AN INVESTIGATION INTO THE FACTORS AFFECTING THE IMPLEMENTATION OF HEALTH AND SAFETY MANAGEMENT PRACTICES BY CONTRACTORS IN NIGERIA

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DECLARATION

I certify that this work has not been accepted in substance for any degree and is not concurrently being submitted for any degree other than that of Doctor of Philosophy being studied at the University of the West of England. I also declare that the wok is the result of my own investigations and no other person except where otherwise identified by references and that I have not plagiarised the work of other people.

Signature…………………………………

Date……12TH of May 2020.

ABSTRACT

Despite the changes in legislation and advances towards an integrated project-wide approach, health and safety (H&S) management practices in the construction industry is still a major problem in Nigeria, like in most developing countries. H&S management practices positively influence the working conditions and employee's attitude, as well as their morale and performance, thereby reducing accidents and fatalities in the workplace. This research investigates the internal and external factors affecting the implementation of H&S practices in the Nigerian construction industry.

A detailed review of literature on H&S management practice within both the developed and developing countries was conducted. The review established that H&S management practice in developing countries like Nigeria is low, and it gave preliminary indication that the following factors could be responsible: lack of top management awareness, involvement and commitment to H&S management practice, non-enforcement of H&S legislation, and lack of dedicated budget to H&S management. This provided a premise for further empirical investigation with focus on how to ameliorate the inadequate H&S management practices in the Nigerian construction industry.

An initial conceptual framework was designed and further refined to develop an instrument to collect and analyse necessary data, to determine the factors affecting implementation of H&S management by contractors in Nigeria. Quantitative analysis was adopted for the data analysis, while an Expert Survey was conducted for validation. A total of 550 self-administered questionnaires were distributed with 350 valid responses, giving a response rate of 63.6%. The target population included Director or Manager of companies, Project Managers, Supervisors and other related professionals in the construction industry. The respondent's distribution was as follows: Company Managers and Project Managers, 16.6% and 15.4% respectively; Supervisors, such as construction managers and site engineers, 12.9% and 12.6% respectively; Other professionals such as Architects, 3.7%.

The study revealed that while H&S management practices is important in Nigeria construction industry, the actual practice of it is low, and the rate of accidents is very high. The frequency of the implementation factors showed values lower than 70% which is the minimum limit for high performance. Results on Policy review showed 37.4 to 58.6%, Organisation 49.1 to 62.6%, Risk Assessment 51.4 to 58.9%, Planning 43.7 to 58.9%, Implementation 42.6 to 55.7%, Performance review 38.3 to 43.4% and Auditing 44.0 to 60.0%. Accident related indices of noncompliance and carelessness showed 41% and 39% for lack of adequate knowledge of H&S technique. Low advocacy, attitude and behavior among workers was precipitated by lack of H&S management practices awareness on the 93.3% active decision makers in the construction industry. Inadequacy of government intervention and budgeting for H&S showed an underreporting of 22%, 62% and 10% in company category registration, turn over and accident rate respectively. The validation result showed a strong relationship between implementation of H&S management practice and wide range of both internal and external factors in the Nigeria construction industry.

The study developed a framework for implementation of H&S management practices in the Nigerian construction industry. A template for the development of a national policy towards addressing the inadequate level of H&S management practices in the Nigeria construction industry was developed.

Keywords: Health and Safety, Implementation, Nigeria Contractor, Management System and Management practice.

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LIST OF ABBREVIATION

H&S	Health and Safety
OHS	Occupational Health and Safety
UK	United Kingdom
HSMP	Health and Safety Management Practice
GNP	Gross National Products
GDP	Gross Development Products
CAN	Construction Association of Nigeria
NSE	Nigeria Society of Engineers
COREN	Council for Registered Engineers of Nigeria
NIOB	Nigeria Institute of Building
NIQS	Nigeria Institute of Quantities Surveyors
NIA	Nigeria Institute of Architecture
NIM	Nigeria Institute of Managements
NITP	Nigeria Institute of Town Planning
FCT	Federal Capital Territory
WHO	World Health Organization
CCECC	China Civil Engineering Construction Corporation
ILO	International Labor Organization
HSMS	Health and Safety Management Service
PPCE	Personal Protective Clothing and Equipment
PDCA	Plan-Do-Check-Act
OECD	
SMEs	Small and Medium Enterprises
SMS	

USA	Safety Management System
MDGs	United State of America
D&S	Millennium Development Goals
PPE	Dantata Sawoe
HSE	Personal Protective Equipment
LTIs	Health and Safety Executives
CDCP	Lead Time Indicators
	Centre for Disease Control and Prevention

CHAPTER 1: INTRODUCTION

1.0 INTRODUCTION

The construction industry has long been connected to the development of nations and citizens, including Nigeria. The contribution of the Nigeria construction industry to economic development has continued to grow. Omole (2000) and Osofisan (2007) noted that it contributes an average of 5 percent to the annual gross domestic product and an average of about one-third of the total fixed capital investment. Danwata (2017) noted that the Nigeria construction industry contributes about 16% of the GDP, employs approximately 25% of Nigeria's workforce and produces approximately 70% of the nation's fixed capital formations. This workforce comprises construction trade units under a contractor and other professionals in the construction industry in Nigeria. Therefore, there is the need to practice Health and Safety management in order to achieve safe construction delivery, further giving rise to the need to investigate the factors affecting the implementation of Health and Safety management practice by contractors in the Nigerian construction industry.

This research is presented in nine chapters covering various aspects of the work. This chapter presents the research background, research questions and overall research aims and objectives. It also discusses the significance of the study, overall research process, the structure of the thesis and research methodology.

Various significant attributes have been identified within the Nigerian construction industry. Glossop (2008), Gardner (2017) and Ayieko (2017) have noted that housing is very important to economic development as it enhances economic performance, while Adeagbo (2014) affirmed that, in Nigeria, the construction industry has been known to provide employment for different categories of citizens, especially in major Nigerian cities where construction activities have been immense. Nevertheless, Omole (2000) and Adeagbo (2014) have noted that the Nigerian construction industry has not been able to ascend to the level of other developing nations such as Asian countries and has been found to be far under-performing in comparison to construction industries from developed economics such as the United Kingdom. According to Enhassi *et al.,* (2008) and Oxford Busi[ness Group (2019), also, the construction industry in many developing countries such as Nigeria has been found to underperform when compared to that of developed countries such as the UK.

The Nigerian construction industry has been characterized by poor performance and productivity (Ifeanyi, 2010; Ihua-Maduenyi, 2019). Osofisan (2007) criticised the Nigerian construction industry for being one of the slowest to integrate technological advancement and best practice. Among the areas of such poor performance is health and safety practices within the industry. More so, poor performance of the Nigerian construction industry as a whole has also been attributed to the prevalence of challenges such as poor health and safety management which has led to loss of manpower, productivity and sometimes lives (Al-Kilani, 2011; Umeokafor *et al.,* 2014; Okoye and Okolie, 2014; Ihua-Maduenyi, 2019). Ofori (2000) and Kawuwa *et al.,* (2018) noted that the challenges in the construction sector are a common phenomenon globally but seem to be higher among developing countries because of high level of socio-economic stress and a lower productivity rate that exist in the developing countries than in the developed countries.

According to Alli (2008), occupational safety and health (OSH) refers to the science of anticipation, recognition, evaluation and control of hazards emanating from the workplace that could harm the health and well-being of workers, considering the possible impact on the surrounding communities and the general environment. The health and safety performance of Nigeria's construction industry remains a glaring challenge in her

attempts to tackle the developmental initiative (Okoye and Okolie, 2014). This challenge has raised issues among stakeholders of the Nigeria construction industry, thus the need for this study. To this end, this present study will ascertain the level of implementation of health and safety management practices and highlight some of the factors and the various challenges facing the improvement of health and safety issues in the Nigeria construction industry and thus offering some strategies for improving as well as enhancing the Nigeria construction industry.

1.1 PROVISIONAL TITLE

An Investigation into the Factors Affecting the Implementation of Health and Safety Management Practices by Contractors in Nigerian.

1.2 BACKGROUND TO THE STUDY

The construction industry is understandably one of the most hazardous industries in most economies, and has the highest injury and death rate among all industries (Edmonds and Nicholas, 2002; Jones, 2016; HSE, 2018). In addition, this seems to be worse in developing countries like Nigeria than the situation in other countries such as the United Kingdom (UK), United States of America (USA) and Japan, because of lack of concern, accurate records and statutory regulations on health and safety (H&S). When compared to the UK's construction industry, Idoro (2004), Enhassi *et al.,* (2008) and Adeyemo and Smallwood (2017) maintain that Nigeria lacks statutory regulations on H&S and that those regulations that serve as points of reference are either British or American ones.

Omiunu (2012) has noted that innovations and development such as related to the development of health and safety in the construction industry brought into Nigeria from the Western world are akin to square pegs in round holes which in most occasions may be unsuitable for the Nigerian environment because of the differences in the operating and cultural system.

Adeogun and Okafor (2013) noted that although Nigeria was among the countries that signed the occupational health and safety law in the Geneva Convention of 1981, however, the law has not been domesticated into local laws. A major achievement in the Nigerian construction industry has been the enactment of a law that will take care of the health and safety of industrial workers, which is observed to include the Nigeria construction industry, by a bill that passed through the second reading in the senate on 25th February 2009 (Iden, 2010). This however portrays a gap between the occupational health and safety law in the Geneva Convention of 1981 and the real situation in Nigeria, this being the high rate of injury and death in the Nigeria construction industry.

As a colonised nation, it is understandable that Nigeria depends upon the laws of what was once her colonial master, but what cannot be understood is the inability of the country to have produced local versions of those regulations, not to mention new regulations since independence in 1960. The Factory Act of 1990 regulates H&S in the manufacturing industry, which is a local version of the Factory Act of 1961 of Britain. The provisions of this act have made the Federal Government of Nigeria to put in place statutory practices and structures for inspecting the H&S condition of factories, for reporting accidents and injuries in factories and for sanctioning non-compliance with statutory H&S conditions and standards. Such regulations, practices and structures do not exist in the Nigeria construction industry.

Despite being a party to the Geneva occupational Safety and Health Convention 1981, Nigeria continues to lag behind in the implementation of occupational H&S practices (Adeogun and Okafor, 2013). According to Idoro (2011), contractors with the best safety record in Nigeria still record substantially high numbers of injuries on their sites. A survey of 42 Nigerian contractors revealed a rate of five injuries per worker and two accidents per 100 workers among some of the best performing firms (Idoro, 2011). According to Ezenwa (2001), these figures are often worse in practice because of a bad culture of under-reporting and concealment.

Okoye *et al.,* (2016) noted that Nigeria has a very high accident record attributable to lack of effective monitoring, reporting and control practices. Furthermore, the regular collapse of buildings in Nigeria, with the attendant loss of lives, makes the health and safety situation in the nation's construction industry grossly disheartening. According to Farooqui *et al.* (2008), the construction industry safety record in Nigeria continues to be one of the poorest in the world. Okojie (2010), Diugwu *et al.,* (2012), Idubor and Oisamoye (2013), Okoye *et al.,* (2016), Adeyemo and Smallwood (2017) among others have attributed the high rate of accidents and injuries in the Nigeria construction industry as attributed to the lack of compliance and implementation of H&S management practices especially among contractors. While other studies have further highlighted a high prevalence of non-compliance with safety regulations that require organisations to report accident (Diugwu *et al.,* 2012), compliance to the enforcement of occupational health and safety legislations have generally been described as poor (Okojie, 2010; Idubor and Oisamoye, 2013; Adeyemo and Smallwood, 2017). These show that there is low implementation of H&S management practices by contractors in Nigeria.

Despite increased efforts towards improved safety performance in Nigeria's burgeoning construction industry, there has been minimal improvement (Okoye *et al.*, 2016). Safety regulation enforcement in Nigeria's construction industry is neither strong nor widespread. No other industry experiences more death, injury or ill health of staff at work than in the construction sector. There is a continuous and geometric rise in the number of accidents, reported and unreported, on Nigerian construction sites despite several efforts towards improving the health and safety standards in construction (Adeyemo and Smallwood, 2017; Okoye *et al., 2016).*To this end, there is need to investigate the causes of the elastic problems in the Nigeria construction industry, thus the need for this study. Thus, so far, existing literature on construction H&S in Nigeria does not provide a thorough understanding regarding the factors contributing to the low implementation and hence the need for research into the major factors affecting the implementation of H&S management practices by contractors in Nigeria.

Nevertheless, improving occupational health and safety in Nigeria's construction industry can be a slow but feasible process (Neale, 2013). However, Okoye *et al.,* (2016) noted that it should start at the designing table and continue throughout the construction phases until the safety and health of end users is ensured due to the complexity of the industry and the hazards it contains. It is, however, an undeniable fact that such improvement of the Nigeria occupational safety and health process may not be achievable when the causative factors are neglected, thus the need for this study. Umeokafor *et al,* (2014) noted that there is need to understand the factors that contribute to occupational hazards or rather concerning this study, factors that influence the implementation of H&S management practices by contractors especially in developing countries such as Nigeria. Understanding the trend, distribution and risk factors of the accidents, injuries, fatalities and accident causal factors remain pertinent in developing effective strategies for the improvement of OHS globally, especially in developing countries such as Nigeria.

From a general view, studies have shown the various factors that could influence the implementation of H&S management practices by contractors. These factors are categorised into management, incentives, policy, personnel, technical and process factors (Ismail *et al.,* 2012; Lee and Jaafar, 2012); resources and relationship factor (Ismail *et al.,* 2012); amongst others. Management factors influencing health and safety management practices and performances include leadership, vision, direction, supervision, commitment, statement of objectives, safety analysis, prevention planning and provision, which cuts across the lack of safety inspection, of safety meeting, of safety regulation enforcement, of safety training and education, and of safety communication. Incentives factors include the lack of provision of monetary and non-monetary incentives, and lack of disciplinary action. Policy factors include a lack of formulation of safety policies, and of well-written and high standard policies and comprehensible and explicit policies. Personnel factors include bad management attitude, supervisors and workers attitude towards safety, and a lack of constant monitoring of human errors. Technical factors include a lack of organized technicalities, a lack of effective risk response and risk management system, and inadequate PPE that is aligned with the nature of work. Process factors include identifying hazards, a lack of assess risks, contingency plans for works, a lack of safety standard of procedure for work processes, among others. Resources factors include availability of safety equipment, personal protective equipment, first aid, emergency shutdown system and control system. Relationship factors include globalization, interfaces and personal relationship.

Concerning this present study, the factors that could influence implementation of H&S management practices by contractors are categorised into the following: top management commitment and awareness; availability of dedicated budget and resourcing; membership of H&S association that promotes H&S; client commitment to H&S; H&S

regulation enforcement; company's engagement with innovation and research in H&S; company characteristics; workers' voice/demand H&S performance of the company; corporate credibility/external image to the company; top management desire to attain enhanced productivity and continuous improvement; top management desire to attain of enhanced competitive advantage; and top management desire to enter into a new construction markets opportunity.

It also important to draw attention to the main fact that studies with respect to investigating level of implementation of H&S management practices as well as the major factors influencing their implementation by contractors in Nigeria is an uncultivated area. Few studies have explored the role of implementation on the attainment of better H&S performance in Nigeria. A thorough investigation needs to be done to be able to understand the imperatives of achieving an improved occupational H&S process by contractors in the Nigeria construction industry. To this end, this study investigates the level of implementation of H&S management practices, major factors that could enhance their implementation as well as the influence of implementation on performance within the Nigeria construction industry.

1.3 RESEARCH QUESTIONS

What is the level of implementation of Health and Safety (H&S) management practices by contractors in Nigeria?

What are the factors affecting the Implementation of Health and Safety (H&S) management by contractors in Nigeria?

How does the Implementation of Health and Safety (H&S) management by contractors in Nigeria influence safety performance?

1.4 RESEARCH AIM AND OBJECTIVES

The aim of this research is to investigate the internal and external factors affecting implementation of H&S management practices by contractors in Nigeria, with the view of reducing accident rate.

The following research objectives have been set to enable the achievement of this aim:

- To review the status of H&S in the Nigerian construction industry.
- To review H&S management systems/models in order to identify the key elements and practices of H&S management.
- To review H&S management implementation in construction in order to identify level of implementation as well as factors that could affect health and safety implementations by contractors.
- To develop a conceptual framework/model for factors affecting implementation of H&S management by contractors in Nigeria towards ensuring an enhanced occupational health and safety performance in the Nigerian construction industry.
- To refine the conceptual framework and develop an instrument to collect and analyse data to determine the level of implementation as well as factors affecting implementation of H&S management by contractors in Nigeria;
- To ascertain the influence of implementing H&S management practices on performance by contractors in Nigeria;
- To discuss and compare the existing literature with the empirical research findings of the present study, in order to recommend necessary improvement to the implementation of H&S management practice by contractors in Nigeria with

the view of reducing rate of accident and ultimately enhancing the performance of the Nigerian construction industry.

1.5 SIGNIFICANCE OF THE STUDY

Amongst other contributions, the findings of this study provide empirical evidence to update the available literature and thus provides the present status of the Nigeria construction industry about health and safety management practices. Moreover, the findings of this study would help provide the necessary gap with respect to the health and safety management practices in the Nigerian construction industry that could need filling when compared with the review of past literature and studies from other countries, most especially from developed countries such as the UK, USA, China and Japan. In addition, the findings of this study would be enlightening to the stakeholders of the Nigerian construction industry because it would assist in providing the major factors and indicators that could be used to predict the health and safety management performance in the Nigeria construction industry, and thus used to provide strategies that could curtail injuries and health & safety threats.

Furthermore, the study and the findings of the study could be a major source helping managers see the need for health and safety management practices in their company and thus helping in their conscious effort to tackle the various health and safety challenges in their firm.

Moreover, the findings of this study could also be used to raise the place of the Nigerian construction industry. When compared to other countries, especially the developed countries, with respect to the empirical findings and the literature used for this study, to affirm that such a comparison could show the place of the Nigeria construction industry from a global perspective and show the gaps and challenges that need to be filled. This could help stakeholders such as the government, policy makers and managers to deploy various strategies to mitigate the threats of health and safety management challenges in the Nigerian construction industry.

1.4.1 SCOPE OF STUDY

The focus of this study is the Nigeria construction industry; however, the literature review covers studies on the construction industries of other countries, which include both developed countries such as the UK, USA, China, Japan, etc. Of major importance of this study is the implementation of Health and Safety (H&S) management practices by contractors towards ensuring an enhanced occupational health and safety in the Nigerian construction industry.

1.5 DEFINITION OF TERMS

Health and Safety (H&S) management: *preventing people from harm at work or becoming ill by taking the right precautionary measures and providing a suitable work environment.*

Health and Safety management practices: These could refer to *strategies and processes put in place to help prevent people from being harmed at work or to become ill.*

The Nigeria construction industry: This refers to *the construction industries that are responsible for the building and construction project in Nigeria.*

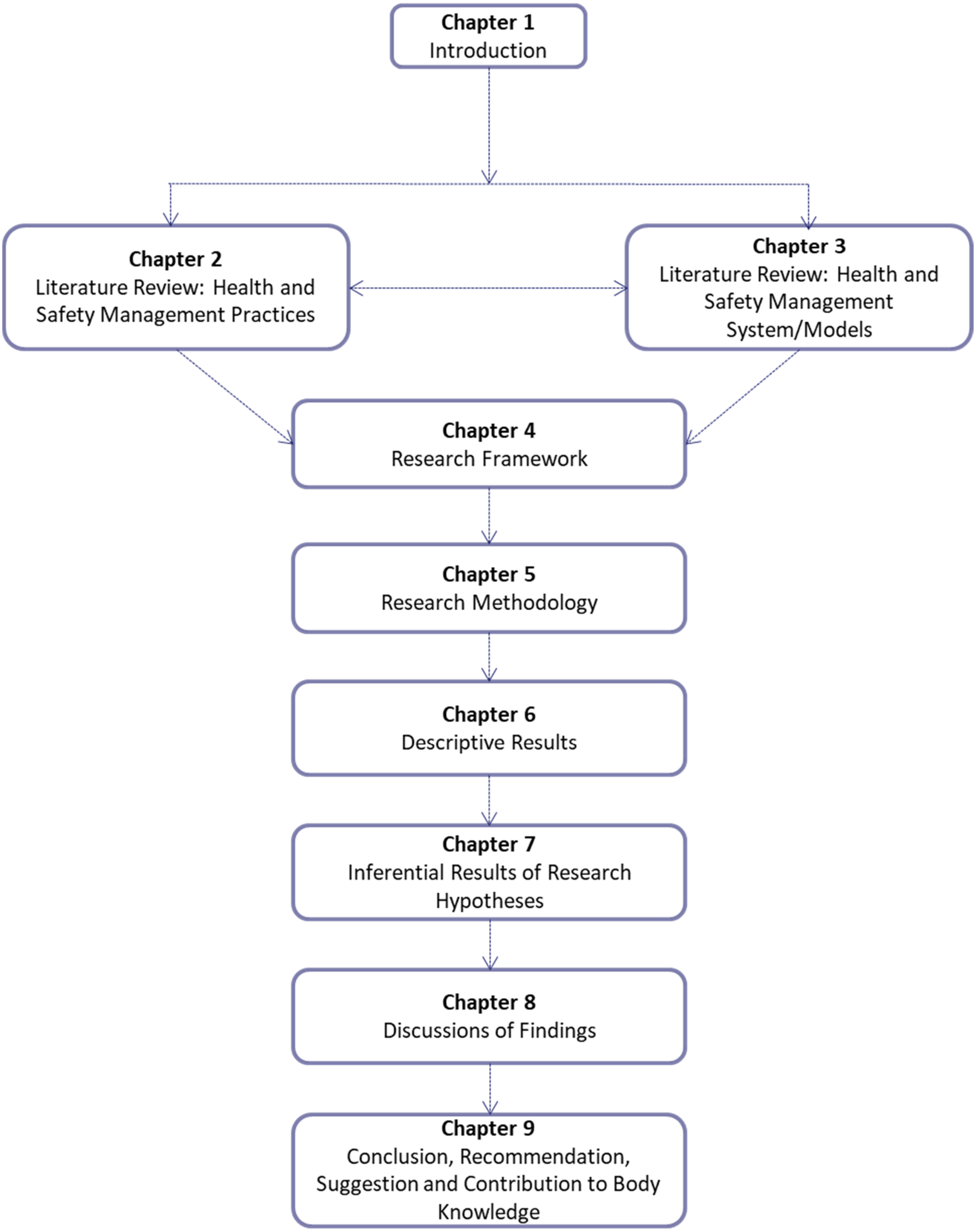

Figure 0-1: Overall research process

1.6 STRUCTURE OF THESIS

The thesis consists of nine chapters, organised as shown in Figure 1.1.

Chapter 1: Outlines the research background of the study and highlights the research questions. This chapter also presents the aim and objectives of the study including the scope and structure of the thesis.

Chapter 2: Presents an in-depth literature review on the global state of H&S including the sub-Saharan African context especially Nigeria. It highlights the H&S performance of Nigeria's construction industry as well as current challenges.

Chapter 3: Presents an in-depth review of health and safety management systems and models in construction industry and the summary of the different models/systems of H&S management.

Chapter 4: Outlines the research framework that was developed by drawing on the outcomes of the literature review. The framework proposes a relationship between the following: the factors affecting implementation of H&S management practices; H&S management practices; and H&S performance.

Chapter 5: Outlines the research methodology. In addition, the methods of data collection and analyses are outlined together with justification for the choices made.

Chapter 6: Data collected from the study is summarised and presented in this chapter. This includes a summary of the demographic information of the respondents and descriptive statistics about data relevant to each of the objectives of the study. This includes summary of level of implementation of H&S management practices among construction companies in Nigeria.

Chapter 7: Outlines findings of inferential statistical analyses regarding the following: the factors affecting implementation of H&S management practices; and the effect of implementation of the H&S management practices on health and safety performance.

Chapter 8: Presents the discussion of the research findings.

Chapter 9: Outlines the main findings of the entire research, the limitations of the research and the recommendations for further research and practice arising from the study.

1.7 RESEARCH METHODOLOGY

Besides the philosophical position espoused in a research, researchers also adopt a research strategy and specific methods for the collection and analysis of data. According to Creswell (2009), the research strategy provides specific direction for procedures in the research design. Quantitative methods were used during the research, and the questionnaire survey was used as an instrument for collecting data. The questionnaire was given to the professionals in construction industry, that is, those who influence and impact safety consciousness to the people. The collected data was then analysed using the SPSS statistical package to answer the research questions.

1.8 SUMMARY

This chapter has presented the Research background, Research questions and overall research Aims and Objectives. It has also discussed the significance of the study, overall research process and the structure of the thesis. The next chapter discusses the literature review of health and safety management practices.

CHAPTER 2: LITERATURE REVIEW: HEALTH AND SAFETY MANAGEMENT PRACTICES

2 INTRODUCTION

This chapter presents the literature review on Health and Safety (H&S) management practices in the construction industry conducted to date on a global scale. It covers H&S management systems and models, and highlights the key elements and components of H&S management. Additionally, the chapter presents issues affecting health and safety management in construction in general and, more specifically, the factors that could make a contractor (organisation/firm) implement or not implement health and safety management practices. This is aimed at providing a literature base that would inform the development of a conceptual framework for diagnosing the factors affecting the implementation of, and towards achieving an enhanced H&S management practices, by contractors in Nigeria.

2.1 GLOBAL VIEW OF THE CONSTRUCTION INDUSTRY

The global view of the market system would help to provide the best and accepted practices and level of the construction market, which would help to provide the gap of the local marketing system. At the global level, Ibem *et al.* (2011) and the World Economic Forum (2016) state that the construction industry has witnessed tremendous institutional and organisational transformation across the globe. There has also been continuous modification of building process, pace and complexity of work. Thus, the increasing demand for higher productivity has become a common feature of the industry. These are in response to globalization of economy and markets, technological advancement and changing consumer preferences. In addition, the dynamic and complex nature of construction works, diverse backgrounds and hostile attitudes of participants and stakeholders are known to influence the rapid changes occurring in the construction industry in general (Wong *et al.,* Toe and Cheng, 2010; Akanni *et al*., 2014; Jarkas, 2015; Ofori, 2015). As a result, professionals and indeed the workforce in this sector operate in an extremely competitive environment where projects are designed, constructed and delivered within tight budgets and period (Akanni *et al.,* 2014; Jarkas, 2015). These, among others, can have a combined effect on the construction industry, making it mentally and emotionally demanding and stressful for the labourers (Wahab, 2010; Ofori, 2015).

According to Ifeanyi (2010); Al-Kilani (2011) and Chete *et al.,* (2016), the construction industry is almost seen as the backbone of every national economy. This is why Ofori (2012) and Isa, Jimoh and Achuenu (2013) noted that it is the nation's economic backbone as it forms the arteries for the facilitation of productive activity by enabling goods and services to be distributed within and outside the country. Seadan and Nanseau (2001) state that the industry accounts for about 15% of the national product of most nations, which includes Nigeria. According to Akindoyeni (2004), in the developed and industrialized countries, the construction industry can be responsible for up to 20% of the Gross Domestic Product (GDP) and employs up to 12% of the total labour force. Al-Kilani (2011) affirmed that the construction industry is both economically and socially important. This was why Okeola (2009) affirmed that the importance of the construction industry in the national development could not be overemphasized, considering the fact that at least 50% of the investments in various development plans is primarily in construction. It is the next employer of labour, after agriculture, in most underdeveloped countries, and is about 10% of labour force (Oyatoye, 1994, cited in Okeola, 2009). In developed countries, activities in the industry, especially the building/civil works, are used as indices of economic growth and buoyancy or recession (Adetifa, 1994, cited in Okeola, 2009; Oladinrin *et al.,* 2012). Mcfallan (2002), in his study on the Australian Construction Industry, states that the construction industry in most countries is dominated by a large number of very small organisations, and are generally driven by single projects that require the creation of team to do the work and the subsequent dissolution of that team once the job is completed.

Still focusing on the construction industry at the global level, in developed countries, there has been recent advancements brought about in the deployment and use of technology in the construction industry, which has contributed positively to the industry productivity. However, this has created an additional challenge and has ushered the industry into an unsafe work environment (Farooqui *et al.,* 2008; Kanchana *et al.,* 2015). According to Okoye and Okolie (2014), it has been recognized at the global level that the construction industry is indisputable for its obvious position in the economy of any nation. This thus, buttresses the importance and place of the construction industry in nations' economies as postulated by authors such as Seadan and Nanseau (2001), Okeola (2009), Ifeanyi (2010), Al-Kilani (2011), Oladinrin *et al.* (2012), Dakhil (2013), Holloway Houston, Inc. (2018), among others. Nevertheless, Haslam, *et al.* (2005) and Nawi *et al.* (2016) have proven that the sector is faced with a high level of poor safety performance and that this has continued to attract international concerns and attention. Al-Kilani (2011) stated that construction industry is both economically and socially important and this has led to a dramatic improvement in recent decades; however, the health and safety record in the construction industry continues to be one of the poorest in the world (Farooqui *et al.,* 2008).

In addition, Okoye and Okolie (2014) and Nawi *et al.* (2016) state that the health and safety performance of construction industry remains a glaring challenge in its effort to tackle the developmental initiative of many nations, not excluding Nigeria. Simply put, workplace H&S remains a global challenge to the sustainable development of the society and civilization (Okoye and Okolie, 2014; EU-ILO, 2013; Lucchini and London, 2014; Nawi *et al.,* 2016; Rantanen *et al.,* 2017). Furthermore, at the global level, it has been stated that work-related accidents and illnesses contribute 3.9 percent of all deaths, and that 25 percent of the world's population suffers a minor or major occupational accident or work-related disease in any year.

In addition, at the global level, the European Agency for Safety and Health at Work (2004), Wardle (2009) and Stebbins *et al.* (2019) all affirm that, unfortunately, the construction industry is one of the most dangerous and more construction workers are killed, injured or suffer ill health than in any other industry. Furthermore, every year more than 1 000 workers are killed, over 800 000 workers are injured, and nearly 600, 000 workers work on sites where asbestos fibres are present. Therefore, there is a need to focus resources on the construction industry to help raise its contribution and reduce the rate of death, thereby enhancing its performance at the global level. However, such efforts must be tailored and, if possible, delivered within specific industry or country contexts in order to be effective. It is therefore imperative to understand the phenomenon or related challenges that are particular to a given industry or country contexts. In so doing, any improvement efforts would be specific to this country-context since concentrating a wider effort on the global construction industry is not feasible.

2.1.1 Overview Of The Nigerian Construction Industry

The building and construction industry has been relevant in the development of the Nigerian economy, and housing (which no one in the nation can do without) is a major component of the building and construction sector (Al-Kilani, 2011; *Isa et al.,* 2013; Adeagbo, 2014; Chete *et al.,* 2016). Kissick *et al.,* (2006), Isa *et al.* (2013) and Chete *et al.,* (2016). All the aforementioned authors afirm that housing in Nigeria is a key input in economic, social and civic development. Many housing-related activities contribute directly to achieving broader socio-economic development goals and it is a major driver of economic growth worldwide. Moreover, especially in developing countries such as Nigeria, it creates job opportunities. According to Glossop (2008), housing matters to economic development as it enhances economic performance. Adeagbo (2014), Emiedafe (2015), Arthur (2016) and the People's Daily (2017) have all noted that in Nigeria, the construction industry has provided employment for different categories of employees, especially in major Nigerian cities where construction activities have been immense.

These include the Federal Capital Territory (FCT), Abuja, and the various State capital cities like Lagos, Port-Harcourt, Ibadan, Kaduna and Kano, among others. The sector is also pivotal in sectoral linkage as its activities have multiplier effects on the growth of other sectors, especially the building materials industry and real estate transactions, among others (Adeagbo, 2014). In addition, Adeagbo (2014) and Okoye *et al.* (2018) state that the drive towards achieving the goal and objectives of the Nigerian Vision 20:2020 blueprint has an anchor in the building and construction sector as its major blueprint is to develop infrastructure and this is recognized as key to achieving economic transformation and development. These have made the Nigerian construction industry a major part of the economy. Ogbebor (2002) and Okoye *et al.* (2018) state that the construction industry is regarded as a potent motivator of the national economy because it provides the driving force necessary for sustaining a buoyant economy or reviving a depressed one. In Nigeria, the construction industry contributes an average of 5 percent to the annual GDP and an average of about one-third of the total fixed capital investment; however, the Nigerian construction industry has not been able to ascend to the level of other developing nations such as Asian countries (Omole, 2000). Adeagbo (2014) states that although the growth rate of the construction industry dropped from 13.07 per cent to 11.97 per cent in 2009 and 10.15 per cent in the third quarter of 2010, it increased steadily to 11.32 per cent in the third quarter of 2011 and 14.31 per cent in the third quarter of 2013. The growth rate of the sector improved from the 7th position in 2010 to 3rd position in the third quarter of 2013.

African countries (including Nigeria) have been forecasted to fall short of meeting most of the millennium development goals (MDGs), particularly those related to health and safety (WHO, 2002). This was because African countries often ignore the importance of occupational health and safety in achieving the millennium development goals (MDGs). Improving occupational health and safety services remain one of the key interventions in pursuance of improved health and safety outcomes for the populations in the African countries.

In his work, Ukaegbu (1991) submits that Nigeria differs from the history of other developed countries particularly those in the Western world. While industries in the west aim to generate, accumulate and reproduce capital, the Nigerian construction industry is premised on “import substitution”, whereby industrial equipment and raw materials are transported into Nigeria, installed and used for routine production activities, either by multinational corporations, the state or indigenous private business men. This implies that the Nigerian construction industry largely still depends on other nation's construction industry and have not been stand-alone.

In Nigeria, the construction industry has been characterized by poor performance and productivity (Ifeanyi, 2010**;** Ihua-Maduenyi, 2019)**.** Osofisan (2007) has criticized the Nigeria construction industry for being one of the slowest to integrate technological advancement and thus, according to Isa *et al., (*2013) and Ihua-Maduenyi (2019)**,** this has led to a slowdown in the growth rate in both the construction industry of the nation and other sectors of the economy. According to Osofisan (2007); Emiedafe (2015); Arthur (2016); the People's Daily (2017) and Okoye *et al.* (2018), in many developing countries such as Nigeria, the construction sector is one of the biggest contributors to the Gross National Product (GNP). In an earlier study, Okeola (2009) states that the output of the construction industry in Nigeria accounts for over 70% of GNP and is therefore a stimulator of national economy and is becoming a recognized and major economic force and, also, one of the more hazardous industries.

The Nigerian construction industry is unique in the sense that it is a major contributor to the other sectors of the economy and encourages other industries and sector of the economy to produce (Ifeanyi, 2010; Chete *et al.,* 2016; Okoye *et al.,* 2018). However, with this great autonomous strength, the Nigeria construction industry does not match up to those from developed countries, and Nigeria is striving to reach the state of developed economies (Akindoyeni, 2004). According to Dantata (2008), the Nigerian construction industry, as in most other developing nations, is divided into two major groups: the organized, "formal," and the unorganized, "informal" sectors of the industry. The unorganized sector, for which no accurate and reliable data is available, is comprised of the simple residential buildings and similar structures built by private citizens and constructed through the efforts of groups of artisans and labour, hired mainly using the multiple primes method of construction i.e., owner supervised construction. The government has an almost insignificant influence on the operations of this sector and receives little or no revenue thorough taxes; hence, it is very difficult to obtain reliable statistical data about this sector.

In corroboration with this, Kheni *et al.,* (2006) stated that the construction sector in developing countries such as Nigeria is dominated by small and medium sized contractors, which operate mainly within the domestic market. And they tend not to take notice of health and safety matters which leads to a considerable number of accidents and ill health. It is known that occupational health and safety performance in developing countries such as in Nigeria is poorer than in developed countries (Hämäläinen *et al.,* 2006). Contractors in developing countries such as Nigeria are constrained by lack of resources, which have a negative impact on the management of health and safety (Gibb and Bust, 2006). The frameworks provided for legal and corporate governance of health and safety exhibit meagre influence on the behaviour of owner-managers of small-scale enterprises with regards to health and safety.

On the other hand, the organized sector of the construction industry, for which all the data available is derived from, constitute all the major companies, which are legally registered in the country and carry out organized construction projects with a combination of both highly skilled expatriates and labourers. This group subscribes to rules and regulations layed down by the government such as employment legislations, acquiusition and tendering. The major companies in this category are Julius Berger Nigeria Plc, Dantata and Sawoe Construction Company Nigeria Limited (D&S), China Civil Engineering Construction Corporation (CCECC) Nigeria Ltd, Setraco Nigeria Limited, Costain West Africa Plc., PW Nigeria Limited, Reynolds Construction

Company Nigeria Limited, among others. In addition, the government is aware of all the activities of this category of builders and collects frequent taxes from the companies.

Eshofonie (2008) states that in Nigeria, like most developing countries, the construction industry plays a dominant role in the economic activities of the country. Furthermore, the construction industry Eshofonie contributed about half of the total stock of fixed capital investment in the Nigeria economy and generates employment opportunities, which places it second to the government in the employment of labour. It was also recorded that when the construction industry was booming in the 1970s, the country's economy experienced similar effects during that period; however, from the early to mid-1980s, the industry experienced a jolt and its effect was felt in all spheres of national life (Eshofonie, 2008). Dantata (2008) stated that, over the last few years, the Nigerian Construction Industry has recorded a considerable transformation but is still heavily dependent on government expenditure. The size of the Nigerian construction industry is very small relative to the total global construction industry. In addition, the Nigerian construction industry makes up only about 0.2% of the global total; despite this, it is by far the highest among all the West African countries. The industry's growth rate has been most impressive over the last few years and is well above the global industry average growth rate. It is projected to continue to grow at high rates as long as oil prices remain high and the government's investments in infrastructure also remains high. The Nigerian construction industry has outgrown most other sectors of the local economy over the last few years. In 2005, the industry grew at an impressive rate of 12.1%, which was more than double the average growth of the overall economy (5.6%) in the same year. As the economy is projected to grow at even higher rates for the near future, the construction industry is also expected to continue to perform very well. In addition, the Nigerian construction industry has grown at an impressive rate of over 20% between 2006 and

2007 (Dantata, 2008). According to the Nigerian National Bureau of Statistics, the contribution of the building and construction industry to the overall GDP between 2001 and 2005 averaged about 1.44% (NBS, 2006). Moreover, the industry accounts for about 69% of the nation's fixed capital formation (BMI, 2007). This indicates/suggests that about 70% of the net capital investment in the country goes to the construction industry.

Furthermore, Ifeanyi (2010) stated that the Nigerian construction industry accounted for 5% of GDP and employed up to 20% of the labour force. This, when compared to the percentage contribution of construction industry of developed countries, outweighs that of developed and industrialized countries, which contribute 20% to the Gross Domestic Product (GDP) and employ up to 12% of the total labour force (Ifeanyi, 2010). Taking a closer look on these percentages and the differential percentage, it is pertinent to draw attention to the fact that the Nigerian construction industry is a significant one and a major sector to recon with, not just at the local level but also at the global level. According to a recent report on the profile of Nigeria on Occupational Safety and Health ILO (2016), Nigerian GDP at the end of 2015 stood at 481.07 Billion US Dollar. The conuntry's annual growth rate averaged 4.07% from 1982 untill Q2 of 2016 when the country witnessed a contraction of 2.08% due to fall in global oil process. During this time, according to the National Bureau of Statistics (Qtr 2, 2016) Report, the constructuioin industry accounted for 4.30% of the National GDP. In 2018, the annual contribution of the construction sector to the national GDP was 4.72% (NBS, 2019), and it grew to 6.24% as at the end of 2019 (NBS, 2020)

In Africa, occupational health and safety issues are prevalent due to inadequate attention given to OHS by industry and the government (Puplampu and Quartey, 2012). Many international and non-governmental organisations have been noted that African countries, such as Nigeria, are struggling to foster an effective occupational health and safety workplace, because African countries have poor health and safety culture (Regional Committee for Africa Report, 2004). Additionally, greater emphasis is laid on increasing productivity and profitability while compromising health and safety standards, procedures and policies.

Several occupational health and safety hazards, risks, and accidents proliferate in most African countries (Puplampu and Quartey, 2012) and occupational health and safety remain neglected in developing African countries such as in Nigeria because of competing national and sector issues and challenges (Nuwayhid, 2004). For instance, the Regional Committee for Africa Report (2004) stipulated that due to endemic poverty and poor performance of African economies, the African region is faced with a number of OHS challenges. According to this report, Africa's (and Nigeria's) challenge is how to ensure that workers in both the informal sector and formal sector have adequate health and safety education and can actively use this information to better their health and safety practices in the workplace such as in the construction companies. It has been suggested that ignorance might probably be the reason for the neglect of occupational health and safety practices and investment in African countries, such as Nigeria (Puplampu and Quartey, 2012). ILO (2003) has pointed out that African countries refuse to provide OHS services for their workers. This is because most African countries, such as Nigeria, have poor OHS review mechanisms and inadequate OHS policy, while some of the countries have low OHS infrastructures to cater for health and safety issues, especially in the construction industry.

In addition, Okoye and Okolie (2014) stated that the health and safety performance of construction industry remains a glaring challenge in its effort to tackle the developmental initiative in Nigeria. However, according to Nairametrics (2013), the construction business in Nigeria is a multibillion-dollar industry with hardly any year falling short of expected windfalls befalling successful contractors who bid for construction projects; the span of five years prior to 2013 witnessed increasing patronage and profits for most construction companies in Nigeria. This was especially seen with some publicly-quoted companies such as Julius Berger Plc, Costain West Africa Plc and G. Cappa Plc, which recorded steadily rising profits with the last two just recovering from years of consistent loses. Many others, which are not publicly quoted, rapidly expanded their operations to meet up with greater challenges such as PW Ltd, Lekki Concession Company and Hitech all of which were handling major infrastructural projects like road and drainage reconstruction/expansion and Land reclamation. Recently, a number of development projects by government and private sector companies have created opportunities for construction companies to reap massive revenues (Nairametrics, 2013),

In most of the states in Nigeria, infrastructure projects such as roads, highways, housing projects construction of drainage, dams, rural electrification, city expansion and beautification projects have been on the increase, especially in Lagos, Rivers and Akwa Ibom states (Nairametrics, 2013). According to Adeagbo (2014), the building and Construction sector has been relevant to the development of the Nigerian economy. Housing is a major component of the building and construction sector. Kissick *et al.* (2006) have stated that housing is a key input in economic, social and civic development; many housing-related activities contribute directly to achieving broader socio-economic development goals, and are is a major driver of economic growth worldwide and especially in developing countries such as Nigeria where housing construction creates job opportunities. In addition, Glossop (2008) notes that housing matters to economic development as it enhances economic performance. Similarly, in relation to Nigeria, Adeagbo (2014) has stated that, the construction sector has provided employment for different categories of employees, especially in major Nigerian cities where construction activities have been immense. These include the Federal Capital Territory (FCT), Abuja, the various State capital cities like Lagos, Port-Harcourt, Ibadan, Kaduna and Kano, among others. The sector is also pivotal in sectoral linkage as its activities have multiplier effects on the growth of other sectors, especially the building materials industry and real estate transactions (Adeagbo, 2014). More importantly, the drive towards achieving the goal and objectives of the Nigerian Vision 20:2020 blueprint has an anchor in the building and construction sector. Furthermore, in the blueprint, infrastructural development is recognized as key to achieving economic transformation. Efforts at transforming the power, transport, housing and industrial sectors are not likely to bear the desired fruits without the active participation of the actors in the building and construction sector as well as the effective and efficient performance of the sector (ibid).

According to Rafindadi (2010), in Nigeria today, the case for taking building infrastructure seriously has never been more potent due to the inadequacy or collapse of infrastructure across all or most sectors (power, petrochemicals, energy, transportation, marine and ports, water and sanitation, education, health etc.). It has become such a topical issue that there is now no other way for the leadership in the nation to gain credibility than to commit to a wholehearted, serious resuscitation of our national infrastructure, and massive creation of new ones thus creating a vital construction industry in Nigeria.

