COST OF IMPLEMENTING HEALTH AND SAFETY MEASURES IN CONSTRUCTION PROJECTS IN ABUJA, NIGERIA

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ABSTRACT

The lack of provision of cost for H&S during the preliminary stage of construction brings about poor attitude of construction stakeholders towards the implementation of H&S measures on construction sites in Nigeria. This might be associated with increase in rate of accidents, injuries and fatalities of which compensations are paid to victims, which has a resultant effect in increase in the final cost of projects. The study was aimed at assessing the cost of implementing H&S measures on the cost of construction projects in Abuja, Nigeria with a view to improving the level of implementing H&S measures among contractors. The study was a criteria based studies in which certain criteria were outlined for selection of projects and firm. The study employed the use of Safety and Health Assessment in construction(SHASSIC) in determining the level of implementing health and safety measures among contractors, cost of implementing H&S measures and cost of construction projects. Regression analysis was used to determine the impact of H&S measures on cost of construction projects The Pearson correlation (r is 0.776, while its $P < 0.001$) revealed a positive and significant relationship between the two variables. The coefficient of the simple linear regression shows the contribution that H&S measures makes on cost of construction projects, it was concluded that a reasonable correlation exists between H&S measures and cost of construction projects. Findings revealed that implementing H&S measures has a significant effect on the cost of construction projects. The study recommends that effective awareness on H&S measures is useful in order to improve the level of it implementation on construction sites, and to reduce construction site accidents.

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CHAPTER ONE

1.0 **INTRODUCTION**

1.1 **Background to the Study**

The laws guiding construction health and safety requires full action and implementation to protect workers at their work place just as well as the general public who may be influenced because of the work. Occupational Health and Safety Act (OSHAct) of 1994 oblige employers to make great and satisfactory arrangement of health and safety measures in their work places, and furthermore keep a protected and solid work environment for every one of its employees. According to Chang (2008), more than hundred million individuals in different part of the world part take in construction works as a profession. The Global Training Centre of International Labour Organisation (ILO, 2011) stated that a few in six deadly accidents at work happen on a construction site. It further stated that at least 60,000 deadly accidents happen on construction sites across the world every year. Similar assumptions were made by Keller and Keller, (2009) and Board of Injuries (2009). The significance of health and safety in the construction industry cannot be over emphasized. Providing a very safe work environment has been reiterated by various researchers; violation of which has a negative and compounding effect on the organisation overall productivity and performance.

The application of health and safety measures in construction projects remain one of the essential criteria to which effective projects delivery can be determined (Ibrahim, 2015). This statement is supported as health and safety policy is seen as one of the important factors that is used in prequalifying appropriate contractors for the award of construction projects in the country (Windapo, 2013 and CDM, 2015).

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Any injury encountered on site involves cost. The costs of injuries can roughly be categorized as either direct or indirect (Awodele and Ayoola, 2005). The direct costs are those attributed directly to injuries while the indirect costs are those elusive components of the costs of construction worker's injuries.

To ensure a reliable and safe working environment, the cost of health and safety are those experienced to comply with legal obligations with respect to preventing accidents, applying measures to prevent the occurrence of accidents during work and to improving the health and safety conditions in all areas of the work performed (Awodele and Ayoola, 2005). Hence, the need to establish the cost of implementing H&S measures in construction projects in Abuja, Nigeria.

1.2   Statement of the Research Problem

The rising in figure of construction accidents has necessitated the awareness of construction H&S measures, thus involving its inclusion as part of project performance criteria. Awodele and Ayoola (2005) affirmed that lack of adequate and proper H&S measures implementation is one of the major contributory causes of operational accident in construction. This means that H&S in construction is a highly practical guide that will help professionals in understanding the implications of H&S legislations in a construction projects.

Awodele and Ayoola (2005), Haupt and Smallwood (2005) reported that not viewer than hundreds of construction workers engaged in construction works on various sites are killed on a yearly basis in Nigeria, and most of the surviving ones been permanently disabled which amounts to more than one million annually. Also the Nigerian construction industry as at 2005 till date loses 5 – 7 % of its workforce annually to construction accidents through building collapse and other major operational accidents (Olatunji *et al.,* 2007). Awodele and Ayoola (2015) opined that lack of adequate provision

of H&S measures in construction projects may be one of the contributing recipes in the increasing cost of construction.

The cost of H&S in estimating the construction expense is absolute little or no emphasis (Idoro, 2011). This attitude of construction stakeholders that is contractors, subcontractors, project managers and clients, towards implementing H&S measures has also caused broad challenges in project implementations with its increasing effect on incurring additional charge in completing the project (Dimuna, 2010).

In view of the above, the lack of provision of cost of H&S during the forecast of construction cost brings about poor attitude of construction stakeholders towards the implementation of H&S measures in construction site in Abuja, Nigeria. This poor attitude most likely leads to increase in rate of accidents, injuries and fatalities of which compensations are paid to victims. The resultant effect is increase in the final cost of projects. It is therefore imperative to access the cost of implementing H&S measures on the cost of construction projects in Abuja, Nigeria.

1.3 Research Questions

In ensuring that the identified problem of the study is properly addressed, the analysis seeks to find answers to the following questions:

i.   What is the level of implementing H&S measures among contractors in construction projects in Abuja?

ii. What is the relationship between cost of construction projects and the cost of implementing H&S measures?

iii. Can cost of implementing H&S measures predict the cost of construction projects?

1.4   Aim and Objectives of the Study

This study aimed at assessing the cost of implementing H&S measures on the cost of construction projects in Abuja, Nigeria with a view to improving the level of implementing H&S measures among contractors.

The objectives are:

i.   To examine the level of implementing H&S measures among contractors in construction projects in Abuja.

ii.   To determine the relationship between the cost of implementing H&S measures and cost of construction projects.

iii.   To validate the relationship between cost of implementing H&S measures as a predictor of cost of construction projects.

1.5   Research Hypothesis

The assumption that is tested for in this research work is;

H_0: - Cost of implementing H&S measures has no significant effect on construction cost.

1.6   Justification for the Study

Considering the important role, the construction industry plays and the level of accidents occurrences, there is necessity for an improve health and safety management system among the Frontline (construction workers). According to Kheni *et al.* (2005) the HSE has demonstrated that by improving safety and health measures, management can save up to 70% of accidents on sites. And as such any effort aimed at improving safety and health measures on the construction site must be undertaken by a rigorous and thorough research. In this respect, many research works have been assumed in order to provide a perfect platform for which safety and health measures can be formulated and implemented.

Over the year's research as being on going as regards to the issues of H&S in the Nigeria construction industry. Many authors like Foad (2011) have made analysis on developing safety implementation in construction projects in Libya, Kadiri *et al*. (2014) also conducted an investigation on the effect and causes of building site accidents, Kheni *et al*. (2005) focused on safety theory, cost and value in construction designs in Jordan, An analysis of safety management on Nigerian building industry was conducted by Samuel (2014), Ibrahim (2015) researched on the safety execution of the Saudi Arabian construction industry, Ashly (2015) also conducted a similar research on review of safety exercises of the construction industry, further study on the effects of poor safety performance in the Ghanaian construction project was conducted by Evans (2016), Additionally, Elke (2016) carried out a research on effect of the Construction S&H Guide settings on Construction Cost in south Africa .

However, little or no emphasis given on the cost of implementing H&S measures in construction projects. Thus, this research seeks to make available information on the cost implementing H&S measures in construction projects in Abuja, Nigeria. This information will help those engaged in construction activities as it will serve as a guide to aid them on H&S decision making, reduced the figure of casualties recorded on building sites as a result of accidents and will also make available useful information for H&S cost construction forecasting.

1.7   Scope of the Study

The research focused on the cost of implementing H&S measures in construction projects. The construction firms that practice Occupational Health and Safety (OSH) are the big multinationals (Adeogun and Okafor, 2013). The construction firms that were selected in Abuja are Multinational and Large Scale construction firms. The location of the study was in Abuja. It was selected for this study for the reason that it is the administrative

headquarters of Nigeria. It is one of the metropolitan cities in Nigeria that has the highest population of the built environment professionals and has many ongoing construction projects.

CHAPTER TWO

2.0   LITERATURE REVIEW

2.1   Operation of the Nigerian Construction Industry

Since from inception a place to live has being a basic human need after food. This need by man to protect himself from rainstorm, wind, danger attack etc. explains the origin of building construction. Construction activity is as old as the existence of mankind, building projects began in Nigeria since the 1930s. Building construction works were carry out by Royal Army Engineers and Public Works Department (PWD). The construction industry is multifarious in nature as it consists of diverse range of activities and different type of workforce (Rao *et al*., 2015).

Construction company has been well-known for her substantial quality due to the series of acts involved in the building construction procedure. It can be argued that, the visible feature of the industry has direct effect on the task of operatives both in developed and developing countries (Babu, 2015). H&S is a key factor in making sure that any construction works fully accomplished its objectives within the estimated cost with negligible or no accident. Similarly, Muhammad *et al.* (2015) expressed that, implementing Health and Safety measures will have a constructive impact in the assessment of worker's quality delivery and productivity of construction works. Ogbu (2011) included that H&S is an inevitable part of construction procedure with the contributions of various tradesmen and professionals during every production phase. Dodo (2014) claimed that whatever defines local construction company in Nigeria is the operation of indigenous management staff and the joint ownership by the Nigerian. They are majorly seen as 'medium and small size firms. However, regardless of the type of their functions, construction industry imparts greatly to the economic outcome of every

nation; by creating employment opportunity and incomes for the populace as asserted by (Rameezdeen, 2007; Myers, 2008; Dhlamini, 2012; and Nyoni and Bonga, 2016). Considering this, Idoro (2010); Okoye and Okolie (2012); and Muhammad *et al.* (2015) stated that multinational construction firms are usually better than the indigenous construction firms in terms of quality performance based on these three criteria:

(1) Workmanship

(2) Percentage of retention fees received for the works after completion and

(3) Quality of materials used for the projects.

Multinational Construction firms are considered to have a better advantage to indigenous construction firms in terms of compliance and performance. Idoro (2007) and Ogbu (2011) stated that global construction firms were believed to have better and a clearer understanding about Safety guidelines than local construction firms however it can be shown that none of them have performed effectively compared to another with regards to the part of safety practices and compliance.

2.2   Construction Health and Safety Measures

Ahmad, et al. (2016) characterized the term safety as a special event that is foremost to persistent attainment of efficiency. Along these lines, Ahmad, *et al*. (2016) reasoned that safety focuses upon minimizing accident on work site and curtaining the possible adverse impact on the workers in each aspect. In light of different evaluation by many specialists, for example, Aniekwu (2007); Idoro (2011); Okoye and Okolie (2012); Oisamoje and Idubor (2013); Umeokafor *et al*. (2014) and Dodo (2014) on the management and regulation of safety in construction projects, the fact still remains that compliance and adoption to H&S provision remains one of the significant catalyst in advancing the construction production measure. Then again, failure in consenting to H&S measures, will increase more accidents and legitimate activities in this manner

raising production cost. In light of this, Fawehinmi and Famakin (2012) expressed that safety routines are standards to rate successful building construction activity which is generally important to the client since they extensively affected in accomplishing productivity and viability among experts and also workers in construction company.

