE DETERMINATION

Sampling procedures capture the segment of the population selected for the research. For the purpose of this research, contractors/site engineers and insurance companies as well as labourers on site who formed the sampling units were selected for the research (Bryman, 2004).

Roscoe (1975) wrote that a sample size between 30 and 500 are fitting for most research. The argument therefore is that, the larger the sample size the more reliable the results are though it is not all necessary to sample the whole population to arrive at reliable outcomes.

Sekaran (2003) wrote that through simple random sampling technique, all elements in the population are well-thought-out and each element has an equal opportunity of being selected.

3.9 DISTRIBUTION AND COLLECTION OF DATA

The data was collected in the central region – cape coast metropolis. The respondent in the study are as follows:

1. 25 contractors and project managers.
2. 20 labours.
3. 20 managers of insurance companies.

The researcher encountered a lot of challenges during the distribution of the questionnaires and out of 65 questionnaires sent out 30 responded.

3.10 DESIGN OF QUESTIONNAIRE

From the preliminary study and literature review, questionnaires were designed to collect the data required for the research. The questionnaire included close – ended and open – ended responses options.

Observation and interviews were done to gather more information for the study both on-site and offsite. The design of the questionnaire were divided into four (4) sections which were, details of respondent, questionnaire for contractors, questionnaire for labourers and questionnaire for insurance company. In all fifty – four questions were designed to cover all the four sections.

3.11. DEMOGRAPHIC DATA

Respondents were asked to provide data variable such as gender of respondents, marital status, categories of staff, staff designation, educational level, number of year(s) in construction industry etc. for the first section.

The next section was the questionnaire for the contractor to respond on various forms of accidents and the challenges they go through in estimating cost of such accident etc. The third section required the respondents to tell the researcher about how construction companies are insured, premium paid to cover accident cost etc. The fourth section required the respondent to respond if they've been involved in accidents before and its challenges in terms of cost.

Most of the questions were open - ended questions and the respondents were asked to write their responses.

3.12. DATA ANALYSIS

Here the researcher composed questionnaires which contained questions that are relevant to the study area. Sixty five questionnaires were sent out and thirty (30) questionnaires were received [Ten (10) from each, contractors, labours and Insurance companies]

Once data was collected, proper organization, summary and analysis was done.

The responses from the participants were coded in the statistical package for social science (SPSS) analysis software. The data was in tables and figures. The researcher used tables to summarize numbers and figures indicated in rolls and columns. The use of tables helped to facilitate the systematic presentation of the collected data.

3.13. SUMMARY OF THE CHAPTER

This chapter describes how research study was undertaken in the area of cost of construction accident and its challenges on Ghanaian contractors from literature.

The research questionnaire was conducted by using purpose sample technique. The primary source of data was obtained with first-hand information through the questionnaire. There were four (4) section of questionnaire which were; section A = Details of respondent (which was optional), section B =questionnaire for contractor/site engineer, section C = questionnaire for insurance company, section D = questionnaire for labourer (worker). A preamble was given before the questions followed. Most of the questions were open - ended questions and the respondents were asked to write their responses,

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

This chapter of the study deals with the presentation and analysis of the data taken from the field. The data was gathered from the responses provide by the respondents in the questionnaires. The statistical Package for Social Science version 21 (SPSSV 21) was used. Of all the 65 questionnaires distributed 30 were responded representing 46 percentages.

4.2. PERSONAL PROFILE OF RESPONDENTS

4.2.1 GENDER OF RESPONDENTS

Respondents were asked to provide data on variables such as gender of respondents, designation in the company, level of education, number of companies worked in and their present companies and how long they have worked in their present companies.

TABLE 4.1 ANALYZING OF GENDER OF RESPONDENTS.

(i) Contractor

Gender	Frequency	Percent
Male	10	100%
Female	-	-
Total	10	100%

(Source: Field data, 2016)

(ii) Labour

Gender	Frequency	Percent
Male	10	100%
Female	-	-
Total	10	100%

(Source: Field data, 2016)

(iii) Insurance company

Gender	Frequency	Percent
Male	7	70%
Female	3	30%
Total	10	100%

(Source: Field data, 2016)

DISCUSSION

Table 4.1 shows that the gender distribution of the respondent 100% of the contractors were male, there were no female contractor, this shows that building contractors are male dominate area.

Based on the table 4.1 from field data, on all the ten (10) different sites the researcher visited, 100% of the workers were male. This shows that the main work force on site are males.

On the Insurance Company 70% of males were managers and 30% were females manageress. This implies that more males were involved in the study than their female counterparts.

4.2.2 DESIGNATION IN THE COMPANY

Table 4.2 Designation in the company

(i) **Contractor/ project manager**

Categories	Frequency	Percent
Contractors	2	20%
Project Managers	8	80%
Total	10	100%

(Source: Field data, 2016)

DISCUSSION

Table 4.2. Indicates that 2 respondent represent 20% were contractors on site and 8 respondents represent 80% were project managers.

For this reason it shows that most of the contractors were not on site and don't witness accidents on site when they happen but are only informed, this in a way brings challenges when cost of accident are to be estimated

(ii) Labourers

Table 4.3 categories of various trade

Trade	Frequency	Percent
Mason	5	50%
Carpentry	2	20%
Plumber	1	10%
Steel binder	1	10%
Tiller	1	10%
Total	10	100%

(Source: Field data, 2016)

DISCUSSION

Table 4.3 shows the categories of the various trade identified from the ten (10) questionnaires received from labourer, 50% were masons, 20% were carpenters, 10% were steal binder, 10% were plumber, and 10% were tillers. This indicated that masons were many on site.

(iii) Insurance Company

From the ten (10) insurance companies the researcher visited, all the respondents were branch managers and 70% were male and 30% were female. It shows that most of the insurance companies have the top management or branch managers as males, just to add that the total number of respondents for the survey were males.