To this end, Omiunu (2012) has affirmed that Nigeria, which in this study includes contactors, customers, government and private organisations, tends to prefer and rely on the westernized sources and resources thereby neglects the local designed or local labour force which could be deployed effectively and efficiently for sustainable development in the nation. Rafindadi (2010) has affirmed that the nation’s construction industry seems to look to others, which includes foreign contractors, labours, etc. For ready-made unsustainable shortcuts.

Recent enabling initiatives such as the Nigerian content law indicate that there is a resolve to address the need for local capacity building and support to the local industry. Making the right choices will place tremendous hope and expectation on the engineering industry, which would then have to become the most crucial sector in the scheme of Nigeria's development. Developing a home-grown capability to produce and sustain the growing housing needs will likely spread its impetus and tentacles to other sectors, relying on local industry to tap the local potentials and enhance sustainable development in the long run. The massive potential for the building/construction industrial growth has so far remained suppressed for a very long time in the case of Nigeria, and will become triggered, along with a burst of entrepreneurial vigour, when the nation and its construction industry seek to deploy and employ its local potential without relying on foreign contractors (Rafindadi, 2010).

To this end, various initiatives are been deployed to enhance health and safety issues, especially in Nigeria. For example, Adebiyi and Charles-Owaba (2009) have revealed that industries, including the construction industry, have recently been pursuing some OHS initiatives such as OHS training, OHS awareness, OHS incentives, OHS accidents investigation and the provision of personal protective equipment (PPE) to curtail occupational accidents and injuries. They have proposed that academics, industry, health, and safety practitioners should help set attainable and sustainable health and safety objectives to help manage health and safety hazards in African countries such as Nigeria. Furthermore, it has been found that the application of information and communication technologies to OHS practices has been observed to be increasing in some African countries (Sass, 2000). This began in 2000 when there was a WHO/ILO joint effort on occupational health and safety in Africa with many collaborators such as USA, EU, WHO, and ICOH for sharing information on occupational health and safety.

Olutuase (2014) affirms that the Nigerian construction firms, especially the multinationals that seem to have inherited safety policies and systems from their parent companies, still record repeated cases of accidents and injuries. Some of these accidents and injuries include falls from height, trapped by something collapsing or overturning, struck by a moving vehicle, contact with electricity or electrical discharge. In addition, struck by flying/falling object during machine lifting of materials, contact with operating machinery or material being machined, exposure to hot or harmful substance or fire outbreak that engulfed their entire office premises (Consultnet Ltd, 2011). Most often, the problem is not the level of awareness of importance of safety and neither is a safety policy absent; rather it is related more to poor or a lack of implementation of safety programs and systems (La Montagne *et al.,* 2003; Indian Council of Medical Research, 2003).

The wide elasticity of problems and challenges militating against the Nigeria construction industry could make it unable to compete at the national level. And, thus, it is deemed appropriate to introduce the assertion of Omiunu (2012) that development, such as the inherited health and safety policies and systems brought into the Nigeria system from neighbourhood countries and developed countries. According to Olutuase (2014) have not been able to curtail these challenges and problems associating with the Nigeria construction industry. There are still repeated records of cases of accidents and injuries in many of the so-called large construction industries in Nigeria, let alone the small ones. To this end, there is a need for this study to help provide a structured and tested model towards enhancing the health and safety challenges militating against the Nigeria construction industry.

2.1.2 Performance of Nigerian Construction Industry

Studies such as Eyiah and Cook (2003), World Bank (2003), Anvuur and Kumaraswamy (2006), Kheni *et al.,* (2006), Windapo and Rotimi (2012), Isa *et al.* (2013), Olutuase (2014), Chete *et al.* (2016); andArthur (2016), among others, have all stated that construction companies in developing countries such as those in Nigeria are marked by poor performance. The construction sector in Africa, which Nigeria is a part, has a higher accident rate than many other economic sectors. In addition, legislation on health and safety is approved by parliament including ILO conventions, but their implementation by the relevant government bodies is poor (Kheni, Gibb, Gibb and Dainty, 2006; Windapo and Rotimi, 2012). Cotton, Sohail and Scott (2005) note that developing countries such as Nigeria are constrained by a lack of effective mechanisms to implement laws governing employment. Mitullah and Watcher (2003) state that many construction operatives are employed on a temporary and casual basis and therefore the employment conditions are not properly defined thus offering little protection on workers' health and safety.

Going by the work of Windapo and Rotimi (2012), a major measure of the performance of the construction industry is building failure. Building failure could conceptualised further in this study when provided with definition of Ayininuola and Olalusi (2004). According to these authors, building failure is defined as an unacceptable difference between expected and observed performance. Building failure components includes limited deflection in a floor, which causes a certain amount of cracking/distortions in partitions, excessive deflection resulting in serious damage to partitions, ceilings and floor finishes could be referred to as failure; sudden dislocation or giving way of a structure is classified as building collapse. Adeagbo (2014) has stated that the strategic importance of the building and construction sector necessitates a review of how the sector has fared in the recent past. According to Adeagbo (2014), the Building and Construction industry in 2008 accounted for 1.84 per cent of the Nigeria's GDP and ranked 8th of the twelve sectors in Nigeria economy. It maintained this same position in 2009 but there was a drop to the ninth position in the third quarter of 2010 through 2012 while it moved to eighth position in the third quarter of 2013. Suffice to say that the share of the sector increased steadily from 1.62 per cent in the third quarter of 2010 to 1.79 per cent in the third quarter of 2013.

Furthermore, combined with the real estate sector, building had a combined share of 3.47 per cent in 2008 and then increased to 3.61 per cent in 2009. Nevertheless, this dropped to 3.18 per cent in the third quarter of 2010 and however steadily increased to 3.28 per cent in the third quarter of 2011, 3.41 per cent in the third quarter of 2012, and 3.59 per cent in the third quarter of 2013. Further analysis by Adeagbo (2014) revealed that the two sectors' share of the overall GDP was ranked 7th in 2008 but dropped to 8th position in 2009. However, it maintained 7th position in the third quarters of 2010 through 2011 while it moved to 6th position in the third quarter of 2013. This is indicative of increasing pace of activities in the building construction and real estate sectors during the years. In addition, Nigeria re-based its GDP in 2014 and the figures from the rebased GDP for the country further underscore the importance of the building and construction and the real estate sectors. It revealed that, as of 2010, the Building and Construction sector contributed 2.90 per cent to the country's GDP while the Real Estate sector contributed 7.62 per cent.

In addition, Adeagbo (2014) notes that the growth rate of the Building and Construction sector dropped from 13.07 per cent to 11.97 per cent in 2009 and 10.15 per cent in the third quarter of 2010. However, it increased steadily to 11.32 per cent in the third quarter of 2011 and 14.31 per cent in the third quarter of 2013. The growth rate of the sector improved from the 7th position in 2010 to 3rd position in the third quarter of 2013. The Real Estate sector growth rate dropped from 11.97 per cent in 2008 to 10.94 per cent in 2009, increased to 11.68 per cent in the third quarter of 2010 dropped gradually to 10.24 per cent in the third quarter of 2012, and increased to 10.35 in the third quarter of 2013. It maintained 7th position in 2008 and 2009 but improved to 6th position in the third quarters of 2012 and 2013. With respect to the combined growth rates of the Building and Construction sector and the Real estate sector, their growth rate dropped from 12.3 per cent to 10.92 per cent in 2008. In the third quarter of 2010, increased to 10.95 per cent in the third quarter of 2011, dropped again to 10.88 per cent in the third quarter of 2012. It then increased to 12.33 per cent in the third quarter of 2013.

Furthermore, according to Kheni *et al.* (2006), contractors in developing countries such as Nigeria, particularly indigenous ones, face numerous constraints, which could hamper the effective management of health and safety, if not taken into consideration. To this end, Gibb and Bust (2006) identified the following factors that could influence health and safety management of construction sites in developing countries such as Nigeria: poor infrastructure, and problems of communication due to low literacy level. Other factors include unregulated practices on construction sites, adherence to traditional methods of working, unavailability of equipment, poor site security, extreme weather conditions, improper use of equipment and corruption. In trying to curtail the poor health and safety situation in developing countries such as Nigeria, Kheni *et al.* (2006) have recommended that training and workshops be introduced and used to create awareness, and also to teach the labour force of the industry the relevance of health and safety and the need to provide safety and health mechanisms in the construction industry.

However, Koehn *et al.* (2000) and Gibb and Bust (2006) have stated that there have been difficulties in training due to illiteracy which is a major barrier to effective health and safety management in developing countries such as Nigeria, which makes the situation more doleful to the stakeholders. This may eventually have a negative impact on the management of health and safety, resulting in a poor health and safety performance of construction sites in developing countries such as Nigeria, and could affect the development of the sector and the country in the long run. Consequently, there is a dire need to introduce strategies and a better framework to ensure better health and safety outcomes on construction industry in Nigeria, hence the justification for this study.

2.1.3 Nigerian Construction Sites

The nature of construction sites may tend to affect or influence the need for a more effective health and safety mechanism in the construction industry, because of the fact that what may attract attention with respect to one site may not do so on other sites. Furthermore, the cost of ensuring a better health and safety in one site may differ and be lower than the cost of such maintenance on other sites. For example, when a construction site is in a remote place, the cost of producing health and safety mechanisms may be high as compared to when, in an urban city, the transportation of safety equipment would be easy. According to Aniekwu and Ozochi (2010), the Nigerian construction sites are often located in remote places, where materials have to be transported to site from long distances. In addition, labourers have to be housed and fed and many unknown and unpredictable events have to be managed, such as weather, ground conditions, price changes, and delay by owners, just to mention a few which are difficult issues to handle for the managers or owners. Also, the production responsibilities are divided among many participants (designers, owners, contractors, sub-contractors, material suppliers, equipment dealers, funding institutions etc.) each performing different functions and belonging to different organisation with different objectives, policies and practices (Aniekwu and Ozochi, 2010).

In most developing countries like Nigeria, there is a constant adverse business environment and the contractor must operate within this complex environment, which further complicates their responsibilities to provide health and safety for their staff (Aniekwu and Ozochi, 2010). This has forced the construction industry to require the possession of a broad range of management strategies and the capacity for a continuum approach to problem solving, especially with handling health and safety issues.

The development of strategies to handle health and safety in construction site can be enhanced by training and education. Meanwhile, it has been recorded that Nigeria spends an estimated 2.4% of its GNP on education, while sub-Saharan Africa as a whole spends 5.1% on education (Osime, 2007; William *et al.,* 2004; Hinchliffe, 1987; UNESCO, 2000). Declining investment and demand volatility have left the Nigerian construction industry's skills base depleted as experienced people leave the industry in times of depressed construction while unpredictable and poor career prospects discourage new entrants (Aniekwu and Ozochi, 2010). Thus, there must be a restructuring of the training of construction workers, which, to be able to handle the problems on construction sites, must achieve the following:

- Address the need for rapid skills enhancement to achieve the quantity and quality required to meet the country's development programme;
- Create synergy with the changing realities of the industry;
- Promote access to training and career progression by the workforce, and emerging enterprise;
- Create an equitable and sustainable financing system for training and education, which recognizes the need for all participants to contribute;
- professional training needs to be more closely harmonized with development priorities and the delivery approaches; and

- Develop a focus on the specific requirements of public sector delivery management.

. If these taining strategies were enhanced, health and safety practice on construction sites in Nigeria would be improved. However, this training cannot be effectively implemented if the current level of H&S being practiced on Nigerian construction sites is not fully understood. There is also the need to study the types and fruequency of accidents on construction sites and investigate the causes and how they could have been prevented. The findings of such studies will be a major source of imput to the resources needed for the training mentioned above and will help in developing appropriate framework for effective health and safety management among construction companies in Nigeria. Hence the need for this study

2.1.4 Role of Government in the Construction Industry

Affirming the links between the construction industry and national development, it is important to note the consequential roles of the government in such sector. Governments are known to play important roles in sectoral and national development. According to Dantata (2008), it is mandatory that in any given country including Nigeria, that the government plays a significant role in the construction industry. Ideally, the government's roles in the construction industry should cover the following (Dantata, 2008):

- Develop the nation's human capital: By providing quality educational services such as technical schools, and other educational institutions, the government could help immensely in the development of the construction industry within its borders. Currently in Nigeria, there is a general lack of quality institutions that are capable of graduating good students. For the few existing ones, there is the problem of inadequate facilities to ensure sufficient education for students, which posed many problems on their existence.

- Facilitate the access of companies to capital, technology and factor inputs: In order for construction companies to operate more efficiently, the government should help facilitate access to capital, latest technology and factor inputs. such as construction materials, equipment and labour.
- Encourage activities of professional associations: The government should facilitate the establishment of professional associations such as the Federation of Construction Industry of Nigeria and should consult with these associations on all major decisions that could potentially affect the industry.
- Demand foreign companies to collaborate with local ones: A big role that the government could play in developing local capacity is to require that foreign companies make a commitment to have local partners for projects in their countries. In addition to insisting that these firms partner with local firms for delivering projects, the government should also demand that the foreign companies train local engineers and labour force, transfer their technical knowhow and help in developing local capacity. Just as the South Koreans did for their nuclear plants with Bechtel, and the Chinese are doing today with American companies operating in China, the Nigerian government should also ensure that foreign companies' partner with local companies in order to transfer knowhow to local companies.
- Streamline its process of procurement of construction services: It is very important that the government streamline its process of procurement of construction services. With an elastic service in the industry by the government, it may be impossible for the government to be able to fulfil them and may be

ambiguous. Thus, the streamlining of these processes makes the government more specific and efficiency would increase.

Taking a keen observation, it would be prerogative in this study to call attention to the fact that the governments at all levels need to deploy resources and inputs to the nation's construction industry and thus develop the human capital of the sector in the nation: Facilitate the access of industrial companies with respect to capital, technology and other inputs that could enhance the service provision of the sector; and encourage activities of professional associations with respect to engineers and other professions associated with the construction industry, and demand foreign companies to collaborate with local ones to enhance a better knowledge transfer from developed countries such as the UK, USA & Japan to Nigeria, and among engineers and the labourers in the sector; and streamline its process of procurement of construction services towards a better service provision. However, to be able to conceptualise the missing gap of the role the government have played thus far in the Nigeria construction industry, it is important to investigate the present state of the industry and provide the factors that have been limiting the effect and performance of the Nigeria construction industry. It is important to draw attention to the fact that a major aspect of understanding the performance of the construction industry is through the rate of injuries and other health related issues in the sector, thus the need to emphasise the occupational health and safety management in the industry and, in turn, the need for this study.

2.2 THE CONCEPT OF OCCUPATIONAL HEALTH AND SAFETY

The term occupational health refers to increased rates of work-related illness and injuries in particularly vulnerable populations (Centres for Disease Control and Prevention (CDC), 2011). Alli (2008) suitably defined occupational safety and health (OSH) as the knowledge of prediction, identification, analysis and management of threats stemming in or from the work environment that could damage the health and well-being of workers, and taking into consideration the likely impact on the immediate and wider environment. The scope for this is quite a large one that covers a significant amount of specialties and several workplace and environmental threats. The field of OSH has slowly and consistently grown due to changes in technological, social, economic and political changes. More recently, global proliferation of the world's economies have produced results that are being regarded as the greatest element of change in the working environment and therefore in the scope of OSH, both positively and negatively.

Additionally, the accelerated advancement in technology, liberalization of world trade, important developments in communications and transport, variation in employment models, modifications in organisational work practices, varying employment forms for men and women, and the magnitude, system and life cycles of businesses and modern technologies can all create new kinds and forms of hazards, threats and perils. Also, changes in demography and migration, and the resultant strain on the environment can also impact H&S in the workplace (Alli, 2008). As a result, it can be said that workers' protection against iilness and injury is connected to the working environment.

A good psychological (mental) H&S strategy benefits employers, affecting workforce stability, productivity, insurance costs, risk of legal or regulatory sanctions, and the financial bottom line. It also benefits employees, with an enormous impact upon their health, morale, work life quality and ability to perform at their highest capacity.

Occupational health is an aspect of public health programme and is established to ensure that the health status of everybody or, to be more specific, every worker in any occupation is protected, maintained and promoted. In addition, it considers the physical, mental and social dimensions of men (holistic view) in the work environment (Asogwa, 2007).

Creating a healthy workplace and workforce in any occupational environment is the best way to position that occupation to better deliver services, the construction industry not excluded. Furthermore, occupational health takes care of the diseases, accidents, emergencies and other hazards faced in the work environment and how the problems can be prevented, improved, controlled, and because of the morbidity and mortality associated with industrialization, industrial legislations were enacted solely for the protection and safety of employees in any paid occupation such as the Nigerian construction industry.

Occupational health practices and services help one to understand the processes taken to ensure that the health status of the employees is protected, promoted and maintained. It also involves detection of the presence of different types of diseases, accidents and hazards that can occur in any occupation; planning and organizing how the services are to be provided to ensure competency and continuity; the types of programs/services to cover; the principles of hygiene to adopt and the effects of the problems on the employees and also determines the preventive and control measures to adopt to ensure that morbidity and mortality of the employees due to diseases and accidents are minimized or even eliminated altogether (Centre for Applied Research in Mental Health and Addiction, 2012).

Alli (2008) stated that there are three major objectives to establishing occupational health and safety. These include:

- the maintenance and promotion of workers' health and working capacity;
- the improvement of work and working conditions so that they are conducive to safety and health; and

- the advancement of work organisations and precautionary health and safety cultures in a way that backs safety and health at work. This kind of advancement also tends to drive a positive societal climate and increases the operational fluidity and probably the productiveness of organisatiions. The term “culture” in this context means an environment reflecting the value systems adopted by the undertaking concerned. This kind of culture is shown in practice in the organisational frameworks, personnel policy, guidance policies and quality management of works.

Thus, occupational safety and health management is a key element in achieving sustained decent working conditions and strong preventive safety cultures (Alli, 2008). UC Berkeley and Young Workers United (2011) have categorized job hazards into different categories, such as:

- Safety hazards**:** which cause immediate accidents and injuries. For example, knives, ovens, slippery floors are hazards that can result in burns, cuts or broken bones. The case of construction industry may be worse than those from other industries.
- Ergonomic hazards: that cause sprains and strains, such as doing repetitive tasks or heavy lifting.
- Other health hazards: additional workplace conditions that can make you sick, such as noise, chemicals, heat, and stress.

Occupational health as described by Hattingh and Acutt (2009), is focused on the link between health and work and was defined by a public commission of ILO and WHO as being to do with:

- The promotion and maintenance of the maximum level of physical, mental and societal welfare of employees in all roles.

- The protection of employees in the jobs from threats and injuries resulting from elements detrimental to health.
- The situation and preservation of the employee in a work environment modified to suit his/her mental and physical state.

From the reviews from the study of Hattingh and Acutt (2009) and UC Berkeley and Young Workers United (2011), there is a need to investigate their causes to help provide a better framework for ensuring a better and efficient health and safety management in the Nigerian construction industry. This is because ensuring health and safety in the workplace of construction industry is known to be tied to major problems such as increased rates of work-related illness and injuries in particularly vulnerable populations; among others. Also, ensuring health and safety at workplace has been extending to the protection of workers psychologically (mentally). The identification, analysis and setting of control measures for hazards, which negatively impact the well-being of workers, in the work place by managers would be further aided through the use of OSH in the construction industry and also help to determine their impact on the wider community. Furthermore, the review of literature proves that creating a healthy workplace and a healthy workforce in any occupational environment is the best way to position that occupation to better delivery of services, the construction industry not exempted. To this end, it is expedient to investigate the possible factors that militate against the H&S management in the Nigerian construction industry because OHS management in Nigeria could differ from the situation in in developed economies.

2.2.1 Occupational Health and Safety in the Nigerian Construction Industry

The fact that occupational health and safety (OHS) is poor in developing countries such as Nigeria cannot be denied when compared to those of developed countries (Idoro, 2008;

Diugwu *et al.,* 2012; Umeokafor *et al.,* 2013; Umeokafor, Umeadi, and Jones, 2014). Okeola (2009) states that H&S in the construction industry relates to preventing employees from been or injured at work, killed or becoming ill by taking appropriate precautions and providing a satisfactory working environment to enhance performance. The safety performance of the construction industry has been improving recently, but the state of the industry in many nations such as Nigeria is still poor (Al-Kilani, 2011) and H&S has been recognized as an important business performance subject, especially in the construction industry (Myers, 2003; Wilson and Koehn, 2000).

The numbers of people injured or even killed in construction projects has been increasing (Al-Kilani, 2011**;** Emiedafe, 2015; Arthur, 2016; The People's Daily**,** 2017; Okoye *et al.,* 2018). This has been due to many safety issues in the construction projects being overlooked by the authority due to ignorance and, on most occasions, the main concern for the authority is how to finish as many projects possible to make up for the lost time. The reasons for this, as stated by Umeokafor *et al.,* (2014), were based on the grounds that occupational accidents are under-reported, the OHS regulatory and enforcement systems (which are intervention strategies) are ineffective and dysfunctional, and accident and injury rates are on the increase. Consequently, developing effective strategies for improving OHS is a challenge. Other factor for the negligence of safety in the construction industry is the fact that most construction workers are foreign nationals from other countries, hence there is little pressure from the local population on the government to address this issue (Al-Kilani, 2011). Understanding the trend, distribution and risk factors of accidents, injuries, fatalities, accident causal factors and intervention remain pertinent in developing effective strategies for the improvement of OHS globally (Umeokafor *et al.,* 2014).

These have contributed to making construction work demanding especially with respect to H&S (Wahab, 2010). In an empirical study titled Work Stress among Professionals in the Building Construction Industry in Nigeria, Ibem *et al.,* (2011) affirmed that in Nigeria, very little studies have examined work stress. The building construction industry and construction sites in Nigeria are characterized by inadequacies in space, ventilation, humidity and temperature control measures, which render them not very conducive for productive work, and thus may affect workers H&S during labour (Ibem *et al.,* 2011).

Furthermore, Okoye and Okolie (2014), in their exploratory study of the cost of health and safety performance of building contractors in south-east Nigeria, found that over decades, the construction industry has been intensifying efforts towards improving its health and safety performance; however, these efforts have been shifted from monitoring safety performance to proactive continuous improvement on safety performance. Studies have been reviewed (Idoro, 2008; Okeola, 2009; Al-Kilani, 2011; Umeokafor, Isaac, Jones and Umeadi, 2013; Umeokafor, Umeadi and Jones, 2014; Okoye and Okolie, 2014), and have shown the state of H&S management in the Nigeria construction industry to be very poor and not comparable to those of other countries such as those in developed countries like the UK, USA, Japan, among others with a more sophisticated health and safety management system. Therefore, it is important to know and understand the major factors responsible for the differential operation of H&S management in the Nigerian construction industry in order to provide a better model that would fit into the Nigeria construction industry, as had been affirmed by Omiunu (2012). To this end, this present study investigates the major factors that have been influencing the H&S management in the Nigeria construction industry.

2.2.2 Measuring Occupational Health and Safety Performance

Understanding the concept of occupational health and safety in the construction industry calls for an urgent need to understand the measurement because not knowing how to capture how it operates in the system may also lead to more jeopardy in the system. However, measuring occupational health and safety at the occupational level has attracted attention among scholars and has also led to a strong debate. This is because what may be important to one location may be different to another and, importantly, many frameworks and models used in developing countries such as Nigeria were imported from the Western world, according to Omiunu (2012). However, these kinds of deployment may not tally with the present environment of the construction industry.

The parameters for measuring OHS performance in the construction industry can also be classified into two categories: objective measurements, which are mainly focused on mishaps and physical traumas, and subjective measurements, that are focused on the people's opinion of OHS position in the work environment. Of the two categories, objective measurements of mishaps and physical traumas is more commonly used by researchers to evaluate OHS performance (Kartam, 1997; OSHA, 1999; Koehn *et al.,* 2000; HSS, 2001; HSE, 2002; Bhutto *et al.,* 2004; Carrigan, 2005). These measurements can be described as mandatory measures, as emphasised in some OHS regulations such as the Factory Act, which stipulate that such cases should be reported. Using the level of occurrence of mishaps and physical traumas as measures of OHS execution is commonplace as they are reliable indicators of safety levels at sites.

However, researchers have criticised these measures and have recommended a more subjective approach. Trethewy *et al.* (2000) and Mohammed (2003) both state that measures based on rates of accidents and injuries suffer from three drawbacks: (a) they assess the aftermath of events and only deliver reactive measures from management; (b) as they lack pre-emptive attributes, establishing casual relationships is impossible; (c) and they have a pessimistic nature and are deemed to provide ineffective measurement of safety performance. In view of these drawbacks, Marosszeky *et al.* (2004) suggested a shift of focus towards detailed management-oriented measurements that have the potential to influence the processes of the project being assessed. A few of these management-oriented measurements include: the subjective performance rating used by Jasekris (1996); the Site Safety Meter based on traditional site inspection developed by Trethewy *et al.* (2000); and access to heights, housekeeping and personal protective equipment used by Marsh *et al.* (1995).

Safety performance is the OHS conditions at a construction site. Researchers use several measures of OHS performance. The most common measure is the accident rate (HSS, 2001; 2003; Bhutto *et al.,* 2004). Another common measure used by researchers is the rate of fatal injuries (Kartam, 1997; OSHA, 1999; Koehn *et al.,* 2000; HSS, 2001; 2003; Bhutto *et al.,* 2004; Carrigan, 2005). Marosszeky *et al.* (2004) maintain that safety management systems have largely been developed in response to statutory requirements and OHS reporting focuses mostly on mandatory information related to accidents and injuries. These two parameters are part of the category of OHS performance indicators called negative performance indicators (NPIs), lead-time indicators (LTIs) or lag factors. The importance of these two factors is emphasised in several OHS.

For Idoro (2011), all contractors in the Nigerian construction industry do not really perform better than others in terms of health and safety, thus the industry has been deprived of the opportunity to make appropriate changes when required, especially when these important stakeholders have poor attitudes towards the health and safety of their employees. These poor attitudes towards safety and health issues in the Nigerian construction industry has long affected the performance level of the industry and, according to Awodele and Ayoola (2005), Dimuna (2010), Ayedun, Durodola and Akinjare (2012), these are manifest in the high rate of fatalities and injuries arising from construction activities in Nigeria.

Hinze (2005) suggests that in order for the improvement of safety performance to be effective, construction firms must be structured and positioned to make changes when it is deemed appropriate. He further posits that to be truly proactive in safety requires that a safety approach be adopted should not be dependent on the monitoring of injuries after they occur, and rather than basing safety actions on measures of failure (as is customary with a focus on injury occurrence), a shift in thinking is needed whereby the focus is on those actions that can lead to good safety performance. Regrettably, Olatunji and Aje (2005) lament that though prequalification has gained tremendous support and popularity in contract procurement in Nigeria, H&S factors of contractor performance is not popularly prioritized, thus the need for this study.

Observing the arguments between the school of thoughts of objective measurements of rates of accidents and injuries provided by Kartam (1997), OSHA (1999), Koehn *et al.* (2000) HSS (2001; 2003), Bhutto *et al.* (2004), HSE (2002) and Carrigan (2005) and that of the subjective measurement by Marsh *et al.* (1995), Jasekris (1996), Trethewy *et al.* (2000) and Mohammed (2003), Marosszeky *et al.*(2004), one may seem to fall into confusion on which strategy could best be adopted. Merging the results from studies as situated above, it is expedient to note that a better method to enhance the health and safety management of construction industry is to adapt both school of thoughts (objective and subjective). This is because, from the perspective of the objective methods, studies have shown that there has been inaccurate data of the rate of health and safety issues in the construction industry and thus the subjective perspective could cover for these shortcomings. Therefore, the study would adapt both the subjective and objective methods to obtain information from the engineers about the factors affecting health and safety issues in the Nigerian construction industry.

2.3 OCCUPATIONAL ACCIDENTS AND INJURIES IN NIGERIA CONSTRUCTION INDUSTRY

The poor state of health and safety management issues in the Nigerian construction industry is conceptualised in providing the rate of occupational accidents and injuries in the Nigeria construction industry. This would help provide the major gap, which this study would tend to fill at the short and long run. Umeokafor *et al.* (2014) have stated that it is necessary to understand the status quo of occupational incidents in Nigeria in relation to accident rates, fatality rates, accident causal factors and intervention as this is vital to developing effective strategies to improve the problematic state of occupational health and safety (OHS) in Nigeria.

This implies that the nation's construction industry with respect to occupation safety and health is in a problematic state. According to ILO (1999), accident prevention is often misunderstood, for most people believe wrongly that the word "accident" is synonymous with "injury". This assumes that no accident is of importance unless it results in an injury. Construction managers are obviously concerned with injuries to the workers, but their prime concern should be with the dangerous conditions that produced the injury – with the "incident" rather than the "injury". On a construction site, there are many more "incidents" than injuries. A dangerous act can be performed hundreds of times before it results in an injury, and for injuries to be reduced, the managers' efforts must be directed to these potential dangers.

The construction industry is recognized as the most hazardous (Suazo and Jaselskis, 1993). Al-Kilani (2011) discovered that the main reasons for accidents in the construction industry are linked to human attitude, the distinct nature of the industry, hard work-site setting, and lack of safety management which leads to poor work processes and procedures. In addition, accident rates in construction are high when compared to other industries in the economy.

The reason for occupational accidents and injuries in the construction industry is that the activities of the industry are done using machines. New plant and equipment (machines) are being developed and produced regularly in response to the needs of the industry. According to Seeley (1996) and Godwin (2011), an increase in the use of mechanization in construction work can speed up construction and reduce the overall cost of construction thus increasing the profit margin of such industry. In appreciation of the important role that plant and equipment play in achieving project objectives, clients place greater emphasis on the use of plant and equipment (Al-Kilani, 2011). In response to this development, contractors often embark on efforts to own construction plant and equipment in order to be able to compete favourably with their counterparts during tendering (Al-Kilani, 2011).

The main fact that mechanization is been used in the construction industry reveals the fact and the prevalence of the various hazards that occur in the industry. According to Kartam (1997, cited in Godwin, 2011) and Al-Kilani (2011), the construction industry is one of the most hazardous industries all over the world and can be more prevalent in developing than in developed countries. According to Alazeb (2004, cited in Al-kilani, 2011), a few examples of the existence of occupational accidents and injuries are employees being struck by an object, falling to the ground level, getting stuck in a machine and being hit by falling objects. Zeng *et al.* (2008) commemorated the work of Alazeb (2004, cited in Al-kilani, 2011) and stated that falling from height and getting hit by falling materials were the most common reason for accidents leading to injuries in the

Chinese construction industry. Farooqui *et al.* (2008) have stated that the major injuries faced by contracting firms in developing countries such as Nigeria on their projects site, in descending order of occurrence, are: fall injuries; struck by waste and raw materials; heat stroke; head injuries; eye injuries; and burning cases, among others.

Accident statistics represent not only terrible human tragedies but also substantial economic costs, because accidents cause damage to plant equipment and the loss of productive work time until the normal site working rhythm and morale are restored (Al-Kilani, 2011). It has been noted that accidents can also cause work disruption and reduce the work rate (Enshassi *et al.,* 2007). From the studies of Al-Kilani (2011) and Enshassi *et al.* (2007), it can be deduced that occupational accidents and injuries affect human lives, the organisation, and the construction sector at large; with an extension to the economy, because when such organisations are affected, it tends to reduce their productivity, and thus it's effect on the GDP contribution and, by extension, the overall national GDP.

Eliciting the effect of occupational accidents and injuries, Koehn and Datta (2003), stated that in developing countries such as Nigeria, injuries often go unreported and employers only provide some form of cash compensation for employees who are injured. This phenomenon is said to have several implications on the construction industries of developing countries such as Nigeria. In another study, Rowlinson (2003) found that the cost of accidents and injuries in the construction industry accounts for 8.5% of the total tender price in Chinese. The resulting implication is a high incidence of accidents and injuries, which may have grave consequences on the industry and even on national development (Godwin, 2011).

From the studies of Suazo and Jaselskis (1993) and Al-Kilani (2011), it has been found that the construction industry is one of the most hazardous industries all over the world.

Moreover, it is more prevalent in developing than in developed countries. Therefore, there is a need to shed light on the developing countries' scenario on the rate of accidents and injuries and their major causes to help proffer strategies to mitigate and cushion them towards a better occupational health and safety in the Nigeria construction industry; hence the need for this study.

2.3.1 Rate of Incidence of Occupational Hazard in Nigeria Construction Industry

Al-khani (2011) declared that there is a 1 in 300 chance of suffering a fatality for those who work on construction sites for most of their lives. From the work of Al-Kilani (2011), the probability of selection could be randomly dispersed among the workers, and this may be grave when conceptualised from the fact that this "1 out of 300" could be anybody and such injury may be grievous or lead to a loss of lives. In the construction industry, the likelihood of being disabled from a seriously injury is much higher when compared to other industries. There is a chance that every single construction worker can be temporarily unavailable for work due to physical traumas or illhealth caused by being on construction sites. (Ahmed *et al.,* 2000, cited in Farooqui *et al.,* 2008).

Although, it has been reported that there is a lack of credible accident data in Nigeria (Idoro 2008, Okolie & Okoye 2012); Ezenwa (2001) reveals that within the period of 10 years (1987 – 1996), 3183 injuries were reported; of which 71 or 2.2% were fatal with the highest annual case fatality rate of 5.41 in 1994 and the lowest annual case fatality rate of 0.94 in 1990. For Umeokafor *et al.* (2014), from 2002 to 2012, 40 accidents were reported in which the following statistics were recorded: 93 injuries, 46 deaths and a high case fatality rate of 49.5. Comparing this result with that of Ezenwa (2001), the findings show a significant increase in case fatality rate in Nigeria.

Umeokafor *et al.* (2014) stated that for the entire 11 years, from 2002 to 2012, the annual case fatality rates of these injuries do not show a definite range of increase or decline, as it indicates case fatality rates of 58% in 2002, 100% in 2003, no fatality in 2004, 25% in 2007, 75% in 2008, 66.7% in 2009, 20% in 2010, 25% in 2011 and 28.6% in 2012. This is in contrast to the study by Ezenwa (2001) which shows an increase in annual fatality rate from 0.9% in 1992 to 5.4% in 1994. This may be due to the decline in reported accidents in Nigeria. Considering, for example, in the year 2002, 29 deaths were recorded (63%), which is the highest number of deaths and 1 (2.5%) accident report for the year.

The work of Umeokafor *et al.* (2014) stated that the death trend and causes during the 11-year period indicate that death is highest as a result of fire outbreaks, which led to 52 injuries (55.9%) and 29 deaths (63%) with a case fatality rate of 59.6%. Next are deaths because of the fall of heavy objects during lifting, which caused 6 deaths (13%), 10 injuries (10.8%) with a case fatality rate of 60%. Another major cause of death during the years of study was explosions, which led to 4 deaths (8.7%), 5 injuries (5.4%) and a case fatality rate of 80%. Trapping of workers by moving parts of machines led to 2 deaths (4.3%) and 2 injuries (2.2%), while the inhaling of poisonous gases, machinery driven by power, hot thermal fluids, electrocution and malfunction of a machine all led to 1 death each (2.2%). Thus, the study of Umeokafor *et al.* (2014) showed that the three highest causes of injuries were fire outbreaks, machinery driven by power, and fall of heavy objects during lifting; while the three highest causes of death were fire outbreaks, the falling of heavy objects during lifting, and explosions. This differs from the data provided by Ezenwa (2001) that, between 1987 and 1996, there were 71 deaths out of which machinery driven by power caused 12 (16.9%) which ranked highest, followed by explosions at 10 (14.1%) and then people falling at 9 (12.6%).

Comparing the study of Ezenwa (2001) and Umeokafor *et al.,* (2014), their findings showed that during the ten years of Ezenwa's (2001) study, 3183 injuries were reported whereas, during the period of Umeokafor *et al's*. (2014) study, only 93 injuries were reported. From these two studies, it could be that the rate of accidents in the construction industry has sharply dropped and reduced from the 3183 injuries noted by Ezenwa (2001) to just 93 noted in the study of Umeokafor *et al.* (2014). Taking into consideration the constant agitations of stakeholders and scholars of the construction industry especially with regards to Nigeria, one could affirm that this data is unrealistic and that cases of occupational injuries are well-reported and documented in Nigeria scenario, thus this data could be misleading and, if used, may tend to cause a development that is unsustainable.

In the UK, the construction industry is one of the biggest industries as it provides employment for 2.2 million people and is one of the most dangerous, recording over 2,800 deaths from injuries received at work in the last 25 years. This condition is worst in developing countries because accident and injury rates in many of the developing countries, such as Nigeria, is high (Idoro, 2008; Godwin, 2011; Al-Kilani, 2011). This rate is high in most developing countries such as Nigeria because safety consideration in construction projects delivery is not given priority and the employment of safety measures during construction is considered a burden (Al-Kilani, 2011).

In United States of America (USA), the National Safety Council (NSC) found that construction injuries accounted for nearly 11% of all work-related injuries and more than 30 percent of all fatalities in 2001 (Eppenberger and Haupt, 2003). In 2005, a four-storey building under construction in Port Harcourt collapsed and at least twenty workers died in the incident, barely 24 hours after a similar incident had occurred in Lagos (The Punch, July 2005). It was noted that availability of data remains a hindrance to OHS in developing countries such as Nigeria (Ezenwa, 2001; Idoro, 2008; Diugwu *et al.,* 2012)

From the review of literature, Hamalainen *et al.* (2006), Idoro (2008), Okeola (2009), Godwin (2011), Al-Kilani (2011), Umeokafor *et al.* (2014), among others, it has been affirmed that the rate of accidents and injuries on construction industry in developing countries such as Nigeria is very high and sometimes there is no available data or information to provide vivid clarification for the high rate of such accidents and injury. To this end, there is a need to shed more light on the Nigerian construction industry to ensure a better health and safety practices and management in the industry. In addition, this present study would provide the necessary factors that influence health and safety management in the Nigerian construction industry towards providing a model that could help ameliorate this high rate of accidents and injuries, as provided by the literature reviewed.

2.3.2 Causes of Occupational Accidents and Injuries in Construction Industry

Concentrating on the rate of accidents and injuries in the Nigeria construction industry would be a wasted effort if justice is not extended to the major causes of the high rate of injuries and accidents in the Nigerian construction industry. Excavating the major causes of injuries and accidents in the Nigerian construction industry would help us to know where the Nigeria construction industry is, where is it supposed to be, and what is necessary for the industry to be where it should be. It is when these are completed that this present study would have reached the nook and cranny of the industry towards enhancing the sector at the long run. In the meantime, according to Umeokafor *et al.* (2014), there is a need to understand the factors that contribute to occupational hazards, especially in developing countries such as Nigeria. In addition, understanding the trend, distribution and risk factors of the accidents, injuries, fatalities, and accident causal factors are salient issues and remain pertinent in developing effective strategies for the improvement of OHS globally, especially in developing countries such as Nigeria. Al-Kilani (2011) reported that factors that may cause occupational accidents and injuries include severe competitive tendering methods, the age of the workers, experience, the lack of training of workers and the main concern of the management on productivity with ignorance about safety issues. Going by the study of Umeokafor *et al.,* (2014), the causes of occupational accidents as reported are management factors which account for 91.3% and include: inadequate training, hence low level of awareness; a lack of supervision; human factors; which accounted for 8.7% include: failure of employees to attend training sessions; lack of training was the highest occurring remote or contributory factors of the reported accidents followed by lack of supervision. The use of obsolete machines accounts for about 50% of the management factors in terms of unsafe conditions.

According to Al-kilani (2011), the lack of safety management, dangerous working conditions and human attitude which lead to treacherous work processes and procedures are some of the major roots of mishaps. For Tole (2002), the main causes of construction accidents are a lack of proper training, deficient enforcement of safety, lack of safety equipment, unsafe methods or sequencing, unsafe site conditions, not using provided safety equipment, poor attitudes toward safety, and isolated and sudden deviation from prescribed behaviour.

Al-Kilani (2011) adds that, in the construction industry of most developing countries such as Nigeria, occupational accidents and injuries seems to be high because safety considerations in the delivery of construction projects are not given priority and the employment of safety measures during construction is considered a burden. In addition, Enhassi *et al.* (2008) affirm that in many developing countries, legislation governing

OHS is significantly limited when compared to those of developed countries such as the UK. In developing countries, provisions for such legislation in the construction industry for their workers' safety are not put in place. However, according to Lee and Halpin (2003), in some countries, safety legislation does exist, but these regulatory authorities are often weak as though not existing.

Furthermore, Al-Kilani (2011) state that, on many sites, no training programs for the staff and workers exist. As a result, new staff don't get the necessary trainings, hazards are not identified. Employees are required to learn from their own mistakes and experiences. In addition, a lack of medical facilities, shanty housing and substandard sanitation often exist on remote projects. Workers undertake a risk while at work and the following problem areas are common:

- While excavating in deep trenches (with no proper shoring or bracing), accidents due to cave-ins often occur.
- Mainly labourer use concrete, and cements burns due to the unavailability of protective gloves and boots are common.
- Workers fall from heights due to weak scaffolding and the unavailability of safety belts.
- Workers sustain injuries on the head, fingers, eyes, feet and face due to the absence of personal protection equipment.

Furthermore, the lack of understanding of the job and poor equipment maintenance are also major causes of accidents and injuries in construction industry (Al-Kilani, 2011). Furthermore, maintenance and inspection schedules often are not followed, and only after a breakdown is equipment repaired (ibid). This can lead to loss of time, idle workers and projects delays. It may also cause damage to property such as a breakdown of concrete mixers, vibrators, water pumps, and tractors which can cause accidents and injuries in the workplace, such as electrocution due to the use of substandard electrical equipment and underground cables, among others. In some cases, workers, especially young ones, take chances and often do not follow safety norms or use personal protective equipment.

Farooqui *et al.* (2008) noted that insufficient safety measures from the current regulatory bodies that have not being able to set safety as an important objective, lack of specialist procedures, non-existent growth in terms of modernisation and inadequate insurance offerings which are unable to push safety as a priority are responsible for the mishaps and physical traumas encountered in developing countries. Many labourers and staff are also sometimes are under the influence of alcohol and drugs and, unfortunately are not checked for drugs and alcohol before the start of and during work, which can also lead to occupational accident and injuries especially in construction industries. In addition, low-level activity supervisors (engineer/technician) can also cause occupational accidents and injuries (Al-Kilani, 2011).

Tam *et al.* (2004) and Hassouna (2005) have both identified poor safety awareness of top management leaders and poor safety awareness of projects managers as the main causes of occupational accidents and injuries in construction industry in China. The studies of Tam *et al.* (2004), and Abdul Rahim, Muhd, and Abd Majid (2008) in the same location (China) also supported these. The causes of accidents in construction industry were due to the following: poor safety awareness from top leaders; lack of training; poor safety awareness of managers; reluctance to input resources for safety; reckless operation; a lack of certified skill labour; poor equipment; lack of first aid measures; a lack of rigorous enforcement of safety regulation; a lack of organisational commitment; low education level of workers; and poor safety conscientiousness of workers.