The irregularities perceived as a result of failure to comply with minimum requirements with respect to H&S practices in the construction company's may cause both the cause both the victim and industry time wastage and loss of money. In spite of the fact that construction company might have registered with life assurance aimed at their employees after clear immediate cost emerging from injury suffered, anyway, there still exist some specific expense included which can't be safeguarded against, like loss of workers, hours of production, loss with respect to further operatives pausing the advancement of work to show involvement or help the harmed person (Aniekwu, 2007). Therefore, absence of appropriate obedience toward safety implementations will pause some building cycle of construction activities.

A few measures had been taken into consideration by the construction company regarding improving its general safety performance. Nonetheless, there is still a paradigm movement after observing safety performance to precautionary actions of advancing safety performance. Many agricultural countries like Nigeria among dissimilar to developed countries still lack versatile laws and guidelines on H&S practices (Ikechukwu and Dorothy, 2013). The research buttressed that, viable administration of safety practices is helped by different factors, for example, financial-economic and socio-humanitarian and view. George et al. (2013) further that construction firm ought to create awareness especially for every project, which includes a framework of the project, a thorough review of the safety necessities and wants,

agreements and frameworks, disciplinary exercises, substance abuse scanning record and proactive administration strategies required for the blueprint.

A generally survey was carried out by Boustras *et al*. (2015) on supervision of H&S of small firms in Cyprus. The investigation centered on the factors determining safety performance at the work environment in small scale firms. It was a purposive report in nature, hence copies of well-designed questionnaire were utilized to obtain information required. Result of the study revealed that, work safety settings in limited scope firms must be improved by the adoption of "guidance", "risk assessment,' and "safety policy design ". The result likewise revealed characteristic and nature of management frameworks showed in an organisation, is determined by the techniques intended for achieving work objectives, and having efficient assets additionally helps in influencing small scale firms. The analysis negates some of the results of past research based on the clarity of "quality management system" which could not have importance cooperation alongside safety result in the last model.

Awwad *et al*. (2016) analyzed construction safety exercises, and difficulties in a central Eastern agricultural nation. An experimental survey was carried out using planned survey with the construction specialists, insurance firms and governmental organizations. Outcomes of the research anyway revealed the accessibility of construction work safety laws but lack the essential application, poor supervision, lack of safety awareness weak support from the majority of stakeholders handling safety routines in construction sites. The investigation thus suggested that the construction firms should be properly informed which may help in controlling the difficulty.

Kolawole (2014) evaluated safety procedures on building construction locations: using North Central, Minna as a case study. Safety approach implemented in some of the construction firms in Minna, the Niger state capital was assessed, it also evaluated that

application of safety regulation will help reduce worker's complaint of accident on sites and encourage them for a better and efficient operation. The population required for this study were selected randomly among building construction firms via a well-structured questionnaire. Outcome from the analysis revealed that site workers supported "safety policy" which improves performances and lower injuries on site, findings of the study also revealed that government as a body lacks a definite precautionary measure for construction activities. And as such the study suggested training and re-training of workers on the significance of safety practices as a priority to all, the study also recommended that government should enact "safety act" aimed at regulating accidents occurring at site.

Idoro (2011) reviewed the impact of support on Occupational Health and Safety (OHS) functioning of the construction firms in Nigerian. His paper assessed the degree of mechanization and its correlation with OHS performance in the industry, furthermore established effect of mechanization on OHS functioning and pleaded for viable OHS management by contractors. The study adopted the use of questionnaires in obtaining information and the analysis was conducted using t-tests, means, percentages, and Spearman's correlation tests. Findings from the result showed that rate of accident and injury occurrences increased as a result of increase in mechanization. This research assumed that failure to efficiently manage mechanization degenerate OHS functioning on project location. Conversely, the study recommended that construction managers should devise efficient measures that will help in the implementation of OHS functioning rather than using extra safety garments.

In an analysis conducted by Agwu (2012) on Total Safety Management (TSM) a methodology designed for developing organisational implementation in selected construction company in Nigeria. Both random and stratified sampling procedure were

utilized in the research for the questionnaire shared within the six (6) selected construction firms which include: (Julius Berger Nigeria Plc, Setraco Nigeria Ltd, Fourgerolle Nigeria Ltd, Arab-Contractors Nigeria Ltd, Dantata and Sawoe Nigeria Ltd and Costain Nigeria Ltd). Effect developed from the exploration proposed that incorporation of absolute safety management as a feature of the hierarchical arrangement would prompt an improved safety practices on building projects. Hence, the research suggested that, agents need to keep up great attitudinal conduct and underlying changes in administration of construction safety in other to support the benefit of complete safety practices in Nigeria. According to an investigation by Babu (2015) which aimed toward examining safety act on the building construction area. The result sighed the assessment of construction associate using samples of a well-structured questionnaire to evaluated safety performance on their sites during construction activities. Weak support from the public authority, insurance agencies, ministry of labour and construction associate were uncovered by the result of the analysis.

According to Okoye *et al*. (2016) in a research carried out on construction workers' H&S knowledge and consistence on sites in Anambra State, Nigeria. Mean Score Index and Pearson's Product-moment Correlation Coefficient (r) were used to analyse the information sampled randomly from the fifteen (15) selected construction sites in the study area. Low safety responsiveness and inconsistence among the sites agents were discovered, which thus resulted into low scheme management. The analysis suggested that, knowledge and consistence regarding H&S practices alone cannot accomplish the optimum and desired project performance, it would necessitate safety refinement which includes so many elements like: adoption of strict safety regulations and ensuring it full enforcement, workers involvement, management commitment. In view of the above, Akinwale and Olusanya (2016) examined the implications of occupational health and

safety intelligence in Nigeria through cross-sectional study plan and good hypotheses'. An in-depth research interviews conducted on managers and senior staffs of the selected organisations in Lagos State, Nigeria. The data collected were subjected to content analysis and demographic procedure. Nonetheless, the investigation insisted that workers and administrators are the significant objective of industrial health threats, for example, loss of manpower, efficiency and employer stability. High degree of perception on the significance of occupational safety was recorded yet there is insufficient interest in capacity building on safety' programmes in the union. The investigation consequently suggests great arrangement on word related safety with sufficient interest in insurances and safety knowledge will improve individual and hierarchical advancement in Nigeria.

2.3   Regulations/Guidelines and Code of Practice Under Osha 1994

Under OSHA of 1994 various guidelines were formulated and the emphasis was on implementing occupational safety and health (OSH) measures at the workplace. Among these regulations are:

1. Safety and health policy: place of work with five (5) workers or more is expected to have a safety and health policy statement, which is a statement of intent with respect to safety and health of those employed at the workplace.

2. Safety and health committee regulation of 1996: workplace with more than 40 workers is expected to have a welfare and health team which is expected to meet once in 3-month and the function of the committee include identifying of risk/hazard at workplace, investigating and reporting of accidents at workplace, conducting safety audit at workplace etc. The composition of the committee includes, for workplace with less than 100 workers four (4) committee members two (2) each from management and workers while workplace with more than 100 workers require eight (8) committee members four (4) each from management and workers.

3. The Safety and Health Officer Regulation: the regulation provides that workplace/industry need. The acronym SHO is a person who has attended training at the National Institute of Occupational Safety and Health (NIOSH) Malaysia, succeeded NIOSH investigation and registered with the Department of Industrial Safety and Health (DISH) Malaysia. The SHO ensure at workplace/industry safety and health regulations are followed so as to provide a safe workplace. They are basically aiming at preventing injuries, accidents and health problems at the workplace.

4. Control of Major Industrial Accident Hazards (CMIAH) Rules 1996: The regulation is formulated in order to control major accidents at the workplace that have major accident hazard. The CIMAH has two main aims, to avoid major industrial accidents and to reduce the impact/effect of the hazard associated with those accidents.

5. Classification, Packaging and Labelling (CPL) Rules 1997, the Use and Standard of Exposure of Chemical Hazardous to Health (USECHH) Regulations 2000: The two regulations aimed at regulating chemical hazards at work. The CPL regulations require for accurate classification, label and package of chemicals by their suppliers. It aims to protect workers, through labeling which reflects possible hazardous effects of a specific chemical. USECHH Regulations 2000 stipulates that the firm should take action to control chemicals, hazardous at the workplace through supplying of Chemical Health Risk Evaluator (CHRE), professional health specialist and modern health technician to carry out their responsibilities in evaluating health risk from chemical exposure. Substance health risk valuation comprises of having detail of all chemicals, evaluating workers' exposure to the risks, deciding on the acceptability of risks and control measures that occur were revised.

Table 2.1 shows the rules made under OSHA 1994. Guidelines and Policy which have been issued by DISH under the OSHA 1994.

Table2.1: Rule for OSHA 1994

Directive	Year
Employee's Safety and General Health Policy Statement	1995
Control of Major Industrial Accident Risks	1996
Health & Safety Team	1996
Packaging, Labelling and Classification of Harmful Substances	1997
Protection of Health Officers	1997
Injunction of Substance usage	1999
Practise and Principles of Exposure to Chemicals, Unsafe for Health	2000
Dangerous Occurrence, Accident Report, Occupational Disease and Industrial pollution	2004

Source: OSHA, 1994.

Table2.2 Guidelines and Code of Practices made under OSHA 1994

Regulation	Year
Regulations for Public Safety and Health at Construction Site	1994
Regulations for First Aid Facilities in the Workplace	1996
Regulations on Occupational Safety and Health in the Office	1996
Regulations for the Classification of Hazardous Chemicals	1997
Regulations for Labelling of Hazardous Chemicals	1997
Regulations for the Formulation of a Chemical Safety Data Sheet	1997
Regulations on Control of Exposure to Dust in the Wood Processing Industry	1998
Regulations on Safety and Health in the Wood Processing Industry	1998
Regulations on Reduction of Exposure to Noise in the Wood Processing Industry	1998
Regulations on Occupational Safety and Health in Tunnel Construction	1998
Regulations for the Preparation of Demonstration of Safe Operation Document (Storage of Liquefied Petroleum Gas in Cylinder)	2001
Regulations on Medical Surveillance	2001
Approved guidelines for Safe Working in a Confined Space	2001
Approved guidelines on HIV/AIDS in Workplace.	2001
Guidance for the Prevention of Stress and Violence at the Workplace	2001
Guidelines on Prevention and Management of HIV/AIDS at the Workplace	2001
Guidelines on Industrial Safety and Health for Standing at Work	2002
Guidelines on Industrial Safety and Health in Agriculture	2002

Source: OSHA, 1994

2.4   Cost of H&S Measures

Just like all workers, construction workers, do not want to be injured as a consequence of

their employment (Elke, 2016). If injuries are to be curtailed, then the issue of safety

cannot be solely left under the control of workers alone but should be a responsibility of

all that is it should be a combined effort of managerial personnel, because the safety environment consists of elements over which workers have little or no power over. According to Haefeli *et al.* (2005), prevention or reduction of accident and job related adverse rates is not the primary motivating element for efficient H&S management. occupational health and safety programs and policies often exist, but implementing them becomes an issue because most people see it as very capital intensive and as such they are rarely enforced in low-income countries like Nigeria where most employers and government do not sufficiently protect workers (Elke, 2016). Smallwood (2005) assesses the cost of implementing H&S measures within a construction industry between 0.5 and 3 percent of total project costs.