4.2.2 EDUCATIONAL LEVEL

Table 4.4 educational level

Categories	Frequency	Percent
NVTI	5	16.667

Intermediate	3	10.000
Technician 1-3	2	6.667
Poly. HND	9	30.000
University 1 st Degree	7	23.333
University Post Graduate	4	13.333
Total	30	100%

(Source: Field data, 2016)

DISCUSSION

Table 4.4. above shows that most of the contractors have no technical certificate although they were graduates. Most of the project managers have HND background. The research showed that years of experience and educational background of the respondents on the construction site had nothing to do with the challenges of estimating cost of accident on the contraction site. The research established that even those with construction background in education and technical know-how are not up to the challenge of estimation of cost of accident on construction site. The research further revealed that, most of the branch managers of the insurance companies are highly educated with degrees such as University Degree and Post-Graduate.

4.2.4 YEARS WORKING IN THE CONSTRUCTION INDUSTRY

Table 4.5 years working in the present company

Categories	Frequency	Percentage
0-2yrs	12	40.00
3-5yrs	8	26.667
6-9	6	20.00
10 yrs. & above	4	13.333

Total	30	100%
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(Source: Field data, 2016)

4.3. ANALYSIS FOR THE CONTRACTORS

4.3.1 FREQUENCY OF ACCIDENTS OCCURRING ON SITE

Table 4.6 Response on how often accident occur on site

Question	Responses	Frequency	Percentage
How often does accidents occur on site?	Weekly	-	0
	Monthly	-	0
	Yearly	4	40%
	Other specify	6	60%
Total			100%

(Source: Field data, 2016)

With reference to table 4.6, all the ten (10) contractors agreed that accident do not occur weekly and monthly. This is due to the fact that strict safety rules are observed on site by supervisors and labourers. However 40% of the construction company experience accident yearly where as 60% of the construction company said the occurrences of accident on site is occasional. However, the companies that regularly experienced the occurrence of accidents within a year at their site attributed it to the fact that management do not enforce strict observation of safety rules on site.

4.3.2 VARIOUS FORMS OF ACCIDENTS

This was an open-ended question and the respondents were asked to response by writing.

The various forms of accidents by response were falls from (height) scaffolds, stepping on nails, being struck by moving or falling machinery, accident caused by unsafe plants and equipment's.

During the survey, a building which was under construction carried concrete slabs with crane including workers and unfortunately the ropes of the crane torn, the slabs and the workers fell from a height and most of the workers were seriously injured.

4.3.3 INTENSITY OF THE ACCIDENT ON SITE.

Table 4.7 shows the analysis of responses on the intensity of accident on site

Question	Response	Frequency	Percentage
What is the intensity of the accident on the site?	Minor	8	80%
	Severe	2	20%
	None	-	-
Total		10	100%

(Source: Field data, 2016)

The responses on the intensity of accidents from table 4.3.3 suggest that most accidents that happen on site are of minor in nature. There were only 20% of accidents recorded in the visited sites which were severe which even resulted in the death of one worker.

4.3.4 INSURANCE OF CONSTRUCTION COMPANY

Table 4.8 shows the analysis of responses (from contractors) on whether the respondents insured their construction companies or not.

Question	Responses	Frequency	Percentage
Has the company been Insured?	Yes	7	70%
	No	3	30%
	If any other specify	-	-
Total		10	100%

(Source: Field data, 2016)

DISCUSSION

Based on the result from table 4.8 seven (7) respondents representing 70% stated that they have insured their company where as three (3) respondents representing 30% stated that they have not insured their companies. These are local industry or contractors who have limited number of plant safety measures and rules enforced on construction sites. These basically affects their method of estimating cost of accident when it occurs.

4.3.5 ESTIMATING COST OF ACCIDENT

This was an open - ended question and the respondents were asked to write their responses. Seven respondents representing 70% stated that estimating cost of accidents are not done on site since they have insured their companies. According to them, it is the duty of the insurance company to estimate the cost of accident.

Three respondents representing 30% stated that cost of accidents are estimated by the company which was based on the level of the worker, the magnitude of the accident and the status of the worker (whether casual or permanent).

4.3.6 KINDS OF ACCIDENTS AND ITS INSURANCE COVERAGE.

Respondents were asked to state whether the insurance they do covers all kinds of accident or not. Three respondents represents 30% stated that the insurance they do covers all kinds of accident on site.

Four respondent representing 40% stated that the insurance they do does not cover all kinds of the accident and is a challenge to estimate the cost of accident for the labour when they are involve in an accident since the insurance does not cover them.

4.3.7 BUDGETING FOR ACCIDENT

Table 4.9 responses on budgeting for accident

Question	Response	frequency	Percent
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1. Do you consider cost of accident when budgeting?	Yes	7	70%
	No	3	30%
	TOTAL	10	100%
2. What is the percentage budgeted for accident	1% - 5%	4	40%
	5% - 10%	3	30%
		3	30%
	TOTAL	10	100%

(Source: Field data, 2016)

These were to assess whether cost of accidents were taken into account during budgeting cost of construction works. Out of ten (10) construction companies three companies do not budget for accident cost. This is because the contract is not bounded by any conditions. The respondents price the contract without preparing any detailed cost estimate but rather priced the project based on experience gained from previous contracts.

The respondents often adds some percentage to the cost of the previous contract to cater for market prices of inflation and their profit.

This form of bidding often brings up delays, suspension of projects, high final project cost, poor workmanship, dispute between client and contractors.

Alteration is also a major problem associated with this system of contracts. The client always consult the designer or the architect to prepare a set of drawings for him of the contractor, this brings some forms of misunderstanding between the designer and contractor about the interpretation of the drawing.

Now, after the drawings have been completed the client then give it to any contractor he wish to execute the work for him at reduce cost. In this situation, the designer has nothing to do with the contractor and would not be available for interpretation of the drawings to the contractor during the execution of the project in which case, the contractor uses his own discretion to undertake the work to his best understanding which might not be exact as produced in the drawing. Contractors under this method of tendering do not budget any amount of money to cater for accidents cost when its occur, this implies that the health, safety and welfare of the employees lies in their own hands.