On any occasions, owners and consultants do stress safety before work commences, but, as the work progresses, their concerns for deadlines become a priority and they tend to pay less attention to health and safety of staff. This negligence and drifted priority may sometimes lead to occupational accidents and injuries (Al-Kilani, 2011). In addition, Idoro (2011) stated that the incorrect use of plant, use of defective plant and careless acts by plant operators are not uncommon on construction sites and can result in accidents, thereby increasing accident and injury rates. According to Okoye and Okolie (2014), the reason to ensure efficient management and prevention of health and safety issues and the causes of accidents in construction industry is that unsafe conditions exist on many sites; both large and small; and labourers are subjected to numerous hazards. Moreover, training programs for the staff and workers does not exist, therefore, no orientation for new staff or workers is conducted, hazards are not pointed out, and no safety meetings are held. On many occasions, employees learn from their own mistakes or experience which could be dangerous to their lives and health. In addition, there is the lack of medical facilities, shanty housing, and sub-standard sanitation and, moreover, while working on site, workers undertake a number of risk which could include the following: when excavating in deep trenches (with no proper shoring or bracing), accidents due to cave-ins often occur; when concreting is carried out mainly by labourers, and cements burns due to the unavailability of protective gloves and boots; workers fall from heights due to weak scaffolding and the unavailability of safety belts; workers sustain injuries on the head, fingers, eyes, feet, and face due to an absence of personal protection equipment; and there is improper housekeeping. The lack of understanding of the construction industry job and the poor maintenance of equipment are also major issues that can cause accidents and injuries among site workers.

Furthermore, Amweelo (2000) investigated industrial accidents in Namibia and reported some causes of occupational health and safety issues such as careless attitudes toward work, which leads to risk and hazards of work, and therefore revealed common industrial incidents at the workplace. In addition, the ILO (1999) has pointed out that the main causes of accidents resulting from excavation work are as follows: workers trapped and buried in an excavation owing to the collapse of the sides; workers struck and injured by material falling into the excavation; workers falling into the excavation; unsafe means of access and insufficient means of escape in case of flooding; vehicles driven into or too close to the edge of an excavation, particularly while reversing, causing the sides to collapse; and asphyxiation or poisoning caused by fumes heavier than air entering the excavation e.g. exhaust fumes from diesel and petrol engines. Nobana and Leesi (2013) state that hazards can result in an accident and thus safety measures are required for hazards control measures. However, to ensure such safety measurement, it is expedient that the major causes of the occupational hazards in the Nigerian construction industry are known in order to be able to arrive at a more conceptualised model that would fit into the Nigeria construction industry system as stated by Omiunu (2012). There is therefore the need for this study to provide necessary and updated information on the causes of occupational hazards or injuries and accident and thus develop a framework to curtail accidents and risks in the construction industry in Nigeria.

2.3.3 Improving Occupational Safety and Health in Construction Projects

Neale (2013), in the African Newsletter on Occupational Health and Safety, affirmed that although improving occupational safety and health (OSH) in the construction industry, especially that of Nigeria, is slow, it is an achievable process. Neal (2013) listed ten factors that would lead to improving the Occupational Health and Safety:

- Developing a national culture of safety: For Neale (2013), construction projects do not operate independently of the society in which they are located; this may affect the ability for project managers if the normal culture for such an environment or society does not demand it. It is pertinent to note that, to develop an effective OSH culture, it has to start at a senior government level and be implemented throughout the government, employers and employee organisations.
- International agreements influence national policies and national laws: The G20, ILO and WHO can do much in terms of influencing governments' attitudes to OSH, especially in developing countries such as Nigeria, and cause them to take action.
- Funding agencies must insist on good OSH through their contracts: In many countries in Africa, which could include Nigeria, a significant proportion of construction projects are funded, at least partially, by external funding agencies. These agencies have a responsibility to enforce good OSH practice through the contracts that they fund. The purpose of most externally funded projects is to enhance the well-being of the citizens of the country, and this includes the well-being of all those engaged in the construction process. Therefore, external funding agencies must see themselves as prime agents of beneficial change.
- Comparative studies of the OSH environment and practices: Deploying comparative studies to investigate African countries' construction industry would be useful in identifying the importance and relevance of such possible key factors as culture, climate and differences between urban and rural environments. Much of the information and technology for OSH has evolved in developed countries such as the USA, Europe and Australia. African countries are obviously very

different and very diverse across the continent. Nevertheless, Neale (2013) has noted that well-intentioned and necessary attempts to simply apply industrialized country practices and procedures in the construction industry are unlikely to succeed. A comprehensive study of these issues, leading to recommendations of how to improve OSH locally may be an important part to ensuring an effective health and safety practices, especially in Nigeria, hence the justification for this study.

- A comprehensive, generalized model on the business case for OSH should be developed: In ensuring an effective OSH in the variety of construction companies throughout the developing countries such as Nigeria, cost has always been put forward as a major obstacle. Suffice it to say that it is quite reasonable to argue that a good business case can usually be made for investing in OSH. In many instances, the operatives in the construction sites cannot work at maximum efficiency if their workplaces are not properly designed; however, productivity could increase when attention is given to the workplace and effective health and safety practices are put into place. According to Neale (2013), when temporary structures or excavations collapse and kill or injure people, the construction project suffers from additional costs and delays. Other factors that could be affected also include reputation, which helps a construction company to obtain work, and insurance costs.
- OSH has to be managed actively: Although most construction works make their plan in some way, a major aspect, which relates to and deals with OSH, is the technical aspect of the construction process. However, in many cases, ensuring an effective technical construction process has not been effective. OSH must be actively managed and planned as an integral part of the planning process and, if

no safe construction method can be found, the construction team should go back to the designers and help them to amend the design. Taking a holistic approach, such a process will be much more effective if the designers embrace OSH principles at the outset of their design process.

- Workers should be more directly involved in planning and implementing safe and decent work: Stakeholders of the safety and health have widely agreed that the traditional belief that employers are solely responsible for workers' safety at work should change. To ensure safe working conditions, workers should also be allowed to participate actively in OSH and cooperate with employers. Since they are closer to their work, it is felt that the workers themselves are the most qualified to make decisions about safety and job improvements. Nevertheless, this calls for the managers to listen and give attention to the voice and decision of the workers or employees. Evidence shows that various benefits could be yielded if workers worked together with employers, including the reduction of death and injury rates at work. However, according to Neale (2013), making workers' participation effective in the construction industry demand some active responses from legal support, management support, trade union support, training, and the positive quality of the workers involved.
- OSH personal protective clothing and equipment (PPCE) must be developed to suit the diversity of cultures and physiques of both men and women workers: Most of the PPCE that is available is designed for quite robust males, and is western/European in design and appearance. In many countries, men are physically smaller and less strong (their diet may influence this) and so the PPCE available is unsuitable. There is also a serious issue with attempts to use items designed for temperate climates in hot or humid conditions. In Africa, where

women work on construction projects, the PPCE may not fit them (and in some cases may be harmful to a woman's physique) and is often culturally unacceptable in appearance. This presents a major obstacle to improving OSH especially in developing countries such as Nigeria. Therefore, attention should be given to providing the PPCE that would be gender equality.

- The technology to improve OSH, including better control and warning systems, communication devices and better (safer) machines, should be further developed: Modern construction machinery is used increasingly in Africa. Thrust upon an unskilled and untrained workforce, this machinery can be lethal. Therefore, manufacturers and suppliers have an important obligation to ensure that the machines are designed and made to be as safe as possible, and incorporate realistic safety devices.
- Effective education and training in OSH are required globally; it should be designed in such a way as to measurably enhance attitudes, skills and knowledge: There should be a need for effective training and workshop of the workforce of the construction industry, especially in developing countries such as Nigeria. Here, lectures on regulations may be relevant, but there is also a need for educators and trainers to become involved in the reality of construction work.

According to Neale (2013), improving occupational safety and health (OSH) in the construction industry, especially that of Nigeria, is achievable. It is crucial to note that to achieve such process; it is expedient to get a framework that would give the blue print of the factors that should be deemed important for an effective health and safety management in the Nigerian construction industry. Therefore, there is need for this present study to provide a general framework that is constrained to the boundary of the

Nigerian construction industry but could be adopted or adapted to a similar environment in the continent of Africa and other likely regions.

2.4 OCCUPATIONAL HEALTH AND SAFETY PRACTICES IN NIGERIA CONSTRUCTION INDUSTRY

The need to provide occupational H&S mechanisms is vested on the employers. However, the failure of the employers to provide safe and conducive work environment, or the inability to use these facilities appropriately by employees, can affect the performances of the industry and can have cost implications on individuals, organisations, and for society this effect may be grave in developing counties such as Nigeria (Pickvance, 2003). In addition, when an organisation adopts a health and safety management system (HSMS), the organisation demonstrates in practical terms its readiness to minimize the frequency and severity of work-related accidents, ill health and damage to property. This is because the provisions and requirements of health and safety management systems encourage greater awareness of responsibilities and may increase the level of health and safety, highlighting the impact of poor health and safety standards on the performance of organisations. In addition, loss and damage to property is rooted in the existence of functional health and safety policies and laws, which cover and ensure that organisations safeguard the health, safety and welfare of workers and visitors by protecting them from risks emanating from their work activities. In addition, employees use facilities and resources provided by their employers in a manner that will neither lead to property damage nor put them or others at risk (Diugwu *et al.,* 2012).

In a study of fatal injuries in Nigerian factories, in Benin City, Nigeria, Ezenwa (2011) stated that on any construction site, appropriate health and safety methods should be considered and used to reduce or eliminate risk, death or injury. Ezenwa (2011) has noted that the first effort to regulate and control health and safety at work place in Nigeria was the establishment of the Factories Act of 1958, but unfortunately, there was lack of provisions for the enforcement of health and safety standards in construction industry. This Act was repealed in 1987 and replaced with the Factories Decree No. 16 and Workman's Compensation Decree No. 17. Both were signed into law on June 12, 1987 but only became effective in 1990. Enforcement of safety and welfare regulations is carried out by the Federal Ministry of Labour and Productivity. Nevertheless, studies such as Ezenwa (2011) and Dodo (2014) have revealed that these ministries charged with the enforcement of these laws were not effective in identifying violators, probably due to inadequate funding as well as lack of basic resources and training. In addition, safety oversight of other enterprises, particularly construction sites and non-factory works have been neglected. Furthermore, Dodo (2014) has noted that there is a loophole in the labour decree as it does not provide workers with the right to remove themselves from dangerous work situations without loss of employment (Nigerian Factories Act, 1990).

According to Adeogun and Okafor (2013), occupational health and safety programs were first introduced in Nigeria during the British colonial period. During this period, health workers were sent to industries especially where construction and manufacturing activities are involved for monitoring (Onyejeji, 2011). The extension of this practice led to the establishment of the legislation of the Labour Act of 1974, the Factories Act of 1987 and The Workman's Compensation Act of 1987. The relevant acts that aid in making occupational health and safety effective in Nigeria are the Labour Acts 1990 and the Workman's Compensation Act 2004 of the laws of the Federation of Nigeria. However, Adeogun and Okafor (2013) clearly state that these acts are not being enforced in Nigeria, as there are multiple pieces of evidence from the reports of unhealthy exposure to risks of workers and employees in various organisations, construction industry not excluded. This was made clear by Iden (2010), the Chief Executive Officer of Occupational Health and Safety Managers Ltd, Nigeria, that organisations in Nigeria, construction industry not exclusive show negligence to occupational health and safety issues.

In Farooqi *et al.'s* (2008) work, using the Egyptian construction industry, it was found that safety programs applied by contractors operating in Egypt were less formal and the accident insurance costs were fixed irrespective of the contractors' safety performance. Also, studies such as Diugwu, Baba & Egila (2012), Idoro (2008), Umeokafor *et al.* (2013), Umeokafor *et al.* (2014), and Umeokafor *et al.* (2014), have shown that occupational health and safety (OHS) is poor in developing countries such as Nigeria. The reason for this is that occupational accidents are under-reported and the OHS regulatory and enforcement systems, which are intervention strategies to curtail occupational accidents, are ineffective and dysfunctional. This has resulted in cases of accident and injury rates to be on the increase. Consequently, developing effective strategies for improving OHS is a major challenge in developing countries such as Nigeria (Umeokafor *et al.,* 2014).

In Nigeria, Iden (2010), Okojie (2010) and Adeogun and Okafor (2013) have noted that only few companies in Nigeria recognized occupational health and safety practices, and these are the big multinationals companies. Furthermore, taking into account the work of Idoro (2011), investigating occupational health and safety management efforts and performance of Nigerian construction contractors, it was found that the contractors' management efforts on occupational Health and safety do not reflect in their scope of operations on site. Sawacha *et al.* (1999), Aksorn (2009) and Al-Kilani (2011) declared that the best results in the reduction of mishaps and injuries at work are produced when health and safety practices such as management talks about safety, distribution of safety pamphlets and equipments, work environments are made safe and apointments of site safety officials. Al-Kilani (2011) has found that lower injury rates were common in companies that provided workers with formal safety orientation, that gave incentives to workers and supervisors and that employed full-time safety representatives. Thus, differences may occur in the prevalence of occupational accidents and injuries due to these factors provided by Al-Kilani (2011). According to Poon *et al.* (2000), Hassanein *et al.* (2007), and Aksorn (2009), safer performance was observed when safety representatives are hired and trained by safety directors in construction industry.

Machabe and Indermun (2013), in their study of management perceptions of the occupational health and safety system in a steel manufacturing firm, have shown that there are pitfalls and gaps between the required H&S management system and the actual H&S performance. As a result of these shortcomings, there have been multiple H&S injuries within the plant. It was also discovered there is no sense of urgency to address safety concerns. For example, health and safety injuries are not investigated on time in order to put corrective measures in place or to prevent the same incident from repeating again. This reveals bad health and safety practices.

In a study in Northern Nigeria, Aliyu and Shehu (2006) observed that all the quarry sites had no preventive/safety measures for the workforce. Another study in India among sandstone quarry workers also showed that none of the workers were using facemask to prevent silica inhalation (Yadav *et al.,* 2011). Haldiya *et al.* (2005) found that about 67% of the workers do not use protective means against occupational accidents and injuries despite their knowledge about protective equipment and its use. Furthermore, a study in Hong Kong also showed that 86.6% of the management team (supervisors) and 48.6% of front-line workers (diggers, labourers) do not use respiratory protective equipment while working on construction sites (Tam and Fung, 2008). In addition, 78% of workers in the Kaduna refinery use protective devices while only 35.9% use protective devices among welders in Benin City (Isah and Okojie, 2008). Babatunde *et al.* (2013) estimated that the total costs of occupational accidents and diseases stand between 1-3% of GDP worldwide; implementing appropriate occupational safety practices among the 13-20 million workers would lessen the burden.

To this end, it is important to draw attention to the fact that, once the issue of H&S is handled, the high rate of accident and injuries or hazards in the Nigeria construction industry may bring about a high cost and burden for the sector, the citizens and the economy at large. Therefore, to ameliorate this high cost and burden, it is important to understand the factors that lead to the high rates of accident and injuries or hazards in the Nigeria construction industry, hence the need for this present study.

2.5 WORKPLACE SAFETY AND HEALTH MANAGEMENT

Workers Health Centre (2004) concluded that health and safety challenges in construction industry are numerous and their identification is the first step in ensuring that workers work in a safe environment. According to Jain and Rao (2008), safety denotes continuing on living heavily without injury. Safety is free from harm or danger of harm (Nobana & Leesi, 2013). Furthermore, safety is the precautions people take to prevent accidents, harm, danger and lose. According to ILO (1999), managers cannot afford to wait for human or material damage before trying to prevent occupational accidents and injuries, so safety management means applying safety measures before accidents happen. Effective safety management has three main objectives (ILO, 1999): to make the environment safe; to make the job safe; and to make workers safety conscious. Occupational health and safety (OHS) management protects the safety, health, and welfare of people at the workplace (Doumbia, 2017). To ensure an effective occupational health and safety among workers, Alli (2008) stated the following:

- Policies for OSH should be established and implemented at all levels of government. They must be effectively communicated to all parties concerned.
- A national system for occupational safety and health must be established. Such a system must include all the mechanisms and elements necessary to build and maintain a preventive safety and health culture. The national system must be maintained, progressively developed and periodically reviewed.
- A national programme on occupational safety and health must be formulated. Once formulated, it must be implemented, monitored, evaluated and periodically reviewed.
- Social partners (i.e. workers and emplyers) as well as associates should be conferred with. It should be carried out during all stages of policy formulation and development.
- OSH measures should be targeted at thwarting and for protection. The work environment should be the priority of any preventive measure. Efforts should be made to create and design the workplace to be secure and safe.
- Continuous improvement of occupational safety and health must be promoted. This is necessary to ensure that national laws, regulations and technical standards to prevent occupational injuries, diseases and deaths are adapted periodically to social, technical and scientific progress and other changes in the environment of work. It is best done by the development and implementation of a national policy, national system and national programme.
- Information is vital for the development and implementation of effective programmes and policies. The collection and dissemination of accurate

information on hazards and hazardous materials, surveillance of workplaces, monitoring of compliance with policies and good practice, and other related activities are central to the establishment and enforcement of effective policies.

- Health promotion is a central element of occupational health practice. Efforts must be made to enhance workers' physical, mental and social well-being.
- Occupational health services covering all workers should be established. Ideally, all workers in all categories of economic activity should have access to such services, which aim to protect and promote workers' health and improve working conditions.
- Compensation, rehabilitation and curative services must be made available to workers who suffer occupational injuries, accidents and work-related diseases. Action must be taken to minimize the consequences of occupational hazards.
- Integral parts of a clean and hygienic work environment are education and training. Employees and owners need to be well informed as to the necessity of establishing safe working conditions and how to do so. It would mean that workers have to receive training that's pertinent to their particular sector which would allow them to focus on distinct OSH concerns. Education and training provide individuals with the basic theoretical and practical knowledge required to carry out their trade or occupation successfully and to fit into the working environment. Because of the importance of occupational safety and health, measures should be taken to include these subjects in education and training at all levels in all trades and professions, including higher technical, medical and professional education. OSH training should meet the needs of all workers, and should be promoted in a manner that is appropriate to national conditions and practice.

- Employees, managers and the appropriate authorities have specific duties and tasks. For instance, employees have to abide by set rules; managers must endeavour to create safe a working environment and provide access to first aid; whilst the appropriate authorities have to continuously develop and release OSH policies.
- Regulations have to be imposed. A supervisory scheme has to be established to ensure compliance with OSH and other regulations.

Alli (2008) has stated that with these key principles structure to occupational safety and health programmes and policies, the above list is by no means exhaustive. More areas that are specialized have corresponding principles of their own. Also, the Nova Scotia Department of Labour and Advanced Education (2007) has stated that to ensure the management of occupational health and safety in any industry, the employer and employees have parts to play. For the employers, they must ensure the health and safety of anyone at or near the workplace. Some of the duties of the employers to ensure occupational health and safety include:

- Maintenance of equipment,
- Provision of safety instruction and job training,
- Making employees familiar with health and safety hazards in the workplace,
- Ensuring employees have the right equipment and safety gear needed to do their job safely,
- Ensuring that employees are not exposed to health or safety hazards,
- Co-operating with the national group, if any that is responsible to ensure occupational health and safety in the country,

- Comply with the Act of occupational health and safety and make sure that employees do so as well.

In addition, Alli (2008) stated that because occupational hazards arise at the workplace, it is the responsibility of employers to ensure that the working environment is safe and healthy. This means that they must prevent, and protect workers from, occupational risks. However, employers' responsibility goes further, entailing knowledge of occupational hazards and a commitment to ensure that management processes promote safety and health at work. For example, an awareness of safety and health implications should guide decisions on the choice of technology and on how work is organized. Training is one of the most important tasks to be carried out by employers. Workers need to know not only how to do their jobs, but also how to protect their lives, health, and those of their co-workers while working. Within enterprises, managers and supervisors are responsible for ensuring that workers are adequately trained for the work that they are expected to undertake. Such training should include information on the safety and health aspects of the work, and on ways to prevent or minimize exposure to hazards.

Okoye and Okolie (2014) stated that injuries in most occasions are generally unreported; however, where necessary and made known to the management, any staff involved in any accident should receive first aid or preliminary medical care, before necessary attention is provided. In most cases, specialized medical treatment or compensation is unavailable, which makes such accidents grave. Although studies such as Awodele and Ayoola (2005), Idoro (2008, 2011), Okoye (2010), Farooqui *et al.,* (2008), Olatunji *et al.,* (2007), Dorji and Hadikusumo (2006) and Guha and Biswas (2013) have affirmed that in most cases of these accidents and incidences of H&S related issues in the construction industries. Workers themselves consider some accidents as due to their own negligence and accept that construction is a dangerous occupation. Thus, this was why

Okolie and Okoye (2013) have posited that the industry should absorb new regulations, laws, standards and codes to make construction industry, especially in the Nigerian context, improve in their H&S performance.

In addition, the prevention of construction accidents usually entails predicting future accidents and their nature under given circumstances and making such predictions is based on knowledge about past accidents (Alkilani, 2011). Because accident rates in construction are high when compared to other industries, the construction and projects managers need to be fully prepared to deal with accidents when they occur, undertaking proper investigations and reporting procedures afterwards. Accident statistics represent not only terrible human tragedies but also substantial economic costs. This is because accidents cause damage to plant equipment and the loss of productive work time until the normal site working rhythm and morale are restored. Accidents can also cause work disruption and reduce the work rate (Enshassi *et al.,* 2007).

On a larger scale, employers' organisations should instigate training and information programmes on the prevention and control of hazards, and protection against risks (Alli, 2008). Where necessary, employers must be in a position to deal with accidents and emergencies, including providing first-aid facilities. Adequate arrangements should also be made for compensation of work-related injuries and diseases, as well as for rehabilitation and to facilitate a prompt return to work. In short, the objective of preventive programmes should be to provide a safe and healthy environment that protects and promotes workers' health and their working capacity (Alli, 2008).

The ILO (1999) have stated that in construction projects where subcontractors are used, the contract should set out the responsibilities, duties and safety measures that are expected of the subcontractor's workforce. These measures may include the provision and use of specific safety equipment, methods of carrying out specific tasks safely, and the inspection and appropriate use of tools. In addition, training should be conducted at all levels, including managers, supervisors and workers. Subcontractors and their workers may also need to be trained in site safety procedures, because teams of specialist workers may mutually affect each other's safety. There should also be a system so that site management has information quickly about unsafe practices and defective equipment. Safety and health duties should be specifically assigned to certain persons. Some examples of duties, which should be listed, are

- provision, construction and maintenance of safety facilities such as access roadways, pedestrian routes, barricades and overhead protection,
- construction and installation of safety signs,
- safety provisions peculiar to each trade,
- testing of lifting machinery such as cranes and goods hoists, and lifting gear such as ropes and shackles,
- inspection and rectification of access facilities such as scaffolds and ladders,
- inspection and cleaning of welfare facilities such as toilets, clothing accommodation and canteens,
- transmission of the relevant parts of the safety plan to each work group; and
- emergency and evacuation plans (ILO, 1999).

Furthermore, for the employees, they have a duty to report anything in the workplace that they think may be dangerous. The report should be made to (the Nova Scotia Department of Labour and Advanced Education, 2007):

Also, workers have to observe every necessary precaution to safeguard their safety and health as well as that of others at work. This includes:

- Reporting hazards to their supervisor as soon as the hazard is noticed,

- Wearing proper safety equipment and using safety procedures when doing a job,
- Co-operating with the National Occupational Health and Safety Committee or Health and Safety Representative if any.

There is also need for the creation of Occupational Health and Safety Committee in any workplace where 20 or more workers are regularly employed. The function of such a committee is to get employers and employees working together to improve health and safety in the workplace. Together they will make sure that (the Nova Scotia Department of Labour and Advanced Education, 2007):

- Hazards are identified,
- Health and safety requirements are complied with,
- Health and safety matters or complaints arising in the workplace are quickly dealt with,
- Regular inspections take place,
- Advice on personal protective equipment is offered by the committee,
- Policies or programs needed to be in compliance with the Act are reviewed in consultation with the committee, and
- Records and minutes of committee meetings are kept.

When such a committee is created:

- The employer and employees must agree on the number of committee members,
- At least half of the committee members must be employees not performing management functions,
- The committee must have co-chairs representing management and non-management interests, unless the members agree to an alternative method of chairing

- The committee must meet at least once a month, unless the members agree on a different schedule
- Employees on the committee are allowed time off work with pay for committee business and
- The committee must create its own rules of procedure.

Alli (2008) has added that the government has its role to play in ensuring health and safety in any industry. Governments are responsible for drawing up occupational safety and health policies and making sure that they are implemented. Policies will be reflected in legislation, and legislation must be enforced. However, legislation cannot cover all workplace risks, and it may be advisable to address occupational safety and health issues by means of collective agreements reached between the social partners. Policies are more likely to be supported and implemented if employers and workers, through their respective organisations, have had a hand in drawing them up. This is regardless of whether they are in the form of laws, regulations, codes or collective agreements. The competent authority should issue and periodically review regulations or codes of practice, instigate research to identify hazards and to find ways of overcoming them, provide information and advice to employers and workers, and take specific measures to avoid catastrophes where potential risks are high.

The occupational safety and health policy should include provisions for the establishment, operation and progressive extension of occupational health services. The competent authority should supervise and advise on the implementation of a workers' health surveillance system, which should be linked with programmes to prevent accident and disease and to protect and promote workers' health at both enterprise and national levels. The information provided by surveillance will show whether occupational safety and health standards are being implemented, and where more needs to be done to safeguard workers.

According to Doumbia (2017), there are six basic elements for good health and safety management systems. These are:

- Worker Participation and Management Commitment. The management has to govern by laying down regualtions, delegating and aiding responsibility, including workers and seeting an example,
- Analysis of Worksite. The worksite is to be frequently reviewed to find all existing and hidden threats,
- Prevention and Control of Hazard. Ways by which existing and hidden threats can prevented or mitigated against are to be developed and maintained,
- Training for Workers, Managers and Supervisors. To understand and deal with threats at worksite, workers, managers and supervisors are to be trained,
- Feedback and review to find out what is working and what is not.

These elements could be the reason why Idoro (2011) has stated that the efforts to reduce the hazards associated with construction industry, where the use of mechanisation is high, are reflected in the accident and injury rates of the industry. This can only be known when such industry takes into account the worksite analysis of accidents and injuries as stated by Doumbia (2017). The increasing rates of accidents and injuries to workers in any construction industry implies a lack of effort aimed at controlling the hazards, whereas decreasing rates of accidents and injuries implies that control measures of hazards are adopted.

Consequently, promotion and maintenance of the highest level of mental, physical and social welfare of employees in all roles should be the aim of occupational health and safety. The prevention amongst workers of departures from good health caused by their working conditions, the protection of workers in their employment from risks resulting from factors adverse to health, the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities. Likewise, (Asikhia and Emenike, 2013). ILO (1999) stated that the improvement of safety, health and working conditions depends ultimately upon people working together, whether governments, employers or workers. Safety management involves the functions of planning, identifying problem areas, coordinating, controlling and directing the safety activities at the work site, all aimed at the prevention of accidents and ill health (ILO, 1999).

2.6 REASONS FOR EFFECTIVE HEALTH AND SAFETY MANAGEMENT IN CONSTRUCTION INDUSTRY

For organisations looking to compete and produce very good products at reduced cost using safe and conducive processes, occupational health and safety is a very significant resource (Machabe and Indermun, 2013). There are important reasons for the need for the effective health and safety management in construction industry, which could lead to either eradicating or reducing work-related accidents and ill health. Among these are (Health and Safety Authority, 2006):

2.6.1 Legal Reasons

It is a legal requirement for employers to make sure their workers are healthy and safe as much as is practically possible and to regulate their work duties such that their safety is still being ensured. This requires that business owners are proactive when it comes to the management of health, safety and well-being tasks and deal with them in a methodical manner. Employers can be aided in the development of their health and safety through this guidance, as it gives recommendations on the management of health and safety, thereby helping them to adhere with the law.

2.6.2 **Economic Reasons**

Aside from minimising the production cost as a result of ill heath, efficient health and safety management improves organisation's performance. Several incidents which occur at work that could make workers miss three or more days of work tend to raise the business's cost of production. Over one million work days are lost as a result of work-induced illnesses and traumas which are hard to quantify due as they tend to have long latency periods. The causes of the incidents and mishaps are usually due to failings in the management of occupational health and safety within businesses. According to Alli (2008), the economic cost of work-related accidents and mortality is very high, at the industrial, national and global level. If training, interruptions to work, disruptions to production, medical expenses, etc. are taken into account; their total estimate result in a loss which is almost equivalent to four percent of global GNP annually.

The amount spent by some OECD nations on compensation was estimated to be $122 billion in 1997, as well as a loss of 500 million work days due to mishaps and ill health. If property losses from accidents, and more specifically major industrial accidents, are included, studies suggest that insured losses are approximately US $5 billion annually and are on the increase (Mitchell, 1996). Moreover, these figures are based mainly on acute and intensive events and do not include uninsured losses, delayed losses associated with acute events such as oil and other toxic chemical spills, or the environmental impact and losses caused by chronic industrial pollution. In addition, according to the Government of Vietnam (2006), the total annual cost to the EU of work-related injuries and ill health in 2001 was estimated at between €185 and €270 billion, or between 2.6

per cent and 3.8 per cent, of the EU's GNP. In comparison, the cost of occupational accidents in Vietnam for 2006 was estimated at US $3 billion.

2.6.3 Moral and Ethical Reasons

The proactive management of safety and health in the workplace helps organisations such as construction industries prevent injuries and ill health at work. This guidance should enable companies to minimise the personal loss brought about by mishaps and ill health at work.

2.6.4 Outdate Of the Manual Methods

Another important reason for the need of occupational health and safety management lies in the fact stated by Al-Kilani (2011) that the manual methods used on construction industries are fast giving way to mechanical methods in the effort to increase productivity. The numerous new construction materials that are being introduced into the industry meet the tight schedules and targets placed by clients' demands, implement control measures required to bring projects on track, and ensure effective and efficient utilization of the numerous resources involved in the construction of projects. To this end, in these construction industries, new plant and equipment are being developed and produced regularly in response to the needs of the industry.

The introduction and use of these new equipment and plants increase occupational injuries and health-related problems (Seeley, 1996). To curtail this, there is need for employees or workers' safety and health management (Al-Kilani, 2011) as the increasing use of mechanization of construction work in a positive way can speed up construction. Furthermore, it reduces the overall cost of construction and, in a negative way, can also increase susceptibility of workers to injuries and health-related problems caused by the modernized plants and machines. Studies such as those by Kartam (1997) and Al-Kilani

(2011) have revealed that mechanization goes with hazards as the use of plant and equipment is prone to accidents and injuries. Also, the construction sector is one of the most hazardous sectors globally.

Moreover, according to Idoro (2011), despite the numerous advantages gained from the use of mechanizations such as plant and equipment in the construction industry, its use has several disadvantages. These include the hazards associated with the increased use of mechanisation, and major concerns about the impact of mechanisation on OHS are very important if this industry is to achieve its main objectives. Hence the affirmation by Idoro (2011) that increased mechanisation can lead to increased numbers and severity of accidents and injuries, which will have adverse effects on OHS in construction sites. The Health and Safety Executive (HSE) (2006) investigated the causes of occupational accidents and injuries in the construction industry in Scotland; however, the occupational safety and health performance of the Scottish construction industry was at the end of the study compared with those if the OHS performance of the construction industry of the UK. Notably, the result of the HSE found that, for a period of four years, (1996–2000), the Scottish construction workers suffered 835 fatal and major injuries per 100,000 workers compared to 552 injuries reported in the rest of the construction industry in the UK.

Furthermore, Machabe and Indermun (2013) have stated that there is a link between human behaviour and workplace safety. In reality, people are different and their values differ; what others hold with high esteem might be considered insignificant by others. Some people derive pleasure from engaging in risky behaviour while others guard vigilantly against risks. Organisations must endeavour to develop a safe and secure workplace framework. Having a strong workplace framework would will assist organistaions in creating a safe and secure work environment. Thus, it could be argued that the high rate of occupational injuries and accidents and hazards in the Nigerian construction industry show that the available framework for managing health and safety has not proven. To be thus effective, there is a need for this study to provide a more efficient framework towards enhancing the health and safety management in the Nigeria construction industry.

2.7 MANAGEMENT PERCEPTIONS ABOUT OCCUPATIONAL HEALTH AND SAFETY SYSTEMS

The need to investigate management perception rests on the fact that they are the employers and the providers of the services in the construction industry. Studies such as Bennet (2002) and Machabe and Indermun (2013) have argued that organisations such as those which belong to the construction industry ignore workers' opinions on health and safety due to various management styles; certain management styles do not take into account the views and opinions of workers and lack an adequate health and safety policy. This allows for very little or no reflection for workers' contribution to health and safety within the organisation. Workers often find themselves compelled to follow the rules and policies of the organisation as these policies have already been put in place (Machabe and Indermun, 2013).

Machabe and Indermun (2013) confirmed that researches carried out in the past on occupational health and safety in various nations show that health, safety and environment have turned into an essential requirement for the survival and profitability of business for onwers, government organisations and many more. Naturally, the need for safety is a very basic requirement for humans (Macintosh and Gough, 1998). Iden (2010), the Chief Executive Officer of OHS Managers Ltd, Nigeria, stated that, his experience, after having visited some of the organisations to solicit for opportunities to permit the training of their employees in occupational health and safety, they were bluntly rejected. The few companies in Nigeria who recognised OHS are the big multinationals who are running the policies constituted in their parent countries of origin (Iden, 2010; Okojie 2010). In another study, comparing occupational health and safety (OHS) management efforts and performance of Nigerian construction contractors, Idoro (2011) found that the contractors' management efforts on OHS do not reflect in their scope of operations and the accident and injury rates of the Nigerian construction industry are high. In addition, Okojie's (2010) observation revealed that, in practice, sealing or prohibitions of default factories occur rarely because powerful individuals in the society such as politicians usually own the factories. In situations where a factory inspector attempts to insist on enforcement of the existing regulations, he may be molested (Adeogun and Okafor, 2013).

Occupational hazard management is an important aspect of organisations, especially in the construction industry. Occupational hazard management is often represented as a four-step process (Adeogun and Okafor, 2013):

Identification: In order to uncover which occupational hazards should be considered, hazards registered are compiled, which consists of the various hazards that can be found in a given operation in such construction industry.

Assessment: This means reorganizing occupational hazards and grouping into high-, medium-and low-risk hazards.

Risk control: Control of risk or hazards is a way of eliminating the identified hazards if possible, or at least, preventing workers from such hazards.

Monitoring: This involves asking some key questions and working again through the other three steps to ensure that such identified occupational hazards have been reduced to a minimum or eliminated.

The fact that a construction industry is considered as high risk and hazardous does not mean that its susceptibility to accident is not controllable; this largely depends on "work situation" which is humanly controllable (Olutuase, 2014). This is more obvious when one considers the H&S records in the construction industry of most developed countries. Studies by Koehn, Ahmed, and Jayanti (2000), Idoro (2008) and Enhassi *et al.* (2008) have expressed worries about the poor state of health and safety conditions of construction industry in developing countries such as Nigeria.

According to the International Training Centre of the ILO (2011) and the Indian Council of Medical Research (2003), the causes of these accidents are well-known and are all preventable and occupational safety and health (OSH) can be managed in the construction industry. However, its reality is contrary in practice, especially in Nigeria construction industry. Studies such as Bluff (2003), Needleman (2000), Saksvik and Quinlan (2003), LaMontagne *et al* (2004), and the Indian Council of Medical Research (2003) have stated that construction firms especially in developing countries such as Nigeria. That is, adopt safety system that strategies to prevent the occurrence of occupational accidents, to eliminate or reduce its prevalence than managing the accident cases and victims, by paying medical bills and compensation after they have occurred. This may affect the organisation in the long run because it increases the cost of management, production and absenteeism from work due to these accidents.

Such safety management system, as stated by Bluff (2003), has its basis on the systematic identification of hazards, assessment and control of risks, evaluation and review of risk control measures to ensure that they are effectively implemented and maintained. For Needleman (2000), an effective safety system management demands that the management are committed to occupational health and safety, assignment of responsibilities, procedures, communication mechanisms, hazard identification, prevention and control, accident investigation, training, documentation and evaluation of program effectiveness. Furthermore, Bluff (2003) opined that if such safety management system are be effective, responsibility must be designated to competent safety personnel who will determine and implement the required preventive measures in which the workers will be actively involved, and it is necessary that procedures are documented and repeatable. To this end, it is important to draw attention to management perspective in ensuring health and safety management in the Nigerian construction industry.

2.8 ISSUES AFFECTING HEALTH AND SAFETY MANAGEMENT IN CONSTRUCTION INDUSTRY

This section presents an abridged review of general issues affecting health and safety management in construction. From earlier studies, several authors have highlighted the lack of clear and realistic goals as a major factor affecting H&S management implementation programme (Weber 1992, Cooper 1993, Blake 1997). Weber (1992),Cooper (1993), and Blake (1997) found that a safety programme can accomplish the desired results when safety goals have been clearly established and such safety goals should give a clear picture, direction and focus for performing day-to-day activities in order to reach desired results. In addition, when realistic and achievable goals are set up, the progress towards accomplishing such goals can be easily measured.

Notwithstanding, there is no doubt that H&S management in construction industry could be influenced by many factors. For example, Haupt (2001) did an analysis of the main factors affecting H&S management in the UK and found the following factors affect H&S management in the UK: a lack of supervision by line managers in the industry; and inadequate equipping of workers to identify dangers and to take steps to protect themselves from these. In the United States' construction industry, there are similarities in the factors affecting implementation of H&S practices in the UK. Cesarini *et al.* (2013) found there to be a lack of trained workers for safety a lack of review accidents and near misses are major factors affecting health and safety management and implementation. In addition, the lack of risk management experts, not making safety an everyday topic; a lack of regular inspections, among others, are major factors which could affect health and safety management in construction industries. The Sustainable Built Environment Research Centre (2012) have found that taking alcohol during work, educating employees, employees' beliefs, attitudes and commitment, top management commitment, lack of safety risk management systems, among others are major factors that could affect health and safety management in construction industries.

Hassouna (2005) and Al-kilani (2011) have identified poor safety awareness of top management leaders and poor safety awareness of projects managers as the main factors that influence health and safety management practices in the construction industry in China. These were also supported by the studies of Al-kilani (2011) and Abdul Rahim *et al.* (2008) in the same location (China) which found that the causes of accidents in construction industry were due to poor safety awareness from top leaders, a lack of training; and poor safety awareness of managers. In addition, reluctance to input resources for safety, reckless operation, lack of certified skill labour, poor equipment, lack of first aid measures, lack of rigorous enforcement of safety regulation, lack of organisational commitment, among others.

The factors that affect implementation of H&S in China bear many similarities to that of UK and of US as well. Fang *et al.* (2004), in their study on construction workplace safety management in China, found there to be a lack of safety inspection, safety meetings, safety regulation enforcement and safety education. In addition, the lack of safety communication, safety cooperation, management–worker relationship, and safety resources all affect H&S management in the construction industry. Also, Tam *et al.* (2004) expressed that in China, parts of the poor construction safety management includes poor safety awareness of the companies' managers, non-existent training and insufficient safety awareness in projects. In addition, Hassouna (2005) and Al-kilani (2011) have identified that poor safety awareness from top management leaders and from projects managers are the main factors that influence H&S management practices in the construction industry in China.

Furthermore, Al-Kilani (2011) had reported that the factors that may affect health and safety management practices include severe competitive tendering methods, whether there is H&S performance assessment during tendering. Whether H&S performance is an important criterion in contractors' selection and whether clients are generally considering H&S to be important, the age of the workers, experience and the lack of training on workers, among others. Having taken a keen observation on these factors highlighted in the literature, it would not be a gain adage to affirm that such factors could hamper the implementation of health and safety mechanisms, thus leading to a high rate of injury and illness in work place, thus leading to a low performance of staff and thus of the construction industry or firm. In the end, since the housing sector is also tied to the development of the nation, this could have a geometric and elastic effect on the development of the nation. Thus, there is a need to ameliorate such problems but before ameliorating these problems, there is need to update the factors and understand the extent to which such problems exist in the construction industry, a major gap this study seeks to fill.

2.9 FACTORS AFFECTING IMPLEMENTATION OF HEALTH AND SAFETY MANAGEMENT PRACTICES BY CONTRACTORS

This section presents an abridged review of the factors that affect the implementation of H&S management practices by contractors i.e. factors that can determine whether a contractor implements H&S management practices. There is no doubt that health and safety management practices in the construction industry could be influenced by so many factors. From the national perspective, a major barrier affecting the implementation of OHS practice in developing countries such as Nigeria is the lack of a comprehensive national OHS policy (Pupulampo and Quartey, 2012; Ghana Health Service (GHS), 2007). According to Mustapha *et al.* (2016), the unavailability of OHS policy and the existing numerous regulatory bodies have immensely contributed to the existing OHS implementation. In addition, there are a wide range of factors known to affect implementation of H&S management practices by contractors. According to Idoro (2011), the importance of stakeholders in the industry having a good understanding of the contributions of contractors to improving health and safety cannot be over-emphasised.

From the organisational point of view, Baldock *et al.* (2005) and Windapo and Jegede (2013) have noted that the number of employees in a construction firm is an important factor influencing health and safety management. Windapo and Jegede (2013), in a study of Nigerian contractors, find that employees of large sized company have witnessed one fatality, while employees of small and medium enterprise (SMEs) contractors have 22 fatalities. This is in addition to poor H&S practices mostly found in Small Medium

Enterprises (SMEs) (Windapo & Jegede, 2013) and the very low level of awareness and knowledge of health and safety requirements in small firms and among their owner/managers (Baldocks *et al.,* 2005).

In addition, large construction organisations have more funds and resources to allocate to H&S implementation than the smaller ones (Windapo and Jegede, 2013). In view of this, it is likely that small construction firms, which mostly comprise the greater part of firms in the Nigeria construction industry, may employ less competent labours due to lack of adequate funds and resources. Similarly, the size of the company in terms of annual turnover can also be a factor for not implementing H&S management practices; this is because limited financial and human resources were factors that influence health and safety negatively (Kheni, 2008). Earlier studies show that owners-managers of small organisation have a poor understanding of H&S in their organisation (Fonteyn *et al.,* 1997); as a result, owner-managers of small construction firms find it challenging to engage in Health and Safety (Kheni *et al.,* 2007).

Dadzie (2013) found there to be a lack of H&S training for workers, poor risk assessment, a poor attitude of workers towards H&S, inadequate H&S professionals, H&S policies and inadequate data collection systems, In addition, the lack of H&S education in various institutions, communication difficulties, the cost of providing and maintaining H&S on sites and accident reporting shortfalls are all major factors affecting the implementation of Health and Safety (H&S) management in developing countries such as Nigeria. Pupulampo and Quartey (2012) have noted that the ineffectiveness of OHS inspection, training and education, limited funds for OSH research, OHS capacity building and monitoring, and limited level of ratifications of ILO conventions have been indicated as factors affecting the implementation of Health and safety (H&S) management in developing countries such as Nigeria.

Gaceri (2015) found that factors such as rapid scientific and technological progress, a very diverse and continuously changing world of work and economics are known to influence implementation of H&S management practices and management in construction firms in developing countries such as Nigeria. In addition, factors such as employee participation, training and leadership are also important to implementation of H&S management practices and management in construction firms in developing countries such as Nigeria (Gaceri, 2015). According to Umeokafor *et al.* (2014), there is need to understand the factors that contribute to occupational hazards, especially in developing countries such as Nigeria. In addition, understanding the trend, distribution and risk factors of the accidents, injuries, fatalities and accident causal factors remains pertinent in developing effective strategies for the improvement of OHS globally, especially in developing countries such as Nigeria. According to Adeagbo (2014), several factors influence the management practices of H&S in the Nigerian construction industry. These include a difficult business environment, a dearth of technical expertise and of key building materials, and constrained access to credit (Adeagbo, 2014).

2.9.1 Difficult Business Environment

Nigeria is ranked 131st out of 185 countries, with respect to the ease of doing business, according to the 2013 World Bank report on ease of doing business, indicating a worse situation compared to South Africa, Ghana, Japan, China, UK and the USA. With respect to starting a business, Nigeria is ranked 119th, only performing better than China. With respect to dealing with construction permits, Nigeria is ranked 88th, worse than South Africa, Japan, United Kingdom and USA but better than Ghana and China. Nigeria is also ranked below other countries with respect to registering property and enforcing contracts. With respect to getting credit, Nigeria ranks equal to Ghana and Japan, better than China but worse than South Africa, United Kingdom and the U.S.A. On the issue of protecting investors, Nigeria also ranks below the selected countries with the exception of China (Adeagbo, 2014).