The cost of H&S was generally observed as an essential and useful business rate (Okoye and Okolie, 2014). However, Haefeli *et al.* (2005) acknowledged that failure to implement H&S measures might ultimately have a financial implication on the operation of an organisation via any of the top elements like customers and consumer expectation, worker's determination, efficiency, productivity and service delivery among others. In light of the above point, Guha and Biswas (2013) argued that safety assumption cannot be complete and a reasonable judgment for safety cost is needed and sustain the costs related to safety factors in developing countries may simply be unjustifiable and that the investors cannot stand the safety cost for financial survival if the actual cost of accident is too small in the economy.

2.5 Validation of the Relationship Between Cost of H&S Measures and Cost of Construction Projects

According to Frees, (1996) the process of model authentication entails the means of validating if a proposed model is suitable, specifically if it purpose is for investigation. Mohammed and Ajala (2017) stated that the process of model validation is in ensuring

that the proposed model is not peculiar to the sample used in its estimation but rather represents the characteristics of the general population. Validation is very vital because it shows the possible reliability and objectivity of the model. Ikpe (2009) stated that there are basically two components of validation namely internal and external justification. Both the internal and external justification are very important for justifying the research assumption.

2.5.1   Internal validation

According to Mohammed and Ajala (2017), interior legitimacy was characterized as legitimate level of proclamations made about whether Y Causes X the major concern to stop possible alternate hypothesis. interior approval tries to state the model strength just as well as evaluate the writing search. Egbu (2007) added that the important thing to consider in surveying strength of a model are the estimation of R and adjusted R^2. The R denotes a proportion of the association between the observed value and the predicted estimation of variables used in the model, while the R-Square (R^2) is a measurement that shows on 0 to 1 scale how changes in a dependent variable are represented by specific independent variable with the end goal that zero implies no impact while one shows 100%. R^2 is a proportion of how high an expectation of the result can be made by knowing the indicator factors. Notwithstanding, R^2 watches out for fairly over-gauge the accomplishment of the idea when applied to this present reality, adjusted R-value is therefore determined which considers the quantity of factors in the model and the quantity of perceptions (for example participant) the model depends on. Thus, the adjusted R^2 value is helpful because it gives a sign of the amount of the difference in the result

2.5.2 External validation

This has to do with the robustness of the research and furthermore surveying the ability to generalize the validity and flexibility of the model under circumstances with comparative qualities. Ikpe, (2009) Identified five primary strategies to carry out external validation. These are:

1. Through utilization of independent confirmation acquired by pausing until the future comes or using substitute factors.

2. Separating the examples and utilizing one section for assessing the model and for approval.

3. Re-inspecting, using iterated samples from the first sample and time to time model update.

4. Utilizing Steins equation of re-evaluating the adjusted coefficient of determination (R^2).

5. Approaching specialists to offer remarks on applicable parts of the model.

Due to constraint in resources most particularly financial constraint, the use of alternative 1 could not be implement in this work. The resampling methodology was likewise limited because of restricted information. Grouping the sample is an easier alternative yet it likewise encountered issues some of the time as resampling if the information is restricted. Additionally, Stein's postulate estimates the adjusted R^2 over and thus can be used for authentication. But the condition utilized in computing the adjusted R^2 in SPSS is to some degree imperfect since it failed to represent how the regression model would predict a complete data set. Ikpe (2009), Stein's postulate can likewise be implement to affirm if the model is capable of forecasting difference samples of data from the population. The information gathered for this investigation was restricted not exceptionally sufficient; it was chosen to move toward certain "Experts in

the field of development health and safety" to comment on the potential relevance of the model within and outside the institution. Contended that it is this interaction of approval that can transform research data into information.

CHAPTER THREE

3.0   **RESEARCH METHODOLOGY**

3.1   Research Design

Research design can be described as a (flexible) set of considerations and assumptions that leads to a specific contextualised guidelines that helps in connecting elements and theoretical notion to dedicated strategy of inquiry which are usually supported by techniques and methods for collecting empirical material (Pennik and Jonker, 2010). Hence, this study focused on the cost of implementing H&S measures in construction projects. The study was a survey research and the study explored three main approaches which are review of literature within the cost of implementing H&S measures in building construction projects. Secondly, the approach that was adopted for this research was a quantitative one because, quantitative research is purely based on measurement of quantities and this research involved measurement of quantities. Lastly, the study used the data collected to determine the cost of effecting H&S measures in construction plans.

3.2   Study Criteria

The study was a criteria – based study, and the criteria for selection of construction firms/sites are summarized as follows:

1. The construction industry must be a civil/building engineering firm.

2. The area of the study is the Federal Capital Territory, Abuja.

3. The contract sum must be 100 million or above.

4. The construction firm must have been in building/civil construction works for a period of more than twenty (20) years.

5. The quantity surveyors with vast knowledge of H&S on the construction site selected for this study must have been with the construction firm for at least a duration of not less than fifteen (15) years.

6. Because large scale construction firms tend to have more records on H&S standard requirements, it is necessary that the construction firm selected for this study must be a large one.

7. The construction projects that were selected falls within a period of eighteen (18) years that is 2001-2018.

3.3   Population for the Study

Williams, (2007) refers to research population as those collective terms used in describing the total quantity of a thing (or cases) which are basically the subject of a study, population constitute the following organisations, objects, events or even people. The targeted population for this study were 102 construction projects registered with Federation of Construction Industry (FOCI) and executed by selected construction firms in Abuja.

3.4   Sampling Frame

The sample frame for this research constituted the Quantity Surveyors in the selected construction firms with vast knowledge of H&S and H&S officers involved in the projects executed by the construction firms selected.

3.5   Sample Size

This study employed the use of archival data in conjunction with primary data obtained through a questionnaire survey and was a survey research. And since it was a criteria based study, the characteristics of the study provided some justification for the use of a relatively small sample, only twenty (20) construction firms meet the study criteria and were selected for the study.

3.6   Sampling Technique

Sampling procedure helps one in selecting elements within a said population. According to Morenikeji (2006), that excluding during census, total analysis of the population for

research objectives is not only unnecessary but also expensive and difficult. One of the objective of sampling is that it helps in providing a practical means of data processing and also helps in collecting basic components of a research while ensuring that a good representation of the population is provided in the sample (Jonker and Pennink, 2010). Therefore, the snowballing sampling technique was employed for this study. According to Snowball sampling technique consists of two steps.

1. Identify potential target in the population often one or two target can be found initially.

2. Ask those target to recruit another target (and ask those target again to recruit another target) etc.

3.7   Method of Data Collection

Several methods can be used in collecting data, depending on the purpose on which the data is to be collected. This study employed the use of questionnaire to elicit information from the respondents as it has been widely used in collecting information relating to construction health and safety. The questionnaire was allotted into four (4) parts. The first unit elicited background information of the respondents. The second section elicited information on the level of implementing H&S measures among construction contractors in Abuja, Nigeria, which is divided into document check, construction site inspection and employer's /construction workers interview. Also archival data comprising of cost of building construction projects and cost of implementing health and safety measures were collected.

3.8 Method of Data Analysis

Answering research questions is one major objective of data analysis and test the goodness of the data. The study therefore, used both descriptive and inferential methods of data analysis, the descriptive employed the SHASSIC method of analysis while the inferential employed both correlation/ regression of data analysis this was achieved using the SPSS statistical software.

3.8.1 Safety and Health Aassessment in Cconstruction (SHASSIC) Method

This assessment method is used in carrying out H&S evaluation in construction (SHASSIC) are explained below

Weighting Percentage

The weight age for H&S performance are allocated with respect to three (3) factors as shown in the Table 3.1 below;

Table 3. 1 Distribution of weighting percentage for Component

FACTORS	WEIGHTING PERCENTAGE
Document check	40%
Workplace inspection	40%
Employee interview	20%
Total score	100%

Source: CIDB CIS 10:2008, Mohammed Y. D 2015

The weight age order is designed for making the quantitative result denoting the H&S functioning of different contractor. The basic formulas for factor weight age are as follows;

a. Document Check

$$\frac{Table\ number\ C\ scord}{(61 - number\ of\ NA)} \times 40\%$$
$$= SHASSIC\ score\ for\ document\ checking - (A)$$

b. Workplace Inspection

$$\frac{Total\ number\ C\ scored}{(235 - number\ of\ NA)} \times 40\%$$
$$= SHASSIC\ score\ for\ workplace\ inspection - (B)$$

c. Employee's Interview

$$\frac{Total\ number\ C\ scored}{(218 - number\ of\ NA} \times 20\%$$
$$= SHASSIC\ score\ for\ employees\ interviewed - (C)$$

Where, C denotes absolute number of "Compliance", NC represents the total number of "Noncompliance" and NA represented total number of items "Not Valid".

Star ranking

The overall SHASSIC target in Document Check (A) plus (+) overall SHASSIC target in Workplace Inspection (B) plus (+) overall SHASSIC grade in Employees Interview (C). Component will justify the ranking star(s) which ranges from 1 to 5 stars as shown in the Table 3.2 below

Table 3. 2 Stars ranking

SHASSIC (rank %)	Star(s) Awarded	Classification
85 to 100	*****	H&S Measures are managed and documented.
70 to 84	****	H&S Measures are maintained and recorded although there exist limited risks activities remain neglected.
55 to 69	***	H&S Measures are maintained and recognized but there are few standard risks work behaviors are neglected.
40 to 54	**	H&S Measures are partly managed and not properly documented.
39 and less	*	H&S Measures are inadequately managed and not properly documented.

Source: CIDB CIS 10:2008, Mohammed Y.D 2015

3.8.2 Correlation and Regression Method

The correlation analysis uses the Probability (P) Value Test and Coefficient of Correlation (r). The regression analysis makes use of the Coefficient of Determination (R^2), Probability (P) Value Test and F – Test.

i. P value test:

The decision rule states that:

(a) If P value < level of significance, there is no significance relationship i.e. reject Ho

(b) If P value > level of significance, there is no significance relationship i.e. accept Ho

ii. Correlation Coefficient (R):

The decision rule states that:

(a) $R \geq 50\%$ implies a strong Correlation.

(b) $R < 50\%$ implies a weak Correlation.

iii. Coefficient of Determination (R^2)

(a) If $R^2 \geq 50\%$ denotes a strong Relationship.

(b) If $R^2 < 50\%$ denotes a weak Relationship.

iv. F – Test:

The decision rule states that:

(a) If $F_{Calculated} > F_{Observed}$ value; there is a significant difference i.e. reject Ho

(b) If F calculated > F tabulated value; there is no significant difference i.e. accept H_o

Table 3.3: Summary of Method of Data Collection and Data Analysis

S/N	Objectives	Data Collection	Data Analysis
1	Objective 1	Structured questionnaires	SHASSIC
2	Objective 2	Archival data	Correlation/Regression
3	Objective 3	Structured questionnaires	Expert Validation

Source: Researcher's construct (2020)

<center>**CHAPTER FOUR**</center>

4.0   **RESULTS AND DISCUSSIONS**

This chapter explained and analysed the data collected for this research work. The data were subjected to both inferential and descriptive type of data analysis of which the results are presented and discussed below.