4.3.8 PERCENTAGE INCREASE OF ACTUAL COST OF ACCIDENT

Table 4.10 shows the analysis of responses on the percentage increase of actual cost to the estimated cost of accident.

Question	Responses	Frequency	Percentage
What is the percentage increase of actual cost of accident from 2010-2015?	10-20	6	60%
	20- 30-	4	40%
	40	-	
	None	-	
Total		10	100%

(Source: Field data, 2016)

Percentage increase of actual estimate cost of accident from 2010-2015 is minimal is seven (7) of the firms because management and labourers cooperate together to eliminate the occurrence of accident on site. However, 3 companies have been experiencing an increase in the accident cost of the percentage ranging from 20% -30% of the estimated cost due to sudden accidents that occur on site. The researcher found that out it is always a challenge for these companies to estimate the percentage of accident cost.

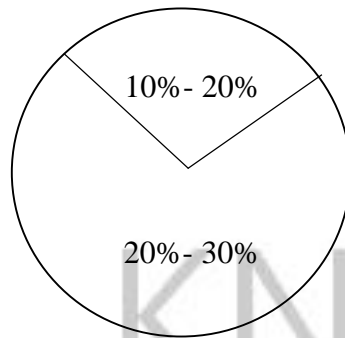


Figure 4.1 percentage increase in actual cost of accident. Source : (British sengupta and Hipta and Himadu Guha, 1999)

4.3.9 METHODS USED TO ESTIMATE COST OF ACCIDENT ON CONSTRUCTION SITE BY THE RESPONDENTS.

These were open question and the respondent were asked to write the various methods used to estimate the cost of accident on site.

From all the Ten (10) respondent they don't have specific methods on site that they use to estimate cost of accident on site. The reason being that

1. Accidents on site are of minor in nature.
2. Most labours are not permanent staff on site and when they are involved in an accident the contractors compensate them or they personally finance themselves to treat the injury.
3. For the respondents who have adequately insured their company it was the duty of the insurance company to estimate the cost of the accident.

4.4. ANALYSIS FOR THE LABOUR

This is the analysis of data collected from the labour force on the construction site visited. This was to assess whether they have been involved in any accident and the challenges the accident has brought to their life.

4.4.1 YEARS WORKING IN THE PRESENT INDUSTRY

Table 4.11 analysis the number years the labour has worked in the construction company.

Question	Responses	Frequency	Percentage
For how long have you worked in this company?	Less than 1 year	-	
	1-3 yrs.	2	20%
	3-5 yrs.	3	30%
	more than 5yrs	6	60%
Total		10	% 100

(Source: Field data, 2016)

The responses from table 4.11. show that 20% of the respondent have worked between 1-3 years, 30% of the respondent have worked 3-5 years, and 50% of the respondent have worked more than 5 years. These depicts that more workers stay in the constructing industry for long period of time.

4.4.2 WORKERS BEEN INSURED

This is to analysis whether workers are being insured or not.

Table 4.12 Response on workers insured

Question	Responses	Frequency	Percentage
Have you been insured?	Yes	3	30%
	No	7	70%
Total		10	100%

(Source: Field data, 2016)

Table 4.12 indicates that 30% of the respondents were insured while 70% of respondent were not insured. The researcher found that most contractors (especially the local contractors) insure their plants and cars but do not insure their workers. This always create a lot of inconvenience and challenges on site anytime severe accidents occur.

4.4.3 THE INTENSITY OF ACCIDENT ON SITE

This was to analyze whether the respondents have been involved in an accident and, how many times as well as the intensity of such accident.

Even though accidents are inevitable with regard to construction activities, the magnitude of accidents on most of the ten (10) site visited were of minor nature which did not take much productive time and loss of days. 20% of the respondents indicated that they have never been involved in accidents while 50% of the respondents indicated that they have been involved in minor accidents before. Also 30% of respondents stated that they have been involved in severe accidents during construction work. There has been a deformity on one of the labourers who was involved in a severe accident. His hand has been amputated.

4.4.4 CHALLENGES IN ESTIMATING COST OF ACCIDENT ON LABOURERS

This was an open - ended question and the respondents were asked to write their responses. The researcher found out that 70% of the respondent had challenges in estimating accident cost since their company did not estimate the cost of their accident. It was a challenge to them since they had to do personnel financing to cater for their injury. The other 30% indicated that though their company didn't estimate the cost their insurance company did since they were insured. Most Workers who were involved in accidents before, indicated that there are several marks on their skin, they feel general pain and are not feeling comfortable working in the company again. Another respondent said he can't use his two hands again to work since one is, amputated creating a big challenge for him.

70% of respondent were of the view that causes of accident can be attributed to the fact that there were lack of safety measures as 30% believe that they were due to overworked employees. There were a lot of challenges in estimating the cost of these affected labourers due

to the fact that many of the labourers were casual and the insurance package did not cover them.

4.4.5 WORKMEN'S COMPENSATION

This was to analyze whether the workers are aware of the law governing the compensation of a worker when he is injured. The ten (10) respondent representing 100% revealed that there were no welfare packages and there was no amount of money for them from any member when accidents occurred.

They were of the view that lack of safety measures on site contribute accident on site.

They also believe that constructional risk also poses more danger in the construction industry during operation.

90% of respondents didn't know anything about job safe Analysis (JSA) and work breakdown structure whereas only 10% had heard it. The respondents were of the view that increase in accident on construction site were as a result of not observing safety rules on site and their method of employment also create a big challenges in estimating their cost of accidents.

90% of the respondents were not aware of workmen's compensation law 1987 (PNDC 187) which relate to compensation from personal injury. 10% of the respondents were aware due to their education level and job experience. These were all challenges affecting the estimating accident cost on construction site due to the fact that many workers lack the best way of doing job in a safe way.