2.9.2 Dearth of Technical Expertise

The activities in the construction industry are often technical and specialized and an adequate availability of skilled professionals is always required to make it efficient. Unfortunately, they are not available in required quantity and quality, and this affects the performance of the secto

2.9.3 Dearth of Key Building Materials

The availability of building materials in adequate quantity and quality is crucial for the activities in the building and construction industry, however, the situation is such that the materials are often not available in the required quantity and quality. This adversely affects the required implementation of H&S practices as the contractors execute construction works in piecemeal.

2.9.4 **Constrainet of Pre-finacing Construction Project**

Activities in the building and construction industry have serious cost implications and, in most cases, actors in the sector are required to pre-finance projects before they are mobilized while the time lag between period of contract completion and final payment is often long. Budget for H&S content must be financed but the situation is compounded by constrained access to credit.

2.9.5 Management and Personnel Factors

Umeokafor *et al.* (2014) found that factors influencing health and safety management in the construction industry are:

Management factors: These accounted for 91.3% and include inadequate training and hence low level of awareness, and a lack of supervision. The use of obsolete machines accounts for about 50% of the management factors in terms of unsafe conditions.

Human factors: These accounted for 8.7% and include the failure of employees to attend training sessions; lack of training was the highest occurring remote or contributory factors of the reported accidents followed by a lack of supervision.

In addition, other authors provide a range of other factors. For example, other factors militating against health and safety implementation in the construction industry, especially in Nigeria, are incompetency and inexperience of Nigeria contractors (Ogbebor, 2002; Chen *et al.,* 2007), a lack of confidence in its construction professionals by the Nigerian Government (Akintunde, 2003; Ogunlana, 2010). There is also structural failure, poor supervision/workmanship, use of sub-standard materials, carelessness, faulty design, rainstorm/natural causes, excessive loading, conversion and disregard for approved drawings, ignorant clients, no structural drawings/design available, no proper drainage, hasty construction, greedy clients, dilapidated building, collapsed ceilings, among others (Windapo and Rotimi, 2012).

Haupt (2001) undertook an analysis of the main factors affecting health and safety management in the UK and found the following: a lack of supervision by line managers in the industry; inadequate equipping of workers to identify dangers and to take steps to protect themselves from these; a lack of coordination between the members of the professional team at the preconstruction phase; a lack of involvement by all participants in the construction process, including workers on a consultative and participatory basis; and unsatisfactory architectural and/or organisational options. Nevertheless, there was also the following: poor planning of the work at the project preparation stage;

impossibility to cover each and every situation and circumstance on construction sites; demands from the construction industry for reform in building legislation; reduction of the amount of legislation; and encouragement of innovative design and advancing technology applications in the most cost-effective way.

In addition, job safety and hazard analysis, task demand assessment, what if analyses, action plan critique, record-keeping and accident analysis, safety checklists, walk-through safety and health audit, worker-to-worker observation program, proactive safety alert systems, and peruse analysis and planning are all major issues that affect health and safety management in the construction industry of United States. ElSafty *et al.* (2012), in their study of construction safety and occupational health education in Egypt, the European Union (EU) and US Firms, found that a lack of recording and reporting of health hazards and illnesses caused include death, loss of consciousness, days away from work, restricted work, job transfers etc. The distinct complexioin of the sector, hard working conditions, human behaviour, and inadequate work site management produces unsafe work processes, equipment and procedure, lack of time management feedback. In addition, there is a lack of new safety programs being implemented, lack of incentives, a lack of training, not knowing the unhealthy worker or risky work environment, the lack of safety consciousness, fatigue and weariness, not maintaining zero tolerance for unsafe construction practices by not enforcing strict discipline against violators, failure to demonstrate a commitment to safety culture through managers, supervisors, and workers lack of incentives, among others.

In the United States construction industry, Cesarini *et al.* (2013) found there to be a lack of training workers for safety, a lack of communication, a lack of focus on fall management, a lack of combat against substance abuse, a lack of review accidents and near misses, a lack of risk management experts, and a pattern of not making safety an everyday topic. Moreover, lack of regular inspections, among others, are major factors that could affect health and safety management in construction industries. The Sustainable Built Environment Research Centre (2012) has found that taking alcohol during work, educating employees affect H&S management, employees' beliefs, attitudes and commitment, and top management commitment. The lack of safety risk management systems, the lack of clear authority and accountability for safety, workplace cultures not being uniform, work group solidarity and team work, job identity and age are all major factors that could affect H&S management in construction industries. Dingsdag *et al.,* (2006), in their study, a construction safety competency framework: improving health and safety performance by creating and maintaining a safety culture found that safety attitudes of staff, safety culture, communication, safety knowledge, mentoring, and leadership are major factors influencing health and safety management in construction industry.

Hassan (2012), in his study, health, safety and environmental practices in the Construction sector of Pakistan, found that a lack of understanding, inspections, reporting and legislation, lack of education, lack of skilled worker, defiance towards new working environment, and personal and economic worries make them ignorant and they do not bother with the HSE guidelines, not consider the HSE department as an essential branch of the organisation. Construction companies do not circulate their HSE yearly reports and accidents record openly because they think it will affect their standing and ultimately their dealings, so they conceal their findings from their clients, government and media. Media does not project the accidents which occur at worksites or inside industries but it does highlight the road accidents and accidents which happened in open areas, among others are major factors influencing health and safety management in Pakistan construction industry. Muiruri and Mulinge (2014), in a case study of construction projects sites in Nairobi, Kenya state that, site layout and planning, personal protective clothing, first aid kits and accident reporting, health and safety warning signs, safety policy health and safety risk assessment, health and safety training in construction sites; working environment, welfare facilities, are the factors influencing H&S practices.

Gohardani and Björk (2013), in their study on conceptual disaster risk reduction framework for health and safety hazards in the construction industry found that the employment of a site-safety manager upper management support and commitment; work participation and involvement, safety and health committees, site-specific safety plan, effort of educating construction workers are major factors influencing health and safety management in the construction industry. Gao and Sun (2004), in their study on the current status of the occupational health and safety countermeasures in Beijing, China, found there to be a lack of enforcement of occupational health and safety, strengthening the management of occupational hygiene. Improving transparency in OHS, motivating government to improve regulations; developing external occupational health and safety aid programs, promoting research on the prevention and control of occupational accidents, among others, could influence the health and safety management in construction industry. Australian Government statutory agency (AGSA) (2014) also found that the following factors influence health and safety management in the construction industry: specializations of employees by specific health and safety responsibilities such as supervisor project managers; first aid officers; arrangements for consultation; cooperation and coordination; arrangements for managing incidents. In addition, site-specific health and safety rules and how people will be informed of the rules, arrangements to collect and assess, monitor and review; the provision and maintenance of a hazardous chemicals register, safety data sheets and hazardous chemicals storage, the safe use and storage of plant, the development of a construction project traffic management plan, obtaining and providing essential services information, workplace security and public safety, ensuring workers have appropriate licenses and training to undertake the construction work, communicating information, training, instruction and supervision, providing a safe working environment, providing and maintaining adequate and accessible facilities, providing first aid, preparing, maintaining and implementing emergency plans, providing workers with PPE, if PPE is to be used to minimise a risk to health and safety, managing risks associated with airborne contaminants, managing risks associated with hazardous atmospheres including ignition sources, storage of flammable and combustible substances, managing risks associated with falls, and managing risks associated with falling objects.

Walters (2010) found that the industry's structure, disorganized and fragmented arrangements of management, presence of unskilled and semi-skilled labour and migrant workers, inexperienced workers, hostility of employers to organized labour, agreements between unions and employers, strong economic ground, among others are all major issues combating health and safety management in the construction industry.

Sawacha, Naoum and Fong (1999), in their study on factors affecting safety performance on construction sites, categorized factors affecting health and safety performance into historical, economic, psychological, technical, procedural, organisational and environmental factors. For the historical factors, important variables include the operative's age of the organisation, the operative's job experience, trade and background safety training. For economic factors, important variables include danger money, banks training, productivity bonus payment, and safety bonus payment. For psychological factors, important variables include personal care for safety, the impact of the Health and

Safety Act, and ongoing safety training on site, the supervisor's safety behaviour, and workmates safety behaviour. For technical factors, important variables include asbestos awareness, asbestos handling, use of ladders scaffolding fixing and inspection, steel erection and plant driving skills. In addition, for procedural factors, important variables include provision of safety clothing and equipment, training on use of safety clothing, training on use of safety equipment, and issuing safety booklets. For organisational factors, important factors include worker-management relationship, trade union involvement, control on sub-contract's safety behaviour, site safety representative, and management worker co-operation on safety, safety committee policy, and talk by management on safety, and safety poster display. Finally, the environmental factors include tidy site, company COSHH information, and planned and organized site (layout).

According to Lee and Halpin (2003), in their study about a predictive tool for estimating accident risk, they found that lack of pre-planning, supervision and training are major challenges affecting health and safety management in the construction industry. Huang and Fang (2003) found that inadequate training is a major factor affecting health and safety in the construction industry. Fang, Xie and Huang (2004), in their study investigating factor analysis-based studies on construction workplace safety management in China, found that there to be a lack of safety inspections, safety meetings, safety regulation enforcement, safety education, safety communication, safety cooperation, management–worker relationships, and of safety resources. Also, Tam *et al.* (2004), revealed that in China, parts of the inadequate safety management of construction are susbstandard safety awareness by managers, insufficient training, unwillingness to commit resources to safety, reckless operation, low availability of skilled labour and inferior equipment. The lack of first aid measures, lack of rigorous enforcement of safety regulations, lack of organisational commitment, low education level of workers, poor safety conscientiousness of workers, lack of personal protective equipment. Ineffective operation of safety regulation, lack of technical guidance, lack of strict operational procedures, lack of experienced project managers, shortfall of safety regulations, lack of protection in material transportation, lack of protection in material storage, lack of teamwork spirits, excessive overtime work for labour, shortage of safety management manual, lack of innovation technology, and poor information flow. Chan, Chan and Choi (2010) undertook an empirical survey of the benefits of implementing pay for safety scheme (PFSS) in the Hong Kong construction industry and found that a lack of training on workers, lack of awareness and a low quality of work are major factors that affect health and safety in the construction industry.

Al-Kilani (2011) states that in the construction industry of most developing countries, occupational accidents and injuries seems to be high because safety consideration in construction projects delivery is not given priority and the employment of safety measures during construction is considered a burden. According to Toole (2002), the main causes of construction accidents are lack of proper training, deficient enforcement of safety, lack of safety equipment, unsafe methods or sequencing, unsafe site conditions, not using provided safety equipment, poor attitude toward safety, and isolated, sudden deviation from prescribed behaviour. In addition, Enhassi *et al.* (2008), in their study on the safety performance of subcontractors in the Palestinian construction industry, affirmed that, in many developing countries, legislation governing OHS is significantly limited when compared to those of developed countries such as the UK. In developing countries, provisions for such legislation in the construction industry for their workers' safety are not put in place. However, according to Lee and Halpin (2003), in some countries, safety legislation does exist.

Al-Kilani (2011) had also expressed that the lack of safety management, dangerous working conditions and human attitude which lead to treacherous work processes and procedures are some of the major roots of mishaps. Furthermore, Al-Kilani (2011) state that, threats are not identified and safety sessions are not held. Employees are required to learn from their own mistakes or experience. In addition, the lack of medical facilities, shanty housing and substandard sanitation tend to exist on remote projects. Workers undertake risks while at work and the following problem areas are common:

While excavating in deep trenches (with no proper shoring or bracing), accidents due to cave-ins often occur. Labourers mainly use concrete, and cements burns due to the unavailability of protective gloves and boots are common. Workers fall from heights due to weak scaffolding and the unavailability of safety belts. Workers sustain injuries on the head, fingers, eyes, feet and face due to absence of personal protection equipment.

Moreover, there is a lack of understanding of the job, a low-level activity supervisor (engineer/technician), maintenance and inspection schedules are often not followed and only after a breakdown is equipment repaired, and poor equipment maintenance are major factors influencing health and safety management practices in construction industry (Al-Kilani, 2011). This can lead to a loss of time, idle workers and projects delays. It may also cause damage to property, such as breakdown of concrete mixers, vibrators, water pumps and tractors which can cause accidents and injuries in workplace such as electrocution due to the use of substandard electrical equipment and underground cables, among other factors. In some cases, workers, especially young ones, take risks and often do not follow safety norms or use personal protective equipment.

Farooqui *et al.* (2008) highlighted the under-development within the construction industry in areas of industrialisation and mechanisation, absence of skilled construction administration procedures, and insufficient safety allowances provided by the current monitoring body that have unsuccessfully set safety as an important reqiurement in the industry. Inadequate and unencouraging insurance measures have led to failure in creating a business case for safety. Also, many labourers and staff are sometime under the influence of alcohol and drugs; unfortunately, they are not checked for drugs and alcohol before the start of and during work, which can also lead to occupational accident and injuries, especially in construction industries.

Hassouna (2005) and Al-kilani (2011) have identified poor safety awareness of top management leaders of projects managers as the main factors that influence health and safety management practices in the construction industry in China. These were also supported by the studies of Al-kilani (2011) and Abdul Rahim *et al.* (2008) in the same location (China) which found that the causes of accidents in construction industry were due to poor safety awareness from top leaders. Also, inadequate training, insufficient safety awareness by owners, unwillingness to invest resources for safety reckless operation. In addition, lack of certified skill labour, poor equipment, lack of first aid measures, lack of rigorous enforcement of safety regulation, lack of organisational commitment, low education level of workers, poor safety conscientiousness of workers among others. On many occasions, owners and consultants do stress safety before work commences, but as the work progresses their concerns for deadlines become a priority and they tend to pay less attention to health and safety of staff. This negligence and drifted priority may sometimes lead to occupational accidents and injuries (Al-Kilani, 2011).

Furthermore, Amweelo (2000) investigated industrial accidents in Namibia and reported some causes of occupational health and safety issues such as careless attitudes toward work, which leads to risk and hazards at work, and therefore revealed common industrial incidents at the workplace. Nobana and Leesi (2013) state that hazards can result in an accident and thus safety measures are required for hazards control measures. Therefore, there is a need for this study- to develop a framework to curtail accidents and risks in the construction industry in Nigeria.

Lee and Jaafar (2012) categorized the factors influencing health and safety management practices and performances into: management factors, incentives factors, policy factors, personnel factors, technical factors and process factors. For management, factors influencing health and safety management practices and performances include lack of safety inspection, lack of safety meeting, lack of safety regulation enforcement, lack of safety training and education, and lack of safety communication. Incentives factors include a lack of provision of monetary and non-monetary incentives and a lack of disciplinary action. Policy factors include a lack of formulation of safety policies, and a lack of well-written and high standard policies and comprehensible and explicit policies. Personnel factors include bad on site and management attitudes, supervisors and workers attitude towards safety, and lack of constant monitoring of human errors. Technical factors include a lack of organized technicalities, effective risk response and risk management system, and inadequate PPE that is aligned with the nature of work. In addition, process factors include identifying hazards, a lack of assess risks, contingency plans for works, a lack of safety standard of procedure for work processes, among others.

In their study, Vitharana *et al.* (2015), classified factors affecting health and safety management in construction industry into: safety equipment, safety management, safety attitude of workers and safety training. Factors considered under safety equipment include a dislike to wearing PPE by unskilled labourers, unavailability of PPE and a low level of awareness on using PPE. For safety management, factors considered include poor safety awareness of project managers, and failure to appoint a safety officer. For safety attitude of workers, a lack of awareness about site safety and regulations and no willingness to follow safety norms are major factors influencing health and safety management in construction industry. Safety training includes the lack of training facilities and lack of understanding the job. Other factors include unsafe behaviour such as operating without authority, working with moving machinery, wearing dangling clothes and unsafe lifting, working under the influence of alcohol and drugs, among others.

Furthermore, in another study, Ali *et al.* (2014) investigated the factors affecting the implementation of safety and health practices in the Libyan construction sites and found that inadequate training, budget, unawareness and misunderstanding towards occupational safe and health. Equipment and facilities to support safety requirements, workers' attitude towards the practices of occupational safety were all major factors affecting the implementation of safety and health practices in construction industry. Moreover, Spillane and Oyedele (2013) investigated the strategies for effective management of H&S in confined site construction and found that the ignorance of safety issues, poor communication, improper project feasibility studies, and a bad healthy working environment for workers were important factors affecting implementation of H&S issues in the construction industry. In addition, Ismail *et al.* (2012) investigated factors influencing the implementation of a safety management system for construction sites and categorized factors influencing H&S management into resources factor, which include the availability of safety equipment, personal protective equipment, first aid, emergency shutdown system and control system. Management factors include leadership, vision, direction, supervision, commitment, a statement of objectives, safety analysis and prevention planning. In another study, Charehzehi and Ahankoob (2012) investigated the enhancement of safety performance at construction site and found that the lack of safety equipment and poor attitude toward safety were important factors affecting health and safety performance of the construction industry. Omran *et al.* (2008) investigated the implementation of safety requirements by the contractors in the construction industry in Libya using case studies, and found a lack of awareness, budget, awareness and understanding towards occupational safety and health. Equipment and facilities to support the safety requirements, training and workers' attitude contribute to a low implementation of safety and health requirements in Libya.

According to Abdul-Rashid *et al.* (2007), factors that impact safety performance in big construction contractors in Egypt consist of a lack of safety awareness at organisation's top and project management; the unavailability of a clear company safety policy, and issuing and implementation of in-house safety rules. Safety program or manuals include an emergency plan and procedure, non-conduction of safety policy review, management's attitude towards employee's welfare, and issuing of safety laws, standards, regulations and legislations. Spillane *et al.* (2011) undertook a qualitative investigation of critical issues affecting management of health and safety and found that a lack of space, problem of co-ordination and management of site personnel, and overcrowding of workplace are major problems affecting management of health and safety on confined construction sites.

Ssegawa-Kaggwa *et al.* (2013) use a situation analysis to identify the construction industry deficiencies in Botswana and found a lack of quality of procured materials, material shortage, poor attitudes toward safety, a lack of professional construction management practice, a lack of certified skill labour, poor safety conscientiousness of workers, inadequate funding, and technical and management competence, among others. Muhammad *et al.* (2015) carried out an assessment of cost impact in health and safety on construction projects and found that deficient enforcement of safety, non-existence of safety legislation and internal management problems are major problems affecting the health and safety management practices in the construction industry.

2.10 SUMMARRY OF LITERATURE OF FACTORS AFFECTING HEALTH AND SAFETY MANAGEMENT PRACTICES

Harmonizing the studies of Sawacha *et al.,* (1999), Amweelo (2000), Haupt (2001), Lee and Halpin (2003), Huang and Fang (2003), Fang *et al.,* (2004), Tam *et al.,* (2004), Gao and Sun (2004), Hassouna (2005), Dingsdag *et al.,* (2006), Enhassi *et al.,* (2008), Omran *et al.,* (2008), Abdul Rahim *et al.,* (2008), Farooqui *et al.,* (2008), Chan *et al.,* (2010), Al-Kilani (2011), Spillane *et al.,* (2011), Hassan (2012), Sustainable Built environment Research Centre (2012), ElSa fty *et al.,* (2012), Lee and Jaafar (2012), Ismail *et al.,* (2012), Charehzehi and Ahankoob (2012), Nobana & Leesi (2013), Cesarini *et al.,* (2013), Ssegawa-Kaggwa *et al.,* (2013), Spillane and Oyedele (2013), Gohardani and Björk (2013), Albert *et al.,* (2014), Muiruri and Mulinge (2014), Australian Government statutory agency (AGSA) (2014); Vitharana *et al.,* (2015), Muhammad *et al.,* (2015), Oregon OSHA (2015), it is apparent that there is need for a framework or model that would fit into the local environment as stated by Omiunu (2012) to enhance the health and safety management system in the construction industry. This is a gap that this study seeks to fill. To this end, the study seeks to provide a framework for enhancing and evaluating health and safety management system in the Nigerian construction industry. However, juxtaposing the review of literature, factors of importance to this present study are as follows: top management commitment and awareness; availability of dedicated budget and resourcing; membership of H&S association that promotes H&S; clients# commitment to H&S; and enforcement of H&S regulations. They also include: a company's engagement with innovation and research in H&S; a company's characteristics; workers' voice/demand H&S performance of the company; corporate credibility/external image of the company; top management's desire to attain enhanced productivity and continuous improvement; top management's desire to attain of enhanced competitive advantage; and top management desire to enter into a new construction markets opportunities.

A summary of the factors affecting health and safety in the construction industry are itemized in Table 2.1 below.

Table 0-1: Summary of factors influencing health and safety in construction industry

Factors \ Literature sources	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
Lack of quality of procured Materials																								√				√	√	
Material shortage & thievery																								√					√	
Lack of training on workers	√	√				√	√	√	√		√	√	√	√	√	√	√		√			√	√	√	√	√	√	√		
Little pressure from the local population on the government to address								√																		√				
Severe competitive tendering methods								√																						

Literature sources / Factors	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
Age of the workers								√												√										
Level of experience of management								√																				√		√
The main concern of the management on productivity					√	√	√	√						√																√
Ignorance of safety issues		√			√	√	√	√	√				√		√		√		√	√		√	√				√			
Lack of supervision	√			√			√	√						√						√	√		√		√		√	√		√
Failure of employees to attend training sessions		√					√																							
Difficult work site conditions,							√	√												√		√		√						

Literature sources / Factors	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
Poor safety management	√	√		√			√	√						√						√	√	√			√		√	√		√
Deficient enforcement of safety						√	√													√	√	√								
Lack of safety equipment	√					√			√	√					√			√	√				√			√		√		√
Not using provided safety equipment																							√							
Poor attitude toward safety									√	√					√			√	√	√	√		√							
Isolated, sudden deviation from prescribed behaviour.																							√							
Safety legislation does exist		√	√				√															√				√				√

Factors / Literature sources	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
No orientation for new staff or workers		√						√																						
Hazards are not pointed out		√					√	√						√								√						√		√
No safety meetings are held.		√						√																			√			√
Lack of understanding of the job		√					√	√						√							√	√	√	√			√			
Poor equipment maintenance							√	√																				√		
Maintenance and inspection schedules often are not followed				√			√	√						√										√			√			√
Lack of development of construction sector in the shape of				√																		√					√			

Literature sources / Factors	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
Lack of professional construction management practice		√		√	√		√																√		√	√				√
Reluctance to input resources for safety						√																								
Reckless operation						√																								
Lack of certified skill labour						√																						√		√
Lack of first aid measures						√																					√			
Low education level of workers						√														√		√			√					
Poor safety conscientiousness of workers		√				√	√							√							√	√			√					√

Literature sources / **Factors**	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
Use of defective plant and careless acts by plant operators																											√			
Budget									√	√		√	√		√				√											√
Poor communication														√							√						√	√		
Improper project feasibility Studies																											√			
Improper project *organisation* structure																								√			√			
Internal management problems	√													√							√					√	√			

Factors \ **Literature sources**	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
Absence of team work	√																								√					√
Change of top management																					√						√			
Corruption/ bribery																														
Change of government policies																						√								
Bureaucracy																				√							√			√
Healthy working Environment for the workers							√															√								
Stiff environmental regulations							√																							

Literature sources / Factors	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
Environmental Impact of the project							√																	√						
Inadequate legislation							√																							
Lack of governmental commitment																										√				
OSH laws are not up to date																						√				√	√	√		
Failure to appoint a safety officer							√																√				√	√		√
Workers under the influence of alcohol and drugs																				√			√							
Lack of accepted industry model for analysis		√																				√					√			

Literature sources / Factors	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
Human/organisation Resistance							√																	√			√			
Difficulty in seeing the Benefits																														
Lack of time							√																					√		
Improper handling and storage of flammable, explosives and combustibles																														
Worker fatigue and boredom							√													√										
Natural causes																														

Literature sources / Factors	Haupt (2001)	Albert *et al.* (2014)	Lee and Halpin (2003)	Farooqui *et al.* (2008)	Hassouna (2005)	Abdul Rahim *et al.* (2008)	ElSafty *et al.* (2012)	Al-Kilani (2011)	Ali *et al.* (2014)	Sawacha *et al.* (1999)	Huang and Fang (2003)	Fang *et al.* (2004)	Tam *et al.* (2004)	Cesarini *et al.* (2013)	Omran, et al. (2008)	Chan *et al.* (2010)	Lee and Jaafar (2012)	Charehzehi and Ahankoob (2012)	Ismail *et al.* (2012)	Sustainable Built environment Research Centre (2012)	Dingsdag, *et al.* (2006)	Hassan (2012)	Vitharana et al. (2015)	Muiruri and Mulinge (2014	Gohardani and Björk **(2013),**	Gao and Sun (2004	(AGSA) (2014)	Oregon OSHA (2015)	Spillane *et al.* (2011)	**Walters (2010)**
Lack of job satisfaction of workers																														
Technical and management competence		√																		√				√			√			√
Lack of space																													√	
Overcrowding of workplace																													√	

From Table 2.1, factors that have been observed to affect health and safety management in the construction industries are as follows: a lack of quality of procured, material shortage and thievery, lack of training on workers, little pressure from the local population on the government, severe competitive tendering methods, the age of the workers, level of experience of management, the main concern of the management on productivity, ignorance of safety issues, the lack of supervision, the failure of employees to attend training sessions, difficult work site conditions, poor safety management, deficient enforcement of safety, a lack of safety equipment, unsafe methods or sequencing, not using provided safety equipment, poor attitude toward safety and isolated, sudden deviation from prescribed behaviour. Furthermore, safety legislation does exist, there is no orientation for new staff or workers, hazards are not pointed out no safety meetings are held, there is a lack of understanding of the job, there is poor equipment maintenance, maintenance and inspection schedules are often not followed, and there is a lack of development of construction sector in the shape of mechanization and industrialisation. There is a lack of professional construction management practice, reluctance to input resources for safety, reckless operation, a lack of certified skill labour a lack of first aid measures, low education level of workers, poor safety conscientiousness of workers, incorrect use of plan and use of defective plant and careless acts by plant operators. Bad and insufficient budgeting, poor communication, improper project feasibility studies, improper project organisation structure, internal management problems, absence of team work, change of top management; law of arbitration clause in contract agreement; corruption/ bribery; change of government policies/bureaucracy; and healthy working environment for the workers.

2.11 CHAPTER SUMMARY

This chapter has presented the literature review on Health and Safety (H&S) management practices in the construction industry conducted to date on a global scale. It covered H&S management systems, models and contributed to highlighting the key elements and components of H&S management. Additionally, the section presented issues affecting health and safety management in construction in general and, more specifically, the factors that could make a contractor (organisation and firm) to implement or not to implement health and safety management practices. It served the purpose of providing a literature base that would inform the development of a conceptual framework for diagnosing the factors affecting the implementation and attempt to achieve enhanced H&S management practices by contractors in Nigeria.

The next chapter will explore different health and safety management system, to determine their suitability for the Nigerian construction industry by observing the impact of the different factors.

CHAPTER 3: LITERATURE REVIEW - HEALTH AND SAFETY MANAGEMENT SYSTEMS

3 INTRODUCTION

This chapter presents different health and safety management systems, in order to determine their suitability to the issue affecting Nigerian construction industry, there having been difficulty of gulping a definite culture of H&S at the workplace. A well-designed H&S management system is needed which can influence and contribute to the successful implementation of H&S in Nigerian construction industry. Many H&S management models have been proposed generally and particularly in construction environment. The purpose is to grow Nigeria construction industry towards a zero-accident industry.

Activities in construction are known to be complex in nature, where various stakeholders work under constant challenge by the varying demands of the job. Mehta and Agnew (2010) have noted that each job has several of its health and safety risk factors requiring health and safety management systems to be established. Several instructions, safety culture, codes and standards, training, leadership and responsibility have been suggested to influence general health safety at the workplace. A well-designed health and safety management system (HSMS) can contribute to the successful implementation of health and safety management in the workplace. Several HSMS for construction sites have been designed and implemented in several countries based on the standard practices for that country (Ismail *et al.,* 2012).

According to Lingard and Rowlinson (2005), Chambers (2017) and Health & Safety Authority (2019), the earliest efforts to prevent undesirable H&S outcomes mainly focused on solutions for safe physical environment, machinery guarding and safe equipment. The role of individual behaviour in contributing to the occurrence of injuries and illnesses has therefore been recognised in the literature; H&S programmes have attempted to encourage positive safety behaviour at workplace. While individual factors have been observed to be an important factor in ensuring effective health and safety management in the construction industry, there is evidence that workplace organisational factors, i.e. H&S management activities, are key in controlling accidents and injuries in the construction industry. In addition, the literature has shed light on various models to enhance the effectiveness of health and safety management in the construction industry. The justification of this study is hinged on the fact that, among these models and frameworks, there is still an increased rate of occupational accidents and injuries in Nigeria, which shows the inefficiency of these models and the lack of the imported models to fit into and meet the demands of the Nigeria construction industry. To investigate the gap, which the framework of this present study would fill, it is expedient to note the strengths and weaknesses of the various available models and frameworks.

3.1 A REVIEW OF HEALTH AND SAFETY MANAGEMENT SYSTEMS

Health and Safety management systems (HSMS) commenced notable development since 1990s in two main streams: the development of the laws which required systematic H&S management (e.g. EU framework directive) and the introduction of some H&S management models (e.g. BS OHSAS 18001) (Hasle & Zwetsloot, 2011). Despite the stated development, the ability to prevent undesirable results from accidents and incidents is another advocated reason for the development of HSMS. The ability of a systematic H&S management to enhance H&S performance is agreed by many researchers (e.g. Lingard & Rowlinson, 2005; Hughes & Ferrett, 2007). Griffith and

Howarth (2001) claimed that the most appropriate way to fulfil the Health and Safety requirements from legislations is via the establishment of H&S management systems. Many H&S management models have been proposed in general and in construction industry environment in particular. Out of the models, the most recognised is the H&S management system of Health and safety Executive (1997) and Pérezgonzález (2005).

The advocacy of the HSE's (1997) model is demonstrated through its worldwide adoption. As an example, British standard BS OHSAS 18001:2007 adapts this model to propose a five-step occupational H&S management model (BSI, 2007). It should be noted that this standard is widely used by many countries (over 70) worldwide (Royal Society of Chemistry, 2014). Another adopted model is the guidelines on occupational safety and health management systems of the International Labour Organisation (ILO, 2001, cited in Muiruri and Mulinge, 2014). There are other models such as the guidelines of the Centre for Chemical Process Safety (1994), the guidelines of the European Process Safety Centre (1994, cited in Pérezgonzález, 2005), the diverse SMS models of Ming (1994, cited in Pérezgonzález, 2005), the guidelines of the Canadian Pulp and Paper Association (1999, cited in Pérezgonzález, 2005).

Although there are some slight differences between those systems, they share similar features. However, Ismail *et al.* (2012) have noted that there is a difference in models with respect to country of interest and of usage. Omiunu (2012), has noted that gulping innovative development with respect to the various elastic H&S models from the western world to developing countries could be to a mismatch due to differences in culture and environment and other factors of interest. To this end, it seems fit to adapt these models from the western world to provide a better framework or model that could fit into the

Nigerian construction industry and be deployed to ameliorate the major problems of injury and accident towards ensuring better H&S management and implementation.

3.2 HEALTH AND SAFETY MANAGEMENT SYSTEMS EVOLUTION

Health and safety management in the construction industry has evolved from measures adopted in accident prevention to more systematic and proactive approaches to minimising the risk of hazards in the industry. Despite the popularity of literature on health and safety management systems, a commonly accepted definition is absent due to the variable nature of the elements often composing them. Robson *et al.* (2007) found that H&S management lack a common definition and reported on health and safety management systems having up to 27 elements. According to the Government of Alberta, Canada (2017), H&S management system is a process put in place by an employer to minimize the risk of injury and illness. Its importance to ameliorating injury and illness has made it of major interest to the study of construction industry. The activities of the construction industry have raised serious H&S concerns amongst governments, H&S professionals, researchers and other stakeholders over the past few decades (Leopold and Leonard, 1987; Enshassi and Mayer, 2002; Kaplinski, 2002; Rowlinson, 2004; Gibb, 2005; International Labour Organisation (ILO), 2005). A number of construction businesses manage the H&S function in their businesses by carrying out health and safety activities aimed at minimising or eliminating the risk of hazards on their sites. A growing number of construction businesses, particularly larger ones, have tended to adopt health and safety management systems, which have their origin in Deming's Plan-Do Check-Act model of continuous quality improvement (Hamid *et al.,* 2004).

There are many H&S model but Helledi (1999) reported on the adoption of a simple, non-bureaucratic H&S management system by SMEs in the Finnish construction industry which proved effective in bringing down the numbers of site accidents experienced by contractors. Essentially, a health and safety management system have four primary elements (Hamid *et al.,* 2004):

• planning;

• implementing the plan;

• reviewing the plan; and,

• evaluating and taking measures to improve strategy.

The planning element involves the assessment of H&S risk. The implementing element involvement implementing measures to manage H&S risk. The review element involves monitoring measures to achieve set targets, and the evaluating element involves auditing and continuous improvement of the entire H&S management system. Health and safety management systems (HSMS) commenced notable development since 1990s. Many H&S management models have been proposed. Amongst the prominent ones are: the H&S management systems of the UK Health and Safety Executive (HSE) (1997, 2013); the safety management systems of McDonald's *et al.,* (2000); occupational safety and health management system guidelines from the ILO**;** Pérezgonzález's safety management methodology (2005); and the occupational H&S management system of BSI (2007). A detailed review of these systems/models is given in chapter three of this study. Whilst there are differences between the systems/models, they also share very similar elements which embody specific H&S management practices.

Approaches to health and safety management reported in construction hardly qualify as health and safety management systems because they lack one or more of the elements of Deming's Plan-Do-Check-Act (PDCA) cycle. For instance, Agrilla's (1999) 3Es suggested for achieving high safety performance is comprised of safety engineering, safety education and safety rule enforcement. This health and safety management system involves planning as part of the safety engineering process, but lacks clear elements or procedures on how to continuously improve health and safety performance. The effectiveness of health and safety management systems in the construction industry has not been assessed. At best, it is only the individual elements that make up the system which have been shown to be associated with improved health and safety performance. The adoption of comprehensive health and safety management systems has been shown to be a difficult task for SMEs (Dawson *et al.,* 1988; Eakin *et al.,* 2000; Mayhew 2000). Some reasons as to why firms which could cut across construction firms might find it difficult adopting such systems include lack of adequate resources and the fact that they operate in a competitive environment and operate under relatively informal management procedures (Banfield *et al.,* 1996, cited in Attabra-Yartey, 2012; Mayhew 1997; Vassie *et al.,* 2000). Therefore, there is a dire need to investigate major factors that affect the H&S implementation, especially in the developing countries environment such as Nigeria.

Moreover, realising construction as a complex activity where various stakeholders are present working under constant challenge by demands of the job and where each job has several of its health and safety risk factors, requiring health and safety management systems to be established, as indicated by Mehta and Agnew (2010); a well-designed HSMS can contribute to the successful implementation of health and safety management in the workplace. To this end, the present study uses empirical findings to provide a principal framework based on the standard practices for the country that could ameliorate the prevalence of injuries and accidents in the workplace in the Nigerian construction industry and thus provide a better H&S management practices in Nigerian construction industry.

3.2.1 Summary Critique of the Systematic Health and Safety Management System

The Health and Safety management systems (HSMS) places emphasis on the management as responsible for ensuring effective health and safety issues in construction industries and deploying other models into the system. On the contrary, other factors could also be important such as employees' nature and their attitude. In addition, the model deployed could be context- and environment-specific. Deploying these models (such as the EU framework directive) and the introduction of some H&S management models (e.g. BS OHSAS 18001) may not be able to meet up with the circumstances needed to be solved to ameliorate the health and safety problems, especially in the Nigerian construction environment. Therefore, this model may fail to keep up with the Nigerian construction environmental needs of the industry, thus not being able to be deployed effectively and to produce reliable outputs and results. To this end, there is a need to revise, if need be, and provide a well encompassing framework of model that would suit the Nigerian construction industry toward ensuring a better health and safety management.

3.3 THE HEALTH AND SAFETY MANAGEMENT OF HEALTH AND SAFETY EXECUTIVE (HSE) (1997)

According to Lingard and Rowlinson (2005), a successful H&S management system requires "a clearly defined policy, well-defined plans incorporating specific objectives, strong management commitment, the provision of sufficient resources, a systematic training programme, effective monitoring and reporting of performance and a process for reviewing performance and making improvement". The content of the H&S management model of the HSE (1997) reflects this. The six major components in this model, as shown in Figure 3.1, are defined by HSE (1997).

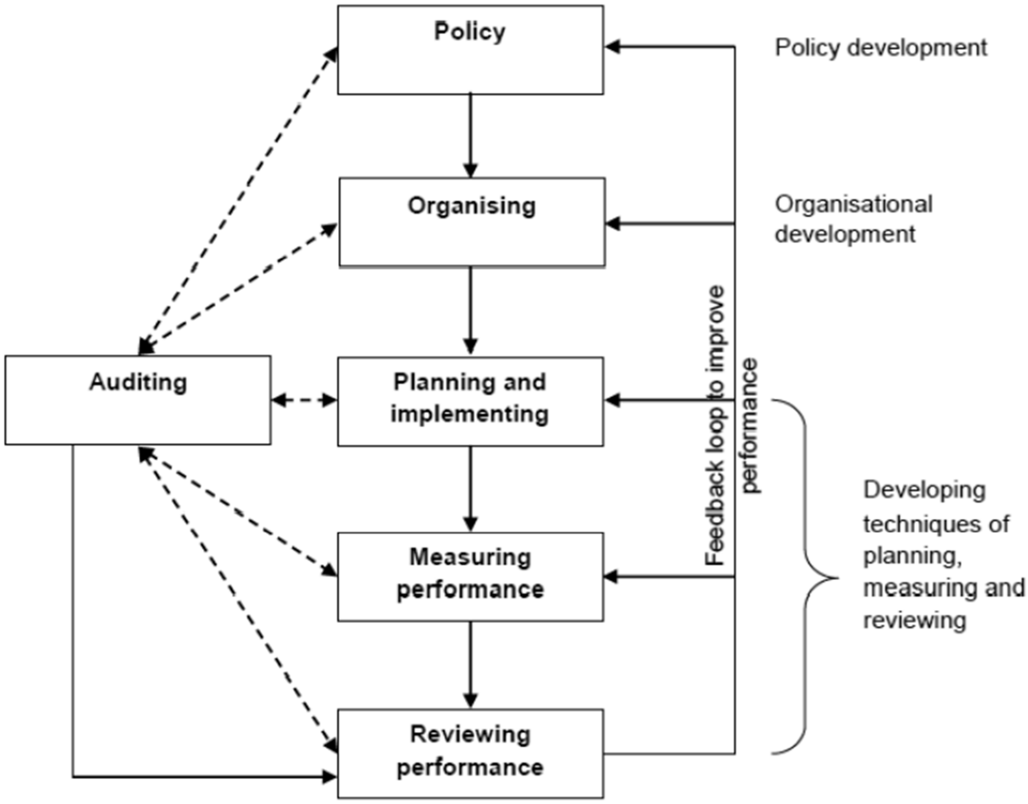

Figure 3-1: Key elements of successful H&S management (adapted from HSE, 1997)

- *Policy*: A general statement and overall guiding principle regarding the H&S of an organisation.
- *Organisation:* It is important to clearly understand responsibility of all parties within an organisation/project to effectively control H&S issues.
- *Risk assessment:* Organisations need to undertake risk assessment in order to assure a safe working environment for all.
- *Planning:* An effective health and safety management system needs an appropriate plan to guide implementation.

- *System implementation:* This can be seen as the most important element in the model. An effective system will only be tested through practice. Failure in this element means that the system is still a theoretical model.

- *Auditing:* This is a normal activity in any management system. Lessons and experiences are documented and applied correctly to achieve continuous improvement.

Pérezgonzález (2005) criticised this model, but the system is an easy-to-understand guide. On the other hand, the relationship between it and other management systems in an organisation is unknown. In addition, auditing appears as a confusing element in the framework between measuring and reviewing, and it seems not to perform any notable role. Hasle and Zwetsloot (2011) pinpoint some shortcomings of auditing, that is, it will orientate an organisation towards complying with requirements from H&S laws, rather than paying attention to the ultimate goal of H&S management systems, preventing occupational injuries and illnesses.

3.3.1 Critique of Health and Safety Management of Health and Safety Executive

The safety, health and environment (SHE) model is more complicated than the health, safety, environmental and quality model, because the model gives room for external personalities such as auditors and using best practices from within and outside the organisation to form a yardstick to be deployed to increase the organisation's efficiency deploying the model. Nevertheless, it still has its shortcomings such as the health, safety, environmental and quality model. This is because emphasis is placed on the high management personalities to ensure effective health and safety issues in construction industries. On the contrary, involving the employees at the base line of the organisation could in the long run bring more effectiveness into the deployment of the model. To this end, there is need to revise, if need be, and provide an all-encompassing framework of model that would suit the Nigerian construction industry towards ensuring a better health and safety management.

3.3.2 Safety Management Systems of Mcdonald's *Et Al.* (2000)

This system was adapted from the Health and Safety management model from HSE (1997) by McDonald *et al.* (2000) and the results of a study on safety management in four aircraft maintenance companies in Europe to produce a new Health and safety (H&S) management model. The model (Figure 3.2) has seven components, which are divided into two functions: operational performance and system auditing. McDonald *et al.* (2000) explain that the sequence starts from safety policy (general goals and strategies to achieve the goals). The safety standards (global criteria to assess the organisational safe level) to planning and organisation of work (management activities to ensure adequate resources provided for managing H&S performance) and normal operational practice (the normal practice and attitude carried out in the organisational functions).

The whole process is controlled by the "monitoring" element. After that, feedback is produced and adjustment or change is accordingly carried out. Changes can be conducted at any level in the system to improve its effectiveness. Although the model is supported by an empirical study, it needs to have more follow-up confirmations to demonstrate its practical value (Pérezgonzález, 2005).