4.1   Examining the level of Implementing H&S Measures Among Contractors in Construction projects in Abuja.

A well-designed questionnaire, was administered to each of the five construction firms/sites selected for this research work. The questionnaire consisted of three sections which are: - document check, workplace inspection and employee interview.   The followings were the analysis/result of assessments carried out in each of the five construction sites, in which was used for the analysis:

SITE 1

CONTRACT SUM: ₦100 Million

WORK PROGRESS: 75%

LOCATION: Abuja

TABLE 4.1 SHASSIC Analysis/Result.

NO	COMPONENT	WEIGHTAGE (%)	SCORES (%)
1	Document Check	$\dfrac{\text{Total number 'c' score}}{(61-\text{number of 'NA'})} \times 40 = \dfrac{42}{61-0} \times 40$	30.16%
2	Workplace inspection.	$\dfrac{\text{Total number 'c' score}}{(235-\text{number of 'NA'})} \times 40 = \dfrac{230}{235-0} \times 40$	39.15%
3	Employee's interview.	$\dfrac{\text{Total number 'c' score}}{(218-\text{number of 'NA'})} \times 20 = \dfrac{203}{218-0} \times 20$	18.60%
		TOTAL SHASSIC SCORE	**87.91%**

Source: Researcher's Analysis (2020).

The total scores of the safety level in site 1 is 87.91%. The Table 4.1 shows the contribution of each component to the total score.

Figure 4.1 SHASSIC Result for site1

The Fig 4.1 shows the scores of the three components, document check 30.16% out of the 40%, workplace inspection score was 39.15% out of 40% and employees interview score was 18.60% out of 20%. The entire component shows an excellent score recorded for site 1.

A- Document Check.

In this site, 61 questions on document checking were administered on the site and the total score was 61. Using the SHASSIC, the site scored 30.16% out of 40% allocated to the document checking. This implies that most documents that are needed for check are properly managed at the site office.

B Workplace Inspection.

The workplace inspection has a total number of 235 questions on the site giving a total score of 235. In the overall assessment of the workplace inspection the contractor scored 39.15% out of the 40% allocated to the workplace inspection. This implies that the site is properly managed as regard to the issue of its safety.

C Employee's Interview.

As regard to employee's interview, it has a total of 218 questions giving a total score of 218. In overall the contractor scored 18.60% out of the 20% allocated to employee's

interview. This implies that H%S measures on the site is well understood, well communicated and well managed among the employees. This section is divided into 3 subsections i.e management personnel interview, health and safety personnel or committee members and construction workers interview.

TABLE 4.2 Star Ranking for site 1

RANKING	DESCRIPTION
85 – 100 *****	H&S Measures are properly managed and well documented.

Source: Researcher's Analysis (2020).

SITE 2

CONTRACT SUM: ₦150 Million

WORK PROGRESS: 55%

LOCATION: Abuja A

TABLE 4.3 SHASSIC Analysis/Result.

NO	COMPONENT	WEIGHTAGE (%)	SCORES (%)
1	Document Check	$\frac{\text{Total number 'c' score}}{(61\text{-number of 'NA'})} \times 40 = \frac{37}{61\text{-}4} \times 40$	25.96%
2	Workplace inspection.	$\frac{\text{Total number 'c' score}}{(235\text{-number of 'NA'})} \times 40 = \frac{173}{235\text{-}0} \times 40$	29.79%
3	Employee's interview.	$\frac{\text{Total number 'c' score}}{(218\text{-number of 'NA'})} \times 20 = \frac{157}{218\text{-}0} \times 20$	14.40%
		TOTAL SHASSIC SCORE	**70.15%**

Source: Researcher's Analysis (2020).
The total scores of the safety level in site 2 is 70.15%. The Table 4.3 shows the

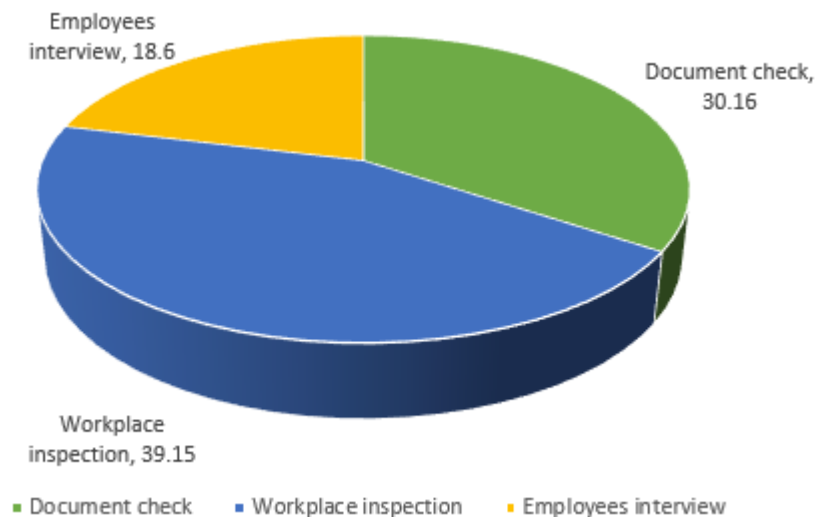contribution of each component to the total score.

Figure 4.2 SHASSIC Result for site 2

Fig 4.2 shows the scores of the three components, document check 25.96% out of the 40%, workplace inspection score was 29.79% out of 40% and employees interview score was 14.40% out of 20%. The entire component shows a very good score recorded for site 2.

A Document Check.

In this site, 61 questions on document checking were administered 4 of the questions were not applicable and the total score was 57. Using the SHASSIC, the site scored 25.96% out of 40% allocated to the document checking. This implies that documents that are needed for check are fairly managed at the site office.

B Workplace Inspection.

The workplace inspection has a total number of 235 questions the site. In the overall assessment of the workplace inspection the contractor scored 29.79% out of the 40% allocated to the workplace inspection. This implies that the site is well managed as regard to the issue of its safety.

C Employee's Interview.

As regard to employee's interview, it has a total of 218 questions. In overall the contractor scored 14.40% out of the 20% allocated to employee's interview. This implies that H&S

measures on the site is understood, well communicated and well managed among the employees. This section is divided into 3 subsections i.e management personnel interview, health and safety personnel or committee members and construction workers interview.

TABLE 4.4 Star Ranking for site 2

RANKING	DESCRIPTION
70 – 84 ****	H&S Measures are properly maintained and recorded but there exist few work risk activities neglected.

Source: Researcher's Analysis (2020).

SITE 3

CONTRACT SUM: N̶270 Million

WORK PROGRESS: 60%

LOCATION: Abuja

TABLE 4.5 SHASSIC Analysis/Result.

NO	COMPONENT	WEIGHTAGE (%)	SCORES(%)
1	Document Check	$\underline{\text{Total number 'c' score}} \times 40 = \underline{24} \times 40$ (61-number of 'NA') 61-3	16.55%
2	Workplace inspection.	$\underline{\text{Total number 'c' score}} \times 40 = \underline{175} \times 40$ (235-number of 'NA') 235-0	29.78%
3	Employee's interview.	$\underline{\text{Total number 'c' score}} \times 20 = \underline{130} \times 20$ (218-number of 'NA') 218-0	11.93%
		TOTAL SHASSIC SCORE	**58.26%**

Source: Researcher's Analysis (2020).
The total scores of the safety level in site 3 is 58.26%. The Table 4.5 shows the

contribution of each component to the total score.

Figure 4.3 SHASSIC Result for site 3

Fig 4.3 shows the scores of the three components, document check 16.55% out of the 40%, workplace inspection score was 29.78% out of 40% and employees interview score was 11.93% out of 20%. The entire component shows a good score recorded for site 3.

A Document Check.

In this site, 61 questions on document checking were administered 3 of the questions were not applicable and the total score was 58. Using the SHASSIC, the site scored 29.96% out of 40% allocated to the document checking. This implies that documents that are needed for check are fairly managed at the site office.

B Workplace Inspection.

The workplace inspection has a total number of 235 questions. In the overall assessment of the workplace inspection the contractor scored 29.79% out of the 40% allocated to the workplace inspection. This implies that the site is managed as regard to the issue of its safety.

C Employee's Interview.

As regard to employee's interview, it has a total of 218 questions. In overall the contractor scored 11.93% out of the 20% allocated to employee's interview. This implies that H&S

measures on the site is fairly understood, fairly communicated and fairly managed among

the employees. This section is divided into 3 subsections i.e management personnel

interview, health and safety personnel or committee members and construction workers

interview.

TABLE 4.6 Star Ranking for site 3

RANKING	DESCRIPTION
55 – 69 ***	H&S Measures are managed and documented but there are little work risks activities ignored.

Source: Researcher's Analysis (2020).

SITE 4

CONTRACT SUM: N 225 Million

WORK PROGRESS: 45%

LOCATION: Abuja

TABLE 4.7 SHASSIC Analysis/Result.

NO	COMPONENT	WEIGHTAGE (%)	SCORES(%)
1	Document Check	$\underline{\text{Total number 'c' score}}$ X 40 = $\underline{24}$ X 40 (61-number of 'NA') 61-3	16.55%
2	Workplace inspection.	$\underline{\text{Total number 'c' score}}$ X 40 = $\underline{175}$ X 40 (235-number of 'NA') 235-0	29.78%
3	Employee's interview.	$\underline{\text{Total number 'c' score}}$ X 20 = $\underline{130}$ X 20 (218-number of 'NA') 218-0	11.93%
		TOTAL SHASSIC SCORE	**58.26%**

Source: Researcher's Analysis (2020).

The total scores of the safety level in site 4 is 58.26%. Table 4.7 shows the contribution
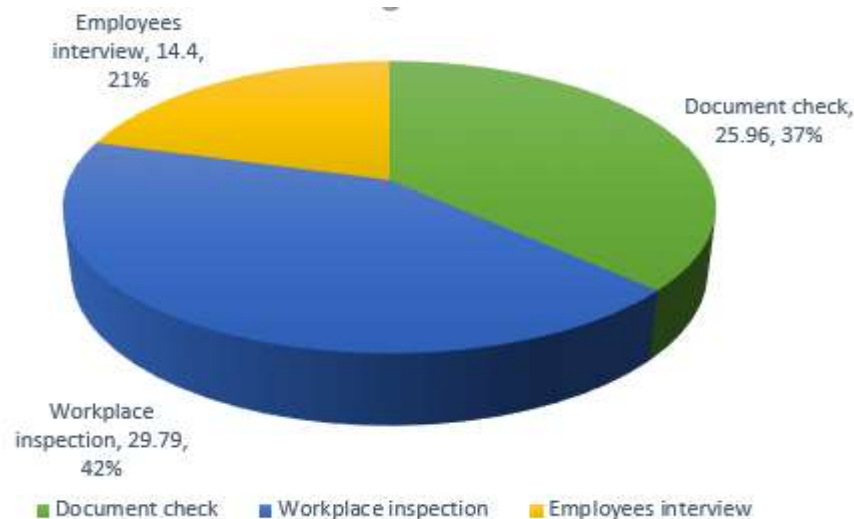
of each component to the total score.
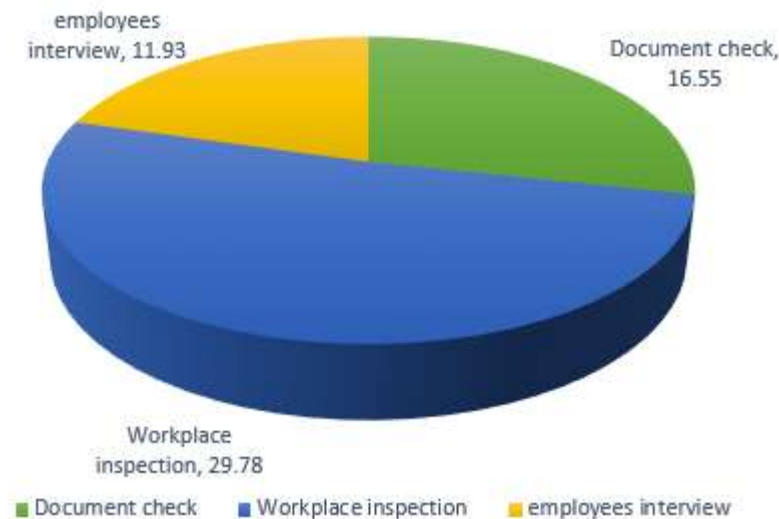
Figure 4.4 SHASSIC Result for site 4

Fig 4.4 shows the scores of the three components, document check 16.55% out of the 40%, workplace inspection score was 29.78% out of 40% and employees interview score was 11.93% out of 20%. The entire component shows a good score recorded for site 4.