4.5. ANALYSIS FROM INSURANCE COMPANY

4.5.1 INSURANCE COMPANIES THAT INSURE CONSTRUCTION COMPANIES.

This was to analysis how insurance company estimates the cost of accident and the challenges they faced with the construction companies.

Table 4.13 Insurance Company Insure Construction Company

Question	Responses	Frequency	Percentage
Does your company insure construction Company?	Yes	7	70%
	No	3	30%
Total		10	100%

(Source: Field data, 2016)

Question	Responses	Frequency	Percentage
Do construction companies come for insurances?	Yes	10	100%
	No	-	100%
Total		10	

(Source: Field data, 2016)

Question	Responses	Frequency	Percentage
For the past five years how many construction companies have been insured so far?	0-5	1	10%
	5-10	2	20%
	10-15	5	50%
Other specify		2	20%
Total		10	100%

(Source: Field data, 2016)

From the analysis from the table 4.13 it obvious that 7 insurance companies representing 70% of the respondents insure construction companies while as 3 insurance companies do not insure construction companies because their package were life insurance policies. The researcher also found out that all the registered construction companies go for insurance but of different packages or policies.

For the past five (5) years 10% of the respondents revealed that they have insured between 05 construction companies, 20% of the respondents have insured between 5-10 construction companies, 50% of the respondents have for the past five years insured 10-15 construction companies.

Two insurance companies also indicated that for the past five years construction companies insured cannot be remembered stating that they have insured “plenty” or more than 20 construction companies.

This depicts that the challenges of estimating cost of accidents on construction site mainly relied on the insurance company that insured and not the construction industry.

4.5.2 INSURANCE CONSTRUCTION COMPANIES NORMALLY DO.

These were an open - ended question and the respondent were asked to write their response.

The ten respondents agreed that although construction companies come for insurance packages, it does not cover all kinds of accident on site. The insurance the construction companies normally do are Bid Bonds, Performance bond, contractors all risk policy (Time Band) and Group Personal Accident Compensation (GPA).

The researcher found out that contractors normally insured their cars, machines and contract works. They normally don't insure their workers since many workers are on casual basis.

4.5.3 PREMIUM FOR ANNUAL PAYMENT FOR ACCIDENT INSURANCE

Per the respondents opinion, the rate of premium for annual payment depends on the type of accident policy that the construction would enroll. For the Bid Bond it is 1% of the bid amount, Advance Payment is 1.25% of the contract sum and performance Bond is 1.5% of contract sum.

For the accident premium all the respondent indicated that it is between 2-4% of the sum insured. These normally depend on the level of the worker and the work involved to be insured.

4.5.4 DOCUMENT REQUIRED TO ESTIMATE FOR ACCIDENT COST.

This was an open - ended question and the respondents were asked to write their response.

This was to analyze the document the construction companies, have to submit before cost of accident can be estimated.

The respondents stated document such as Hospital medical bills and companies accident record. The respondents also said that documents required for estimating accident costs depend on the person involved in the accident. The document required can also be determined by the labour department said by the respondents.

In addition to the document required, the company should write officially to the insurance company before they start processing or estimating accident cost.

If the severity of the accident result is death the document required are burial or death certificate as stated by the respondents.

4.5.5 METHODS USED IN ESTIMATING COST OF ACCOUNT

This was an open - ended question and the respondent were asked to write their response.

The respondents stated that the method used to evaluate cost of accident depends on the type of accident policy such as Group Personal Accident (GPA) and workmen`s compensation policy.

The respondents further indicated that the main method used to calculate cost of accidents for construction companies are policy conditions and terms and Labour sheet from the Labour department.

4.5.6 CHALLENGES THE INSURANCE COMPANY FACE WHEN ESTIMATING ACCIDENT COST.

This was an open - ended question and the respondent were asked to write their response. The respondents stated that there are various challenges they go through when estimating accident cost. These challenges were

1. The ramification of under insurance
2. Inadequacy of sum insured
3. The delay in the submission of the relevant document by the construction company.
4. Fictitious claims.
5. Medical report been forged.
6. Not all claim are payable.
7. Limit for claim (status bar)
8. Litigating – End up in court and the construction company (client) doesn't have patience to waits.

4.6. BASIC PROCEDURE FOLLOWED TO EVALUATE COST OF ACCIDENT.

This was an open - ended question and the respondent were asked to write their response. 40% of the respondents revealed that they do not have a basic procedure to be followed to estimate the cost of accident. They said that the estimation would always be based on the report from the company's survey from the accident field. This was a challenge in estimating cost of accident since those involved is accident have to be sent to hospital immediately the accident happens.

The insurance company always visits the site after the incident. 60% of the respondents stated that the basic procedure followed to estimate cost of accident on site were:

1. Check the Nature of the accident or injure.

2. Provide the required document
3. The recommendation by the doctor
4. Determination by liability as per the policy terms and conditions. If the above cannot be provided it brings a lot of challenges of estimating cost of accident on construction sites as explained by the respondents.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION & RECOMMENDATION

5.1 INTRODUCTION

This chapter discusses the researcher's findings from the investigation which touched in the challenges of estimating cost of accidents on construction site in Central Region – Ghana.

It also presents the conclusions and recommendations made to ensure construction companies participation is fully practiced in Ghana - Central region. The findings are presented based on the specific issues analyzed in chapter four.

Using data obtained from 30 respondents in the construction industry the survey revealed the following results.

5.2.1 SUMMARY OF FINDINGS

5.2.2 DEMOGRAPHIC DESCRIPTION OF RESPONDENTS

- (i) There were twenty seven (27) males and three (3) females three (3) and their occupational distribution were five (5) masons, one (1) plumber, two(2) Carpenters, one(1) steel binder and one(1) tiller. There were ten (10) contractors and project managers, and from the insurance companies, seven (7) managers and three(3) manageress.

(ii) The level of training received were ten (10) with technical training, nine (9) with polytechnic training, and eleven (11) with university training.