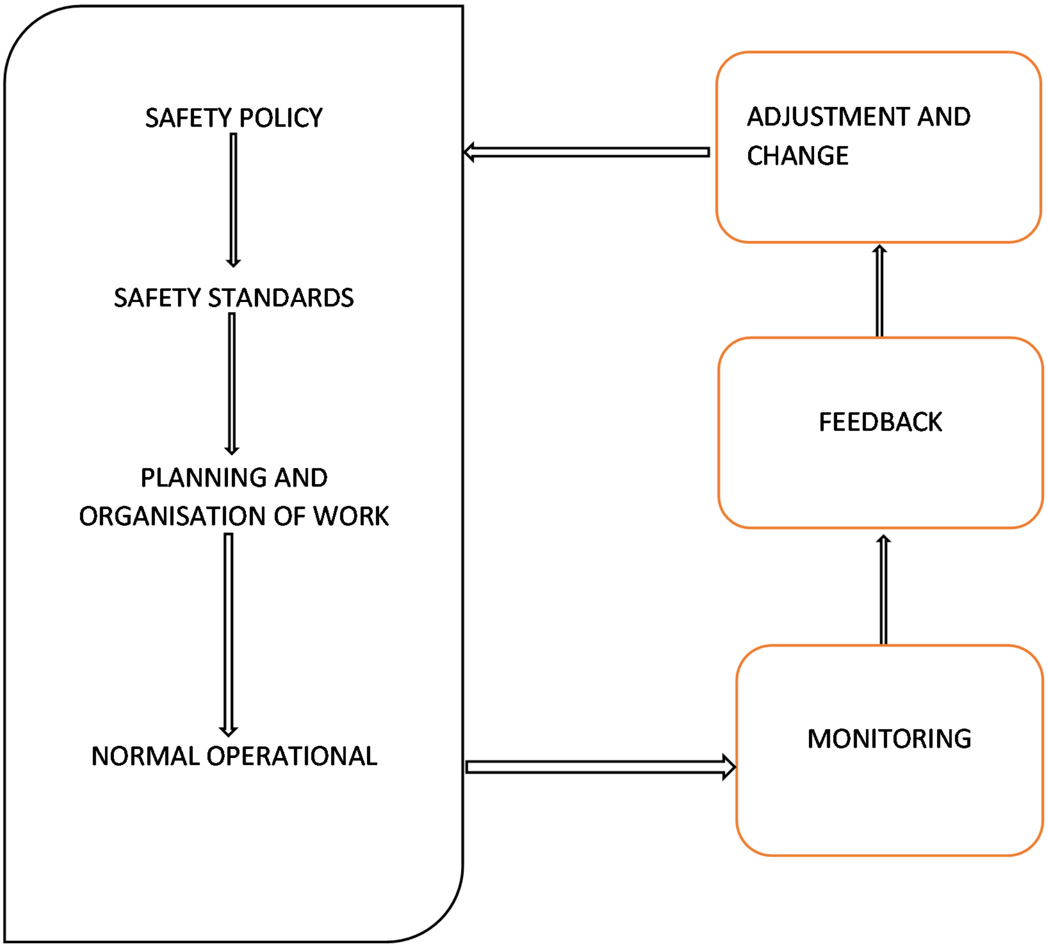

Figure 3-2: Safety management model (McDonald et al., 2000, p.171)

3.3.3 Critique of Safety Management Systems

The Safety Management System model place emphasis on the management and other professional service providers with respect to health and safety issues. Nevertheless, employees are important in the initiation and accomplishment of this model but have been left out of this model. This is because employees can decide not to do what the management tells them to do and deploy their own strategies, which would render the effort of the management a wasted one and thus increase the level of injuries and accidents in a given construction industry. Therefore, there is a need for a holistic framework that would at least cover all the factors responsible for the increased rate of accidents and injuries in the Nigeria construction industry, hence the need for this study.

3.3.4 Guidelines On Occupational Safety And Health Management System Of International Labour Organisation (ILO, 2001)

The ILO (2001) Guidelines on Occupational Safety and Management (Figure 3.3) was introduced in 2001. In general, the difference between this model and BS OHSAS 18001's model is not great. The difference is mainly in the wording of the elements.

Figure 3-3: Management diagram for ILO 2001 (ILO, 2001)

3.3.5 Critique of Guidelines on Occupational Safety and Health Management System of International Labour Organisation

The ILO (2001) Guidelines on Occupational Safety and Management is an offshoot of other standards in the construction industry to ameliorate health and safety challenges. However, the variables, factors or stages provided in this model are all the responsibility of the management. There is no room given for the employees to contribute and partake in such policy. This may fail to achieve its goals and objectives in the long run. It is most disastrous to make policy categories of individuals and implement such a policy without involving those at the grassroots whom the policies are meant to assist. Other factors may seem to hinder the effectiveness of such an implemented policy in the long run.

3.3.6 Safety, Health, Environmental and Quality-Management System (SHEQ-MS) MODEL

The SHEQ-MS model (Figure 3.4) is similar to the management system model for BS OHSAS 1800:2007 by BSI (2007). A common difference is that, while for the management system model for BS OHSAS 1800:2007 has its first step as the OHS policy, the SHEQ-MS model has its first step as SHEQ policy. SHEQ stands for safety, health, environment and quality model. However, the pattern travels across like the BS OHSAS 1800:2007.

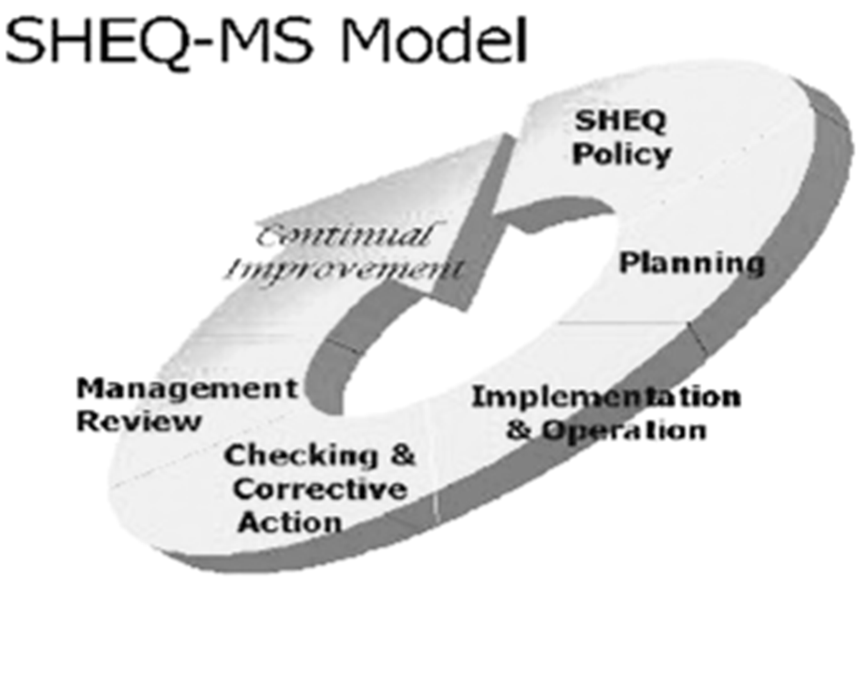

Figure 3-4: Integrated Safety, Health, Environmental and Quality (SHEQ) Management System Model (Yang, 2002)

3.3.7 Critique of SHEQ-MS Model

The SHEQ-MS model is an offshoot of other standards in the construction industry to ameliorate health and safety challenges. However, the variables, factors, or stages provided in this model are all the responsibility of the management. There was no room given for employees to contribute and partake in such a policy. This may fail to achieve its goals and objectives in the long run.

3.3.8 Safety Management Model of Perezgonzalez (2000)

According to Pérezgonzález (2005), the model is an enhancement due to a clearer explanation of the theory and a practical application of the McDonald *et al.'s* (2000) model. As shown in Figure 3.5, there are two main loops: primary loop (start at planning & organisation of work and finish at post-adjustment and change) and secondary loop (start at safety policy and finish at post-adjustment and change) (Pérezgonzález, 2005).

Perezgonzalez (2005) argue that the data for auditing are from the day-to-day operating tasks rather than the general goals and strategies, resulting in creating the primary loop - a more important process. In addition, there are two more supplementary elements in the model compared with the McDonald *et al.'s* model: risk assessment and pre-adjustment and change. The explanation is that the general goals and strategies (safety policy and safety standards) need to be clarified by short-term goals (e.g. weekly, monthly, quarterly or annually) through planning and organisation of work (Pérezgonzález, 2005). The feedback can now be received from risk assessment (an independent element of the management process) or from pre-adjustment and change factor based on experience/knowledge. The outcome of these steps helps to prevent negative results in the next stage. Both loops end at the post-adjustment and change. However, if there is any adjustment, it should be done at the planning and organisation component rather than the policy. Any changes at this general level are solely conducted in case of serious incidents, which demonstrate the unsuitability of the global goals and strategies. Although it is a precise management model, it still needs more practical examinations to demonstrate its effectiveness (Pérezgonzález, 2005).

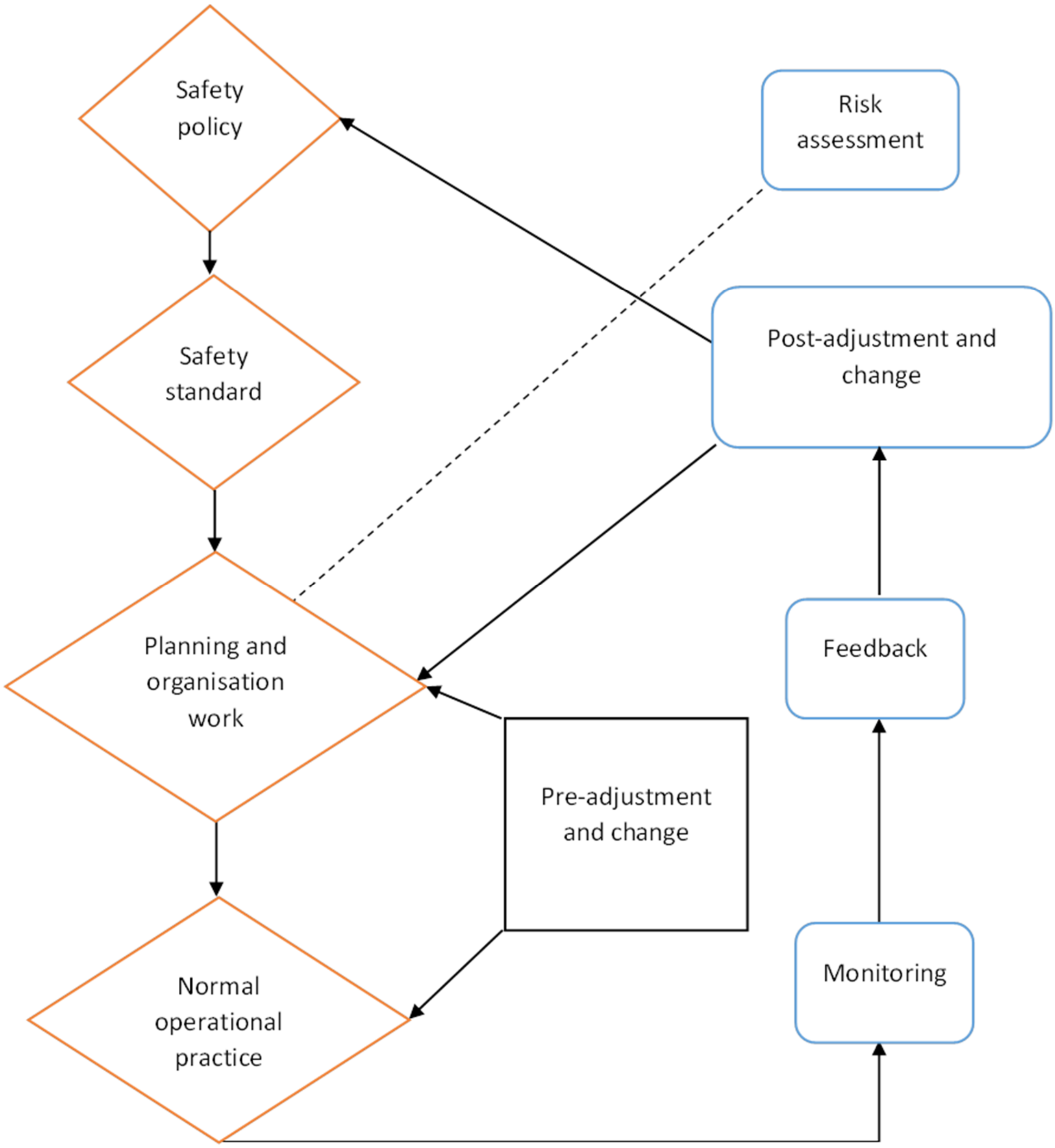

Figure 3-5: Safety management model (adapted from Perezgonzalez, 2005)

3.3.9 Critique of Safety Management Model of Perezgonzalez

The safety management model places emphasis on the management as the only one responsible for ensuring effective health and safety issues in construction industries. On the contrary, a wide range of factors from the employees' end is also important, which this model failed to incorporate into its structure or strategy. Employees' attitudes could frustrate the effort of the management planning, delivering, monitoring and reviewing processes. To this end, this model only covers the supply side (the management) of health and safety issues and fails to consider the demand side, which include the factor of the employees. In addition, there may be some things that the management may not be able to see or discover without help from the employees.

3.3.10 Occupational H&S Management System BS OHSAS 18001:2007

The previous version of this standard is BS 8800: 1996 (updated in 2004). The introduction of BS 8800:1996 was the consequence of the demand for good practices in H&S management under the Management of Health and Safety at Work Regulation 1992 (Royal Society of Chemistry, 2014). BS OHSAS 18001:2007 is an H&S management model compatible with the international standards ISO 9001:2000 (Quality) and ISO 14001:2004 (Environment). This produces a good condition for organisations to integrate the H&S management system into quality and environmental management systems in day-to-day operations (BSI, 2007). The elements of the BS OHSAS 18001:2007 are shown by Figure 3.6.

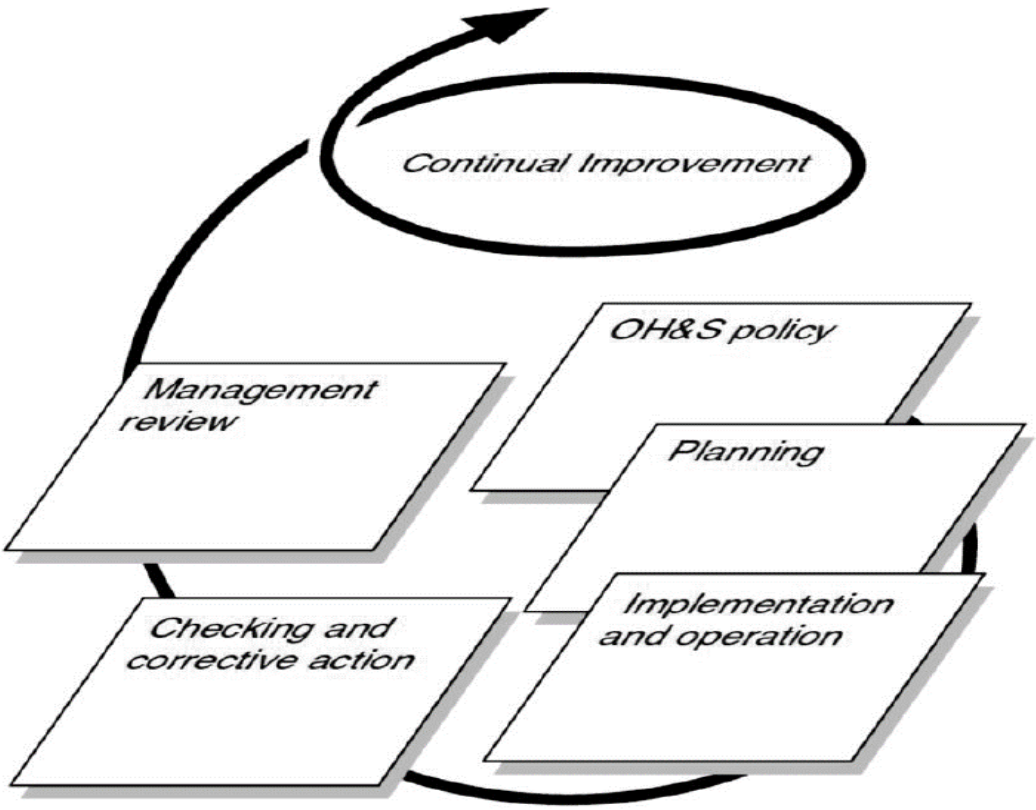

Figure 3-6: Management system model for BS OHSAS 1800:2007 (BSI, 2007)

3.3.11 Critique of Occupational H&S Management System

The ILO (2001) Guidelines on Occupational Safety and Management is an offshoot of other standards in the construction industry to ameliorate health and safety challenges. However, the variables, factors, or stages provided in this model are all the responsibility of the management. There was no room given for the employees to contribute and partake in such policy. This may fail to achieve its goals and objectives in the long run. It is most disastrous to make policy categories of individuals and implement such a policy without involving at the grassroots these individuals whom the policies are meant to assist. Other factors may seem to hinder the effectiveness of such an implemented policy in the long run.

3.4 THE MANAGEMENT FOR H&S MODEL OF HSE (2013)

This model is a revision to the HSE (1997) model. The model shifts away from the policy, organising, planning, measuring performance, auditing and reviewing (POPMAR) structure to the Deming's Plan, Do, Check, Act (PDCA) approach (Figure 3.7) (HSE, 2013). This could be because the PDCA approach helps to achieve balance between systems and behavioural aspects of management, and the model is treated as part of an organisation's operation rather than a separated area (HSE, 2013).

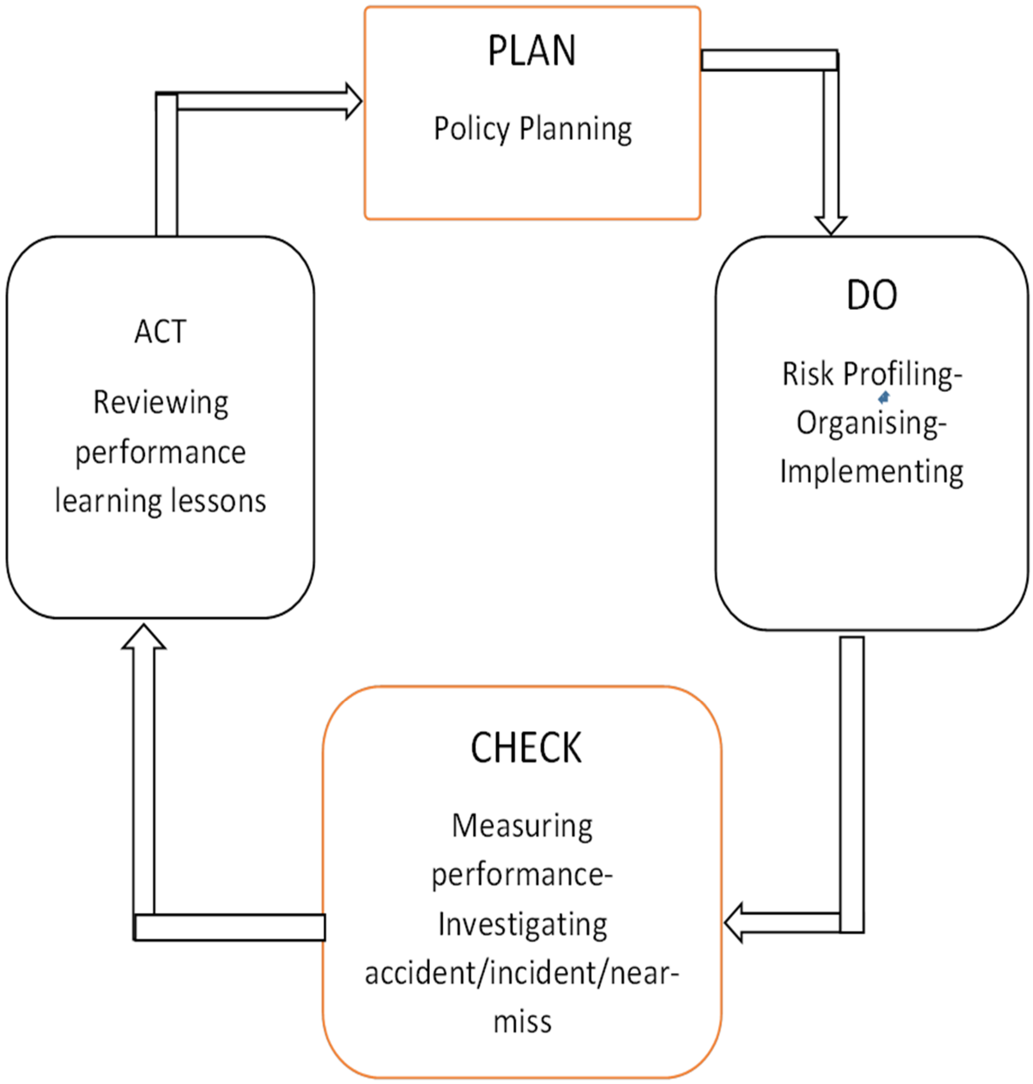

Figure 3-7: Plan, Do, Check, Act cycle (produced from HSE, 2013)

This guideline encourages organisations to satisfy the H&S legal requirements. In other words, it shows what compliance looks like and orientates the organisations toward results rather than process (HSE, 2013). Indeed, there is no constraint of using any specific H&S management systems from the HSE. The decision belongs to organisations. However, it requires that whatever systems are used, the management work should cover four main items: Plan (development of company policy and planning);
Do (risk profiling, organising and implementing); Check (measuring performance, investigating accidents/incident/near-miss); and Act (reviewing performance, learning lessons) (Royal Society of Chemistry, 2014).

3.4.1 Critique of the Management for H&S Model

Taking a critical look at the model, it places more emphasis on the management as the only one responsible for ensuring effective health and safety issues in construction industries. On the contrary, a wide range of factors from the employees' end is also important which this model failed to imbibe into its structure or strategy. Employee's attitude could frustrate the effort of the management planning, delivering, monitoring and reviewing processes. To this end, this model only covers the supply side (the management) of health and safety issues and failed to consider the demand side, which include the employees' factor. In addition, there may be some things that the management may not be able to see or discover except for the help of the employees.

3.5 MCKINSEY'S 7 S-MODEL

Another important model for health and safety management practices in the construction industry is Mckinsey's 7S model (Figure 3.8). The model has seven variables, which is termed 7S in the model: strategy, structure, systems, skills, staff, shared values and style. The culture of organisations comprises the values, norms, opinions, attitudes, taboos and visions of reality that have an important influence on decision making and behaviour of construction organisations. Construction organisations can be regarded as social communities that share a set of core values. The core values of an organisation are increasingly recognized as the main determinants of the organisation's identity; they underlie the organisation's mission, vision and strategies, and influence the design and functioning of their systems, structure, style of operation, and the selection and development of staff and skills.

The basic assumptions cannot be directly observed or perceived, but they are the core of an organisational culture. The espoused values are those that the organisation and its higher management proclaim to be important. The artifacts (e.g. working practices) are phenomena co-determined by the corporate culture, which can easily be observed or measured. It is more difficult to clarify the link between the artifacts and the two underlying layers of the culture. The influence of the culture of the organisation on its members remains largely unconscious or even subconscious. It is transferred to new members of the organisation through an implicit socialisation processes.

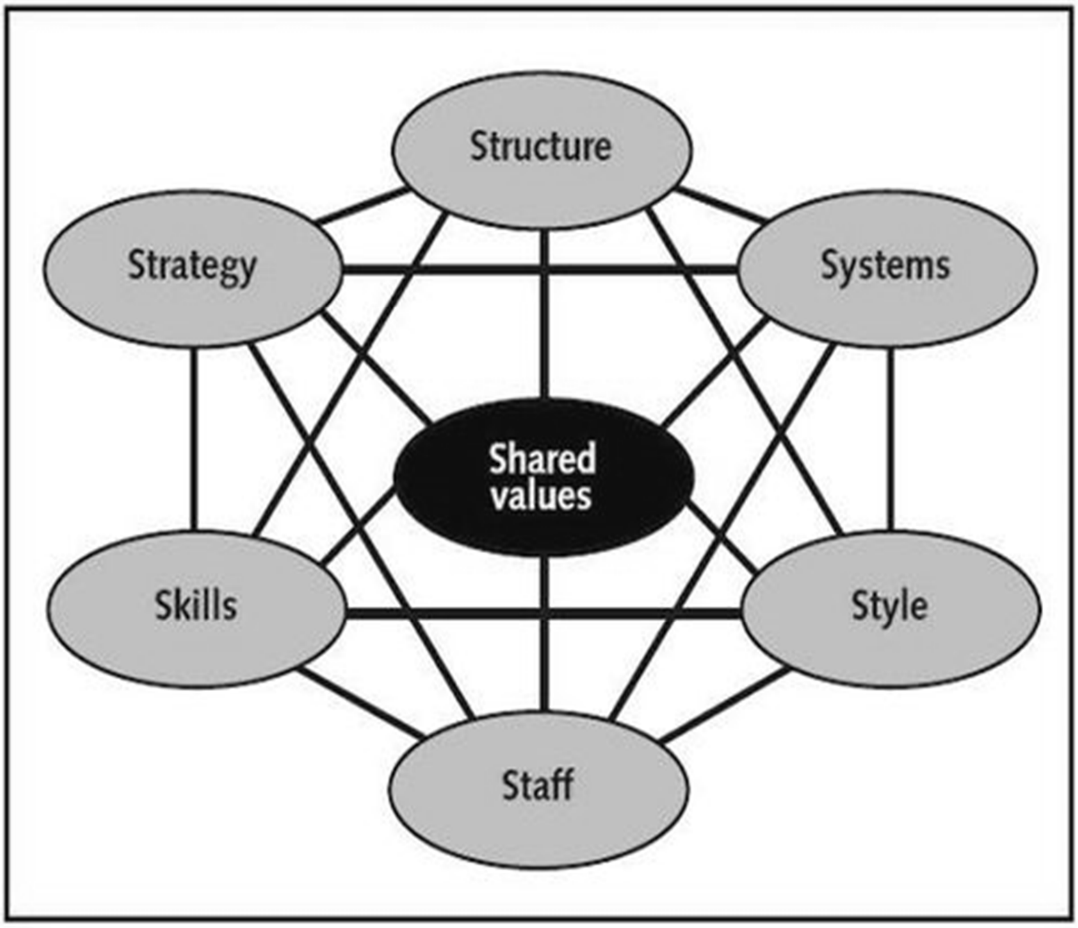

Figure 3-8: McKinsey's 7 S-model (Zwetsloot and Steijger, 2013)

Organisational culture influences the attitudes, motivation and behaviour of managers, supervisors and workers. It influences working practices, the perceptions, understanding and management of OSH risks, and whether these risks are discussed and dealt with. It also determines which risks are considered acceptable and what is regarded as responsible OSH behavior. In construction companies, to maintain high productivity, individuals might violate certain OSH regulations. When such organisations have an OSH culture, construction activities and OSH are not seen as conflicting but as two sides of the same coin: safety pays, and OSH is good for employees and organisational productivity. The culture supports desired safe and healthy behaviour with a focus on responsibility and competence; and discourages irresponsible action. There are many different definitions of OSH culture (organisational) and the related concept of OSH climate. OSH culture is the totality of attitudes, (implicit) assumptions, beliefs, perceptions and habits of the members of an organisation that are relevant for OSH. Occupational safety and health culture are expressed in policy, procedures, activities and behaviour, and is always an aspect of the organisational culture. As organisational OSH culture is intangible, it is not a phenomenon that can easily be measured or managed.

3.6 MANAGE WORK HEALTH AND SAFETY RISKS MODEL

Another important model is the Work Health and Safety Risks Model (Figure 3.9). There are many recognized standards: ANSI, ASME, OSHA, OHSAS 18001, AS/NZS 4801-2001, UNE 81902, SA 8000, BSI, CDM Regulations, SCC, EU, ILO-OSH, ISO 14001, ISO 9001. Frequently, construction project management commits to compliance with complex standards, such as OSHA or AS/NZS 4801-2001, with an associated abundance of mandatory documentation, without a full understanding of how such compliance could affect their project. The project starts with high-profile declarations at public "town hall" meetings about introducing new and high standards and strict compliance to the country. Then, as the impact on schedule and costs of compliance become known, management surreptitiously backs off from their initial enthusiasm and their commitment to such compliance.

Figure 3-9: How to Manage Work Health and Safety Risks: Queensland, Australia Code of Practice 2011

Source: Kinsey (2013)

Whatever the standard deployed, there are four steps to duly follow, according to the Australia Code of Practice 2011. These include identifying the risks, controlling the risks, reviewing control measures and identifying major hazards in the construction project industry. These would give a better understanding of which standard of health and safety management to use.

3.6.1 Critique of Mckinsey's 7 S-model

This model is encompassing as it covers both the supply and demand side of the health and safety issues. Nevertheless, the model is too complex and may eventually not be achieve due to its complexity. Rather, along the line of implementation, some aspects may be done away with or not properly carried out which may lead to inefficiency in the deployment of the model. It should be advisable to constrain the variables to selected few and break the model into two different stages where the completion of the first stage would give birth to the other.

3.6.2 Critique of the Manage Work Health and Safety Risks Model

The model sees management commitment as the major factor to ameliorate health and safety issues in construction industries. On the contrary, user factors that include the factors with respect to the employees are relevant to ensuring efficient strategy. The fact that the model only captured the management does not make it sufficiently encompassing to meet the user need in the construction industry. This is because users such as the employees are closer to the work than management and they see what the management would not see and, until they are involved, they may decide to keep to themselves.

3.7 HEALTH AND SAFETY STRATEGY MODEL

The Health and Safety Strategy Model are presented in figure 3.10 below.

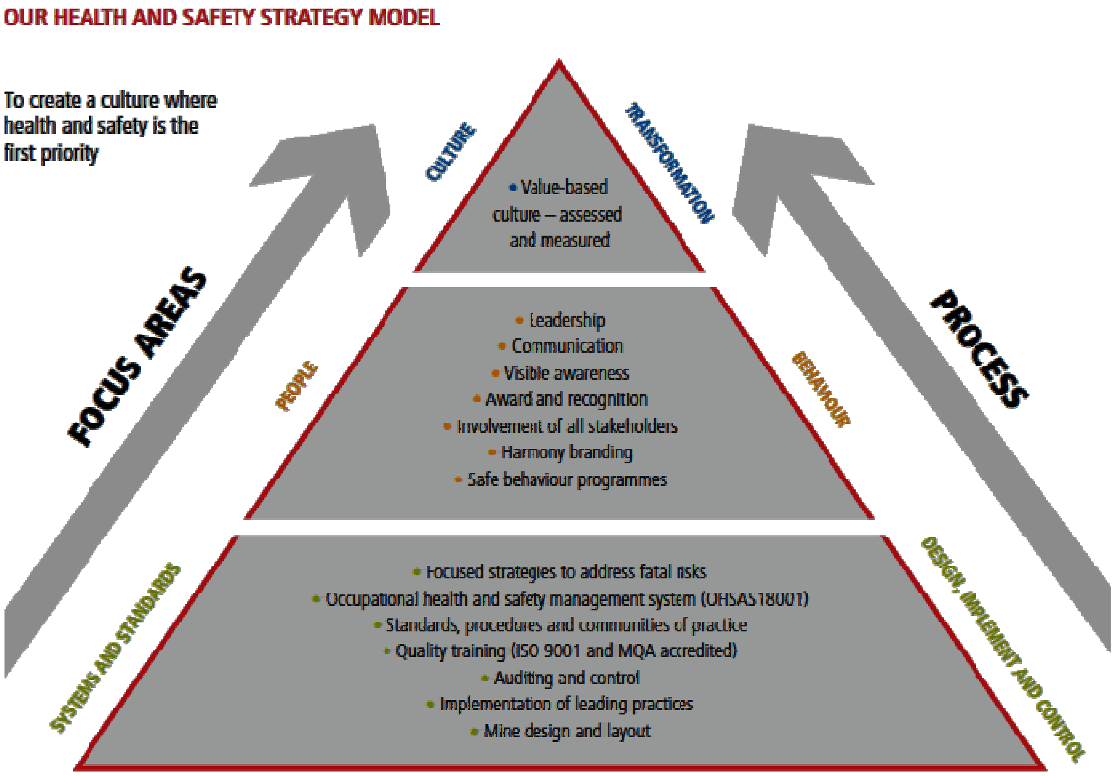

Figure 3-10: Health and safety strategy model Source: Harmony Gold Mining Company Limited: Annual Integrated Report 2014

In the H&S strategy model, representatives from all levels of management, union and government are encouraged to actively participate in the H&S framework. The H&S strategy model is in the form of a triangle having two opposite sides with focus areas and the process aspect, and operates at three levels from the two different sides. For example, from the focus area side, it has three levels: culture, people and the systems and standards. In addition, from the process side, it has the transformation, behaviour towards H&S, and design, implementation and control. All of this work together in a unified whole to give an effective model for curtailing H&S issues in the construction industry.

3.7.1 Critique of Health and Safety Strategy Model

The health and safety (H&S) strategy model places emphasis on the management responsible for ensuring effective H&S issues in construction industries. However, a wide range of factors from the employees' end is also important which this model failed to absorb into its structure or strategy. Employees' attitudes could frustrate the management planning, delivering, monitoring and reviewing processes. To this end, this model only covers the supply side of H&S issues and failed to consider the demand side that include the employees' factor. In addition, there may be some things that the management may not be able to see or discover without help from the employees.

3.8 HEALTH, SAFETY, ENVIRONMENTAL AND QUALITY MODEL

The health and safety (H&S) environmental and quality model is presented in Figure 3.11 below. A high level of health, safety, environmental and quality awareness at all levels is essential, and this can only happen through ensuring openness and the dissemination of information and knowledge to all employees through the guiding principles behind communications policy that cuts across inclusiveness, rapidity and accuracy (CRC-Evans Pipeline International, 2017).

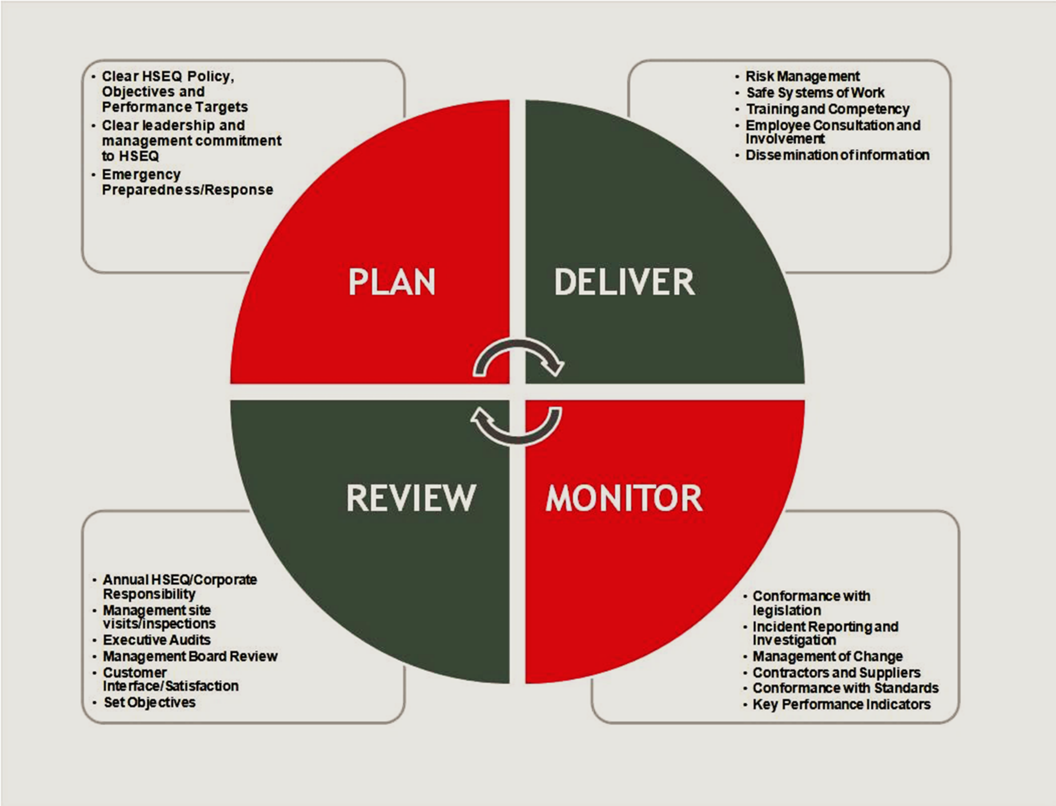

Figure 3-11: Health, safety, environmental and quality model (CRC-Evans Pipeline International, 2017)

In addition, the direction of an effective health and safety (H&S) issues in industries follows from planning, delivery, monitoring and reviewing. A common phenomenon with this model is that the process of ensuring effective H&S issue in construction industry is that the process is continuous, as shown in the H&S, environmental and quality model of CRC-Evans Pipeline International (2017). Another important model is the H&S and Environment (SHE) Model.

3.8.1 Critique of the Health, Safety, Environmental and Quality Model

The health, safety, environmental and quality model places emphasis on the management as the only one responsible for ensuring effective H&S issues in construction industries. However, a wide range of factors from the employees' end is also important which this model failed to absorb into its structure or strategy. Employees' attitudes could frustrate the effort of the management planning, delivering, monitoring and reviewing processes. To this end, this model only covers the supply side (the management) of health and safety issues, and fails to consider the demand side which includes the employee factor. In addition, there may be some things that the management may not be able to discover without help from the employees.

3.9 THE SAFETY MANAGEMENT SYSTEM MODEL

The safety management system model (Figure 3.15) is a cycle of continuous improvement by the University of Sydney (2017) and is also an important H&S management model.

Figure 3-12: Safety management system model: Cycle of continuous improvement (The University of Sydney, 2017)

A Safety Management System (SMS) is a part of an organisation's overall management system used to manage health and safety. An SMS includes a range of components including policy, planning activities, procedures, resources and activities.

3.9.1 Critique of the Safety Management Model

The health Safety management model place emphasis on the management and other professional service providers with respect to health and safety issues. Nevertheless, employees are important in the initiation and accomplishment of this model. This is because employees can decide not to do what the management tells them to do and deploy their own strategies, which would make the effort of the management waste.

3.10 SUMMARY REVIEW OF THE DIFFERENT MODELS OF HEALTH AND SAFETY MANAGEMENT PRACTICES

The various models reviewed in this study include the Health and Safety management systems (HSMS) and the Health and Safety Management of Health and Safety Executive (HSE) (1997), safety management systems of McDonald's *et al.* (2000), the Guidelines on Occupational Safety and Health Management System of International Labour Organisation (ILO, 2001). Also, Safety Health Environmental and Quality-Management System (SHEQ-MS) Model, Safety Management Model of Perezgonzalez (2000), Occupational H&S Management System BS OHSAS 18001:2007, the Management for H&S Model of HSE (2013), Mckinsey's 7 S-Model, Manage Work Health and Safety Risks Model, Integrated Health and Safety (H&S) Management System, Health and Safety Strategy Model, Health, Safety, Environmental and Quality Model, Safety, Health and Environment (SHE) Model, and the Safety Management System Model. Two major defrences which have been observed as common to all the models are that, firstly, emphasis is placed on senior management with respect to the internal factors and other external factors such as policymakers, auditors, etc., thus neglecting other factors such as employees' nature and their attitude, and, secondly, that they are too complex for the Nigeria construction industry which is perhaps due to the Nigerian environment. According to Omiunu (2012), such models need to be adapted and fitted into the ones that could accommodate the Nigeria construction industry. There is a need for an encompassing and yet more appropriate model to cater for the health and safety issues and management and practices in the Nigeria construction industry; this is the gap that this present study seeks to fill. Table 3.1 gives the summary of all the factors highlighted in literature.

Table 3-1: Different models of health and safety management in construction industry

s/n	Models/Frameworks	Strength	Weakness
1	Health and safety management systems (HSMS)	Management as an important factor	Neglect other factors such as employees' nature and their attitude etc.
2	The Health and Safety Management of Health and Safety Executive (HSE) (1997)	Includes factors from internal (such as managers) and external personalities such as auditors, policy makers and using best practices from within and outside the *organisation*	Emphasis placed on high management personalities with respect to the internal factors thus neglect other factors such as employees' nature and their attitude etc.
3	Safety Management Systems of McDonald's *et al.* (2000)	Place emphasis on the management and other professional service providers with respect to health and safety issues	Neglect other factors such as employees' nature and their attitude etc.
4	Guidelines on Occupational Safety and Health Management System of International Labour Organisation (ILO, 2001)	Variables, factors, or stages provided in this model are all related to the management	Neglect other factors such as employees' nature and their attitudes etc.

5	Safety, Health, Environmental and Quality-Management System (SHEQ-MS) Model	It is an offshoot of other standards in the construction industry majoring on the responsibility of the management	Neglects other factors such as employees' nature and their attitude etc.
6	Safety Management Model of Perezgonzalez (2000)	Emphasis placed on the management as the only one responsible for ensuring effective health and safety issues	Fails to consider the demand side, which include the employees' factor
7	Occupational H&S Management System BS OHSAS 18001:2007	Variables, factors, or stages provided in this model are all the responsibility of the management	Fails to consider other range factors such as those on the demand side, which include the employee factor
8	The Management for H&S Model of HSE (2013)	Places more emphasis on the management as the only one responsible for ensuring effective health and safety issues	Fails to consider other range factors such as those on the demand side, which include the employee factor
9	Mckinsey's 7 S-Model	It covers both the supply and demand side of the health and safety issues	The model is too complex and may ultimately not be achievable due to its complexity
10	Manage Work Health and Safety Risks Model	Management commitment as the major factor to ameliorate health and safety issues in construction industries	Failed to ta take into account other range factors such as those from the demand side, which include the employee factor

11	Health and Safety Strategy Model	Places emphasis on the management responsible for ensuring effective health and safety issues in construction industries	Fails to take ino account other range factors such as those from the demand side, which include the employee factor
12	Health, Safety, Environmental and Quality Model	Places emphasis on the management responsible for ensuring effective health and safety issues in construction industries	Fails to takr ino account other range factors such as those from the demand side, which include the employee factor
13	The Safety Management System Model	Places emphasis on the management and other professional service providers with respect to health and safety issues	Fails to take ino account other range factors which include those from the demand side, which include the employee factor

Table 3-2: Summary of health and safety management models

Management Area/Elements		HSE (1997)	ILO (2001)	HSE (2013)	McDonald *et al.* (2000)	BSI (2007)	Perezgonzalez, (2005)	Griffith and Howarth (2001)	(ROBELO, Santos Silva, 2014)	Gangolells *et al*, (2013)
PLAN	Policy	v	v	v	v	v	v	v	v	v
	Planning	v		v	v	v	v	v	v	v
DO	Risk Assessment			v			v	v	v	v
	Organising	v	v	v	v		v	v	v	
	Implementation	v	v	v		v		v	v	v
CHECK	Measuring and reviewing performance (Evaluation)	v	v	v	v	v		v		v
ACT	Auditing	v	v	v				v	v	v

Table 3-3: Lists of health and safety management practices

Elements	Practices	Sources
POLICY	A formal company health and safety policy statement.	Mitropoulos *et al.* (2005)
	A company director with overall responsibility for health and safety.	Jones *et al.* (2005)
	Formation of Policy that sets the direction for the safety organisation and safety committee to follow.	Robson *et al.* (2007)
	Establishes management worker interaction (Periodic safety meetings, Regular site visit).	Hinds, P.J. and Cramton, C.D. (2013)
ORGANISATION	Providing H&S training for the site safety supervisors and site manager.	Teo *et al.* (2005)
	Communicating health and safety information to workers through newsletters, leaflets, posters, etc.	Hossain *et al.* (2003)
	Engaging with workers on health and safety issues e.g. H & S meetings and suggestion schemes.	Sawcha *et al.* (1999)
	Networking with other companies/institutions (insurance companies, government offices) about H&S issues.	Kheni *et al.* (2006)
	Providing health and safety supervisors on site.	Goldenhar *et al.* (2001)
	A designated H&S department	Komaki *et al.* (1980).
	Assessing the competence of workers and subcontractors.	Kartam, N.A. and Kartam, S.A (2011)
	Providing training programs for safety managers.	Goldenhar *et al.* (2001)
	Display of regulatory H&S posters on construction sites.	Hughes, P. and Ferrett, E. (2015)
	Open display of company H&S policy on construction sites, company websites, and head/branch offices.	Hughes, P. and Ferrett, E. (2015)
	Propagating H&S practices to external stakeholders e.g. the client.	Wang, J. and Chadhi, V. (2009)
	Undertaking risk assessments for work packages/operations before they start.	CORRIDOR, E. W. (2004)

Elements	Practices	Sources
RISK ASSESSMENT	Undertaking overall project risk assessments before project starts.	Webster *et al.* (2006)
	Designing site rules and measures to mitigate assessed risks.	Baloi, D and Price, A.D. (2003)
	Informing employees about hazards on sites before work starts.	Wells, J. and Hawkins J. (2014)
	Review and updating risk assessments during construction.	Shen *et al.* (2001)
PLANNING AND IMPLEMENTATION	Prepare method statement.	Jaselkis *et al.* (1996)
	Preparing H&S plans for every construction project.	Fewing, P. (2013)
	Provision of personal protective equipment	Langford *et al.* (2000)
	Provision of first aid equipment on sites.	Lingard, H. (2002)
	Implementing site H&S rules and measures	Bosworth *et al.* (1999)
	Health and safety insurance cover for site	Riel, P.F. and Imbeau, D. (1998)
	Amending and correcting health and safety plans during construction	Burstin *et al.* (1998)
	Site induction for workers.	Sawcha *et al.* (1999)
	Pricing to cover H&S requirements for projects.	Hinze, J. (1988)
	Training programs for workers.	O'Connor *et al.* (2005)
	Carrying out site H&S inspection regularly	Choudhry *et al.* (2008)
	Provision of sanitation and welfare facilities on sites (e.g. toilets, canteens, drinking water.	Kumar, A. (2014)
	Setting H&S performance targets.	Robinson *et al.* (2005)
	Rewarding workers for safe work behaviour.	Aksom, T. and Hadikusumo B.H.W. (2008)
	Discipline workers for unsafe work behaviour.	Harcourt, M. and Harcourt S. (2000)
	Conduction regular health checks for employees.	Enhassi *et al.* (2008)

Elements	Practices	Sources
	Assigning H&S supervisors on site.	Aksorn, T. and Hadikusumo B.H.W. (2008)
MEASURING AND REVIEWING PERFORMANCE	Measuring health and safety performance against targets.	Cameron, I. and Duff, R. (2007)
	Keeping incident records on every project.	Pheng, L.S. (1993)
	Reviewing and updating health and safety plans after projects completion.	Lingard, H. and Rowlinson, S.M. (2005)
	Investigating the causes of incidents, accidents and near misses.	Mitropoulos *et al.* (2005)
	Publishing or sharing lessons learnt from incidents investigations across the company or on project.	Von Zedtwitz, M. (2002)
AUDITING	Undertaking periodic safety management auditing.	Christini *et al.* (2004)
	Use of in-house personnel for undertaking safety management auditing.	Sui Pheng, L. and Chen Shiua, S. (2000)
	Use of external consultant for undertaking safety management auditing.	Sui Pheng, L. and Chen Shiua, S. (2000)
	Data base safety monitoring	Hallowell *et al.* (2013)

3.11 CHAPTER SUMMARY

This chapter has reviewed different H&S models and introduced and explored several health and safety factors such as organisational structure, communication, clear instructions, safety culture, codes and standards, training, leadership and responsibility that influence general H&S in the workplace. The review of different frameworks carried out showed that the characteristics of the various available models and frameworks explored would need to be explained to extract their best features and merged to create an ideal model that would be fit for use in Nigeria. The next chapter presents the research framework proposed for this study and the factors that were considered.