A Document Check.

In this site, 61 questions on document checking were administered 3 of the questions were not applicable and the total score was 58. Using the SHASSIC, the site scored 29.96% out of 40% allocated to the document checking. This implies that documents that are needed for check are fairly managed at the site office.

B Workplace Inspection.

The workplace inspection has a total number of 235 questions. In the overall assessment of the workplace inspection the contractor scored 29.79% out of the 40% allocated to the workplace inspection. This implies that the site is managed as regard to the issue of its safety.

C Employee's Interview.

As regard to employee's interview, it has a total of 218 questions. In overall the contractor scored 11.93% out of the 20% allocated to employee's interview. This implies that H&S measures on the site is fairly understood, fairly communicated and fairly managed among the employees. This section is divided into 3 subsections i.e. management personnel interview, health and safety personnel or committee members and construction workers interview.

TABLE 4.8 Star Ranking for site 4

RANKING	DESCRIPTION
55 – 69 ***	H&S Measures are properly maintained and recorded but there exist few work risk activities ignored.

Source: Researcher's Analysis (2020).

SITE 5

CONTRACT SUM: N̶ 163Million

WORK PROGRESS: 68%

LOCATION: Abuja

TABLE 4.9 SHASSIC Analysis/Result.

NO	COMPONENT	WEIGHTAGE (%)	SCORES (%)
1	Document Check	Total number 'c' score X 40 = 23 X 40 (61-number of 'NA') 61-8	17.36%
2	Workplace inspection.	Total number 'c' score X 40 = 105 X 40 (235-number of 'NA') 235-5	18.26%
3	Employee's interview.	Total number 'c' score X 20 = 80 X 20 (218-number of 'NA') 218-0	7.34%
		TOTAL SHASSIC SCORE	**42.96%**

Source: Researcher's Analysis (2020).

The total scores of the safety level in site 5 is 42.96%. Table 4.9 shows the contribution of each component to the total score.

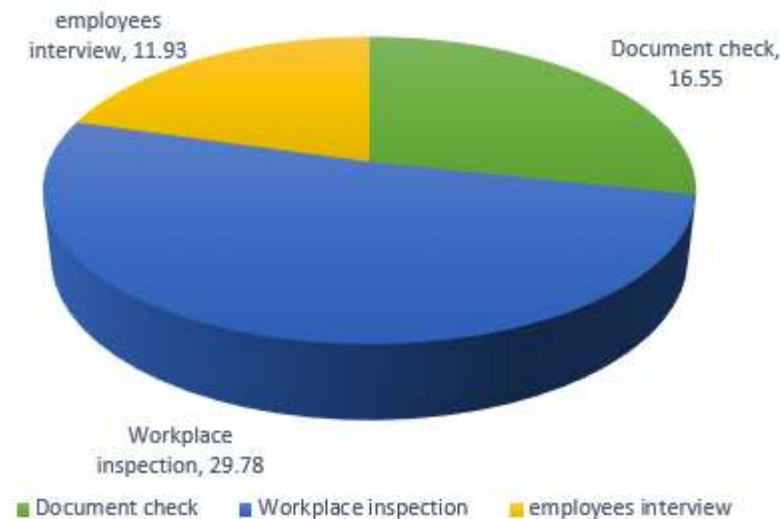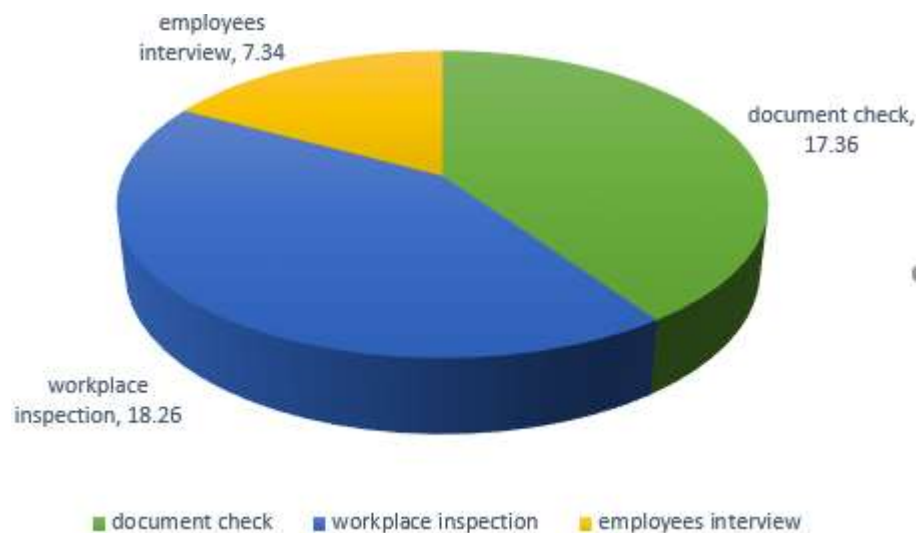**Figure 4.5 SHASSIC Result for site 5**

Fig 4.5 shows the scores of the three components, document check 17.36% out of the 40%, workplace inspection score was 18.26% out of 40% and employees interview score was 7.34% out of 20%. The entire component shows a poor score recorded for site 5.

A Document Check.

In this site, 61 questions on document checking were administered 8 of the questions were not applicable and the total score was 53. Using the SHASSIC, the site scored 17.36% out of 40% allocated to the document checking. This implies that documents that are needed for check are poorly managed at the site office.

B Workplace Inspection.

The workplace inspection has a total number of 235 questions 5 of which were not applicable with on the site giving a total score of 230. In the overall assessment of the workplace inspection the contractor scored 18.26% out of the 40% allocated to the workplace inspection. This implies that the site is poorly managed as regard to the issue of its safety.

C Employee's Interview.

As regard to employee's interview, it has a total of 218 questions. In overall the contractor scored 7.34% out of the 20% allocated to employee's interview. This implies that H&S measures on the site is poorly understood, poorly communicated and poorly managed

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among the employees. This section is divided into 3 subsections i.e management personnel interview, health and safety personnel or committee members and construction workers interview.

TABLE 4.10 Star Ranking for site 5

RANKING	DESCRIPTION
40 – 54 **	H&S Measures are properly maintained and recorded but there exist few work risk activities ignored.

Source: Researcher's Analysis (2020).

4.1.2 General review of the five (5) sites.

Table 4.11 Scores of the Five Sites.

Sites	Document check 40%	Workplace inspection 40%	Employees interview 20%
1	30.16%	39.15%	18.60%
2	25.96%	29.79%	14.40%
3	16.55%	29.79%	11.93%
4	16.55%	29.79%	11.93%
5	17.36%	18.26%	7.34%
Total	**106.58%**	**146.78%**	**64.20%**

Source: Researcher's Analysis (2020).

Table4.12 Analysis of the Five Sites.

$\dfrac{106.58 \times 40}{200}$	$\dfrac{146.78 \times 40}{200}$	$\dfrac{64.20 \times 20.}{100}$
=21.20%	=29.36%	=12.84%.

THERE FORE TOTAL SHASSIC = 63.40% (55 – 69). 3 – STAR IN RANKING.

Sources: Researcher's Assessment.

The total SHASSIC score of the five sites is 63.40% which is 3 star in ranking, which implies that, H&S Measures are maintained and recorded but there exist work risks activities ignored. The Figure 4.6 shows the contributions of the 3 basic components to the total SHASSIC as shown in Table 4.12.
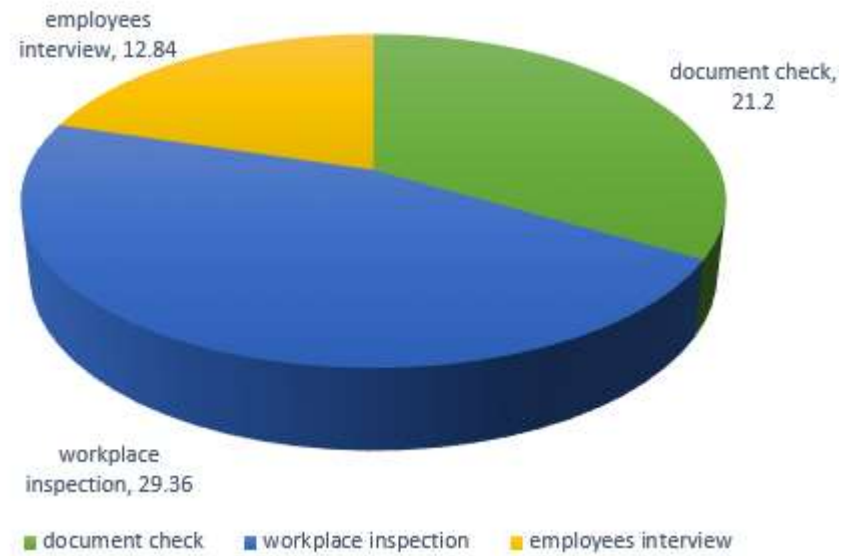
Figure 4.6 SHASSIC Result of the five (5) sites.

4.2 Relationship Between Cost of Implementing H&S Measures and Cost of Construction Projects.

4.2.1 Correlation Analysis

Correlation analysis was carried out in order to identify if the two variables that is cost of

H&S measures and cost of construction projects are related.

Table 4.13 below shows the correlation between Actual construction cost and Actual health and safety cost.

Table 4.13 Average actual construction cost (AVGACC) and Average budgeted health and safety cost (AVGAHSC).

Component	R	P
AVGACC	.796	.001
AVGAHSC	.796	.001

Source: Researcher's Analysis 2020

 List wise N =35

Where,

AVGACC   = Average Actual construction cost

AVGAHSC = Average Actual health and safety cost

The result shows a positive and strong relationship between the two variables. Given

that the Pearson's correlation (r) from table 4.13 is 0.796 while P< 0.001.

Findings revealed that construction sites with effective implementation of H&S measures have an improve safety working standards that protects both workers and workplace.

4.2.2 Regression Analysis

Regression analysis is an analytical tool that predicts relationship outcomes between variables from a predictor or several predictors. Thus, this study adopted the use of a simple linear regression due to the fact that it seeks to examine the effectiveness of cost of implementing H&S measures on the cost of construction projects. To determine the predictors, two variables exist: the dependent variable (the cost of construction projects) and the independent variable (cost of implementing H&S measures).