Again twelve respondent (12) had spent between 0-2 years in the construction industry while eight (8) respondents each had spent 3-5 years, 6-9 years with their current company. Also twelve (12) had spent 0.2 years with their present company.

5.2.3 ESTIMATING COST OF ACCIDENTS

With reference to the analysis and discussions of the results of the findings, the challenges of estimating cost of accidents on construction sites are as follows;

- a) Accident occur on construction sites at least once a year.
- b) The intensity of frequent accident that occurs on most construction site is of minor nature which most constructors do not estimate when it occur.
- c) Companies that observed safety or preventive measures made financial gains (profit which enabled the firm to maintain well experienced and skillful operatives for longer period). On the other hand the companies that did not ensure these safety or preventive rules lacked experience and skillful workers.
- d) Some of the companies prepare cost budget to include accident costs so that the contract sum would not be affected by any form of accident cost while some of them do not consider accident in terms of budgeting.
- e) The percentage rate for accident cost in general is on the increase. The increment is minimal for companies that adopt good safety measures while it is higher for the other companies.
- f) In situation of severe nature of accidents the actual cost is mostly higher than the estimated cost.
- g) High medical expenses are the main causes of the increase in the cost of accident

- h) The most common form of accident observed was workers falling from height.
- i) Most contracts do not insure their workers and affect the determination of their cost of accident when it occurs.
- j) Contracts only insure their plant, cars and machines but not accidents of workers.
- k) The challenge the construction company goes through when there is an accident is that their contract period is affected (delay of work) and their contract sum is also affected.
- l) Although the construction companies are being insured it does not cover all kinds of accidents on site and that is a challenge to estimate the cost of accident.
- m) Contracts do not have a specific method they use to estimate the cost of accidents on the construction site.
- n) Most workers employed on construction sites are casual and when they are involved in accidents it raises challenges for the contractor to estimate their cost of accident because they are paid daily.
- o) The casual workers involved in accidents personally finance their treatment
- p) Most construction companies go to insurance companies for
 - i) Bid bond
 - ii) Performance bond
 - iii) Advance mobilization
 - iv) Contractors All risk policy

All the above state (i, ii, iii and iv) do not cover all kinds of accidents on site.

- q) Construction companies have to run all the insurance policies for at least a year before they would be qualified for accident claim after the insurance.

- r) Construction companies have to supply insurance companies with some documents before they can estimate cost of accidents. These documents are always a challenge for the construction company.
- s) Some of the documents required are hospital medical bills, companies' accident record and death/burial certificate (if the accident victim died).
- t) The challenges insurance companies face during estimating cost of accidents are:
 - i) fictitious claims ii) Medical report forged iii) Limit for claim iv) Litigation
 - v) Impatience of accident victims waiting for their document to be processed.
- u) The insurance company has a specific method used to estimate cost of accident which takes into account the types of accident, the type and level of the accident victim and the premium construction company paid annually.
- v) The premium for accident insurance for annual payment for a worker is 2-4% of sum insured. Based on this percentage cost of accidents is estimated.
- w) The insurance companies have a basic procedure followed to estimate cost of accidents compared to construction companies who do not have the specific methods and procedures in estimating cost of accidents and that is a challenge to the construction industry.

5.3 CONCLUSION

The project has been made to throw more light on the challenges of estimating cost of accidents on construction sites in Ghana - Central Region. It has also come to notice that adequate measures should be put in place to improve the challenges of estimating cost of accidents on construction sites.

The following are the conclusions of the findings from the study.

1. The approaches used by construction companies to secure contract and employ workers was not the best and that has developed challenges and litigation between contractors and workers when accidents occur.
2. Some construction companies do not insure their workers against accidents because most are casual workers.
3. Lack of records or information on accidents is a challenge for both construction companies and the insurance companies to estimate cost of accidents for the construction companies or workers involved.
4. The research identified six challenges affecting estimating cost of accidents as listed below;
 1. Contract procedures
 2. Method or nature of employment
 3. Nature or type of contract
 4. Lack of information, records or document to estimate accident cost
 5. Lack of expertise on site to estimate accident cost.
 6. Lack of specific procedures or methods for the construction company to be used to estimate accident cost;

Finally the building contractors should understand to introduce new strategies or construction technology to improved method of construction and procedures eliminate to the challenges in estimating cost of accident on construction site.

5.4 RECOMMENDATION

Based on the facts, opinions and ideas drawn from the study, the following recommendations have been made. In order to eliminate the number and severity of accidents these safety rules must be adopted:

- a) Proper site layout plan to ensure mobility on the site.
- b) Channel of communication should be short and clear.
- c) Labourers must be given at least monthly basic education on safety and how to prevent accidents.
- d) Labourers must be insured against minor and severe accident on all construction sites.
- e) Inspections must be conducted on all construction operations before work commences.
- f) First Aid Kit should be available on site to treat minor accidents.
- g) Construction companies should have costing department to deal with estimating cost of accident.
- h) Contractors must be upgraded by the contractors association, given them refreshing courses concerning the measures to put in place to mitigate the challenges of estimating the cost of accident.
- i) Contracts procured by construction companies must be contracted with formal contract agreement done to allow for budgeting to be done to include accident cost.
- j) Management should set a mechanism (such as awarding certificate and remuneration) to the employees at the end of every year to honour those operatives who do not fall into accidents so that the company will benefit from the estimated cost of the accident.

5.6 RECOMMENDATION FOR FURTHER RESEARCH

Finally the researcher recommend that

i) Further research in the area should be carried out in other regions to ascertain whether their findings will be similar to these ones or otherwise ii) Further research in this area could be carried out to ascertain other factors that may influence the challenges of estimating accident cost on construction site.