CHAPTER 4: RESEARCH FRAMEWORK

4.0 INTRODUCTION

Juxtaposing the review of literature and the various health and safety (H&S) models reviewed in this study, major factors of importance to this present study and the proposed research framework and model are: top management commitment and awareness; availability of dedicated budget and resourcing; membership of H&S association that promotes H&S; client commitment to H&S; enforcement of H&S regulations; the company's engagement with innovation and research in H&S; company characteristics; workers' voice/demand H&S performance of the company.

Frameworks consist of three important elements (Rechenthin 2004; Abudayyeh et al., 2006):

1. Practices;
2. Factors; and
3. Indicators

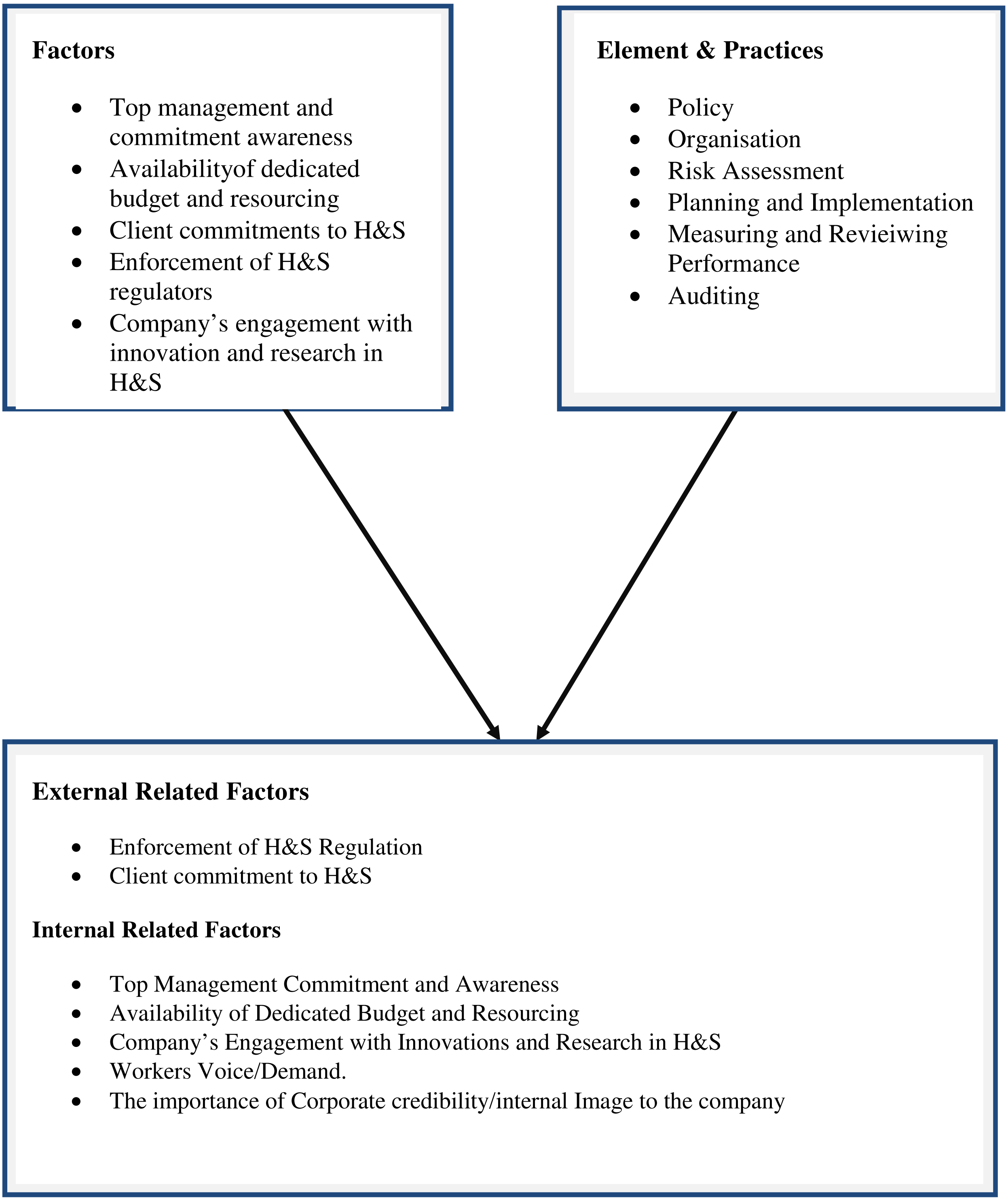

Fig. 4.1 Proposed frame work

Factors

These are some of the factors that influence what effect the execution of H&S management procedures in construction industry are:

- Enforcement of H&S Regulation
- Top management commitment and awareness
- Availability of dedicated budget and resourcing
- Company's engagement with innovations and research in H&S
- Client commitment to H&S

Indicators

Their corresponding indicators, which help implement the factors, are as follows:

- Periodic visit by H&S inspectors; persecution or fines for violation of H&S rules and regulations, and warning for breach of H&S regulation.
- Regular review of contractors H&S policies; importance of H&S as contractor selection criteria and availability of client clerk of works who oversees H&S among other responsibilities.
- Availability of safety policy; discussing H&S during company board meetings and company directors with responsibilities for H&S.
- Budget allocation for H&S management and evidence of monitoring the effective use of the budget.

Furthermore, corporate credibility and external image to the company; top management desire to attain enhanced productivity and continuous improvement; top management desire to attain enhanced competitive advantage; and top management desire to enter into a new construction markets opportunity. The framework that drives this present study is presented in Figure 4.1. The chapter is divided into 2 main sections: first, the variables or factors of interest in the framework of this research and second, the proposed research framework for the research.

4.1 THE VARIABLES OR FACTORS OF INTEREST IN THE FRAMEWORK OF THIS STUDY

Various factors have been provided to affect H&S management in construction industry. The choice of the variables or factors of interest in the framework of this study are depend on Omiunu's (2012) observation that development plans which cuts across frameworks, and models deployed from developed economies or rather from different environments, may not be suitable for the Nigeria system and thus may lead to non-sustainability and under-development. To this end, the present study, having outlined various factors affecting the health and safety management from a global, general and holistic perspective, isolated and selected thirteen main factors which are known to be common to the Nigerian context and construction industry. These are highlighted in Table 4-1.

Table 0-1: Factors affecting health and safety management in Construction Industry and their Indicators used in the proposed research model.

Factors	Indicators
Top management commitment and awareness.	• Availability of safety policy • Discussing H&S during company board meetings • Company directors with responsibilities for H&S
Availability of dedicated budget and resourcing	• Budget allocation for H&S management • Evidence of monitoring the effective use of the budget
Client commitments to H&S	• Regular review of contractors H&S Policies • Importance of H&S as contractor selection criteria. • Availability of client clerk of works who oversees H&S amongst other responsibility
Enforcement of H&S regulations	• Periodic visit by H&S inspectors • Prosecution or fines for breach of H&S regulations • Warning for breach of H&S regulations
Company's engagement with innovation and research in H&S	• Assessment by us of Likert scale.
Company characteristics	• The size of the company by number of employees • Company age • Location of the company • Annual turnover • Type of work / operations (e.g. Civil, Building, M&E.) • National contractors' classification (e.g. A, B, C, E, D…) • Type of sector of operation

Workers' voice / demand	• Pressure from workers for H&S improvement (e.g. boycotts by workers for H&S issues). • Employee representation in H&S governance in the company (e.g. employees' representation on company H&S committee).
H&S performance of the company	• Number of Accidents / Fatalities / Injuries / Illness
The importance of corporate credibility / external image to the company	• Assessment by use of Likert scale
Top management desire / objective for attaining enhances productivity and continuous improvement	• Assessment by use of Likert Scale
Top management desire / objective for attaining of enhanced competitive advantage	• Assessment by use of Likert Scale
Top management desire / objective for entering into new construction markets opportunities.	• Assessment by use of Likert Scale

These factors are grouped into two: external and internal ones (Figure 4.1). The reason for this is to know the various sources of the highlighted factors in the framework. A summary of the literature to this effect is provided in Table 4.2.

Table 0-2: A Review of Key Factors and Constructs on the implementation of health and safety management practices in the construction industry

Literature sources / **Company related factors And external Factors.**	Jaselkis *et al.* (1996)	Gallagher (1997)	Simonds and Shafai (1977)	(CITB,2001)	Mcdonald *et al.* (2000)	Tam *et al.* (2004)	Baldock *et al.* (2005)	Baldock *et al.* (2005)	Kheni (2008)	Solomone (2008)	Esquer-Peralta *et al.* (2008)	Asif *et al.* (2009)	Zeng *et al.* (2008)	Idoro (2011)	HSE (2013)	Windapo and Jegede (2013)	Umeokafor (2017)
Top management commitment and awareness.	√	√	√														
Availability of dedicated budget and resourcing.						√										√	√
Membership of H&S Association that promotes H&S.				√			√										
Client commitment to H&S		√															
Enforcement of H&S Regulations								√									
Company’s engagement with Innovation and Research in H&S.															√		
Company Characteristics									√					√			
Workers’ Voice / Demand																	
H&S Performance of the company															√		
The importance of corporate credibility / External image to the company										√		√					
Top management desire / objective for attaining enhanced productivity and continuous improvement.																	

					√								√				
Top management desire / objective for attaining of enhanced competitive advantage										√	√						
Top management desire / objective for entering into a new construction markets opportunity.										√							

The summary of the table shows that Jaselkis *et al.* (1996), Gallagher (1997) and Simonds and Shafai (1977) have found that top management commitment and awareness is observed to influence the management of H&S procedures in construction industry. CITB (2001) and Baldock *et al.* (2005) observed that membership in an H&S association that promotes health and safety will influence the administration of H&S practices in the industry.

Other factors, as highlighted in the literature, to affect H&S practices in the construction sector highlighted in Table 4-2 are as follows: availability of dedicated budget and resourcing (Tam *et al.,* 2004; Windapo & Jegede, 2013; Umeokafor, 2017); the client's commitment to H&S (Gallagher, 1997; Baldock *et al.,* 2005); enforcement of H&S regulations (Baldock *et al.,* 2005); the company's engagement with innovation and research in H&S (HSE 2013); the company's characteristics (Kheni, 2008; Idoro, 2011); H&S Performance of the company (Idoro, 2011); the importance of corporate credibility and external image to the company (Solomone, 2008; Asif *et al.,* 2009); top management desire and objective for attaining enhanced productivity and continuous improvement (Mcdonald *et al.,* 2000; Zeng *et al.,* 2008); top management desire and objective for attaining of enhanced competitive advantage (Solomone, 2008; Esquer-Peralta *et al.,* 2008); top management desire and objective for entering into a new construction markets opportunities (Solomone, 2008).

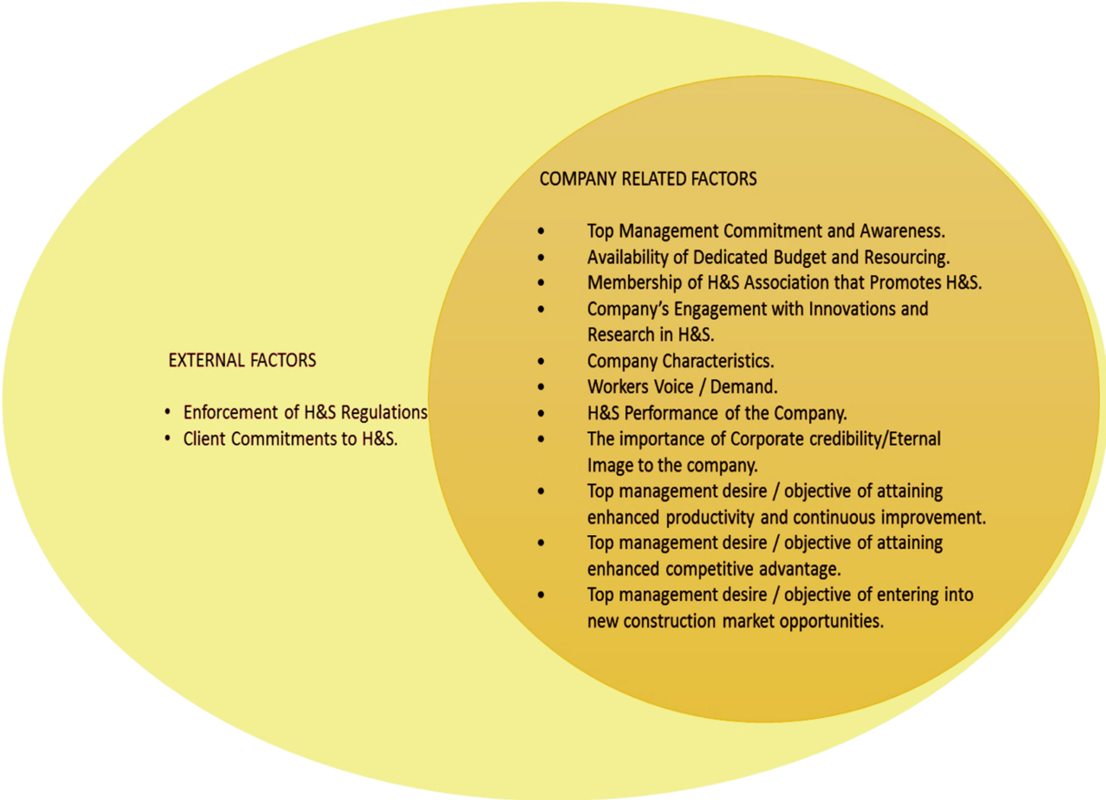

Figure 0-1: Categorisation of main factors in proposed research framework

From **Error! Reference source not found.**, it may be important that enforcement of H&S regulations (Baldock *et al.,* 2005) and client commitment to H&S (Gallagher, 1997; Jaselkis *et al.,* 1996; Gallagher, 1997; Simonds and Shafai, 1977). Membership of H&S association that promotes H&S (Construction Industry Training Board (CITB) (2001, cited in Sreenivasan and Benjamin, 2002, p.?; Baldock *et al.,* 2005); availability of dedicated budget and resourcing (Tam *et al.,* 2004; Windapo and Jegede, 2013; Umeokafor and Nnedinma, 2016); The company's engagement with innovation and research in H&S (HSE 2013); company characteristics (Kheni, 2008; Idoro, 2011); and H&S Performance of the company (Idoro, 2011); the importance of corporate credibility and external image to the company (Solomone, 2008; Asif *et al.,* 2009); top management desire and objective for attaining enhanced productivity and continuous improvement (Mcdonald *et al.,* 2000; Zeng *et al.,* 2008); top management desire and objective for attaining of enhanced competitive advantage (Solomone, 2008; Esquer-Peralta *et al.,* 2008); and top management desire and objective for entering into a new construction markets opportunity (Solomone, 2008) are all internal factors as conceptualised in this present study.

The justification for the few external factors in comparison to the many internal factors as identified in Figure 4.1 can be explained by the assertion of Ogunleye (2002), Krakah and Ameyaw (2010), Ebiringa (2011) and Oghojafor *et al.* (2010). The internal factors are said to be within the control of the management, while the external factors are known to be outside the control of the management. To this end, it is the responsibility of management to provide an adequate sustainable internal environment that would help the construction industry to face the challenges of unstable external environment, which cuts across the external variables of interest in the research model of this study.

4.2 THE PROPOSED RESEARCH FRAMEWORK

The framework for this study is presented in Figure 4.2. The research framework for this study conceptualises that the major factors that affect H&S management practices observed in Nigeria's construction sector can broadly be categorised into two categories: internal and external. With respect to the internal factors, the variables of importance are: top management commitment and awareness; and availability of dedicated budget and resourcing; membership of H&S association that promotes H&S; the company's engagement with Innovation and Research in H&S; company characteristics; workers' voice and demand; H&S Performance of the company; importance of corporate credibility and external image to the company; top management desire and objective for attaining enhanced productivity and continuous improvement; top management desire and objective for attaining of enhanced competitive advantage; and top management desire and objective for entering into new construction markets opportunities. The external factors are client commitment to health and safety and the enforcement of health and safety regulations.

Furthermore, these factors can be viewed from seven major practices, which include policy, measuring and reviewing performance, implementation, planning, risk assessment, and organisation practices towards enhancing H&S management practices among Nigerian construction companies. To this end, this study adopted the major practices, which are to be measured through the internal and external factors, hence the conceptual framework for this study which is shown below:

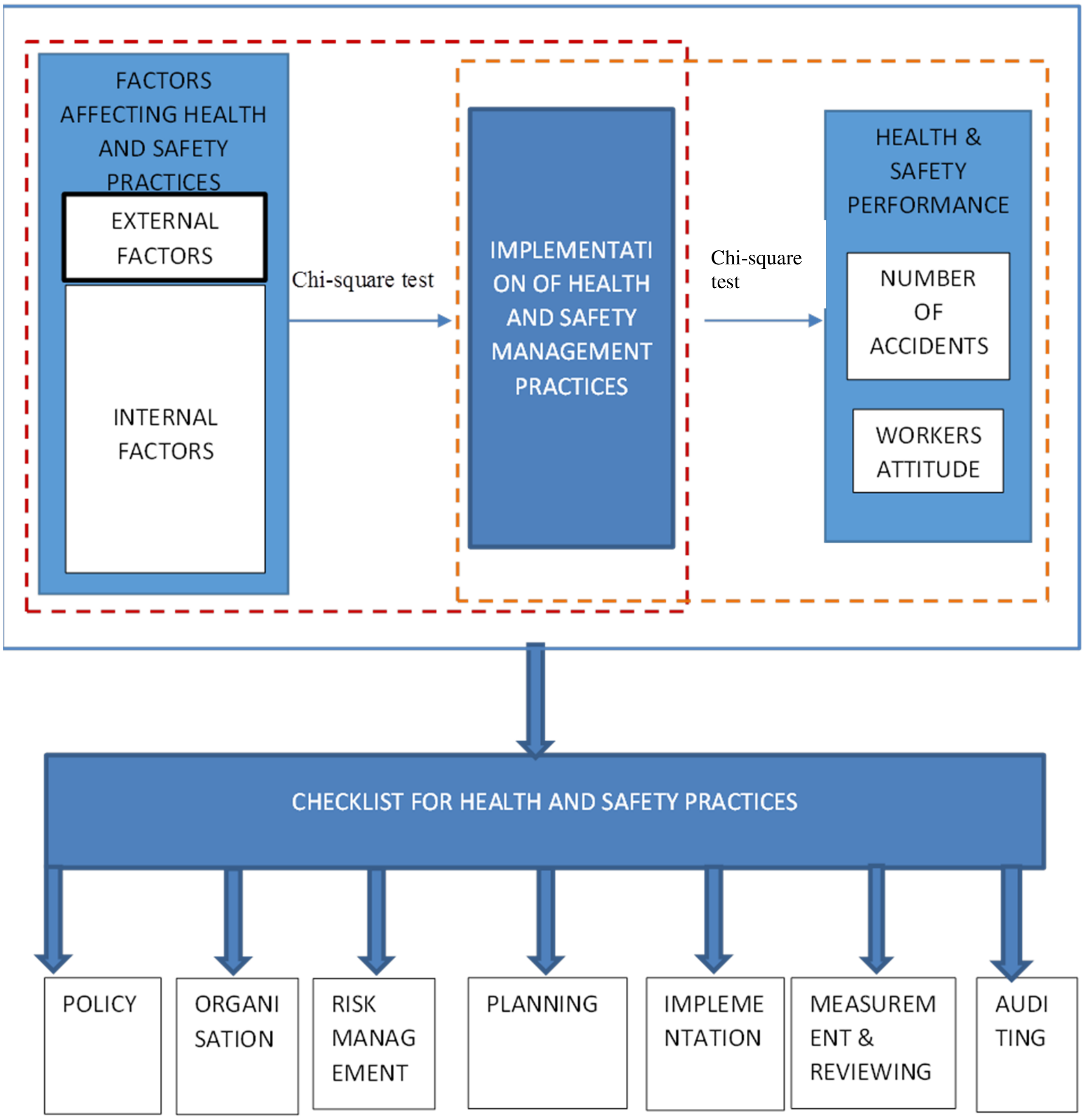

Figure 0-2: The proposed research framework for this study

The framework in Figure 4.2 also conceptualises external and internal factors that can affect H&S management practices in Nigeria's construction sector. In addition, health and safety management practices in Nigerian construction companies can be affected by the joint effect of both external and internal factors. To this end, the study formulated hypotheses which were examined to understand which of the factors are important. Moreover, conceptualising the membership of H&S Association that promotes H&S is captured. Client commitments to H&S is captured in this study by obtaining information about company's' regular review of contractors H&S Policies, the importance of H&S

as contractor selected criteria, and the availability of client clerk of works who oversees H&S amongst other responsibility. The construct of enforcement of H&S regulations is captured by obtaining information on the periodic visits by H&S inspectors, prosecution or fines for violation of health and safety regulations, and warnings for breach of H&S regulations. Any company's engagement with innovation and research in H&S construct is obtained by acquiring a wide range of information with regard to the company's engagement with innovation and research in H&S using the assessment of a Likert scale where respondents will be asked to tick only one from the available options.

The construct of company characteristics is captured in this framework through the size of the company defined by the number of staff: company age; company location; annual turnover; type of work and operations (e.g. Civil, Building, M&E.); national contractors' classification (e.g. A, B, C, E, D…); and the type of sector of operation. Workers' voice and demand is captured by obtaining information from the company about the pressure from workers for H&S improvement (e.g. boycotts by workers for H&S issues; and the employee representation in H&S governance in the company (e.g. employees' representation on company H&S committee).

The importance of corporate credibility or external image to the company would be captured through obtaining information about the variable using the assessment of a Likert scale where respondents are asked to tick one of the available options. Top management desire and objective for attaining enhances productivity and continuous improvement, whereas top management desire and objective for attaining of enhanced competitive advantage. In addition, and top management desire and objective for entering into new construction markets opportunities follows the same measure obtaining information with regard to the variables of interest through a Likert scale where respondents are asked to tick one of the available options.

4.3 CHAPTER SUMMARY

This chapter's purpose has been to present the study's research framework. The first section introduced the concept of framework and the factors and indicators that help shape it. In the second section, the factors considered for this study's research framework were explored in detail. The final section proposes the research framework conceptualised by this study.

CHAPTER 5: RESEARCH METHODOLOGY

5.0 INTRODUCTION

The chapter outlines the processes adopted in the study designed to help achieve its aim and objectives. Its first section presents the research design adopted for this research. This section further presents discussions from literature relating to paradigms that informed the research's fundamental philosophical premises, and diverse existing research strategies that could be employed as options for solving the identified research problem.

5.1 RESEARCH DESIGN

The research provides guidelines that link up the elements of the methodology adopted in a research. It relates the chosen paradigm to the research strategy and then the strategy to methods for collecting data (Denzin and Lincoln, 2000). There are many existing strategies that can be used to conduct research. Likewise, many literatures on research methods exist with differing claims regarding the suitable strategy for a given research question (Dainty, 2008; Harriss, 1998; Runeson, 1997; Rooke *et al.,* 1997; Seymour and Rooke, 1995).

According to Manu (2012), dilemmas often appear when carrying out research. This is often the case when choosing a suitable strategy and research methods for achieving the study's objectives. Creswell (2009) suggests that a research design incorporates the plan and techniques used to conduct a study. It involves the coming together of 3 key elements which include philosophical worldview, strategies of inquiry, and specific methods.

There are 3 types of research design commonly used namely quantitative, qualitative and mixed method approaches (Creswell, 2009; Fellows and Liu, 2008). According to Creswell (2009), when choosing a suitable method for any given study, the decision should be made based on an alignment of the 3 elements of research design. In selecting a suitable research design for this research, Creswell's (2009) three-way framework, presented in Figure 5-1 below, acted as an important guide. The following sections present a review of this framework in relation to this research.

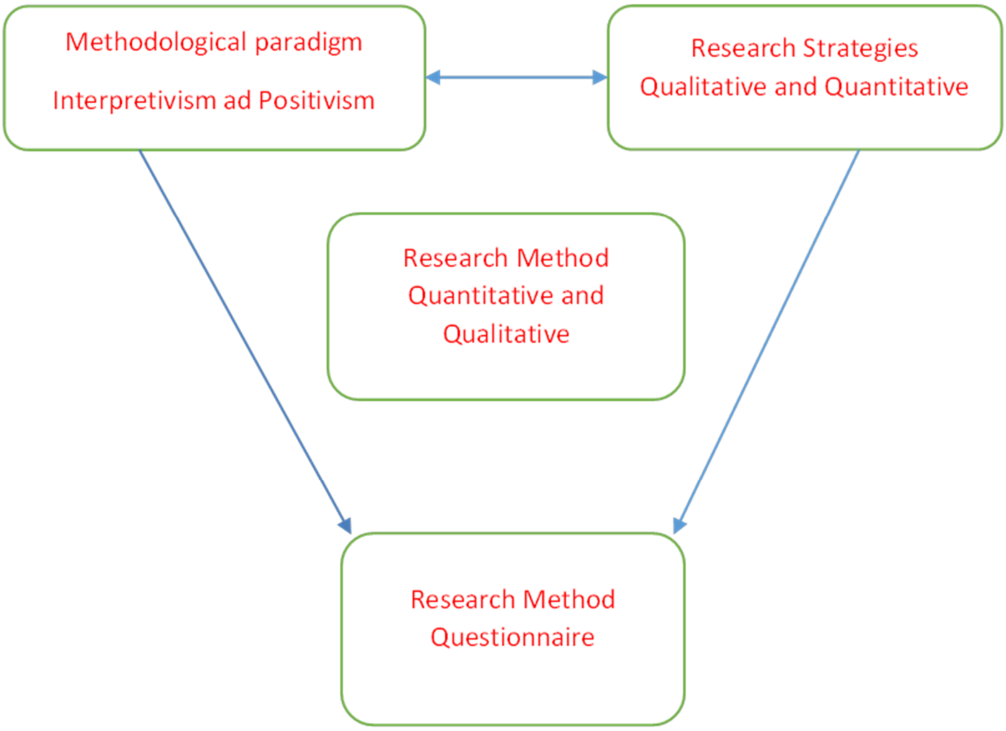

Figure 5-1: Tripartite framework for research design (Creswell, 2009)

5.1.1 Methodological paradigms

In Pollack (2007, p. 87), paradigm refers to "a commonly shared set of assumptions, values and concepts within a community, which constitutes a way of viewing reality". In Creswell (2009) the term, "philosophical worldview" is used for paradigm and is considered to mean, "A basic set of beliefs that guide action". Research paradigms shape the strategies and methods implemented by researchers, although they may be hidden in the research and as such need to be identified (Creswell, 2009; Pollack, 2007; Smyth and Morris, 2007; Slife and Williams, 1995).

There are two commonly used research paradigms namely, positivism and interpretivism (Fellows and Liu, 2008; Bailey, 1987). The positivist paradigm infers that a phenomenon conforms to the laws of nature and is subject to quantitative logic, while the interpretivist believes that a phenomenon will not obey the laws of nature but can be interpreted based upon an observer's conviction and/or their comprehension of the realities around the phenomenon (Walliman, 2001; Bailey, 1987). Thus, a positivist believes that reality can be studied, modelled and observed. Whereas, reality can only be interpreted from an interpretivist's point of view (Sutrisna, 2009).

The two paradigms are connected to 2 key ontological standpoints or views of reality. Positivism involves the ontological position of single objective reality also known as objectivism whilst the interpretivist paradigm is linked to the ontological position of multiple realities referred to as constructivism (Sutrisna, 2009). From the objectivist viewpoint, reality can be independently observed as it is single and therefore experienced the same way by every observer. From the constructivist viewpoint, reality can only be interpreted as it is multiple and therefore experienced differently by every observer.

The choice between positivism and interpretivism has implications in conducting research. With positivism, the observer is usually not part of what is being studied, with interpretivism, the observer has to be part of the investigation. The concepts or constructs in positivism need to be operationalised so that they can be measured. Whereas, the stakeholder interest has to be incorporated in interpretivism. Furthermore, a relatively large sample size may be required to draw statistical conclusions in positivism, whereas smaller sample sizes are normally adequate to help develop an in-depth understanding in interpretivism. Table 5-1 provides further contrasting implications of the choice between the two research paradigms.

Table 5.1: Contrasting implications between positivism and interpretivism Source: Easterby-Smith *et al.* (2002).

POSITIVISM	INTERPRETIVISM
The observer must be independent	The observer is part of what is being observed
Demonstrates causality	The aim is to increase general understanding of the situation
Research progresses through hypothesis/prior formulation	Research progresses through gathering rich data from which idea are induced.
Concepts need to be operationalised so that they can be measured.	Concepts should incorporate stakeholder perspectives.
Generalisation through statistical probability	Generalisation through theoretical abstraction
Requires large sample selected randomly	Requires small number of cases chosen for specific reasons.

Apart from positivism and interpretivism, an intermediary paradigm is pragmatism. Pragmatism is a widely associated paradigm for the conduct of mixed method research (Creswell, 2003). It also focuses on adoption of the most appropriate research strategies which answer each aspect of the research question adequately, hence its pluralistic and practical nature (Amaratunga *et al.,* 2002). It therefore works well across both interpretive (qualitative) and positivist (quantitative) paradigms (Creswell, 2003).

5.1.2 THE RESEARCH PARADIGM ADOPTED

Quantitative strategy is the adopted method used for this research. This is because is the method that deals with asking "what" and "how" of the Health and Safety management practices of construction firms (Creswell, 2014). In addition, the adoption of H&S management practices `mainly relates to organisational characteristics (Kheni, 2008) that is, annual turnover, age and business size (Champoux and Brun, 2003; Baldock *et al.,* 2005). Moreover, a quantitative strategy is better to determine and to establish association between H&S management practices and organisational characteristics (Kheni, 2008).

With this study, a survey and a cross-sectional design using a questionnaire acts as an instrument for data collection. Furthermore, questionnaires elicit more truthful responses due to the confidentiality concept (Burns, 2000).

The research phenomenon and the main research questions under consideration play a role in selecting the type of paradigm that must be implemented (Remenyi and Williams, 1998; Pollark, 2007). It is imperative to select suitable research methodology in order to obtain necessary data to complete a research project (Bell, 1987). Positivist methodology is used during the course of this research as this allows different methods to be used to carry out research investigations (Fellow and Liu, 2010; Leary, 2010). This research is thus based on pragmatist philosophy, which gives room for both qualitative and quantitative research to be conducted to address a research problem. The key inquiries in this research will be based "on the assumption that collecting a mix of diverse data types best provides a more in-depth understanding of the research problem than either quantitative or qualitative data alone."

5.1.3 Research Strategies and Methods

Besides the philosophical position taken in research, researchers also implement a research strategy and specific methods for collecting and analysing data. The research strategy provides specific direction for procedures in a research design (Creswell, 2009). The commonly adopted strategies in research are quantitative, qualitative and mixed method strategies.

5.1.3.1 Qualitative Research Strategies And Methods

Qualitative research provides a means of exploring and understanding the meaning individuals or groups ascribe to a phenomenon (Creswell, 2009). It is useful in answering research questions relating to how and why (Fellows and Liu, 2008). The qualitative process of research is inductive in relation to theory and literature and is usually rooted in the interpretivist/constructivist philosophical position (Sutrisna, 2009). It involves emerging questions and procedures, data typically collected in the participant's setting, data analysis building from particular to general themes, and the researcher making interpretations of the meaning of the data (Creswell, 2009). Qualitative researchers tend to collect four kinds of data: interview data; observation data, document data and audio-visual data. There are several qualitative research strategies including ethnography, Case study, grounded theory, phenomenological research and narrative research (Cresswell, 2009).

5.1.3.2 Quantitative Research Strategies and Methods

Quantitative research is a means of testing objective theories or prior formulations by examining the relationship among variables. The quantitative research strategy is adopted in this study. It incorporates objective and numerical measurements to address research questions. Hence, its usefulness in answering research questions relating to how, how many, how much and what (Fellows and Liu, 2008). The quantitative research process is deductive with regards to theory and literature and is usually based upon the positivist or objectivist philosophical perspective (Sutrisna, 2009). It involves prior formulations of hypothesis or of a conceptual model based on theory and literature followed by collection and analysis of data to approve, disprove or verify those prior formulations. Researchers using the quantitative approach tend to collect instrument-based data by the use of close-ended questioning by means of a questionnaire for example,) and then employ statistical techniques to analyse the data to arrive at conclusions. The samples collected are often large and representative. This means that quantitative research results can be generalised to a larger population. There are two prominent quantitative strategies namely, survey and experiment. The survey strategy used in this research is discussed below.

5.1.3.2.1 Survey

According to Creswell (2009) this strategy provides a numeric description of opinions, trends and attitudes of a population by studying a selected sample of the population. In Babbie (1990) the survey approach includes “cross-sectional and longitudinal studies using questionnaires or structured interviews for data collection with the intention of generalising from a sample to a population”. With the cross-sectional survey, the data on all relevant variables is collected at the same time or within a short period. Therefore, it provides a snapshot of the variables included in the study at a particular point in time. Whereas, with longitudinal surveys, data is collected over longer periods. Over two or more distinct periods, measurements are collected on each variable. This allows the measurement of changes in the variables over time.

5.1.3.3 Mixed Method Strategies and Methods

Mixed method research is a combination of qualitative and quantitative strategies within a single study (Morse, 2003). It involves the application of both qualitative and quantitative methods of data collection and analysis in one study (Creswell, 2009). Mixed method research is normally appropriate in research programmes where, due to the nature of the research problem being investigated, it is possible to collect both qualitative and quantitative data, the analysis of which would offer a better and deeper understanding of a phenomenon (Creswell, 2009).

Initially, the idea of mixing data was aimed at seeking convergence across qualitative and quantitative methods (Jick, 1979). However, in the early 1990s, the idea of mixed research methods moved to actually integrating or connecting qualitative and quantitative data. There are three main mixed method strategies namely, sequential, concurrent and transformative mixed methods (Creswell, 2009).

5.2 THE ADOPTED RESEARCH STRATEGY

Quantitative strategy is the research method adopted for this study. This is because it is the method that can deal with asking “what” and “how” of the Health and Safety management practices of construction firms (Creswell, 2014) In addition, the adoption of H&S management practices ’mainly relates to organisational characteristics’ (Kheni, 2008), that is, annual turnover, age and business size (Champoux and Brun, 2003; Baldock *et al.,* 2005) Moreover, a quantitative strategy is better to determine and establish an association between H&S management practices and organisational characteristics (Kheni, 2008). With this study, a survey and a cross-sectional design using a questionnaire as an instrument for data collection. Furthermore, questionnaires elicit more truthful responses due to the confidentiality concept (Burns, 2000).

Creswell (2003) explains that the sequential exploratory strategy in quantitative research allows the researcher to both generalise the findings to a population and develop a comprehensive view of the meaning of the phenomenon under investigation. This approach would enable the refinement of the conceptual framework of factors affecting health and safety management implementation by contractors through an initial phase of qualitative inquiry. The refinement through the qualitative inquiry would also enable the design of a robust instrument that can then be applied in a quantitative inquiry to establish a generic view of the factors affecting H&S management implementation by contractors in Nigeria.

Due to these reasons, this strategy was adopted for this study. The application of this approach in construction management studies is not uncommon. For example, this approach was used in some completed construction management doctoral studies (Tuuli, 2009; Ankrah, 2007). This approach has also been applied to some H&S studies. For example, Langford *et al.,* (2000) in their study used qualitative interviews combined with literature to identify the variables investigated in a more expansive inquiry using a survey instrument. The outcomes of the qualitative phase contributed to their development of the survey instrument.

5.2.1 Quantitative Data Collection

In the quantitative phase, a questionnaire survey was designed based on the refined conceptual framework to enable a wider empirical diagnosis of the factors affecting the implementation of

H&S management practices by contractors in Nigeria. The questionnaire was administered to a sample of contractors with operations in the Nigerian construction sector.

Nigeria consists of six geopolitical zones, covering 36 stats and over 170 million citizens (National Bureau of Statistics, 2017). Selecting the right mix of participants for the research requires adequate sampling of the entire population to sift out a representative sample (McNeill and Chapman, 2015). The effective selection of the sample population was made based on criteria such as gross domestic product, safety and industrial activities. The Federal Ministry of Works assisted the population through the identification of registered contractors. Participant selection was then narrowed down to key stakeholders in each business, such as its Director/Manager, H&S Supervisor, Site Engineer, Quantity Surveyor, Project Manager and other key professionals on site.

5.2.2 Quantitative Data Analysis

The data collected was analysed using descriptive statistics (e.g. mean, mode, median, standard deviation and frequencies) and inferential statistics (e.g. Pearson's Chi-square). The inferential statistics was used to explore associations between the factors composed in the conceptual framework and the employment of H&S management practices by contractors.

5.3 RESEARCH INSTRUMENT

From the nature of this study, it has been stated earlier that the study would use the questionnaire method. Because of the scope of this study, it is important to elucidate as follows on the various aspect of these instruments used for this study.

5.3.1 The Questionnaire

The questionnaire design was guided by the framework of this study and thus consists of three major sections: the demographic characteristics of the respondents/organisations (where necessary); the health and safety management practices of the construction industry; and the factors that affect the health and safety management practices of the construction industry. The section of the factors predicting the health and safety management practices of the construction industry was divided into two sub-sections: the external and internal factors. While the external factor sub-section has two variables and thus two sub-sub-sections, the internal factor sub-section has eleven variables and thus eleven sub-sub-sections. The measurement of many of these variables takes the form of an assessment of a 5-likert scale where respondents are asked to tick only one from the available options. Other variables such as company characteristics, H&S performance of the company, may take different forms of measurement such as knowing the numbers of accidents, sickness, among others, that may have occurred, and size of the industries, among others.

5.4 ETHICAL CONSIDERATION

To ensure the ethical consideration in this study, the researcher has ensured that it passed through the ethical procedures of University of the West of England (see Appendix C). Furthermore, information and consent were obtained from potential participants before the questionnaire was administered to such individual(s) or before such individual(s) were slated for the interview section. In addition, information obtained from the respondents would be treated as anonymous, thereby providing a wide range of opportunity to provide necessary information that would be made useful for this study. To this end, the results will be presented without the identity of the respondents.

5.5 CHAPTER SUMMARY

The chapter presented the selected methodology for the work carried out to meet the study's aim and objectives. It also presented discussions of literature on the paradigms that informed the research's fundamental philosophical assumptions and identified the diverse research strategies which could be employed to answer the specific research issues.

The next chapter presents the detailed results from the fieldwork carried out in Nigeria.

CHAPTER 6: DESCRIPTIVE RESULTS

6 INTRODUCTION

This chapter presents the results of the fieldwork on the practices that affect the implementation of Health and Safety practises by Nigeria contractors. The chapter covers the results of the questionnaire survey administered to the construction companies in Nigeria. The presentation of results is provided and divided into three major sections: demographic information of respondents, company's information, and responses to the dependent and independent variables.

6.2 BACKGROUND INFORMATION OF RESPONDENTS

McNeill and Chapman, (2005) allayed fears that covering the entire population under a survey, using any of interviews or questionnaire tools, might still be too wide, might be easy in some cases, and might also vary otherwise in other cases, hence the need to identify participants. The years of experience and specialty that a respondent holds in a professional role that allows for his or her involvement in designing, coordinating or managing health and safety practices in the Nigerian construction industry plays an important role in the course of the study. The wealth of experience that each respondent possesses in each professional role further validates the views of the population it represents. In lieu of this, respondents' background and professional details were collected to ascertain the strength of responses gathered. The data presented was structured to assist investigations into H&S compliance within the Nigerian Construction Industry. They were gathered across all six geo-political zones of the country. The information represented covered a wide range of professionals across the country with the aim of deducing generalization of results from the survey exercise. A total of 550 respondents were distributed with 360 responses returned, 10 of which were incomplete. This left 350 valid responses with a response rate of 63.6% which is considered good. The respondents covered in the survey were made up of top management personnel and other relevant to H&S professionals in the Nigerian construction industry across all the geopolitical zones. The response per geopolitical zone is presented in the Table 6-2 below.

Table 6-1: Descriptive statistics showing the response rate from each state

States	Frequency	Percent %
Edo	11	3.1
Ekiti	19	5.4
Anambra	22	6.3
Ondo	19	5.4
Jigawa	22	6.3
Ogun	21	6.0
Sokoto	21	6.0
Niger	19	5.4
Kwara	18	5.1
Enugu	19	5.4
Bauchi	21	6.0
Osun	20	5.7

Lagos	15	4.3
Rivers	15	4.3
Oyo	15	4.3
Abuja	15	4.3
Kano	14	4.0
Kaduna	12	3.4
Cross river	14	4.0
Nassarawa	18	5.1
Total	350	100.0

The result in Table 6-1 above reveals that Anambra and Jigawa States have the highest respondents (6%), followed by Ogun, Sokoto, and Bauchi (6%). Edo State has the lowest respondents (3%). The results of this table do not necessary mean that there are more construction industries in the states with the highest values, but they connote that the level of questionnaires administration and collection was high in those states. The result in Table 6-2 further categorized the States into six geopolitical zones of Nigeria.