Regression modeling

A model was developed for this research work on the cost of implementing H&S measures and cost of construction projects: In the model the cost of construction projects stands as the dependent variable while the cost of implementing H&S measures was the independent variable. Below is The result of the simple linear regression analysis presented in Table 4.14

Table 4.14 Model Summary

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate
1	.796[a]	.781	.775	.12612

Source: Researcher's Analysis 2020

a. Predictor: (Constant), AVGAHSC

b. Dependent Variable: AVGACC

Table 4.14 shows that 78% (R^2 = 0.78) of the proportion of variation in the cost of implementing H&S measures is explained by the variation in construction projects cost. Given the R^2 adjusted = 0.77 revealed that the model explained 77% of the variation in the cost of construction projects within the population leaving 23% unexplained.

From the model discussed above, some of the explanation for the results can be deduced from literature findings that little or no emphasis is given to the cost of H&S during forecasting construction cost, this attitude of construction stakeholders that is contractors, subcontractors, project managers and clients, towards implementing H&S measures has also posed negative challenges in project executions with its multiplying negative impact on incurring additional cost in completing construction projects. And as such construction stakeholders should improve their level of implementing H&S measures through programmes like job training, and should also ensure full management participation in safety committee

etc., as construction firms with full and effective H&S measures implementation have reported and recorded operational efficiency benefits, reduction in the rate of accidents and injuries of which compensation are paid to victims which in turn has a positive impact in the final cost of construction projects. However, the relationship between cost of implementing H&S measures and cost of construction projects may not necessarily be linear entirely, there is need to find other regression techniques in other to check the amount of variation.

Described below is the relationship between the two variables of the model actual cost of H&S measures on actual cost of construction projects. The equation (1) abstracted from Table 4.15

AVGACC = 85962248.19 + 11.626 AVGAHSC

Table 4.15 Coefficient Analysis

<table>
<tr><td colspan="9" align="center">Coefficients^a</td></tr>
<tr><td rowspan="2">Model</td><td colspan="2">Unstandardized Coefficients</td><td>Standardized Coefficients</td><td rowspan="2">T</td><td rowspan="2">Sig.</td><td colspan="2">95.0% Confidence Interval for B</td></tr>
<tr><td>B</td><td>Std. Error</td><td>Beta</td><td>Lower Bound</td><td>Upper Bound</td></tr>
<tr><td>(Constant)</td><td>85962248.19</td><td>9257997.269</td><td></td><td>9.285</td><td>.000</td><td>67126711.12</td><td>104797785.3</td></tr>
<tr><td>1   AVGAHSC</td><td>11.626</td><td>1.071</td><td>.884</td><td>10.858</td><td>.000</td><td>9.447</td><td>13.804</td></tr>
</table>

Source: Researcher's Analysis 2020

a. Dependent Variable: AVGACC

AVGACC = 85962248.19 + 11.626 AVGAHSC

Shows the contribution of implementing H&S measures on the cost of construction projects, the result revealed a significant and strong relationship between cost of implementing H&S measures and cost of construction projects given that t value which is equal to 10.858 and $P < 0.005$. The technique ($t = 10.858$, $P < 0.005$) is a predictor of actual cost of construction projects and make a huge significant input to the model. Since the t-statistic is greater than 2 (rule of thumb) is a confirmation of the consistency of the proposed model. The t-test determined whether each β differ significantly or not. β value has an associated standard error which is used to determine whether or not the β value is significantly differ from 0.000. The t – test correlated with β value is significant at $0.005 > P$ meaning that the predictor contributes significantly to the proposed ideal. Field, (2005) stated that the significant value is greatly affected by the contribution of the predictor. The cost of implementing H&S measures has an impact on the cost of construction projects from the degree of the t – statistic. As $P<0.005$, F-statistic indicate that the model has a high statistical significance level as shown in table 4.15.

The Table 4.15 specifies further that the independent variable accounts well for the variation in the level of implementing health and safety measures. The positive β of 11.626 confirms the positive relationship between actual cost of implementing health and safety measures and actual cost of construction projects. This result implies that implementing health and safety measures doesn't increase the cost of construction projects.

Table4.16 Analysis of Variance (ANOVA)

	Model	Sum of Squares	Df	Mean Square	F	Sig.
			ANOVA[a]			
1	Regression	1.876	1	1.876	117.892	.000[b]
	Residual	5.250	33	1.591		
	Total	2.400	34			

Source: Researcher's Analysis 2020

[a]. Dependent Variable: AVGACC

b. Constant: AVGAHSC

Table 4.16 i.e. the ANOVA revealed the significance of the model as a useful predictor of efficient H&S measures with $F_{Calculated} = 117.892$ and $P < 0.005$ which implies that the model contributed significantly in predicting the benefits of implementing health and safety measures in construction projects. The comparison of existing large residual sum of squares to regression sum of squares show that the model does not explain actual variations in the dependent variable. This could be attributed to other variables in the independent variable that are not present in the model.

Testing the assumption of regression

Regression assumption was provided by the SPSS output, on cost of implementing H&S measures on construction projects cost, and the Figure 4.7 shown:
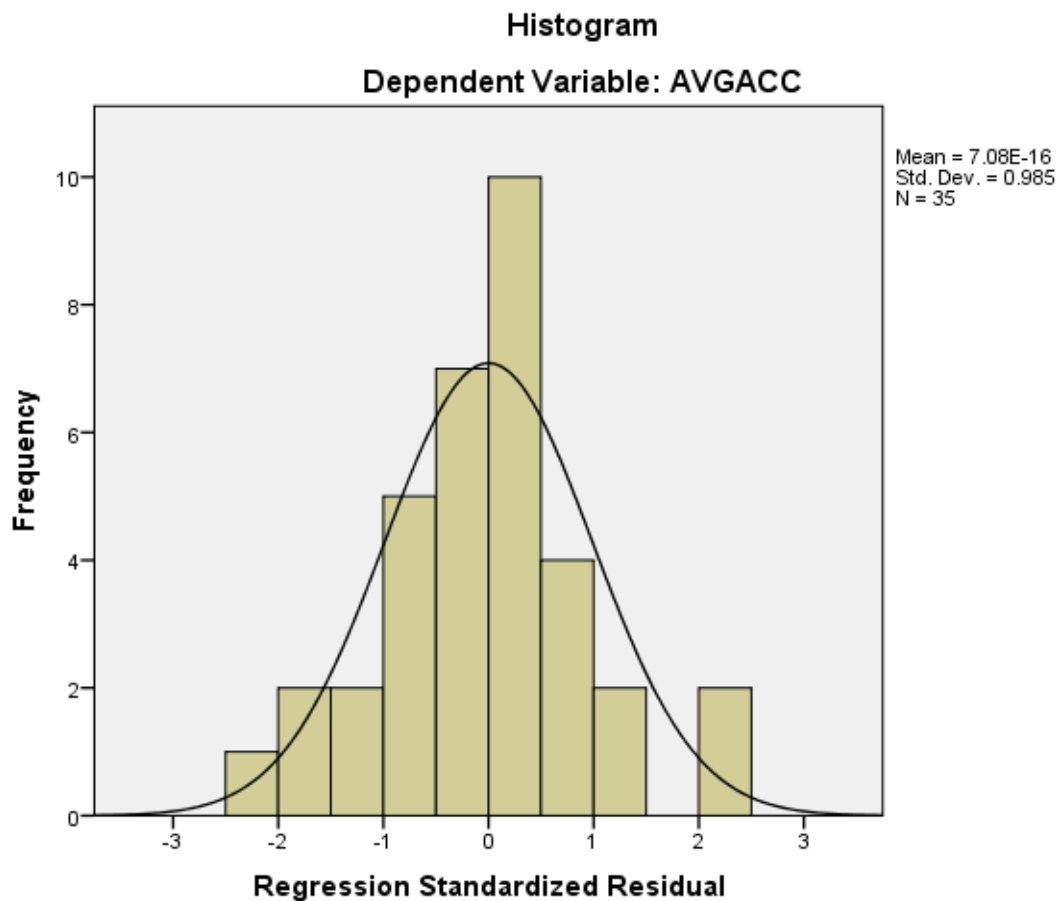
Figure 4.7 histogram for Normal Probability Plot of Regression Standardized residual actual cost of construction projects

In testing for normality assumption, histograms were used. A bell-shaped and the curve drawn on the histogram show the shape of the distribution and also reveals a normal distribution. According to Field, (2008) that little deviation from the curve is signifying abnormality, the greater the deviation the more non-normality distributed the residuals are. Therefore, Figure 4.7 above reveals a normal distribution and as such the assumption of the normality has not been violated.

The normal probability plot of actual cost of construction projects shown in Figure 4.8 respectively.
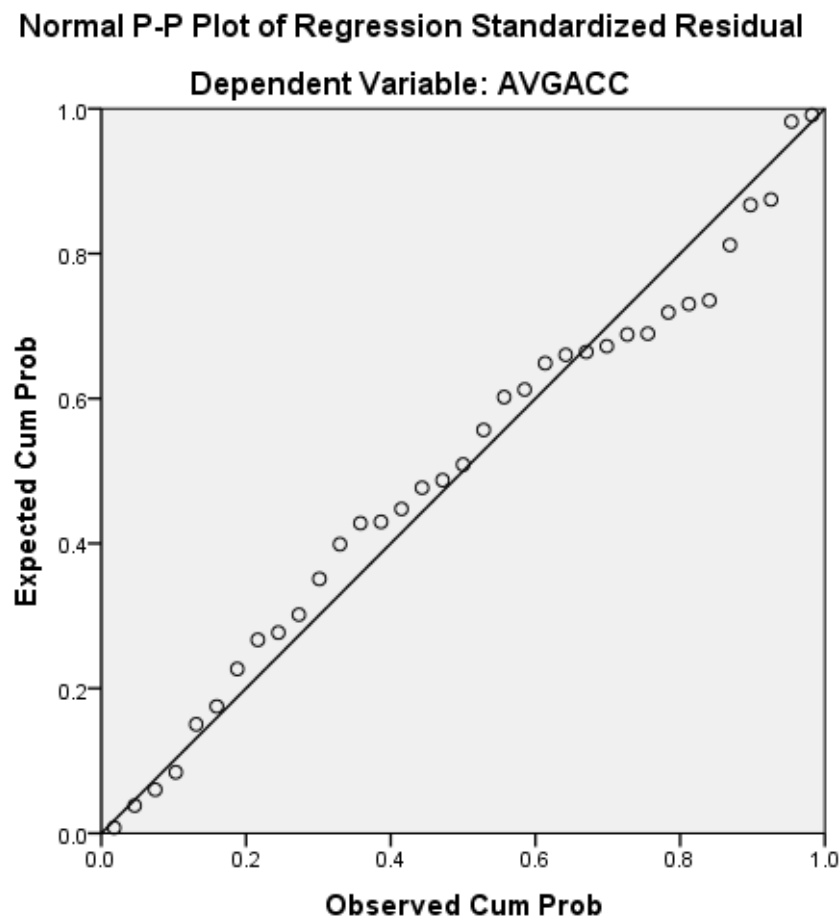
Figure 4. 8 Normal Probability Plot of Regression Standardized residual for actual cost of construction projects

A normal distribution is represented by the straight line in the plot and the point represent the residual error observed, all the points lies on the line in a perfect normally distributed

data (Field, 2008). From Figure 4.8 all the points lied closely to the straight line which is indicating that the residuals are approximately normally distributed.