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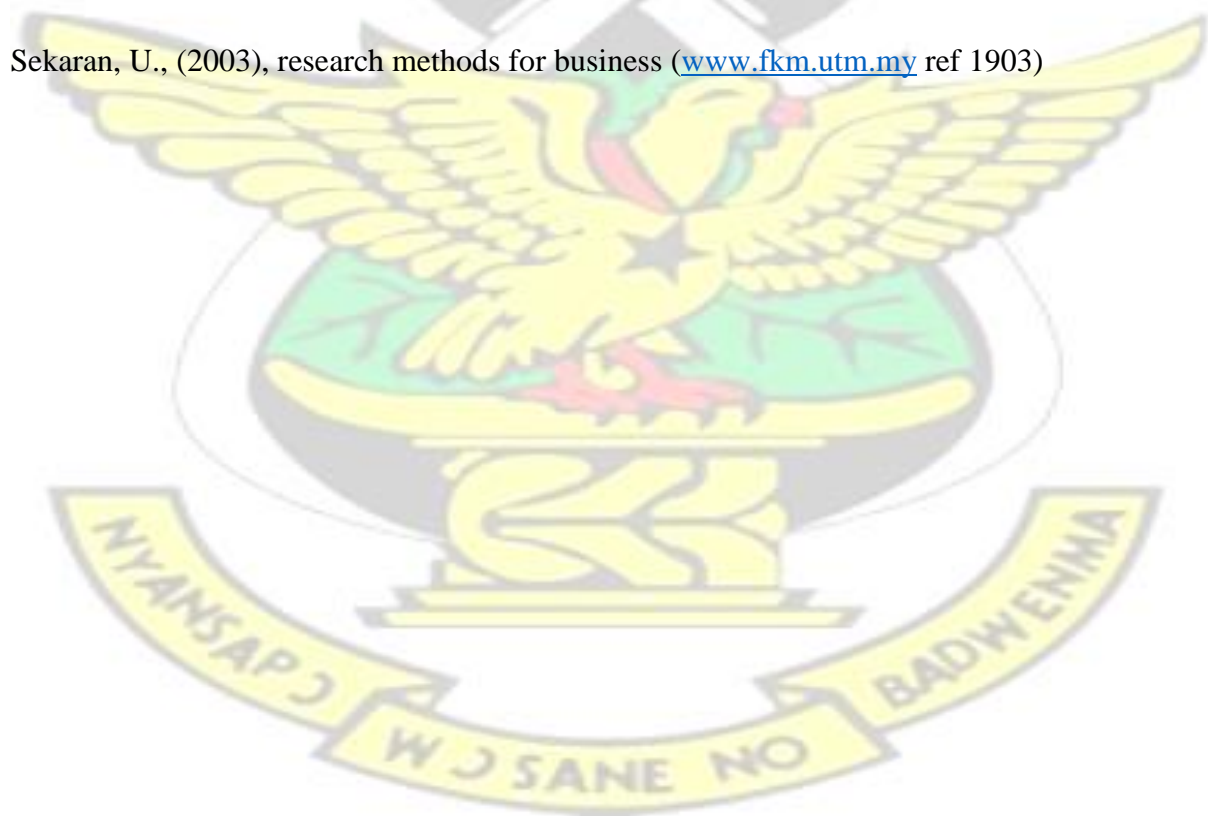
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APPENDIX A

**QUESTIONNAIRE FOR CONTRACTORS, LABOURS AND INSURANCE
COMPANY**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
KUMASIGHANA**

COLLEGE OF ART AND BUILT ENVIRONMENT

DEPARTMENT OF BUILDING TECHNOLOGY

RESEARCH QUESTIONNAIRE SURVEY

Research Topic: “**challenges in estimating cost of accident on construction site**”

Questionnaire for **challenges in estimating cost of accident on construction site**

Dear Sir/Madam

Introduction

This questionnaire is to seek the challenges of estimating cost of accident on the construction industry.

I am a final year student of Kwame Nkrumah University of Science and Technology (KNUST) pursuing MASTER OF SCIENCE (MSc) degree in CONSTRUCTION MANAGEMENT and currently undertaking my final year research project.

Thank you for your cooperation

Yours faithfully,

Emmanuel Arthur

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HND building technology

College of Art and Built Environment

Department of building technology

Kwame Nkrumah University of Science and Technology

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Email: omanserew@yahoo.com

If you have any question or help, don't hesitate to contact my dynamic project supervisor Dr. Gabriel Nani

(Lecturer and Research supervisor, Department of Building Technology, KNUST)

Email: gabrielnaniresearch@gmail.com

I am humbly asking you if you could assist me as honestly as possible with my research topic: "CHALLENGES IN ESTIMATING COST OF ACCIDENT ON CONSTRUCTION SITE". This questionnaire or research is being used as a tool for collecting information on the cost of accident and its challenges on the construction industry in the Central Region of Ghana. The information that would be obtained shall be used to examine whether "CHALLENGES OF ESTIMATING COST OF ACCIDENT" has any potential danger on the construction industry.

The study is exclusively for academic purpose and any information provided shall be treated as confidential.

I would be very grateful if you could allow me to interview some of the construction managers and labours to respond to this short and brief but important questionnaire which would take less than fifteen minutes (15mins) of their precious and valuable time.

In fact, I am very mindful and promise not ever exposes any respectful respondent identities or even your reputable companies name for so ever.