Table 6-2: Descriptive statistics showing the response rate from the six geographical zones in Nigeria

Geographical zones	Frequency	Percent %
Middle Belt	78	22.3
North-East	20	5.7
North-West	68	19.4
South-East	40	11.4
South-South	40	11.4
South-West	104	29.7
Total	350	100.0

The result in Table 6-2 shows that the South-West has the highest percentage (30%), followed by the Middle belt with 22%. The South-East and South-South has the lowest respondents (11%). This implies that most of the respondents of this study are from the South-western states and Middle belt states of Nigeria. The increase in the respondents in the South-western and Middle belt States was because the respondents in these states were readily available for the study and, hence, more questionnaires were administered to them Moreover, construction industries are more zone classification is further provided in the diagram below (Figure 6-1). The professional roles of the respondents in various construction companies are provided in Table 6.3.

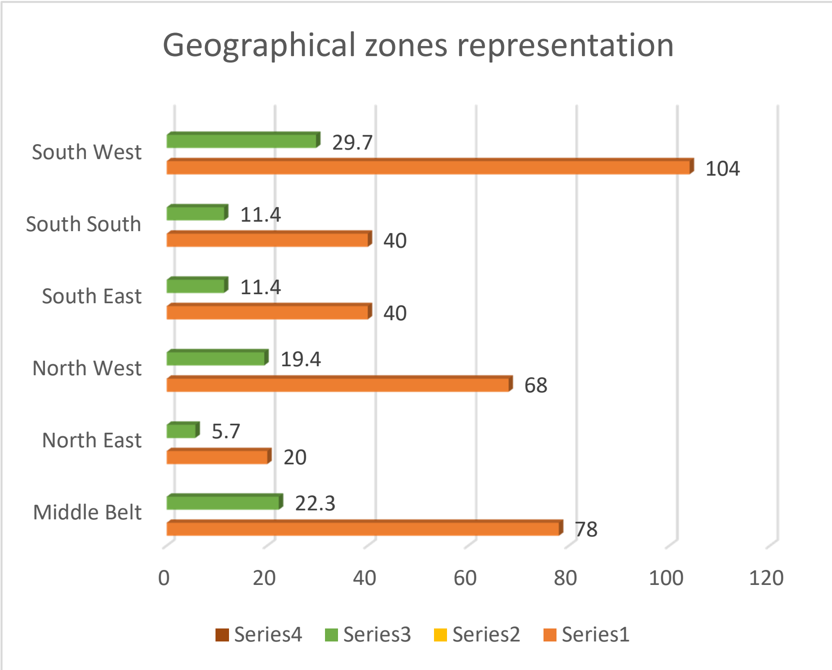

Figure 6-1: Bar chart showing the geographical zones in Nigeria represented.

Table 6-3: Professional role in the company

Professional roles	Frequency	Per cent %
Company manager	58	16.6%
Project Manager	54	15.4%
Supervisors (site engineer, construction manager, site manager)	181	51.7%
Quantity surveyor	44	12.6%
Others	13	3.7%
Total	350	100

The survey returned a satisfactorily distribution of responses across all the major professionals selected under this research. Company Managers and Project Managers who are responsible for the overall planning and execution of the construction work on site, including its health and safety component, recorded 16.6% and 15.4%, respectively. Supervisors, such as construction managers and site engineers with assigned responsibilities of day-to-day execution of specific aspects of the project, showed a participation rate of 12.9% and 12.6%, respectively. Other professionals such as architects had a low participation of 3.7%. The architect is very important in construction site works in the consultancy and supervision areas; architects are the prime consultants on projects and are the top management after the client or client's representative in site rankings.

The above three categories therefore represent the management and senior personnel on construction sites. The total percentage participation of Management and Senior personnel of the respondents is thus 48.6%. This confirms that the selected professionals are persons with relevant experiences in the construction industry, either in site management positions or as experienced senior site personnel. At these positions, the respondents will have had opportunities to become conversant with health and safety practices within their respective domains, thus encouraging the validity of information expected from these experienced respondents. The period of working in present professional roles is provided in Table 6-4.

Table 6-4: Period of working in respondents' current role

Years of experience	Frequency	Per cent (%)
0-5 years	74	21.1
6-10 years	134	38.3
11-15 years	61	17.4
16-20 years	37	10.6
21-25 years	25	7.1
over 25 years	19	5.4
Total	**350**	**100.0**

In consideration of how long the respondents used for this study have been working in their respective roles, it is expected that the more years of experience in their current positions, the more reliable their opinions or assessment. Most of them (about 38%) have been working in their current role for about 6 to 10 years, followed by some (about 21%) who have been there for about 1 month to 5 years. Some of the respondents (about 17% and 11%) have been working on their role for about 11 to 15 years and 16 to 20 years respectively. Few of the respondents (about 7% and 5%) have been working for about 21 to 25 years and above 25 years respectively. In summary, 78.9% have above 5 years' experience in their current position, which is sufficient to have an informed opinion about health and safety practices on projects within their companies. The respondents' years of experience is also presented in Table 6-5.

Table 6-5: Respondents' years of experience in the Nigerian construction industry

Years of experience	**Frequency**	**Per cent (%)**
0-5 years	24	6.9
6-10 years	49	14.0
11-15 years	83	23.7
16-20 years	94	26.9
21-25 years	49	14.0
over 25 years	51	14.6
Total	**350**	**100.0**

From Table 6-5, most of the respondents (approximately 27% and 24%) have been in the Nigerian construction industry for about 16 to 20 years and between 11 and 15 years, respectively. Some of them (approximately 15%, 14% and 14%) have been working in the Nigerian construction industry for about more than 25 years, 21 to 25 years and 6 to 10 years, respectively. Others (approximately

7%) have been working there for between a month and 5 years. This also confirms the reliability of the information supplied by respondents, who have a combined percentage of 93% with over 5 years' experience in the construction industry. This also is considered sufficient to have an informed opinion on health and safety practices in their respective company. The professional bodies to which respondents belong are presented in Table 6-6.

Table 6-6: Professional body membership

Professional Body	Frequency	Per cent (%)
NSE	32	9.1
COREN	27	7.7
NISP	8	2.3
NIQS	20	5.7
NIOB, NIM, NISP, NIA, NITP	21	6.0
NSE & COREN	32	9.1
No of Responses	210	60.0
Total	**350**	**100.0**

NSE: Nigerian Society of Engineers, COREN: Council for the Regulation of Engineering in Nigeria, NISP: Nigerian Institute of Safety Professionals, NIQS: Nigerian Institute of Quantity Surveyors, NIOB: Nigerian Institute of Builders, NIM: Nigerian Institute of Management, NIA: Nigerian Institute of Architects, NITP: Nigerian Institute of Town Planners

From Table 6-6 above, it can be observed that NSE (Nigerian Society of Engineers) and COREN (Council for the Regulation of Engineering Practices in Nigeria) are the major professional bodies in Nigeria responsible for the examining and endorsing professionals in construction (NSE), and also for regulating and monitoring its activities (COREN). The results cannot reflect the true situation on respondents, as no professional can be a project or construction manager without a professional qualification and membership. It is also unusual, with the years of experience respondents showed the selves to have in Tables 6-4 and 6-5 not to have acquired professional qualifications and memberships. This result indicates that most respondents failed to give their actual professional registration status.

6.3 BACKGROUND INFORMATION OF CONSTRUCTION COMPANIES

The responses with regards to the information of construction industries are presented in this section. The organisations sector to which companies belong are provided in Table 6-7.

Table 6-7: Respondent's organisations sector of clients

	Frequency	Percent (%)
Private clients only	72	20.6
Public clients only	71	20.3
Private and Public clients	207	59.1
Total	**350**	**100.0**

From Table 6-7, it is observed from the responses that the majority of the respondents (59%) have experience in both the private and public sector. Respondents who only have private sector experience amount to 21%, which is about the same as those with only public sector experience (20%). This shows that the responses obtained will cover health and safety practices in both the public and private sector of the Nigerian construction industry. The responses on the category and size of company is provided in Table 6-8

Table 6-8: Category of company registration/operation

	Frequency	Percent (%)
Less than ₦1Million	12	3.4
Less than ₦10 Million	29	8.3
Less than ₦30Million	83	23.7
Less than ₦50Million	149	42.6
₦100Million and above	77	22.0
Total	**350**	**100.0**

The results in Table 6-8 showed that 78% of the respondents have an operating registration size below N50 million, while 22% of the respondents have an operating registration size of above N100 million. However, the registration size within the country does not really show the operating size of the companies, as most companies register at small categories in order to avoid huge registration fees but, in reality, they operate far above their registration limits. The annual turnover of the companies will give a more accurate description of the sizes of the companies. The information on the size of the companies is presented in Table 6-9.

Table 6-9: Company size

	Frequency	Per cent (%)
Micro (up to 10 employees)	52	14.9
Small (11 to 50 employees)	112	32.0
Medium (51 to 150 employees)	109	31.1
Large (over 150 employees)	77	22.0
Total	**350**	**100.0**

According to Manu *et al.* (2018) the companies are categorized as follows: Micro firms with up to 10 employees; Small firms with to 50 employees; Medium firms with 51 to 150 employees; and large firms with over 150 employees. Most of the firms are considered to be of small (about 32%) and medium (31.1%) sizes. However, some (2%) of these companies are considered as large construction companies, while the remaining companies are classified as micro. However, the staff strength of a company may not accurately reflect the operating capacities of the companies, as modern techniques of sub-contracting, supply chains and contract-staff discourage having or keeping a large number of staffs. Thus, this categorization in terms of staff strength is not an accurate reflection of largeness or smallness. The operating turnover of each company per year will give a more accurate definition of the size of the company or firm. The information on the year of establishment of the construction companies are presented in Table 6-10.

Table 6-10: Year of company establishment

	Frequency	Per cent (%)
Less than 10 years	55	15.7
11-35 years	255	72.9
Above 35 years	40	11.4
Total	**350**	**100.0**

The number of years that a company has been operational for is a very important factor which says how much tradition, culture, managerial or particular attributes a company has developed in their operations over the years. In addition, companies with longer years of operation with sufficient patronage will have acquired practical experiences in all areas of their operations, including health and safety. Such companies also have a history of keeping their staff together. Furthermore, experienced personnel in the construction industry will prefer working for such established firms. This in turn affects positively on their competence, which also includes their health and safety management. The results in Table 6-10 show that 73 per cent of the respondents have working experience in their respective companies between 11 and 35 years' experience. Theses survey responses can be judged to come mostly from workers in organisations with sufficient years of operations to have developed a health and safety culture or modality in its operation. Only 15.7% work in organisations with less than 10 years of operations. The survey does not capture the range within the 10 years because 6 to 10 years can be considered adequate to understand the health and safety practices within a company. The annual turnover of companies is presented in Table 6-11.

Table 6-11: The Company's annual turnover for 2016-2017

	Frequency	Percent (%)
Less than ₦50Million	51	14.6
₦50 Million <₦100Million	83	23.7
₦ 101 Million <₦500Million	68	19.4
₦ 501 Million <₦1billion	81	23.1
Above N 1 billion	67	19.1
Total	**350**	**100.0**

Table 6-11 above shows that 62% of the companies have annual turnover of above NGN100,000,000. This contradicts the values in Table 6-7, which indicates that only 22% of companies have a registration of operating in categories above 100,000,000. This buttresses the earlier opinion of some companies registering at lower ranks simply to evade high registration costs and/or taxes. However, in reality, such companies operate businesses far above their registration limits. This indicates the laxities in the enforcement of policies and regulations in the Nigerian construction industry. The high percentage of companies with turnovers above NGN100million at 62% shows that the responses obtained are actually from companies with actual large operating capacities.

With the laxities in the enforcement of registration requirements and operating limits, companies operating in the Nigerian construction industry may also take advantage of the laxity to avoid and/or reduce expenditure in health and safety implementations. A company with a turnover above NGN100 million yearly can be said to be doing large construction works which will require a lot of movement of materials and men (labour) thus demanding robust health and safety policies and frequent regulatory checks. However, if the company is registered below the NGN10million naira registration/operation category, such company may evade the health and safety scrutiny accorded companies with higher registration categories. The information on the type of construction works undertaken is provided in Table 6-12.

Table 6-12: Types of construction work undertaken

	Frequency	Percent (%)
Civil Construction Companies	135	38.6
Building Construction Companies	202	57.7
Others	13	3.7
Total	**350**	**100.0**

The result in Table 6-12 shows that most of the respondents in this study (above 96%) are involved in core construction works that have active health and safety components. It can be seen that more than half of the respondents (about 57.7%) are in building construction companies. While some (about 38.6%) are in civil construction companies, few are in other types of construction companies. Construction work is composed of an interplay between humans and material components and these which have health and safety guidelines which should be attached to their uses. The information on the numbers of employees of construction companies is presented in Table 6-13.

Table 6-13: Number of direct employees in the company

	Frequency	Per cent (%)
1-50 employees	52	14.9
51-100 employees	112	32.0
101-150 employees	68	19.4
151-200 employees	41	11.7
201-250 employees	47	13.4
Above 250 employees	30	8.6
Total	**350**	**100.0**

Traditionally, the volume or number of staff or direct employees measures the size of a company. However, this trend has been challenged as more companies prefer the services of specialized sub-contractors, established supply chain lines and contract staff in order to achieve the same goal, but with fewer number of direct employees. Some companies are however still conservative and retain a large number of direct employees in various departments. Consequently, it will not be accurately possible to categorize a company based on the strength of its direct employees. The result in Table 6-13 shows that most of the companies (approximately 32%) have about 51 to 100 direct employees, followed by some companies (approximately 19%) that have about 101 to 150 direct employees. It can also be seen that the remaining companies (approximately 15%, 13% and 12%) have about 1 to 50 direct employees, 201 to 250 direct employees and 151 to 200 direct employees respectively. However, few of the companies (approximately 9%) have about

250 direct employees. Comparing this statistic with company size data in Table 6-9 shows a correlation, as 22% represent the large companies and 63.1% represent the small and medium size companies.

6.4 RESPONSES WITH RESPECT TO THE VARIABLES OF INTEREST IN THE STUDY

This section provides the responses from the respondents with respect to the variables of interest of this study. The results are presented below in tables and interpretations are also provided to explain the tables of interest. The companies' health and safety policy review status among the Nigeria construction companies are provided in Table 6-14.

Table 6-14: The companies' health and safety policy review status in Nigeria

	Frequency	Per cent (%)
Every 3 months	41	11.7
Every 6 months	37	10.6
Every year	149	42.6
Every 2 years or more	103	29.4
Never reviewed	20	5.7
Total	**350**	**100.0**

The review of health and safety policies is an indication of a company's awareness of healthy and safe practices together with its importance. Observing the Nigeria construction companies' health and safety policy review, Table 6-14 shows that most of these companies (42.6%) often review their H&S policy every year, followed by some (about 29.4%) that often review their H&S policy every two years or more. However, some (about 11.7% and 10.6%) usually review their H&S policy every three and six months, respectively, while few of the respondents (about 5.7%) claimed that their H&S policy has never been reviewed. Reviewing of health and safety policies every three or six months will be due to a possible high volume of activity that requires constant reviewing.

This implies that such companies will be large companies with turnover of over N100 million monthly, translating to above N1 billion annually. The above results show a combined percentage of 22.3% in this category. This result compares substantially with results obtained on frequency of policy reviews (Table 6-14) with company yearly turnover (Table 6-10) where companies with a turnover of above 1 billion recorded 19.1% results. This is another indication of the correlation of the data acquired from the survey and personal experiences and observations in the industry. The information on the company's membership of Nigeria and international construction association industry is presented in Table 6-15.

Table 6-15: Information on company's membership of Nigeria / international construction association industry

	Frequency	Percent (%)
Members	121	34.6
Non-Members	229	65.4
Total	**350**	**100.0**

The result in Table 6-15 shows that most (65.4%) of the respondents indicated that construction companies are not members of Nigeria's construction industry association, while the remaining (about 34.6%) claimed to be part of the association. This high statistic could be indicative of the lack of strong supervisory agencies from the government overseeing construction activities. Consequently, contractors do not feel the need to belong to any association or body. The information of the priority of the company's client on health and safety is also given in Table 6-16.

Table 6-16: The priority of the company's client on health and safety issues

	Frequency	Per cent (%)
Not important	240	68.6
Important	110	31.4
Total	**350**	**100.0**

This result in Table 6-16 shows that most (about 68.6%) of the Nigerian construction companies' clients considered the health and safety status not to be an important criterion for selecting the contractors to undertake the project. This statistic is not farfetched as the tender analysis panels and boards in Nigeria are structured around the Public procurement act 2007, (Public procurement Act 2997 No 14) which has no mandatory requirements on health and safety competencies for prospective tenderers. The responses from Table 6-16 reflects poor health and safety management practices among Nigerian construction companies because health and safety management practices should be given a high priority among construction companies. The information on the designated budget for health and safety management's status is presented in Table 6-17.

Table 6-17: Designated budget for health and safety management's status

	Frequency	Per cent (%)
Available	180	51.4
Not Available	170	48.6
Total	**350**	**100**

The results in Table 6-17 show that more than half (about 51.4%) of the respondents revealed that Nigerian construction companies have a designated budget for health and safety management, while almost half of the remaining respondents (about 48.6%) affirmed not to have a designated budget for health and safety management. Comparing the data in Table 6-17 with Table 6-18 points to an awareness on the part of clients of the need to provide for health and safety management, compared to the slight differential of those that do not consider health and safety as contractor selection criteria. This shows an awareness of the importance to provide for the management of health and safety by the clients, but also indicates that no obligatory importance is currently placed on it in most construction environments. The information and responses of government H&S inspection visit to company/workers advocating for H&S improvement on company's sites is provided in Table 6-18.

Table 6-18: Government H&S inspection visit to company / workers advocating for H&S Improvement on company's sites.

	Government H&S inspection visits to company		Workers advocating for H&S improvement on company's site	
	Frequency	Percentage %	Frequency	Percentage %
Not often	199	56.9	265	75.7
Often	151	43.1	85	24.3
Total	350	100	350	100

This result in Table 6-18 shows that the government H&S inspectors' inspection was in frequent (about 56.9%) up to one out of every four projects. Some of the respondents (about 43.1%) indicated the inspection to take place regularly. Most of these site workers (about 75.7%) rarely advocate for health and safety improvement, while other respondents (about 24.3%) claimed that the advocating for health and safety improvement is frequently. The information on the occurrence of accident on company's sites is presented in Table 6-19.

Table 6-19: Occurrence of accident on company's companies' sites

	Frequency	Per cent (%)
Accident Occurred	149	42.6
No Accident Occurrence	201	57.4
Total	**350**	**100.0**

From Table 6-19, it could be observed from this study that the more than half of the respondents (about 57.4%) claimed no accident occurrence in their companies, while slightly near to half of the respondents (about 42.6%) claimed the occurrence of accident in their companies. The attitudes of site workers towards H&S among construction companies in Nigeria are presented in Table 6-20.

Table 6-20: Attitude of site workers towards H&S

	Attitude of site workers towards health and safety		**Health and safety Behaviour of site workers**	
	Frequency	Percentage %	Frequency	Percentage %
Bad	87	24.9	47	13.4
Good	263	75.1	303	86.6
Total	350	100.0	350	100.0

The results in Table 6-20 reveal that the attitude of the site workers (75.1%) was considered to be good towards health and safety status, followed by some (about 24.9%) who considered their attitude as being bad towards health and safety issues. The percentage of those with good attitudes towards health and safety requirements show a desire to have accident and injury free work spaces by majority of the construction workers. Also, the behaviour of the site workers (86.6%) was considered to be good. While the remaining respondents (about 13.4%) claimed that their behaviour was bad. This goes to show that most companies have setups to educate and monitor adherence to their health and safety standards on site. In addition, the information on the fatal and non-fatal accident that occurred in the company between the years 2016 and 2017 is provided in Table 6-21.

Table 6-21: Descriptive statistics showing the fatal and non-fatal accident that occurred in the company between the years 2016-2017

	N	Range	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Fatal accident	350	25.00	.00	25.00	1.313	.14509	2.71440
Valid N (list-wise)	350						
Non-Fatal accident	349	19.00	1.00	20.00	2.380	.14123	2.63844
Valid N (list-wise)	349		•				

The results in Table 6-21 show that the maximum number of fatal accidents in the year 2016-2017 was 25, with an average of 1 person and standard error of 0.145. These statistics on fatal accidents cannot be accepted as accurate, as there are cases of underreporting within the construction industry. The bodies charged with enforcement or planning of health and safety matters at the moment are not closely monitored to ensure of the ferociousness of the reported accident cases. From the descriptive statistics in Table 6-21 above, the maximum number of non-fatal accident that occurred in the year 2016-2017 was 20, with an average of 2 persons and a standard error of 0.141. The issue of underreporting may also be responsible for the low figures of reported non-fatal accidents. The responses to the level of internal motivation among construction companies are also presented in Table 6-22.

Table 6-22: Internal motivation

	Disagreed	Agreed
H&S management is often discussed at company senior management meetings	141(40.3%)	209(59.7%)
There is a H&S management committee working group within my company	191(54.6%)	159(45.4%)
There is site worker representation on the company H&S management committee	168(48.0%)	182(52.0%)
The company invests into innovation and research activities in H&S	195(55.7%)	155(44.3%)
Within the past 3 years, the company has been prosecuted for breach of H&S regulation	314(89.7%)	36(10.3%)
Within the past 3 years, the company has received a warning for breach of H&S regulation	306(87.4%)	44(12.6%)
There is a client clerk/representative attached to the projects undertake to oversee H&S on the projects	184(52.6%)	166(47.4%)

The internal motivation mechanism on H&S issues on Table 6-22 shows that only 10% of the companies have breached H&S guidelines, while 12.6% have escaped with a warning. This may actually be a reflection of the current realities of the construction industry in Nigeria, as there are not many agencies saddled with the responsibility of enforcing acceptable minimum standards and penalizing offenders. The low response does not imply that the companies are complying as 90% of them suggested, but it shows a lack of statutory agencies for its assessment. Moreover, 52% of the responses on the question “There is a site worker representation on company’s H&S management committee" on H&S issues are moderate. This innovation of bringing some or at least one of the workers into management meetings is a brilliant idea, as it bridges the gap between management and workers. The high response of 52% shows that the Nigerian construction industry is just becoming aware of such a laudable process of bringing workers into management decisions. The level of external motivation of staff among construction firms in Nigeria is presented in Table 6-23.

Table 6-23: External motivation

	Not Important	**Important**
Attainment of enhanced competitive advantage	170(48.6%)	180(51.4%)
Continuous improvement in operation and productivity	175(50.0%)	175(50.0%)
Enhanced external corporate image/credibility	194(55.4%)	156(44.6%)
Entry into construction market of another state in Nigeria	200(57.1%)	150(42.9%)
Entry into the construction market of another country in Africa	227(64.9%)	123(35.1%)
Entry into the construction market of another country outside Africa	223(63.7%)	127(36.3%)

The results in Table 6-23 show that the "attainment of enhanced competitive advantage" and "continuous improvement in operation and productivity" reflected a percentage response of 51% and 50% respectively as respondents considered these highly important for external motivation. Conversely, 44.6%, 42.9% and 35.1% do not consider it important. This is in line with the previous submission on auditing about the lack of any external supervisory of auditing agency. Without such enforcement, H&S values cannot be properly driven into the fabric of the companies. This implies that companies may not be able to internalize H&S practices without their enforcement. Furthermore, 42.9%, 35.1% and 36.3% stated that "entry into construction market of another state in Nigeria", "entry into the construction market of another country in Africa", and "entry into the construction market of another country outside Africa" respectively, are important to the external motivation of companies. This reflects the reality in the construction industry in Nigeria, where most companies do not expand beyond the boundaries of their state, let alone outside of their country or of Africa. Much research has shown that when some practices are been implemented to improve the H&S, it creates a good performance. The extent to which the H&S management practices are implemented by contractors within the country was assessed by frequency and general categorissed as Low (i.e. 0-49%), Moderate, (i.e. 50-69%), and High (70 %+); Manu et al (2015). The level of implementation of H&S practices among construction companies in Nigeria are provided in Table 6-24.

Table 6-24: Level of implementation of H&S practices

	Policy	**Frequency**	**Per cent (%)**	**Rate of Implementation**
PL1	A formal company H&S policy statement	205	58.6	Moderate
PL2	A company director with overall responsibility for H&S	131	37.4	Low
	Organisation			
OR1	Providing H&S supervisors on sites	199	56.9	Moderate
OR2	Communicating H&S information to workers through newsletter, leaflets, posters, etc.	192	54.9	Moderate
OR3	Engaging with workers on H&S issues e.g. H&S meetings and suggestion schemes	201	57.4	Moderate
OR4	Network with other companies/institution (Insurance companies, government offices) about H&S issues	172	49.1	Low

OR5	Propagating H&S practices to external stakeholders e.g. clients	187	53.4	Moderate
OR6	A designated H&S department	198	56.6	Moderate
OR7	Assessing the competence of workers and subcontractors	200	57.1	Moderate
OR8	A company designated H&S budget	201	57.4	Moderate
OR9	Display of regulatory H&S posters on construction sites	204	58.3	Moderate
OR10	Display of company H&S policy on construction sits, company website and head/branch offices	203	58.0	Moderate
OR11	Provision of H&S annual reports	219	62.6	Moderate
OR12	A designated H&S manager	167	47.7	Low
OR13	Providing H&S training for site H&S supervisors and site managers	197	56.3	Moderate
	The Risk Assessment			
R1	Undertaking overall project risk assessments before projects start	180	51.4	Moderate
R2	Designing site rules and measure to mitigate assessed risk	197	56.3	Moderate
R3	Undertaking risk assessments for work packages/operations before they start	193	55.1	Moderate
R4	Reviewing and updating risk assessment during constructions	204	58.3	Moderate
R5	Informing employees about hazards on sites before work starts	206	58.9	Moderate
	Planning			
P1	Preparing H&S plans for every construction project	206	58.9	Moderate
P2	Provision of H&S insurance cover for sites	189	54.0	Moderate
P3	Pricing to cover H&S requirement for projects	210	60.0	Moderate
P4	Preparing method statements	192	54.9	Moderate
P5	Setting an H&S performance target	153	43.7	Low

	Implementation	Frequency	Percent (%)	Rate of Implementation
IM1	Implementing site H&S rules and measures	172	49.1	Low
IM2	Amending and correcting H&S plans during construction	176	50.3	Moderate
IM3	Rewarding workers for safe work behavior	168	48.0	Low
IM4	Site induction for workers	170	48.6	Low
IM5	Training Programs for site workers	179	51.1	Moderate
IM6	Carrying out site H&S inspection regularly	195	55.7	Moderate
IM7	Provision of sanitation and welfare facilities on site (toilets, canteens, drinking water)	189	54.0	Moderate
IM8	Provision of personal protective equipment	191	54.6	Moderate

IM9	Provision of first aid equipment on sites	185	52.9	Moderate
IM10	Disciplining workers for unsafe work behavior	182	52.0	Moderate
IM11	Assigning H&S supervisor(s) on sites	168	48.0	Low
IM12	Conducting regular health check for the employees	149	42.6	Low
	Measuring and Reviewing Performance			
MR1	Measuring H&S performance against set target	134	38.3	Low
MR2	Reviewing and updating H&S plans after project completion	152	43.4	Low
MR3	Keeping incident records on every project	150	42.9	Low
MR4	Investigating the causes of incidents, accidents and near misses	142	40.6	Low
MR5	Publishing or sharing lessons learnt from incident investigations across the company or on projects	136	38.9	Low
	Auditing			
A1	Undertaking periodic safety management auditing	192	54.9	Moderate
A2	Use of external consultant for undertaking safety management auditing	154	44.0	Low
A3	Use of in-house personnel for undertaking safety management auditing	210	60.0	Moderate

The results in Table 6-24 shows that with respect to policies about Health and Safety, approximately 37% of the companies do not have a specific director charged with overall responsibility on H&S, although approximately 59% claim that they have a formal company health and safety policy statement. Policy is crucial to the success of any administrative or organisational initiative and a well-documented policy is very good. However, in the Nigerian environment, many good policies have been curtailed because of lack of adequate implementation strategies. The lack of a specific director primarily charged with H&S responsibilities will definitely affect or weaken the implementation of H&S policies. This will undermine the potential advantage of having a formal policy if there is no drive towards implementation. In addition, without a specific or designated director, it will be difficult to transmit the useful lessons learned from previous implementations into the updating of the current year policy document. It can therefore be inferred that policy formulation in H&S in Nigeria is still inadequate. This is further buttressed by "implementing site H&S rules and measures", which ranks low at 49.1%. "Amending and correcting H&S plans during construction", "Rewarding workers for safe work Behaviour", "and site induction for workers" returned 50.3%, 48.0% and 48.6%, respectively. The low responses returned on questions such as "conducting regular health check for employees", "assigning H&S supervisors on site", "site induction for workers" and "rewarding workers for safe work behaviour" are all indications that a designated overseeing management officer is absent among the Nigerian construction companies.

The responses recorded on how the respondent companies organize for their health and safety management is generally moderate, but the low response recorded on "Networking with other companies/institutions (Insurance companies, government offices) about H&S issues" is noteworthy. This is a phenomenon common to Nigerian companies, due to the fierce competitive nature of individuals and companies in the construction industry. This trend is characterized by secrecy and confidentiality by companies, who also view every little piece of information, techniques and solutions at their disposal as a competitive edge or industrial advantage over their competitors. Responses on risk assessment returned that risks were moderately assessed, with all assessment criteria averaging below 60% this goes to confirm the inadequate level of H&S monitoring and assessment, as risk assessment pointers should always rank high in an H&S meticulous environment.

These irregularities and inconsistencies in the range of responses discussed above can be attributed partly to the defensive and company interest bias nature of some of the respondents and were boldly checked by the low responses recorded under "Measuring and reviewing performance." The auditing of the H&S system in a company is usually the responsibility of an external regulatory body. Also, 81.1 % of the companies believe that the policy formulation of companies as regards health and safety issues is moderate while 8.1% believe that it is low. The combined percentage of companies who report that the level of policy formulation is between low and moderate is thus 89.2%. Only 10.3 % believes it to be high.

The same pattern is recorded for most of the other criteria in the graph above with 44% of respondents returning a medium verdict and 38% considering the level as low. 82% of respondents thus assess the organisation of health and safety implementation as between low and moderate, while only 18% considered it as adequate or high. Risk, planning, implementation, measuring & review and auditing all have the companies reporting an assessment of low to medium at 75%,71%, 76%, 76.3% and 65.7% respectively. Conversely, between 18% reports, organisation abilities or practice within the companies as high, while Risk, planning, implementation, measuring & review all returned 24`% level of progress or compliance with health and safety regulations or practices. Auditing has 34% progress reports from participants as high.

The above points to the conclusion that health and safety planning, practices, implementation and reviews in the Nigerian construction companies are assessed as being low or at best moderate. It must be emphasized that moderate is not an acceptable threshold level in health and safety efforts, as we are dealing with the lives of staff and personnel as well as very valuable equipment and resources. Damages or injuries to lives can be irreparable. The same goes for the expensive equipment usually deployed or associated with construction. Thus, protecting all these with a just a moderate approach to health and safety is unacceptable. In addition, some of those who assessed the level of health and safety practices as medium may actually have slightly overrated as respondents, most of whom are nationals, may hesitate to speak frankly and may thus choose moderate as a more acceptable word to describe the state of health and safety practices.

The percentage of personnel in companies who believe that health and safety practices in the country are high averages about 23% to 24%. As stated earlier, health and safety practices are meant to offer considerable if not total sense of security and, failing this, it is not achieving its purpose. H&S initiatives on site and projects must be very adequate, covering all loopholes or potential injury prone areas fully. Health and safety are crucial, and practices such as planning, measuring and review, policy formulation and auditing etc., should be given utmost priorities by government agencies. The regulation and review processes must also be properly planned and executed without any loopholes. In summary, the health and safety practices required must not only be seen to be high but must actually be very high in their execution. The information on the difficulty experienced by the site workers in the Nigerian construction companies is presented in Table 6-25. In addition, it is important that directors and owners of company have the right

Table 6-25: Difficulty experienced by the site workers in the Nigerian construction firms

	Frequency	percentage
Lack of knowledge and technique	136	38.9
Non-compliance and carelessness	145	41.4
Problem in Nigeria, no value for H&S, not well equipped	13	3.7
H&S consume time	4	1.1
Worker not comfortable	2	0.6
No difficulty	15	4.3
Lack of H&S staff & supervision	15	4.3
Insufficiency of kits, first Aids funds & stealing	14	4.0
No response	3	0.9
Total	350	100

attitude towards H&S for their company. Moreover, the hazard involved in the construction site is not the case with construction companies in Nigeria, where ignorance and assumption dominated her industry (Champoux and Brun 2002). Table 6-25 expreses the experiences of the worker in a Nigerian construction company.

The result in Table 6-25 show that among the various difficulties cited by the site workers, non-compliance and carelessness of the site workers (41%) and a lack of adequate knowledge and technique (39%) are among the most difficult. This implies that construction companies in Nigeria are faced with many difficulties on site. To this end, it is important to know the suggested improvements that could cushion these difficulties among construction companies in Nigeria. The information on the improvement of health and safety practice in construction companies is provided in Table 6-26.

Table 6-26: Suggestion given by the respondents for the improvement of health and safety practice in construction companies

	Frequency	Per cent
Proper training & respect for H&S	132	37.7
Proper training, enforcement & supervision	136	38.9
More resources, proper storage & usage	28	8.0
Need for little trade off and H&S must be included in the quotation	38	10.9
Need for government intervention	6	1.7
Good relation between management and workers	2	.6
No Response	8	2.3
Total	350	100.0

The results in Table 6-26 reveal that among the various suggestion given by the respondents, proper training, respect for health and safety practice (38%), and enforcement and supervision

(38%) are the most preferred recommendation considered to improve the health and safety practice in the industry. In addition, another important factor that could also contribute to the amelioration of the several difficulties faced in construction industries in Nigeria is that health and safety requirements should be included in the quotation. This implies that the difficulties and problems of health and safety issues faced among Nigeria construction companies could be ameliorated if they were tackled well.

6.5 SUMMARY OF FINDINGS

The offices held by respondents' plays an important role in assuring the reliability of the responses obtained, based on their roles and professional experiences. Of the 350 returned responses, as represented in Table 6-3, 16.6% were directors/company owners, 40.9% were senior management staffs such as project managers, site managers and construction managers, 25.2% were team leaders/supervisory heads of teams, and 3.7% were middle/low cadre staff hence, offering a 96.3% active decision maker responses that participated in the study. Respondents' general expertise was further highlighted in Table 6-4, with 54.5% having over 16 years of professional experience in their current role.

The survey responses showed that 80% of the respondents have over 11 year's minimum experience within the Nigerian construction industry. Thus, it can be stated that most of the respondents have sufficient years of experience, at over 11 years, in order to have participated in health and safety practices in the Nigerian construction industry. The findings on the size of the companies with the comparison of their registration limits and the volume of operations turnover showed that more companies with large turnover than the registration limits indicated. This is aided by the lack of sufficient legislation or regulatory enforcement to counter this adverse development. This will influence negatively not only health and safety practices but also the economy, as large companies will thus avoid the appropriate taxes. This underreporting may also be responsible for the low rates of recorded fatal and non-fatal accidents by respondents. The lack of specific client health and safety criteria in the procurement of public works is also a finding from this survey that needs to be addressed as regulatory enforcement and provision of standards for companies would go a long way in fast-tracking the growth of robust health and safety practices. Generally, the acceptance and adherence to health and safety components can be said to be between low and moderate from the results of the survey.

6.6 CHAPTER SUMMARY

This chapter explored the results of the fieldwork carried out in Nigeria, which was done to investigate the factors that affect the implementation of H & S by contractors in the country. It presented the results from the administered survey by examining the demographic information of respondents, company's information, and responses to the dependent and independent variables.

The next chapter presents the analysis of the data-using differential in this chapter. It will present the results to the hypotheses of the study and some explanations are given below in the tables provided.

CHAPTER 7: INFERENTIAL RESULTS OF RESEARCH HYPOTHESES

7 INTRODUCTION

This chapter presents the analysis of inferential statistics and presents the result to the hypotheses of the study providing some explanation below each table presented in the result of the study. The findings of the inferential statistics are presented and divided into three major sections in this chapter with respect to the categorization of the hypotheses. The study has eleven hypotheses, and these are categorized into three sections.

7.1 ESTABLISHMENT OF FACTORS THAT DETERMINE THE IMPLEMENTATION OF HEALTH AND SAFETY MANAGEMENT PRACTICES AMONG CONTRACTORS IN NIGERIA

This part of the chapter provides the factors that determine the implementation of health and safety management practices among contractors in Nigeria and these factors are further categorized into three of the factors.

7.1.1 Roles of The Internal Factors on Implementation of H&S Management Practices

This part of the chapter provides the results with respect to the internal factors on influencing the implementation of H&S management practices among construction companies in Nigeria. There are six major hypotheses in this section and are provided below.

Ho1: There is no significant relationship between the health & safety practices and the company's annual turnover.

Ho2: There is no significant relationship between the health & safety practices and the Company's Health and Safety Policy Review.

Ho3: There is no significant relationship between the health & safety practices and advocacy for Health and Safety Improvement.

Ho4: There is no significant relationship between the health & safety practices and the Frequent Discussion of Health and Safety during Board Meeting.

Ho5: There is no significant relationship between the health & safety practices and the Age of Nigeria Construction

Ho6: There is no significant relationship between the health & safety practices and the Companies' Size.

7.1.2 Roles of the External Factors on the Implementation of H&S Management Practices

This part of the chapter provides the external factors influencing the H&S performances and there are two major hypotheses to this effect in this section.

Ho7: There is no significant relationship between the health & safety practices and Government H&S inspectors to the Site.

Ho8: There is no significant relationship between the health & safety practices and the company's client on Health and Safety among construction firms in Nigeria

7.1.3 Roles of the Implementation of H&S Management Practices on H&S Performance

This part of the chapter provides the factors influencing the H&S performances and there are three major hypotheses to this effect in this part hence there are three sub-sections.

Ho9: There is no significant relationship between the health & safety practices and the level of Health and Safety Behaviours of the Site Workers.

Ho10: There is no significant relationship between the health & safety practices and the level of Health and Safety attitudes of the Site Workers.

Ho11: There is no significant relationship between the health & safety practices and the rate of occurrence of accidents in the Nigeria construction industry.

7.1.4 Establishment Data Analysis Techniques Used

The school of thought that drives the method of data analysis used in this study is hinged on the fact that the study tends to investigate the influence of selected variables which are called the independent variables on the dependent variables of the study; hence, the Chi-Square analysis is adopted to test for significant influence at 0.05 level of significance. The Chi-Square analysis value are presented along side with their Crammer's value to observe the level of influence of the independent variables on the dependent variable of the study. These results are arranged in Tables numbered with respect to the hypothesis of interest and a brief explanation is provided to ease understanding of the results presented in the Tables.

7.2 INFLUENCE OF INTERNAL (COMPANY RELATED) FACTORS ON THE IMPLEMENTATION OF H&S MANAGEMENT PRACTICES

This section presents the internal or company factors that could influence H&S management practices among contractors in Nigeria. There are six hypotheses in this section hence, there are six sub section with regards to the hypotheses of interest.

7.2.1 The Role of Annual Turnover

Research Hypothesis One

Ho1: There is no significant relationship between the health & safety practices and the company's annual turnover.

This sub-section provides the result to one of the hypotheses of the study with respect to the influence of the constructions' companies' annual turnover on the H&S management practices among construction companies in Nigeria. The result is presented in Table 7-1

Table 6-27: Chi-Square Test Showing the Relationship between Health & Safety Practices and the Company's Annual Turnover

		< N 50M			N50 M<N 500M			> N 500 M			Pearson's $_{\chi}$2			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected Count	%within	Count	Expected count	%within	Count	Expected Count	%within	Value	Df	P (2-Sided)	Value	P
Pol2	Yes	11_{a}	18.9	21.6	54_{b}	56.1	35.8	59_{a}	49.0	44.7%	8.650	2	.013	.161	.013
	No	40_{a}	32.1	78.4	97_{b}	94.9	64.2	73_{a}	83.0	55.3					
Org2	Yes	23_{a}	27.6	45.1	76_{a}	81.8	50.3	82_{b}	71.5	62.1	5.949	2	.051	.133	.051
	No	28_{a}	23.4	54.9	75_{a}	69.2	49.7	50_{b}	60.5	37.9					
Org3	Yes	28_{a}	29.2	54.9	75_{a}	86.4	49.4	88_{b}	75.5	66.7	8.440	2	.015	.159	.015
	No	23_{a}	21.8	45.1	76_{a}	64.6	50.3	44_{b}	56.5	33.3					
Org4	Yes	27_{a}	27.7	52.9	57_{a}	73.2	37.7	78_{b}	64.0	37.7	13.319	2	.001	.200	.001
	No	24_{a}	26.3	47.1	94_{a}	77.8	62.3	54_{b}	68.0	40.9					
Org5	Yes	32_{a}	27.5	62.7	70_{a}	81.4	46.4	78_{b}	71.1	59.1	6.494	2	.039	.139	.039
	No	19_{a}	23.5	37.3	81_{a}	69.6	53.6	54_{b}	60.9	40.9					
Org6	Yes	21_{a}	28.9	41.2	87_{b}	85.4	57.6	81_{b}	74.7	61.4	6.221	2	.045	136	.045
	No	30_{a}	22.1	58.8	64_{b}	65.6	42.4	51_{b}	57.3	38.6					
Org8	Yes	23_{a}	29.2	45.1	76_{a}	86.4	50.3	92_{b}	75.5	69.7	14.380	2	.001	.207	.001
	No	28_{a}	21.8	54.9	75_{a}	64.6	49.7	40_{b}	56.5	30.3					
Org9	Yes	22_{a}	30.2	43.1	84_{a}	89.5	55.6	92_{b}	78.3	69.7	12.273	2	.002	.192	.002
	No	29_{a}	20.8	56.9	67_{a}	61.5	44.4	40_{b}	53.7	30.3					
Org10	Yes	28_{a}	29.8	54.9	76_{a}	88.2	50.3	91_{b}	77.1	68.9	10.38	2	.006	.176	.006
	No	23_{a}	21.2	45.1	75_{a}	62.8	49.7	41_{b}	54.9	31.1					
RA2	Yes	22_{a}	28.7	43.1	79_{b}	85.0	52.3	87_{c}	74.3	65.9	9.518	2	.009	.169	.009
	No	29_{a}	22.3	56.9	72_{b}	66.0	47.7	45_{c}	57.7	34.1					
RA3	Yes	26_{a}	28.4	51.0	74_{a}	84.1	49.0	86_{b}	73.5	65.2	7.448	2	.018	.155	.018
	No	25_{a}	22.6	49.0	77_{a}	66.9	51.0	46_{b}	58.5	34.8					
Pl1	Yes	$20_{a,\ b}$	30.2	39.2	83_{b}	89.5	55.0	95_{a}	78.3	72.0	18.475	2	.000	.235	.000
	No	$31_{a,\ b}$	20.8	60.8	68_{b}	61.5	45.0	37_{a}	53.7	28.0					
Pl4	Yes	$24_{a,\ b}$	28.4	47.1	69_{b}	84.1	45.7	93_{a}	73.5	70.5	19.313	2	.000	.240	.000

	No	$27_{a, b}$	22.6	52.9	82_{b}	66.9	54.3	39_{a}	58.5	29.5					
Pl5	Yes	22_{a}	22.8	43.1	56_{a}	67.4	37.1	71_{b}	58.9	53.8	8.004	2	.018	.155	.018
	No	29_{a}	28.2	56.9	95_{a}	83.6	62.9	61_{b}	73.1	46.2					
Imp3	Yes	15_{a}	24.4	29.4	64_{a}	72.3	42.4	81_{b}	63.2	61.4	18.414	2	.000	.235	.000
	No	36_{a}	26.6	70.6	87_{a}	78.7	56.6	51_{b}	68.8	38.6					
Imp4	Yes	24_{a}	25.0	47.1	62_{a}	74.1	41.1	78_{b}	64.8	59.1	9.263	2	.010	.167	.010
	No	27_{a}	26.0	52.9	89_{a}	76.9	58.9	54_{b}	67.2	40.9					
Imp6	Yes	25_{a}	28.6	49.0	70_{b}	84.5_{b}	46.4	92_{c}	73.9	69.7	16.756	2	.000	.224	.000
	No	26_{a}	22.4	51.0	81_{b}	66.5	53.6	40_{c}	58.1	30.3					
Imp7	Yes	24_{a}	27.8	47.1	73_{a}	82.3	48.3	85_{b}	71.9	64.4	8.657	2	.013	.161	.013
	No	27_{a}	23.2	52.9	78	68.7	51.7	47_{b}	60.1	35.6					
Imp11	Yes	18_{a}	24.7	35.3	64_{a}	73.2	42.4	80_{b}	64.0	60.6	13.567	2	.001	.202	.001
	No	33_{a}	26.3	64.7	87_{a}	77.8	57.6	53_{b}	68.0	39.4					
Imp12	Yes	17_{a}	21.8	33.3	53_{a}	64.6	35.1	73_{b}	56.5	55.3	13.952	2	.001	.204	.001
	No	34_{a}	29.2	66.7	98_{a}	86.4	64.9	59_{b}	75.5	44.7					
MP1	Yes	13_{a}	19.9	25.5	53_{a}	58.8	35.2	64_{b}	51.4	48.5	9.876	2	.007	.172	.007
	No	38_{a}	31.1	74.5	98_{a}	92.2	64.9	68_{b}	80.6	51.5					
MP2	Yes	15_{a}	22.1	29.4	58_{a}	65.6	38.4	72_{b}	57.19	54.5	12.267	2	.002	.192	.002
	No	36_{a}	28.9	70.6	93_{a}	85.4	61.6	60_{b}	74.7	45.5					
MP3	Yes	13_{a}	22.1	25.5	55_{a}	65.6	36.4	77_{b}	57.3	58.3	21.633	2	.000	.254	.000
	No	38_{a}	28.9	74.5	96_{a}	85.4	63.6	55_{b}	74.7	41.7					
MP 4	Yes	13_{a}	21.2	25.5	55_{a}	62.8	36.4	71_{b}	54.9	53.8	15.183	2	.001	.213	.001
	No	38_{a}	29.8	74.5	96_{a}	88.2	63.6	61_{b}	77.1	46.2					
MP 5	Yes	14_{a}	20.5	27.5	58_{a}	60.6	38.4	62_{b}	53.0	47.0	6.169	2	.046	.136	.046
	No	37_{a}	30.5	72.5	93_{a}	90.4	61.6	70_{b}	79.0	53.0					
AUD2	Yes	17_{a}	22.1	33.3	59_{b}	65.6	39.1	69_{c}	57.3	52.3	7.485	2	.024	.150	.024
	No	34_{a}	28.9	66.7	92_{b}	85.4	60.9	63_{c}	74.7	47.7					
AUD3	Yes	27_{a}	30.5	52.9	83_{b}	90.4	55.0	90_{c}	79.0	68.2	6.326	2	.042	.138	.042
	No	24_{a}	20.5	47.1	68_{b}	60.6	45.0	42_{c}	53.0	31.8					

Yes = Implementation of health and safety practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with the Company's Annual Turnover

The subscript letter denotes a subset of the Health and Safety practices categories whose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson’s column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer’s column shows the strength of the relationship existing between each predictor and its corresponding health and safety management practice. Furthermore, a positive relationship was found existing between each between each predictor and its corresponding health and safety management practice

The result in the table 7.1 shows that the subscript letter of the frequency of responses to the Health and Safety management practices categories shows that the significant differences do not differ from one another at the 0.05 level of significant. There is a significant difference between the construction firms who are involved in Health and Safety management practices and those who do not among the three levels of annual turnover. The result also shows that firms who have higher annual turnover have higher health and safety management practices than those who do not in this study as presented in table 7.1 above. The results with the highest crammers’ values are presented in Table 7.2 below.