4.2.3   Summary of Correlation and Regression Analysis

The cost of implementing H&S measures on the cost of construction projects was determined through correlation and regression analysis.

From the result of correlation analysis, it was found out that the cost of implementing H&S measures is significantly related to the cost of construction projects. Also the result of regression analysis revealed that the cost of construction projects is to some extent influenced by the cost of implementing H&S measures. Also the regression analysis also revealed that implementing H&S measures in construction projects reduces the rate of accidents, injuries and fatalities of which compensations are paid to victims and helps to keep the workers and workplace safe and free from danger. The result also signified that the implementation of health and safety measures in construction projects remains one of the important criteria to which successful projects delivery can be determined (Ibrahim, 2015). However, Haefeli *et al.* (2005) acknowledged that H&S failures might ultimately impact negatively on the financial performance of an organisation and as such implementing of H&S measures is aimed at reducing or eliminating accidents in construction and protecting workers and the work place from danger.

The findings of this research has provided a basic challenge that the absence or lack of implementing health and safety measures in construction projects is responsible for most accidents on construction site. As such there is need for the construction stakeholders effectively implement health and safety measures in construction projects.

4.3   Validation of Cost of Implementing Health and Safety Measures Model

For a model to be highly standard, the mode of it validation should produce valuable and applicable significance from notable specialists. Table 4.17 shows the response. The model gained the support of the majority of the respondents implying that the model has

a positive impact in a construction project. In responding as professionals in the field of

H&S construction company, findings revealed valid implementation of H&S measures in

the cost of construction projects.

Safety Practitioners Response Analysis

Table show the summary of response of the 12 respondents.

Table 4.17 Response summary from Experts

Validation criteria	Expert Response											
	1	2	3	4	5	6	7	8	9	10	11	12
Implementing H&S measures increases the cost of construction projects.	Not	Not	Not	Not	Not	Yes	Not	Not	Yes	Not	Not	Yes
Implementing H&S measures has a positive influence on cost of construction projects.	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
The model demonstrates a benefit on accident prevention, reducing no of casualties and injuries.	Yes of benefit	Yes highly of benefit	No benefit	Yes of benefit	Yes highly of benefit	No benefit	Yes of benefit	Yes of benefit	No benefit	Yes of benefit	No benefit	Yes highly of benefit
The model demonstrates a benefit of improving both worker's and work place safety.	No benefit	Of benefit	Of benefit	Yes of benefit	Yes	Of benefit	Yes	Of benefit	No benefit	Yes of benefit	No benefit	No

The model is capable of assisting construction shareholders in decision making.	Yes highly capable	Not capable	Yes but not sure of it capability	No not capable	Yes capable	Yes capable	Yes capable	Yes capable	Yes but not sure of it capability	Yes capable	Yes capable	No not capable
The model is clear, easy and simple to understand.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
General description of the model.	Adequate	Adequate	Poor	Not Adequate	Adequate	Adequate	Adequate	Poor	Adequate	poor	Adequate	Adequate

Source: Researcher's Analysis (2020).

Majority of the respondents supported the model which implies that the model has a positive influence to the theme of implementing H&S measures in construction projects. In reaction as professionals in the field of construction H&S in the construction industry, findings revealed that the ''*model demonstrates a benefit on accident prevention and reducing number of casualties and injuries on construction sites''*.

In other to identify whether the model shows a benefit of improving both workers and work place safety, the respondents proved it to be of benefit. The respondents also confirmed that the model has the ability to aid construction stakeholder in making decision.

The model is confirmed to be simple, clear and easy to understand by almost all the respondent. '*'One of the respondent stated that the ideal appears in its simple and logical way''*. Other respondents affirmed that '*'the model contains the needed variables and is apparent and also very easy to understand''*. And with respect to it comprehensiveness most of the respondents agreed that it is sufficient and comprehensive affirming that *''it contains the valuable variables''*.

. **4.4   Discussion of Findings**

The study was aimed at assessing the cost of implementing H&S measures in construction projects. The objectives were to examine the level of implementing H&S measures among contractors in construction projects in Abuja, to determine the relationship between the cost of implementing H&S measures and cost of construction projects and to validate the relationship between cost of implementing H&S measures as a predictor of cost of construction projects. Findings revealed that:

1)   The total SHASSIC score of the five sites visited is 63.40% which is a 3-star ranking, which implies that, H&S Measures are documented and managed but there are still a few medium risks work activities that are neglected.

2)   The Pearson's correlation (r) is 0.796 and $P < 0.001$. The Pearson's correlation result implies a positive, strong and highly significant relationship between the two variables. Actual construction cost and actual H&S cost. This means that as actual construction cost increases there is a corresponding increase also to the actual cost of H&S.

3)   The regression analysis of the dependent variable against the independent variables from table 4.14 shows that 78% (R^2 = 0.78) of the proportion of variation in the cost of construction projects is explained by the variation on the cost of implementing H&S measures. The adjusted R^2 is 0.77 which implies that the model explains 77% of the variation in the cost of construction projects within the population with 23% unexplained.

4)   For a model to acquire a satisfactory level, the method of it validation should produce relevant and useful information from ideal specialists. The summary

of response of the 12 respondents is shown in table 4.17 with majority of the respondents showing their support of the model which denotes a positive contribution by the model to the course of implementing H&S measures in construction projects.

CHAPTER FIVE

5.0   CONCLUSION AND RECOMMENDATIONS

5.1   Conclusion

The importance of H&S in construction cannot be over emphasized. Providing a very safe work environment has been reiterated by various researchers; violation of which has a negative and compounding effect on the organisation overall productivity and performance. H&S measures implementation in construction projects remains one of the important recipe to which successful projects delivery can be determined. From the findings of this research, the conclusion reached is that little or no emphasis is given to the cost of H&S during forecasting the construction cost and as such have negative financial implications on the performance of an organisation.

Deductions from the findings of this research also revealed that the cost of implementing H&S measures has significant effect on the cost of construction project, and as such the study concludes that the construction stakeholders need to effectively implement health and safety measures in construction projects.

Conclusions drawn from the view of professionals revealed that, the model is a viable tool as it information will help construction stakeholders and those engaged in construction activities. It will serve as a guide to aid them on H&S decision making, decrease the number of injuries recorded on sites as a result of accidents and will also make available useful information for H&S cost construction forecasting.

2.6   Recommendations

Based on the results and conclusions reached, the following recommendations are made:

1. Effective awareness to H&S measures is useful to improve the level of it

   implementation on construction site.

2. Construction site accidents can be minimized when the implementation of H&S measures is given adequate priority.

3. **H&S measures should be included as part of project performance criteria and should also be one of the criteria for awarding construction projects to suitable contractors.**

5.3 Areas for Further Studies

From the findings of this research, the study recommends that future research should be undertaken in other areas within Nigeria since this study was limited to only construction firms and sites in Abuja as there may be differences in findings.

5.4 Contribution to Knowledge

Construction works are getting more complex and sophisticated this study has contributed in highlighting the importance of safety as a priority to all. This study will serve as a reference material for researchers that will like to carry out similar research in this area, and has made available useful information for both H&S and construction cost forecasting.

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APPENDICES

APPENDIX A

Department of Quantity Surveying,

School of Environmental Technology,

Federal University of Technology Minna,

Niger State, Nigeria.

Dear respondent,

This questionnaire is to elicit information for a master of technology (M. TECH) research project at Federal University of Technology, Minna, Nigeria. It is designed to obtain relevant information on the status of implementing health and safety measures among construction contractors in Abuja, it is part of my study titled **COST OF IMPLEMENTING HEALTH AND SAFETY MEASURES ON CONSTRUCTION PROJECTS IN ABUJA, NIGERIA.**

It will be highly appreciated, if you can provide necessary information with utmost clarity and sincerity. You are also assured of the **CONFIDENTIALITY** of the information provided and will be used strictly for academic purpose. The questionnaire consists of 3 parts. Please read the instruction carefully and answer all questions.

Yours faithfully,
KHAIRAT HASSAN MAMMAN,
Department of Quantity Surveying,
FUT Minna.

Part A: Background Details.

Gender------------------

Educational qualification--

 Number of years with the company--

Part B. Construction Safety and Health Measures.

SHASSIC CHECKLIST – DOCUMENT CHECK

Item	Checklist	C	NC	NA	Remarks.
A	**OSH POLICY**				
1	Whether there is a written corporate or project OSH policy statement.				
2	Check whether the OSH policy is signed by the current CEO, MD, PD or PM.				
3	Check whether the OSH policy is Visibly displayed.				
4	Check whether the OSH policy is dated or not.				
B	**OSH ORGANIZATION.**				
1	The OSH responsibilities are clearly stated for all levels.				
2	The OSH responsibilities are effectively communicated to all levels.				
3	The workplace SHC is established.				
4	The committee composition is as per the provision of the statutory requirement.				
5	The members of the committee are officially appointed.				
6	Regular meeting of minimum one in every three month is held.				
7	The SHC minute of the meetings are safely retained.				
8	The SHC caring out site inspection minimum one in three months.				
9	There is a competent CSHO appointed.				
10	There is a site safety supervisor appointed.				
11	Designated person are assigned for respective work or job.				
C	**HIRARC**				
1	The HIRARC procedure is available.				
2	The HIRARC cover all work activities.				
3	The HIRARC are continuously updated and maintained.				

Item	Checklist	C	NC	NA	Remarks.
4	The workplace SHC is involved in the development of HIRARC.				
D	**TRAINING AND PROMOTION**				
1	The availability of OSH training program.				
2	There is OSH induction training conducted.				
3	Safe work practices incorporated in the site OSH training program.				
4	The tool Box meetings conducted regularly.				
5	The promotion of OSH by audio and video is being practiced.				
6	There is safety and health campaign held by management.				
7	The work place SHC is involved as the key player in OSH promotion program.				
8	The OSH competition and incentive are considered as one of the tools in OSH promotional activities.				
E	**MACHINERY MANAGEMENT.**				
1	The availability of valid certificate of fitness.				
2	The operators are adequately trained				
3	The schedule inspection of machineries and equipment is conducted.				
4	The machinery and equipment servicing and maintenance records available.				
5	The owner/operation manual or specification are kept.				
6	The safety operation procedures (SOP) available.				
7	The competency certificates for crane operators are available.				

Item	Checklist	C	NC	NA	Remarks.
F	**MATERIAL MANAGEMENT**				
1	The availability Materials Register List.				
3	The availability of MSDS				
4	The availability of Material Safe Handling, Storages and Transportation Procedure.				
5	Availability of waste management procedures.				
G	**EMERGENCY RESPONSE PLAN (ERP)**				
1	The availability of ERP.				
2	The availability of Fire prevention and protection plan.				