SECTION A” DEMOGRAPHIC (GENDER) DATA

General Information (Willful)

Please tick in the appropriate box [√] (Select all that apply)

1. Are you male or female? **Please tick only one** (√)
Male [] female []
2. Marital status. **Please tick only one** (√)
Single [] married []
3. What is your designation in this company? **Please tick only one** (√)
Site engineer [] general foreman [] labour []
4. How long have you been working in the construction industry? **Please tick only one** (√)
0-2 years [] 3-5 years [] 6-9 years [] 10- years and above []
5. What form of training or education level do you have? **Please tick only one** (√)
Technical training [] Apprenticeship Training []
Polytechnic Training [] University Training []
6. Which of these qualifications do you have from our training? **Please tick only one** (√)
BECE [] NVTI [] Intermediate []
SSCE/WASSCE [] Technician Part I [] Technician Part II []
Technician Part III HND [] BSc []
MSc. [] M.PHIL [] PHD []
Any other specify
.....
None of the above []

7. How many companies have you ever worked with deferent from your present company? **Please tick only one** (✓)

One [] Two [] Three [] Four [] Five []
Many [] none apart from this []

8. Do you belong to any of the trade union in the construction industry?

Please tick only one (✓)

Yes [] No [] Now deciding to join one [] Not interested []

9. For how long have you been working in this present company? **Please tick only one** (✓)

0 -2 years [] 3-5 years []
6 -9years [] 10 years and above can't remember []

10. Which of the ages below do you fall? **Please tick only one** (✓)

18 – 25 [] 30 -35 [] 40 – 45 []
50 – 55 [] 60 and above []

Ends the Questionnaires for the Demographic (Gender) Of the Respondent

SECTION B: QUESTIONNAIRE FOR CONTRACTORS/SITE ENGINEER

1. How often does accident occur on the construction site? **Please tick only one** (✓)

weekly [] monthly [] yearly []

Any other specify.....

2. What are the various forms of accident in your company? **(please comment)**

a.

b.

c.

- d.
3. What is the intensity of the accident on the site? **Please tick only one (√)**
 Minor [] severe [] none []
4. What challenge(s) does this accident have on your company? In terms of cost (**Please write**)
 a.
 b.
 c.
 d.
5. What challenge(s) does this accident have on your workers? in terms of cost (**Please write**)
 a.
 b.
 c.
 d.
6. Has the company been insured? **Please tick only one (√)** Yes []
 No [] If any other way,
 specify.....
7. If NO, how is the cost of accident estimated? (**Please comment**)
 a.
 b.
 c.
 d.
8. If YES (to question 4) how is the cost of accident estimated? By the company [] by
 insurance company []

Others specified.....

9. Does the insurance covers all kinds of accidents on site? **Please tick only one (√)**

Yes [] No []

10. If NO please specify.....

11. Is cost of accident taken into account during budgeting? **Please tick only one (√)**

Yes [] No []

12. What is the percentage increase of actual cost to estimated cost of accident from 2010 - 2015? **Please tick only one (√)**

10% - 20% [] 20% - 30% [] 30% - 40% [] none []

13. If the actual cost of accident is high, what is the causes? **Please you can tick more one (√)**

High medical bills [] severe accident. [] frequent occurrences of accident []

Others specify.....

14. What are some of the challenges your company faces when estimating cost of accident (please comment)?

a.

b.

c.

d.

15. What methods are used by your company to estimates cost accident on the construction site? **(Please write)**

a.

b.

c.

d.

16. What measures are put in place to mitigate the challenges of estimating the cost of accident on construction site?

a.

b.

c.

d.

SECTION C: QUESTIONNAIRE FOR INSURANCE COMPANY

1. Does your company insure Construction Company? **Please tick only one (√)**

Yes [] No []

2. Do construction companies comes for insurance registration?

Please tick only one (√)

Yes [] No []

3. For the past five years how many construction companies have been registered so far?

0 - 5 [] 5 - 10 [] 10 - 15 [] others specify.....

4. What type of insurance does construction companies normally do? **(please write)**

a.

b.

c.

d.

5. Does the insurance that Construction Company do covers all kinds of accident on construction site? **Please tick only one (√)**

Yes [] No []

6. If NO which of them does it cover **(please write)**

- a.
- b.
- c.

7. For accident insurance, what is the premium for annual payment in relation to number of workers? **(please write)**

- a.
- b.
- c.
- d.

8. For how long does a company qualified for accident claim after the insurance
0 – 2 years [] 2 – 5 years [] 5 – 10 years [] others specify

9. What document(s) are required to estimate cost of accident in other for a worker to qualified for insurance claim

Hospital medical bills [] companies accident record []

Workers personnel record [] others specify.....

10. What are the methods used in estimating the cost of key forms of accident on construction site? **(please write)**

- a.
- b.
- c.
- d.

11. What are the challenges that your company goes through when a construction company experience accident? **(please write)**

- a.
- b.
- c.
- d.

12. What challenges does your company goes through to estimate accident cost of individuals involves in an accident? **(please write)**

- a.
- b.
- c.
- d.

13. What are the basic procedure to follow to evaluate cost of accident? **(please write)**

- a.
- b.
- c.
- d.

14. What measures are put in place to mitigate the challenges of estimating the cost of accident on construction site?

- a.
- b.
- c.
- d.

SECTION D: QUESTIONNAIRE FOR LABOUR (WORKERS)

Please tick where appropriate (√)

1. For how long have you worked in this company?

Less than 1 year [] 1 – 3 years [] 3 – 5 years [] more than 5 years

2. Have you been insured?

Yes [] No []

3. Have you been involved in an accident before? Yes [] No []

4. If YES how many times? Once [] twice [] thrice [] 4- 5 times []

5. What was the intensity of the accident of the accident?

Severe [] minor [] others specify.....

6. Did your company estimate the cost of your accident? Yes [] No []

7. If YES who bear the cost of the accident of the accident you Fall into?

The construction company [] insurance company [] personnel finance []

Others specify.....

8. What challenge(s) did you faced during the estimates of the accident cost? **(please write)**

a.

b.

c.

d.

9. What do you think would be some of the causes of the accident?

Inexperience [] overworked employees [] lack of safety measures []

10. What challenge(s) has accident brought to your life?

a.

b.

c.

d.

11. What are some of the challenge(s) you went through before you were compensated for the accident?

a.

b.

c.

d.

12. Are you aware of workmen's compensation law 1987 (PNDC 187) which relates to compensation for personal injuries? **Please tick only one (√)**

Yes []

No []

13. Job Safe Analysis (JSA) is a basic approach to develop improved accident prevention procedures while Work Breakdown structure Dictionary (WBS) is used to break down activities into smaller unit to be done. Which of the above procedures does management apply to do job? **Please tick only one (√)**

WBS []

JSA []

don't know []

14. Construction is pretty expensive and accident prone business sector would severe risks.

Which of the risk below that poses more danger in the construction industry during operation? Please tick only one.

Construction Risks []

Environmental Risks []

External Risk []

Organizational Risks []

Project Management Risks []

Technical, Quality or Performance Risk []

15. Which of the following do you see as the main source of worker injury to the worker?

Lack of maintenance [] lack of safety measures on site [] no protective tools/equipment for workers []

Others specify.....

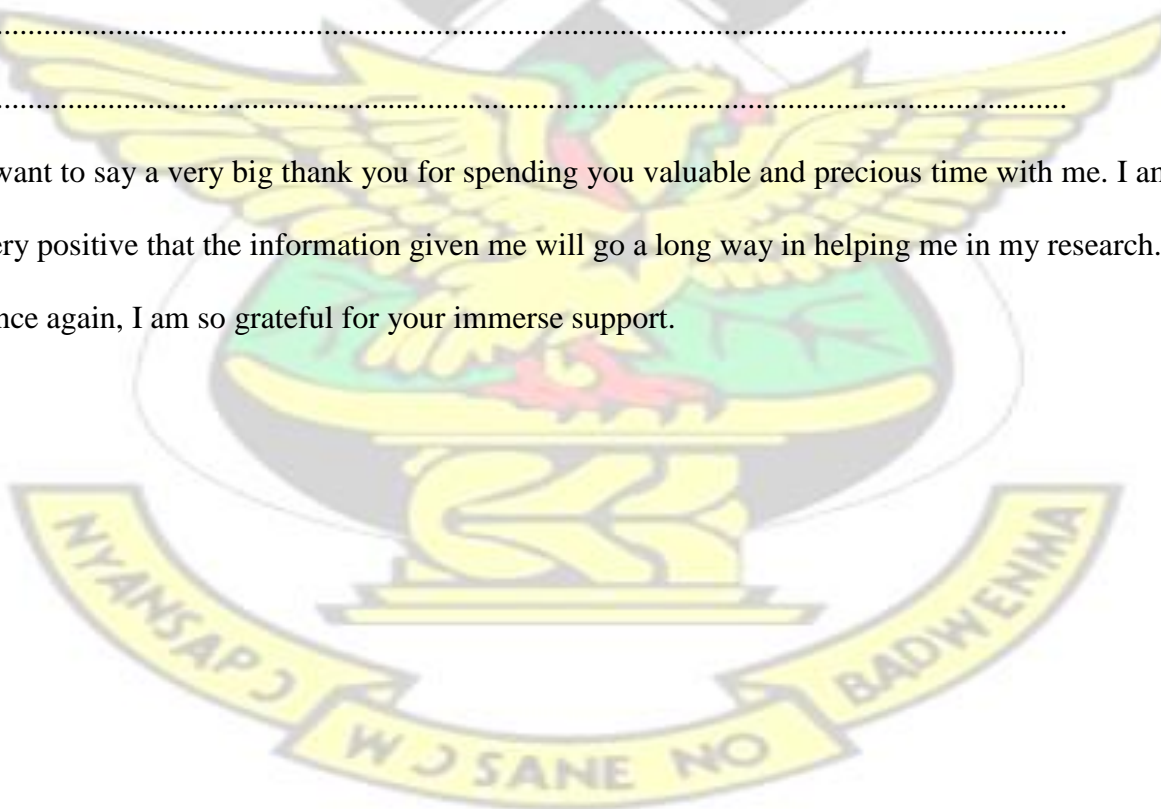
Are you on any welfare packages in this company? **Please tick only one (✓)**

Yes [] No [] If any other specify.....

If you are given an opportunity to comment on how to mitigate or improve the challenges of estimating cost of accident on construction site, what will be (suggest) your opinion. (Please write).....

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

I want to say a very big thank you for spending you valuable and precious time with me. I am very positive that the information given me will go a long way in helping me in my research. Once again, I am so grateful for your immerse support.



**APPENDIX
B**

RESULT ON OCCURRENCE OF ACCIDENTS

Question	Response	Frequency	Percentage
What is the intensity of accident on site	Minor	8	80%
	Severe	2	20%
	None	-	-
	Total	10	100%

Question	Responses	Frequency	Percentage
Has the company been Insured? If any other Specify	Yes	7	70%
	No	3	30%
	Total	10	100%

Question	Responses	Frequency	Percentage
What is the percentage increase of actual cost of accident from 2010-2015?	10-20	6	60%
	20- 30-	4	40%
	40	-	-
	None	-	-
Total		10	100%

C

RESULT OF INSURANCE OF CONSTRUCTION COMPANY

APPENDIX

Question	Responses	Frequency	Percentage
Have you been insured? Total	Yes	3	30%
	No	7	70%
		10	100%

Question	Responses	Frequency	Percentage
Does your company insure construction company Total	Yes	7	70%
	No	3	30%
		10	100%

Question	Responses	Frequency	Percentage
Do construction companies comes for insurances Total	Yes	10	100%
	No	-	
		10	100%

Question	Responses	Frequency	Percentage
For the past five years how many construction companies have been insured so far Other specify Total	0-5	1	10%
	5-10	2	20%
	10-15	5	50%
		2	20%
		10	100%

APPENDIX

D

An example of an observation form/sheet is provided below that help a company to make a claim for accident.

(Please write what was observed beside the appropriate column)

Observers name.....

Company's name.....

Sectioned observed.....

Date Health conditions at site.....

First aid box and other accessory.....

Nature of supervisor.....

Comments.....

Procedure at work place

Logical flow of work.....

Rate of safety awareness.....

Inspection of work, plates, scaffold before operation of work, plates, scaffold before operation commence.....

Maintenance of plant and others.....

APPENDIX

Observation of safety rules.....

Comments.....

KNUST