Item	Checklist	C	NC	NA	Remarks.
3	The availability of Emergency Recovery Plan.				
H	**ACCIDENT INVESTIGATION AND REPORTING.**				
1	The availability of accident investigation and reporting procedure.				
2	The responsibilities of those involved in accident investigation and reporting are clearly stated.				
3	The team has been trained for accident investigation and reporting.				
4	The accident investigation was performed by a competent team or person.				
5	All accident investigations are carried out and documented.				
6	The recommended corrective and preventive measures are implemented accordingly				
7	All kinds of incidents are reported and recorded accordingly.				
8	All reported incidents are accordingly reported to the nearest Department of Occupational Safety and Health (DOSH) under ministry of labour and productivity by the fastest means available.				

Item	Checklist	C	NC	NA	Remarks.
I	**RECORD MANAGEMENT AND PERFORMANCE MONITORING.**				
1	There is a written OSH Record Management Procedure available.				
2	A responsible person is assigned to managed OSH records and documentations.				
3	There is a master register/list of current OSH related records available and maintained at site and office.				
4	The relevant OSH records are maintained.				
5	The circulation and movement of these records are controlled by responsible person.				
6	The OSH records are securely stored.				
7	The OSH records such as HIRARC records, audit reports, workplace inspection reports, safe work procedures/instructions, minutes of meeting, machinery's manufacturer – fitness certificate; corrective actions register etc. are easily accessible.				

8	The OSH Performance Measurement Monitoring Procedure established and maintained.																		
9	The Performance Measurement Monitoring Report and Findings are Reviewed by Senior Management.																		

F	**HOUSEKEEPING.**																			
1	Site cleanliness																			
2	Materials arrangement orderly.																			
3	Rubbish bins																			
G	**ILLUMINATION/LIGHTING**																			
1	Adequate lightning at work place																			
2	Adequate lightning in the construction site office																			
H	**FIRE PROTECTION**																			
1	Portable fire extinguisher																			
2	Dry riser																			

SHASSIC CHECKLIST -WORK PLACE INSPECTION

ITEM	CHECKLIST	LOCATION/AREA 1			LOCATION/AREA 2			LOCATION/AREA 3			LOCATION/AREA 4			LOCATION/AREA 5			REMARKS
		C	NC	NA	C	NC	NA	C	NC	NA	C	NC	NA	C	NC	NA	
A	MACHINERY																
1	Fitness certificate (PMA)																
2	Condition of machinery																
B	SCAFFOLD																
1	Sitting on firm ground																
2	Horizontal braces																
3	Diagonal braces																
4	Cross braces																
5	Wall ties																
6	Access.																
7	Stepladder hand railings																
8	Catwalk/ working platform																
9	Toe board																
10	Scaffold tag																
11	Condition of scaffold.																

C	SIGNAGES COLOUR CODE																
1	Mandatory.																
2	Prohibition.																
3	Warning.																

4	Safe.	
D	**NOTICES**	
1	ER Safe escape route	
2	Assembly point	
3	Emergency contact numbers	
4	Project sign board	
E	**VENTILATION**	
1	Adequate ventilation at work site	
2	Adequate ventilation in the construction site office	
F	**HOUSEKEEPING.**	
1	Site cleanliness	
2	Materials arrangement orderly.	
3	Rubbish bins	
G	**ILLUMINATION/LIGHTING**	
1	Adequate lightning at work site	
2	Adequate lightning in the construction site office	
H	**FIRE PROTECTION**	
1	Portable fire extinguisher	
2	Dry riser	

I	**PERSONAL PROTECTIVE EQUIPMENTS.**	
1	Safety hard hat/safety helmet.	
2	Safety foot gears	
3	Hand protection/hand gloves	
4	Eye protection such as safety glasses/goggle	
5	Falls arresters	
6	Face shield	
7	Hearing protection	
8	Respirator.	
9	Dust mask.	
J	**BARRICADES FOR HAZARD AREAS.**	
1	Floor/wall opening	
2	Edges.	
3	Trench/pits	
K	**ACCESS/EGRESS** (free from obstruction)	
L	**SUITABLE WORKING TOOLS/EQUIPMENTS.**	

M	ELECTRICAL SAFETY																
1	Unsafe act																
2	Unsafe condition																
N	PREVENTION OF FALLING OBJECTS.																
1	Catch platform																

SHASSIC CHECKLIST - EMPLOYEE'S INTERVIEW

Category A (Management Personnel)

ITEM	QUESTIONNAIRES	MANAGEMENT		REMARKS
A	POLICY			
1	Do you know what OSH policy statement is?			
2	What OSH management system do your organization use?			
B	OSH ORGANIZATION			
1	Who is the Secretary of the workplace SHC?			
C	HIRARC			
1	What do you know about HIRARC?			
2	Have you ever got involved in HIRARC exercise?			
3	What are the most hazardous activities in this project?			
D	TRAINING AND PROMOTION			
1	Have you attended any formal safety training?			
E	**EMERGENCY PREPAREDNESS**			
1	What is Emergency Response Plan?			
	TOTAL SCORE.			

Category B (Safety and Health Personnel or Safety and Health Committee Members)

ITEM	QUESTIONNAIRES	EMPLOYEES 1			EMPLOYEES 2			EMPLOYEES 3			REMARKS .
		C	NC	NA	C	NC	NA	C	NC	NA	
A	OSH POLICY										
1	Who signed the OSH Policy?										
B	OSH ORGANIZATION.										
1	How often is the SHC meeting conducted?										
2	Who is the Chairman of the Committee?										
C	TRAINING AND PROMOTION										
1	Have you attended SHO Training?										
2	Have you attended Site Safety Supervisor Training?										
D	EMERGENCY PREPAREDNESS										
1	Have you received you training on emergency response at this site?										
	TOTAL SCORE										

Employees interview (continue)

ITEM	QUESTIONNAIRES	EMPLOYEE 1			EMPLOYEE 2			EMPLOYEE 3			EMPLOYEE 4			EMPLOYEE 5			REMARKS
		C	NC	NA	C	NC	NA	C	NC	NA	C	NC	NA	C	NC	NA	
A	**OSH POLICY**																
1	Have you seen one? Where?																
2	Do you understand the content of the policy?																
B	**OSH ORGANIZATION**																
1	Do you know who a safety and health officer is?																
2	If you face any OSH problem, who would you refer to?																
3	Have you ever heard about workplace SHC?																
4	How often does your safety and health officer visit the site?																
5	Can you identify your safety officer/supervisor?																
6	Are you aware of your OSH responsibility?																

Category C, (Construction Workers) (Continue)

C	HIRARC																	
1	What is/are you work potential hazard?																	
2	How to address the potential hazards?																	
D	**TRAINING AND PROMOTION**																	
1	Have you undergone specific workplace induction course e.g ISPON?																	
2	Have you ever attended tool box meeting?																	
3	Have you participated in any safety campaign?																	
E	**MACHINERY AND EQUIPMENT**																	
1	Are you the competent operator with license to operate this machinery/equipment/vehicle?																	
2	Have you received training on this machinery operation that you are operating with?																	
3	Is there safety checklist for you to complete prior to operate the machinery?																	
F	**MATERIAL MANAGEMENT**																	
1	Do you know what hazardous and non-hazardous substances are?																	
2	Do you know what is MSDS																	
G	**EMERGENCY PREPAREDNESS**																	
1	Have you undergone any emergency drill?																	
2	Do you know what to do during an emergency?																	
3	Can you show me where the assembly point is?																	
4	Can you identify your First Aider?																	

5	Can you show me the nearest First Aid Box.															
6	Do you know the emergency contact numbers?															
7	Where is the nearest Fire Extinguisher?															
H	**MATERIAL MANAGEMENT**															
1	Do you know what hazardous and non-hazardous substances are?															
2	Do you know what is MSDS															
I	**EMERGENCY PREPAREDNESS**															
1	Have you undergone any emergency drill?															
2	Do you know what to do during an emergency?															
3	Can you show me where the assembly point is?															
4	Can you identify your First Aider?															
5	Can you show me the nearest First Aid Box.															
6	Do you know the emergency contact numbers?															
7	Where is the nearest Fire Extinguisher?															
J	**ACCIDENT INVESTIGATION AND REPORTING.**															
1	What are you supposed to do in the event of an accident?															
2	What would you do if you witness somebody is injured?															
	TOTAL SCORE															

Department of Quantity Surveying,

School of Environmental Technology,

Federal University of Technology Minna,

Niger State, Nigeria.

Dear respondent,

This questionnaire is to elicit information for a master of technology (M. TECH) research project at Federal University of Technology, Minna, Nigeria. It is designed to obtain relevant information on the ''Validation of Cost of Implementing Health and Safety Measures Model'', it is part of my study titled **COST OF IMPLEMENTING HEALTH AND SAFETY MEASURES ON CONSTRUCTION PROJECTS IN ABUJA, NIGERIA.**

It will be highly appreciated, if you can provide necessary information with utmost clarity and sincerity. You are also assured of the **CONFIDENTIALITY** of the information provided and will be used strictly for academic purpose. The questionnaire consists of 3 parts. Please read the instruction carefully and answer all questions.

Yours faithfully,
KHAIRAT HASSAN MAMMAN,
Department of Quantity Surveying,
FUT Minna.

The following are the validation criteria of the model of cost of implementing H&S measure, please fill accordingly.

S/N	VALIDATION CRITERIA			
1	Implementing H&S measures increases the cost of construction projects?			
2	Implementing H&S measures has a positive influence on cost of construction projects?			
3	The model demonstrates a benefit on accident prevention, reducing of casualties and injuries?			
4	The model demonstrates a benefit of improving both workers and workplace safety?			
5	The model is capable of assisting construction stakeholders in decision making?			
6	The model is simple, clear and easy to understand?			
7	What is the general description of the model?			

APPENDIX C

```
COMPUTE AVGBCC=(BCC1 + BBC2 + BCC3 + BCC4 + BCC5) / 5.
EXECUTE.
COMPUTE AVGBHS=(BHS1 + BHS2 + BHS3 + BHS4 + BHS5) / 5.
EXECUTE.
COMPUTE AVGACC=(ACC1 + ACC2 + ACC3 + ACC4 + ACC5) / 5.
EXECUTE.
COMPUTE AVGAHSC=(AHSC1 + AHSC2 + AHSC3 + AHSC4 + AHSC5) / 5.
EXECUTE.
REGRESSION
/DESCRIPTIVES MEAN STDDEV CORR SIG N
/MISSING LISTWISE
/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT AVGACC
/METHOD=ENTER AVGAHSC
/RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID).
```

Descriptive Statistics

	Mean	Std. Deviation	N
AVGACC	183782171.4286	26571205.49136	35
AVGAHSC	8414171.4286	2020246.77418	35

Correlations

		AVGACC	AVGAHSC
Pearson Correlation	AVGACC	1.000	.884
	AVGAHSC	.884	1.000
Sig. (1-tailed)	AVGACC	.	.000
	AVGAHSC	.000	.
N	AVGACC	35	35
	AVGAHSC	35	35

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	AVGAHSC[b]	.	Enter

a. Dependent Variable: AVGACC

b. All requested variables entered.

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	AVGAHSC
1	1	1.973	1.000	.01	.01
	2	.027	8.568	.99	.99

a. Dependent Variable: AVGACC

Residuals Statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	145717920.0000	247558304.0000	183782171.4286	23486612.56158	35
Residual	-30619390.00000	29940216.00000	.00000	12426101.22469	35
Std. Predicted Value	-1.621	2.715	.000	1.000	35
Std. Residual	-2.428	2.374	.000	.985	35

a. Dependent Variable: AVGACC