Table 6-28: Highest crammers' values for hypothesis one

		< N 50M			N50 M<N 500M			> N 500 M			Pearson's χ^2			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected Count	%within	Count	Expected count	%within	Count	Expected Count	%within	Value	Df	P (2-Sided)	Value	P
Pl1	Yes	$20_{a,b}$	30.2	39.2	83_{b}	89.5	55.0	95_{a}	78.3	72.0	18.475	2	.000	.235	.000
	No	$31_{a,b}$	20.8	60.8	68_{b}	61.5	45.0	37_{a}	53.7	28.0					
Pl4	Yes	$24_{a,b}$	28.4	47.1	69_{b}	84.1	45.7	93_{a}	73.5	70.5	19.313	2	.000	.240	.000
	No	$27_{a,b}$	22.6	52.9	82_{b}	66.9	54.3	39_{a}	58.5	29.5					
Imp3	Yes	15_{a}	24.4	29.4	64_{a}	72.3	42.4	81_{b}	63.2	61.4	18.414	2	.000	.235	.000
	No	36_{a}	26.6	70.6	87_{a}	78.7	56.6	51_{b}	68.8	38.6					
Imp6	Yes	25_{a}	28.6	49.0	70_{b}	84.5_{b}	46.4	92_{c}	73.9	69.7	16.756	2	.000	.224	.000
	No	26_{a}	22.4	51.0	81_{b}	66.5	53.6	40_{c}	58.1	30.3					
MP3	Yes	13_{a}	22.1	25.5	55_{a}	65.6	36.4	77_{b}	57.3	58.3	21.633	2	.000	.254	.000
	No	38_{a}	28.9	74.5	96_{a}	85.4	63.6	55_{b}	74.7	41.7					

The result in table 7.2 shows that keeping incident records on every project (.254); preparing method statements (.240); preparing H&S plans for every construction project (.235); rewarding workers for safe work behaviour (.235); and carrying out site H&S inspections regularly (.224) have the highest crammers' value hence posing a higher relationship on H&S management practices among construction firms in Nigeria.

7.2.2 The Role of Company's Health and Safety Policy Review

Research Hypothesis Two

Ho_2: There is no significant relationship between the health & safety practices and the Company's Health and Safety Policy Review

The relationship between the health & safety practices and the Company's Health and Safety Policy Review is shown in table 7.3. Abbreviations of the items used to capture and measure the health & safety practices are used in the table 7.3 and would be explained after the table below.

Table 6-29: Chi-Square Test Showing the Relationship between Health & Safety Practices and the Company's Health and Safety Policy Review

		Often			Not Often			Pearson's χ^2			Cramer's φ_c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Org 1	Yes	143_a	129.1	71.9	56_b	69.9	28.1	9.922	1	.002	.168	.002
	No	84_a	97.9	55.6	67_b	53.1	44.4					
Org 2	Yes	137_a	124.5	71.4	55_b	67.5	28.6	7.877	1	.005	.150	.005
	No	90_a	102.5	57.0	68_b	55.5	43.0					
Org 3	Yes	150_a	130.4	74.6	51_b	70.6	25.4	19.772	1	.000	.238	.000
	No	77_a	96.6	51.7	72_b	52.4	48.3					
Org 4	Yes	123_a	111.6	71.5	49_b	60.4	28.5	6.571	1	.010	.137	.010
	No	104_a	115.4	58.4	74_b	62.6	41.6					
Org 7	Yes	143_a	129.7	71.5	57_b	70.3	28.5	9.035	1	.003	.161	.003
	No	84_a	97.3	56.0	66_b	52.7	44.0					

Org 8	Yes	142_a	130.4	70.6	59_b	70.6	29.4	6.944	1	.008	.141	.008
	No	85_a	96.6	57.0	64_b	52.4	43.0					
Org 9	Yes	142_a	132.3	69.6	62_b	71.7	30.4	4.842	1	.028	.118	.028
	No	85_a	94.7	58.2	61_b	51.3	41.8					
Org 10	Yes	143_a	131.7	70.4	60_b	71.3	29.6	6.617	1	.010	.138	.010
	No	84_a	95.3	57.1	63_b	51.7	42.9					
Org 12	Yes	120_a	108.3	71.9	47_b	58.7	28.1	6.865	1	.009	.140	.009
	No	107_a	118.7	58.5	76_b	64.3	41.5					
RA 1	Yes	136_a	116.7	75.6	44_b	63.3	24.4	18.610	1	.000	.231	.000
	No	91_a	110.3	53.5	79_b	59.7	46.5					
RA 2	Yes	137_a	127.8	69.5	60_b	69.2	30.5	4.342	1	.037	.111	.037
	No	90_a	99.2	58.8	63_b	53.8	41.2					
RA 3	Yes	136_a	125.2	70.5	57_b	67.8	29.5	5.939	1	.015	.130	.015
	No	91_a	101.8	58.0	66_b	55.2	42.0					
RA 5	Yes	148_a	133.6	71.8	58_b	72.4	28.2	10.726	1	.001	.175	.001
	No	79_a	93.4	54.9	65_b	50.6	45.1					
Pl 1	Yes	146_a	133.6	70.9	60_b	72.4	29.1	7.952	1	.005	.151	.005
	No	81_a	93.4	56.3	63_b	50.6	43.8					
Pl 2	Yes	137_a	122.6	72.5	52_b	66.4	27.5	10.493	1	.001	.175	.001
	No	90_a	104.4	55.9	71_b	56.6	44.1					
Pl 4	Yes	134_a	124.5	69.8	58_b	67.5	30.2	4.544	1	.033	.114	.033
	No	93_a	102.5	58.9	65_b	55.5	41.1					
Pl 5	Yes	111_a	99.2	72.5	42_b	53.8	27.5	7.056	1	.008	.142	.008
	No	116_a	127.8	58.9	81_b	69.2	41.1					
Imp 1	Yes	131_a	111.6	76.2	41_b	60.4	23.8	18.966	1	.000	.233	.000
	No	96_a	115.4	53.9	82_b	62.6	46.1					
Imp 2	Yes	127_a	114.1	72.2	49_b	61.9	27.8	8.282	1	.004	.154	.004
	No	100_a	112.9	57.5	74_b	61.1	42.5					
Imp 3	Yes	125_a	109.0	74.4	43_b	59.0	25.6	12.921	1	.000	.192	.000
	No	102_a	118.0	56.0	80_b	64.0	44.0					
Imp 4	Yes	122_a	110.3	71.8	48_b	59.7	28.2	6.920	1	.009	.141	.009
	No	105_a	116.7	58.3	75_b	63.3	41.7					
Imp 6	Yes	143_a	126.5	73.3	52_b	68.5	26.7	13.880	1	.000	.199	.000
	No	84_a	100.5	54.2	71_b	54.5	45.8					
Imp 7	Yes	133_a	122.6	70.4	56_b	66.4	29.6	5.479	1	.019	.125	.019

	No	94_a	104.4	58.4	67_b	56.6	41.6					
Imp 8	Yes	136_a	123.9	71.2	55_b	67.1	28.8	7.431	1	.006	.146	.006
	No	91_a	103.1	57.2	68_b	55.9	42.8					
Imp 9	Yes	131_a	120.0	70.8	54_b	65.0	29.2	6.103	1	.013	6.103	.013
	No	96_a	107.0	58.2	69_b	58.0	41.8					
Imp 10	Yes	134_a	118.0	73.6	48_b	64.0	26.4	12.793	1	.000	.191	.000
	No	93_a	109.0	55.4	75_b	59.0	44.6					
Imp 11	Yes	121_a	109.0	72.0	47_b	59.0	28.0	7.280	1	.007	.144	.007
	No	106_a	118.0	58.2	76_b	64.0	41.8					
Imp 12	Yes	114_a	96.6	76.5	35_b	52.4	23.5	15.457	1	.000	.210	.000
	No	113_a	130.4	56.2	88_b	70.6	43.8					
Mp 1	Yes	101_a	86.9	75.4	33_b	47.1	24.6	10.535	1	.001	.173	.001
	No	126_a	140.1	58.3	90_b	75.9	41.7					
Mp 2	Yes	114_a	98.6	75.0	38_b	53.4	25.0	12.128	1	.000	.186	.000
	No	113_a	128.4	57.1%	85_b	69.6	42.9					
Mp 3	Yes	114_a	97.3	76.0	36_b	52.7	24.0	14.300	1	.000	.202	.000
	No	113_a	129.7	56.5	87_b	70.3	43.5					
Mp 4	Yes	112_a	92.1	78.9	30_b	49.9	21.1	20.595	1	.000	.243	.000
	No	115_a	134.9	55.3	93_b	73.1	44.7					
Mp 5	Yes	100_a	88.2	73.5	36_b	47.8	26.5	7.339	1	.007	.145	.007
	No	127_a	138.8	59.3	87_b	75.2	40.7					
Aud 5	Yes	146_a	136.2	69.5	64_b	73.8	30.5	5.016	1	.025	.120	.025
	No	81_a	90.8	57.9	59_b	49.2	42.1					

Yes = Implementation of health and safety

practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with the Company's Health and Safety Policy Review

The subscript letter denotes a subset of the Health and Safety practices categories whose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson's column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer's column shows the strength of the relationship existing between each predictor and its corresponding health and safety practice. Furthermore, a moderate positive relationship was found existing between each between each predictor and its corresponding health and safety practice

The result in the table 7-3 shows that the subscript letter of the frequency of responses to the Health and Safety practices categories shows that the significant differences do not differ from one another at the 0.05 level of significant. There is a significant difference between those who are involved in Health and Safety practices and those who do not for both those who often and do not often do health and safety review practices respectively. The result also shows that firms who often do health and safety review have higher health and safety practices than those who do not in this study as presented in table 7-3 above. The results with the highest crammers' values are presented in Table 7-4 below.

Table 6-30: Highest crammers' values for hypothesis two

		Often			Not Often			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Org 3	Yes	150_a	130.4	74.6	51_b	70.6	25.4	19.772	1	.000	.238	.000
	No	77_a	96.6	51.7	72_b	52.4	48.3					
RA 1	Yes	136_a	116.7	75.6	44_b	63.3	24.4	18.610	1	.000	.231	.000
	No	91_a	110.3	53.5	79_b	59.7	46.5					
Imp 1	Yes	131_a	111.6	76.2	41_b	60.4	23.8	18.966	1	.000	.233	.000
	No	96_a	115.4	53.9	82_b	62.6	46.1					
Imp 12	Yes	114_a	96.6	76.5	35_b	52.4	23.5	15.457	1	.000	.210	.000
	No	113_a	130.4	56.2	88_b	70.6	43.8					
Mp 4	Yes	112_a	92.1	78.9	30_b	49.9	21.1	20.595	1	.000	.243	.000
	No	115_a	134.9	55.3	93_b	73.1	44.7					

The result in table 7-4 shows that investigating the causes of incidents, accidents and near-misses (.243); engaging with workers on H&S issues e.g. health and safety meetings and suggestion schemes (.238); implementing site H&S rules and measures (.233); undertaking overall project risk assessments before projects starts (.231); conducting regular health checks for employees (.210) have the highest crammers' value hence posing a higher relationship on H&S management practices among construction firms in Nigeria.

7.2.3 The role of Health and Safety Advocacy

Research Hypothesis Three

H_{O3}: There is no significant relationship between the health & safety practices and the advocacy for Health and Safety Improvement

The relationship between the advocating for Health and Safety improvement and health & safety practices is shown in table 7.5. Abbreviations of the items used to capture and measure the health & safety practices are used in the table 7.5 and would be explained after the table below.

Table 6-31: Chi-Square Test Showing the Relationship between Health & Safety Practices and Advocating for Health and Safety Improvement

		Not Often			Often			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Pol 2	Yes	89_a	99.2	67.9	42_b	31.8	32.1	6.883	1	.009	.140	.009
	No	176_a	165.8	80.4	43_b	53.2	19.6					
Org 12	Yes	135_a	126.4	80.8	32_b	40.6	19.2	4.561	1	.033	.114	.033
	No	130_a	138.6	71.0	53_b	44.4	29.0					
Mp 1	Yes	112_a	101.5	83.6	22_b	32.5	16.4	7.310	1	.007	.145	.007
	No	153_a	163.5	70.8	63_b	52.5	29.2					
Mp 5	Yes	113_a	103.0	83.1	23_b	33.0	16.9	6.578	1	.010	.137	.010
	No	152_a	162.0	71.0	62_b	52.0	29.0					

Yes = Implementation of health and safety practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with Advocating for Health and Safety Improvement

The subscript letter denotes a subset of the Health and Safety practices categories whose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson's column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer's column shows the strength of the relationship existing between each predictor and its corresponding health and safety practice. Furthermore, a moderate positive relationship was found existing between each between each predictor and its corresponding health and safety practice

The result in the table 7-5 shows that there is a significant difference in the involvement of Health and Safety practices with consideration with the advocacy for Health and Safety improvement in construction companies. The result also shows that firms who often gave important considerations to the advocacy for Health and Safety improvement in construction companies tend to have higher health and safety practices than those who do not give priority to the advocacy for Health and Safety improvement in construction companies in Nigeria as presented in table 7-5 above.

7.2.4 The Role of Frequent Discussion of Health and Safety during Board Meeting

Research Hypothesis Four

H_{O4}: There is no significant relationship between the Frequent Discussion of Health and Safety during Board Meeting and the health & safety practices.

The relationship between the frequent discussion of Health and Safety during board meetings and health & safety practices is shown in table 7-6. Abbreviations of the items used to capture and measure the health & safety practices are used in the table 7-6 and would be explained after the table below.

Table 6-32: Chi-Square Test Showing the Relationship between the Frequent Discussion of Health and Safety during Board Meeting and Health & Safety Practices

		Not Often			Often			Pearson's χ^2			Cramer's φ_c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Pol 2	Yes	43_a	52.8	32.8	88_b	78.2	67.2	4.845	1	.028	.118	.028
	No	98_a	88.2	44.7	121_b	130.8	55.3					
Org 1	Yes	68_a	80.2	34.2	131_b	118.8	65.8	7.169	1	.007	.143	.007
	No	73_a	60.8	48.3	78_b	90.2	51.7					
Org 2	Yes	60_a	77.3	31.3	132_b	114.7	68.8	14.435	1	.000	.203	.000
	No	81_a	63.7	51.3	77_b	94.3	48.7					
Org 3	Yes	60_a	81.0	29.9	141_b	120.0	70.1	21.371	1	.000	.247	.000
	No	81_a	60.0	54.4	68_b	89.0	45.6					
Org 4	Yes	53_a	69.3	30.8	119_b	102.7	69.2	12.613	1	.000	.190	.000
	No	88_a	71.7	49.4	90_b	106.3	50.6					
Org 5	Yes	60_a	75.3	32.1	127_b	111.7	67.9	11.224	1	.001	.179	.001
	No	81_a	65.7	49.7	82_b	97.3	50.3%					
Org 6	Yes	62_a	79.8	31.3	136_b	118.2	68.7	15.258	1	.000	.209	.000
	No	79_a	61.2	52.0	73_b	90.8	48.0					
Org 7	Yes	71_a	80.6	35.5	129_b	119.4	64.5	4.443	1	.035	.113	.035
	No	70_a	60.4	46.7	80_b	89.6	53.3					
Org 8	Yes	60_a	81.0	29.9	141_b	120.0	70.1	21.371	1	.000	.247	.000
	No	81_a	60.0	54.4	68_b	89.0	45.6					
Org 9	Yes	66_a	82.2	32.4	138_b	121.8	67.6	12.793	1	.000	.191	.000
	No	75_a	58.8	51.4	71_b	87.2	48.6					
Org 10	Yes	60_a	81.8	29.6	143_b	121.2	70.4	23.128	1	.000	.257	.000
	No	81_a	59.2	55.1	66_b	87.8	44.9					
Org 11	Yes	77_a	88.2	35.2	142_b	130.8	64.8	6.391	1	.011	.135	.011
	No	64_a	52.8	48.9	67_b	78.2	51.1					
Org 12	Yes	50_a	67.3	29.9	117_b	99.7	70.1	14.211	1	.000	.201	.000
	No	91_a	73.7	49.7	92_b	109.3	50.3					
Org 13	Yes	66_a	79.4	33.5	131_b	117.6	66.5	8.619	1	.003	.157	.003
	No	75_a	61.6	49.0	78_b	91.4	51.0					

RA 1	Yes	62_a	72.5	34.4	118_b	107.5	65.6	5.256	1	.022	.123	.022
	No	79_a	68.5	46.5	91_b	101.5	53.5					
RA 3	Yes	65_a	77.8	33.7	128_b	115.2	66.3	7.807	1	.005	.149	.005
	No	76_a	63.2	48.4	81_b	93.8	51.6					
RA 4	Yes	72_a	82.2	35.3	132_b	121.8	64.7	5.065	1	.024	.120	.024
	No	69_a	58.8	47.3	77_b	87.2	52.7					
RA 5	Yes	61_a	83.0	29.6	145_b	123.0	70.4	23.714	1	.000	.260	.000
	No	80_a	58.0	55.6	64_b	86.0	44.4					
Pl 1	Yes	65_a	83.0	31.6	141_b	123.0	68.4	15.871	1	.000	.213	.000
	No	76_a	58.0	52.8	68_b	86.0	47.2					
Pl 2	Yes	55_a	76.1	29.1	134_b	112.9	70.9	21.368	1	.000	.247	.000
	No	86_a	64.9	53.4	75_b	96.1	46.6					
Pl 3	Yes	71_a	84.6	33.8	139_b	125.4	66.2	9.153	1	.002	.162	.002
	No	70_a	56.4	50.0	50.0	83.6	50.0					
Pl 4	Yes	60_a	77.3	31.3	132_b	114.7	68.8	14.435	1	.000	.203	.000
	No	81_a	63.7	51.3	77_b	94.3	48.7					
Pl 5	Yes	46_a	61.6	30.1	107_b	91.4	69.9	11.803	1	.001	.184	.001
	No	95_a	79.4	48.2	102_b	117.6	51.8					
Imp 1	Yes	49_a	69.3	28.5	123_b	102.7	71.5	19.567	1	.000	.236	.000
	No	92_a	71.7	51.7	86_b	106.3	48.3					
Imp 2	Yes	52_a	70.9	29.5	124_b	105.1	70.5	16.976	1	.000	.220	.000
	No	89_a	70.1	51.1	85_b	103.9	48.9					
Imp 3	Yes	52_a	67.7	31.0	116_b	100.3	100.3	11.699	1	.001	.183	.001
	No	89_a	73.3	48.9	93_b	108.7	51.1					
Imp 4	Yes	53_a	68.5	31.2	117_b	101.5	68.8	11.402	1	.001	.180	.001
	No	88_a	72.5	48.9	92_b	107.5	51.1					
Imp 5	Yes	59_a	72.1	33.0	120_b	106.9	67.0	8.171	1	.004	.153	.004
	No	82_a	68.9	48.0	89_b	102.1	52.0					
Imp 6	Yes	69_a	78.6	35.4	126_b	116.4	64.6	4.397	1	.036	.112	.036
	No	72_a	62.4	46.5	83_b	92.6	53.5					
Imp 7	Yes	60_a	76.1	31.7	129_b	112.9	68.3	12.455	1	.000	.189	.000
	No	81_a	64.9	50.3	80_b	96.1	49.7					
Imp 8	Yes	67_a	76.9	35.1	124_b	114.1	64.9	4.739	1	.029	.116	.029
	No	74_a	64.1	46.5	85_b	94.9	53.5					
Imp 9	Yes	60_a	74.5	74.5	125_b	110.5	67.6	10.061	1	.002	.170	.002

	No	81_a	66.5	49.1	84_b	98.5	50.9					
Imp 11	Yes	44_a	67.7	26.2	124_b	100.3	73.8	26.682	1	.000	.276	.000
	No	97_a	73.3	53.3	85_b	108.7	46.7					
Imp 12	Yes	44_a	60.0	29.5	105_b	89.0	70.5	12.476	1	.000	.189	.000
	No	97_a	81.0	48.3	104_b	120.0	51.7					
Mp 1	Yes	35_a	54.0	26.1	99_b	80.0	73.9	18.114	1	.000	.227	.000
	No	106_a	87.0	49.1	110_b	129.0	50.9					
Mp 2	Yes	42_a	61.2	27.6	110_b	90.8	72.4	17.885	1	.000	.226	.000
	No	99_a	79.8	50.0	99_b	118.2	50.0					
Mp 3	Yes	40_a	60.4	26.7	110_b	89.6	73.3	20.239	1	.000	.240	.000
	No	101_a	80.6	50.5	99_b	119.4	49.5					
Mp 4	Yes	36_a	57.2	25.4	106_b	84.8	74.6	22.151	1	.000	.252	.000
	No	105_a	83.8	50.5	103_b	124.2	49.5					
Mp 5	Yes	33_a	54.8	24.3	103_b	81.2	75.7	23.733	1	.000	.260	.000
	No	108_a	86.2	50.5	106_b	127.8	49.5					
Aud 1	Yes	59_a	77.3	30.7	133_b	114.7	69.3	16.147	1	.000	.215	.000
	No	82_a	63.7	51.9	76_b	94.3	48.1					
Aud 2	Yes	49_a	62.0	31.8	105_b	92.0	68.2	8.196	1	.004	.153	.004
	No	92_a	79.0	46.9	104_b	117.0	53.1					
Aud 3	Yes	70_a	84.6	33.3	140_b	125.4	66.7	10.549	1	.001	.174	.001
	No	71_a	56.4	50.7	69_b	83.6	49.3					

Yes = Implementation of health and safety practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with Frequent Discussion of Health and Safety during Board Meeting

The subscript letter denotes a subset of the Health and Safety practices categories whose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson’s column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer's column shows the strength of the relationship existing between each predictor and its corresponding health and safety practice. Furthermore, a moderate positive relationship was found existing between each between each predictor and its corresponding health and safety practice

The result in the table 7-6 shows that there is a significant difference in the involvement of Health and Safety practices with consideration to the Frequent Discussion of Health and Safety during Board Meeting in Nigeria construction companies. The result also shows that firms who often had frequent discussion of health and safety during board meeting often gave important considerations to the Health and Safety practices in construction companies and tend to have higher health and safety practices than those who do not consider the topic important in the board meeting as presented in table 7-6 above. The results with the highest crammers' values are presented in Table 7-7 below.

Table 6-33: Highest crammers' values for hypothesis four

		Not Often			Often			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Org 3	Yes	60_a	81.0	29.9	141_b	120.0	70.1	21.371	1	.000	.247	.000
	No	81_a	60.0	54.4	68_b	89.0	45.6					
Org 8	Yes	60_a	81.0	29.9	141_b	120.0	70.1	21.371	1	.000	.247	.000
	No	81_a	60.0	54.4	68_b	89.0	45.6					
Org 10	Yes	60_a	81.8	29.6	143_b	121.2	70.4	23.128	1	.000	.257	.000
	No	81_a	59.2	55.1	66_b	87.8	44.9					
RA 5	Yes	61_a	83.0	29.6	145_b	123.0	70.4	23.714	1	.000	.260	.000
	No	80_a	58.0	55.6	64_b	86.0	44.4					
Pl 2	Yes	55_a	76.1	29.1	134_b	112.9	70.9	21.368	1	.000	.247	.000
	No	86_a	64.9	53.4	75_b	96.1	46.6					

Imp 11	Yes	44_{a}	67.7	26.2	124_{b}	100.3	73.8	26.682	1	.000	.276	.000
	No	97_{a}	73.3	53.3	85_{b}	108.7	46.7					
Mp 4	Yes	36_{a}	57.2	25.4	106_{b}	84.8	74.6	22.151	1	.000	.252	.000
	No	105_{a}	83.8	50.5	103_{b}	124.2	49.5					
Mp 5	Yes	33_{a}	54.8	24.3	103_{b}	81.2	75.7	23.733	1	.000	.260	.000
	No	108_{a}	86.2	50.5	106_{b}	127.8	49.5					

The result in table 7-7 shows that engaging with workers on H&S issues e.g. health and safety meetings and suggestion schemes (.247); a company designated H&S budget (.247); display of company H&S policy on construction sites, company website, and head/branch offices (.257); informing employees about hazards on sites before work starts (.260); provision of H&S insurance cover for sites (.247); assigning H&S supervisor(s) on site (.276); investigating the causes of incidents, accidents and near-misses (.252); publishing or sharing lessons learnt from incident investigations across the company or on projects (.260) have the highest crammers' value hence posing a higher relationship on H&S management practices among construction firms in Nigeria.

7.2.5 The Role of Age of Nigeria Construction Companies

Research Hypothesis Five

Ho_8: There is no significant relationship between the Age of Nigeria Construction Companies and the health & safety practices

The relationship between the age of construction companies and health & safety practices is shown in table 7-8. Abbreviations of the items used to capture and measure the health & safety practices are used in the table 7.8 and would be explained after the table below.

Table 6-34: Chi-Square Test Showing the Relationship between the Age of Construction Companies and Health & Safety Practices

		Less than 10 years			11-35 years			Above 35 years			Pearson's $_{\chi}2$			Cramer's $^{\varphi}$ c	
H&S Practices	Implementation of practice	Count	Expected Count	%within Practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Org3	Yes	37_a	31.6	18.4	132_b	146.4	65.7	32_a	23.0	15.9	13.862	2	.001	.199	.001
	No	18_a	23.4	12.1	123_b	108.6	82.6	8_a	17.0	5.4					
Org7	Yes	29_a	31.4	14.5	139_a	145.7	69.5	32_b	22.9	16.0	9.693	2	.008	.166	.008
	No	26_a	23.6	17.3	116_a	109.3	77.3	8_b	17.1	5.3					
Org9	Yes	26_a	32.1	12.7	147_a	148.6	72.1	31_b	23.3	15.2	8.860	2	.012	.159	.012
	No	29_a	22.9	19.9	108_a	106.4	74.0	9_b	16.7	6.2					
Org10	Yes	24_a	31.9	11.8	148_a	147.9	72.9	31_b	23.2	15.3	10.902	2	.004	.176	.004
	No	31_a	23.1	21.1	107_a	107.1	72.8	9_b	16.8	6.1					
Org12	Yes	25_a	26.2	15.0	113_a	121.7	67.7	29_b	19.1	17.4	11.144	2	.004	.178	.004
	No	30_a	28.8	16.4	142_a	133.3	77.6	11_b	20.9	6.0					
Org13	Yes	22_a	31.0	11.2	147_b	143.5	74.6	28_b	22.5	14.2	9.178	2	.010	.162	.010
	No	33_a	24.0	21.6	108_b	111.5	70.6	12_b	17.5	7.8					
Pln1	Yes	29_a	32.4	14.1	146_a	150.1	70.9	31_b	23.5	15.0	6.865	2	.032	.140	.032
	No	26_a	22.6	18.1	109_a	104.9	75.7	9_b	16.5	6.3					
Pln2	Yes	25_a	29.7	13.2	133_a	137.7	70.4	31_b	21.6	16.4	10.859	2	.004	.176	.004
	No	30_a	25.3	18.6	122_a	117.3	75.8	9_b	18.4	5.6					
Pln4	Yes	24_a	30.2	12.5	136_a	139.9	70.8	32_b	21.9	16.7	13.246	2	.001	.195	.001
	No	31_a	24.8	19.6	119_a	115.1	75.3	8_b	18.1	5.1					
Pln5	Yes	16_a	24.0	10.5	111_b	111.5	72.5	26_c	17.5	17.0	12.149	2	.002	.186	.002
	No	39_a	31.0	19.8	144_b	143.5	73.1	14_c	22.5	7.1					
Aud1	Yes	28_a	30.2	14.6	134_a	139.9	69.8	30_b	21.9	15.6	7.448	2	.024	.146	.024
	No	27_a	24.8	17.1	121_a	115.1	76.6	10_b	18.1	6.3					
Aud2	Yes	$25_{a, b}$	24.2	16.2	104_b	112.2	67.5	25_a	17.6	16.2	6.673	2	.036	.138	.036
	No	$30_{a, b}$	30.8	15.3	151_b	142.8	77.0	15_a	22.4	7.7					
Imp1	Yes	$26_{a, b}$	27.0	15.1	119_b	125.3	69.2	27_a	19.7	15.7	6.096	2	.047	.132	.047

	No	$29_{a, b}$	28.0	16.3	136_{b}	129.7	76.4	13_{a}	20.3	7.3					
Imp2	Yes	22_{a}	27.7	12.5	126_{a}	128.2	71.6	28_{b}	20.1	15.9	8.624	2	.013	.157	.013
	No	33_{a}	27.3	19.0	129_{a}	126.8	74.1	12_{b}	19.9	6.9					
Imp3	Yes	23_{a}	26.4	13.7	114_{a}	122.4	67.9	31_{b}	19.2	18.5	15.897	2	.000	.213	.000
	No	32_{a}	28.6	17.6	141_{a}	132.6	77.5	9_{b}	20.8	4.9					
Imp5	Yes	24_{a}	28.1	13.4	125_{a}	130.4	69.8	30_{b}	20.5	16.8	10.812	2	.004	.176	.004
	No	31_{a}	26.9	18.1	130_{a}	124.6	76.0	10_{b}	19.5	5.8					
Imp6	Yes	21_{a}	30.6	10.8	144_{b}	144_{b}	73.8	30_{c}	22.3	15.4	12.941	2	.002	.192	.002
	No	34_{a}	24.4	21.9	111_{b}	112.9	71.6	10_{c}	17.7	6.5					
Imp7	Yes	30_{a}	29.7	15.9	129_{a}	137.7	68.3	30_{b}	21.6	15.9	8.303	2	.016	.154	.016
	No	25_{a}	25.3	15.5	126	117.3	78.3	10_{b}	18.4	6.2					
Imp8	Yes	26_{a}	30.0	13.6	136_{a}	139.2	71.2	29_{b}	21.8	15.2	6.526	2	.038	.137	.038
	No	29_{a}	25.0	18.2	119_{a}	115.8	74.8	11_{b}	18.2	6.9					
Imp9	Yes	25_{a}	29.1	13.5	129_{a}	134.8	69.7	31_{b}	21.1	16.8	11.484	2	.003	.181	.003
	No	30_{a}	25.9	18.2	126_{a}	120.2	76.4	9_{b}	18.9	5.5					
Imp 10	Yes	27_{a}	28.6	14.8	126_{a}	132.6	69.2	29_{b}	20.8	15.9	7.606	2	.022	.147	.022
	No	28_{a}	26.4	16.7	129_{a}	122.4	76.8	11_{b}	19.2	6.5					
Imp 11	Yes	19_{a}	26.4	11.3	115_{a}	122.4	68.5	34_{b}	19.2 1 9.2	20.2	26.788	2	.000	.277	.000
	No	36_{a}	28.6	19.8	140_{a}	132.6	76.9	6_{b}	20.8	3.3					
Imp 12	Yes	17_{a}	23.4	11.4	102_{a}	108.6	68.5	30_{b}	17.0	20.1	20.955	2	.000	.245	.000
	No	38_{a}	31.6	18.9	153_{a}	146.4	76.1	10_{b}	23.0	5.0					
MP 1	Yes	14_{a}	21.1	10.4	96_{a}	97.6	71.6	24_{b}	15.3	17.9	11.859	2	.003	.184	.003
	No	41_{a}	33.9	19.0	159_{a}	157.4	73.6	16_{b}	24.7	7.4					
MP 2	Yes	18_{a}	23.9	11.8	108_{a}	110.7	71.1	26_{b}	17.4	17.1	10.260	2	.006	.171	.006
	No	37_{a}	31.1	18.7	147_{a}	144.3	74.2	14_{b}	22.6	7.1					
MP 3	Yes	18_{a}	23.6	12.0	105_{a}	109.3	70.0	27_{b}	17.1	18.0	12.517	2	.002	.189	.002
	No	37_{a}	31.4	18.5	150_{a}	145.7	75.0	13_{b}	22.9	6.5					
MP 4	Yes	13_{a}	22.3	9.2	101_{b}	103.5	71.1	28_{c}	16.2	19.7	21.008	2	.000	.245	.000
	No	42_{a}	32.7	20.2	154_{b}	151.5	74.0	12_{c}	23.8	5.8					
MP 5	Yes	12_{a}	21.4	8.8	101_{b}	99.1	74.3	23_{c}	15.5	16.9	12.633	2	.002	.190	.002
	No	43_{a}	33.6	20.1	154_{b}	155.9	72.0	17_{c}	24.5	7.9					

Yes = Implementation of health and safety practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with the age of the Nigeria construction companies.

The subscript letter denotes a subset of the Health and Safety practices categories whose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson's column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer's column shows the strength of the relationship existing between each predictor and its corresponding health and safety practice. Furthermore, a moderate positive relationship was found existing between each between each predictor and its corresponding health and safety practice

The result in the table 7-8 shows that there is a significant difference in the involvement of Health and Safety practices with consideration to with the age of the Nigeria construction companies. The result also shows that firms with higher age often gave important considerations to the Health and Safety practices in construction companies and tend to have higher health and safety practices than those belonging to a lower age limit as presented in table 7-8 above. The results with the highest crammers' values are presented in Table 7-9 below.

Table 6-35: Highest crammers' values for hypothesis four

		Less than 10 years			11-35 years			Above 35 years			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected Count	%within Practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Org3	Yes	37_a	31.6	18.4	132_b	146.4	65.7	32_a	23.0	15.9	13.862	2	.001	.199	.001
	No	18_a	23.4	12.1	123_b	108.6	82.6	8_a	17.0	5.4					
Imp3	Yes	23_a	26.4	13.7	114_a	122.4	67.9	31_b	19.2	18.5	15.897	2	.000	.213	.000
	No	32_a	28.6	17.6	141_a	132.6	77.5	9_b	20.8	4.9					
Imp 11	Yes	19_a	26.4	11.3	115_a	122.4	68.5	34_b	19.2	20.2	26.788	2	.000	.277	.000
	No	36_a	28.6	19.8	140_a	132.6	76.9	6_b	20.8	3.3					
Imp 12	Yes	17_a	23.4	11.4	102_a	108.6	68.5	30_b	17.0	20.1	20.955	2	.000	.245	.000
	No	38_a	31.6	18.9	153_a	146.4	76.1	10_b	23.0	5.0					
MP 4	Yes	13_a	22.3	9.2	101_b	103.5	71.1	28_c	16.2	19.7	21.008	2	.000	.245	.000
	No	42_a	32.7	20.2	154_b	151.5	74.0	12_c	23.8	5.8					

The result in table 7.9 shows that engaging with workers on H&S issues e.g. health and safety meetings and suggestion schemes (.199); rewarding workers for safe work behaviour (.213); assigning H&S supervisor(s) on site (.277); conducting regular health checks for employees (.245); and investigating the causes of incidents, accidents and near-misses (.245) have the highest crammers' value hence posing a higher relationship on H&S management practices among construction firms in Nigeria.

7.2.6 The Role of Companies' Size

Research Hypothesis Six

Ho_6: There is no significant relationship between the health & safety practices and the Companies' Size

The relationship between the size of construction companies and health & safety practices is shown in table 7.10. Abbreviations of the items used to capture and measure the health & safety practices are used in the table 7.10 and would be explained after the table below.

Table 6-36: Chi-Square Test Showing the Relationship between the Companies' Size and Health & Safety Practices

		Micro			Small			Medium			Large			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected Count	%within Practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Pol 1	Yes	38_{a}	30.5	18.5	74_{a}	65.6	36.1	46_{b}	63.8	22.4	47_{a}	45.1	22.9	19.335	3	.000	.235	.000
	No	14_{a}	21.5	9.7	38_{a}	46.4	26.2	63_{b}	45.2	43.4	30_{a}	31.9	20.7					
Pol 2	Yes	$14_{a, b}$	19.5	10.7	28_{b}	41.9	21.4	45_{a}	40.8	34.4	44_{c}	28.8	33.6	23.308	3	.000	.258	.000
	No	$38_{a, b}$	32.5	17.4	84_{b}	70.1	38.4	64_{a}	68.2	29.2	33_{c}	48.2	15.1					
Org 1	Yes	32_{a}	29.6	16.1	56_{a}	63.7	28.1	51_{a}	62.0	25.6	60_{b}	43.8	30.2	21.045	3	.000	.245	.000
	No	20_{a}	22.4	13.2	56_{a}	48.3	37.1	58_{a}	47.0	38.4	17_{b}	33.2	11.3					
Org 2	Yes	28_{a}	28.5	14.6	48_{a}	61.4	25.0	57a	59.8	29.7	59_{b}	42.2	30.7	21.554	3	.000	.248	.000
	No	24_{a}	23.5	15.2	64_{a}	50.6	40.5	52_{a}	49.2	32.9	18_{b}	34.8	11.4					
Org 3	Yes	26_{a}	29.9	12.9	53_{a}	64.3	26.4	61_{a}	30.3	30.3	61_{b}	44.2	30.3	20.906	3	.000	.244	.000
	No	26_{a}	22.1	17.4	59_{a}	47.7	39.6	48_{a}	46.4	32.2	16_{b}	32.8	10.7					
Org 4	Yes	$29_{a, b}$	25.6	16.9	47_{b}	55.0	27.3	47_{b}	53.6	27.3	49_{a}	37.8	28.5	11.277	3	.010	.180	.010
	No	$23_{a, b}$	26.4	12.9	65_{b}	57.0	36.5	62_{b}	55.4	34.8	28_{a}	39.2	15.7					
Org 5	Yes	$29_{a, b}$	27.8	15.5	56_{b}	59.8	29.9	49_{b}	58.2	26.2	53_{a}	41.1	28.3	11.131	3	.011	.178	.011
	No	$23_{a, b}$	24.2	14.1	56_{b}	52.2	34.4	60_{b}	50.8	36.8	24_{a}	35.9	14.7					
Org 6	Yes	27_{a}	29.4	13.6	61_{a}	63.4	30.8	55_{a}	61.7	27.8	55_{b}	43.6	27.8	9.236	3	.026	.162	.026
	No	25_{a}	22.6	16.4	51_{a}	48.6	33.6	54_{a}	47.3	35.5	22_{b}	33.4	14.5					
Org 7	Yes	31_{a}	29.7	15.5	50_{a}	64.0	25.0	57_{a}	62.3	28.5	62_{b}	44.0	31.0	25.504	3	.000	.270	.000
	No	21_{a}	22.3	14.0	62_{a}	48.0	41.3	52_{a}	46.7	34.7	15_{b}	33.0	10.0					
Org 8	Yes	27_{a}	29.9	13.4	63_{a}	64.3	31.3	51_{a}	62.6	25.4	60_{b}	44.2	29.9	18.983	3	.000	.233	.000
	No	25_{a}	22.1	16.8	49_{a}	47.7	32.9	58_{a}	46.4	38.9	17_{b}	32.8	11.4					
Org 9	Yes	29_{a}	30.3	14.2	52_{a}	65.3	25.5	60_{a}	63.5	29.4	63_{b}	44.9	30.9	24.620	3	.000	.265	.000
	No	23_{a}	21.7	15.8	60_{a}	46.7	41.1	49_{a}	45.5	33.6	14_{b}	32.1	9.6					
Org 10	Yes	26_{a}	30.2	12.8	59_{a}	65.0	29.1	55_{a}	63.2	27.1	63_{b}	44.7	31.0	23.145	3	.000	.257	.000
	No	26_{a}	21.8	17.7	53_{a}	47.0	36.1	54_{a}	45.8	36.7	14_{b}	32.3	9.5					
Org 11	Yes	$35_{a, b}$	32.5	16.0	68_{b}	70.1	31.1	57_{b}	68.2	26.0	59_{a}	48.2	26.9	12.072	3	.007	.186	.007
	No	$17_{a, b}$	19.5	13.0	44_{b}	41.9	33.6	52_{b}	40.8	39.7	18_{a}	28.8	13.7					
Org 12	Yes	24_{a}	24.8	14.4	51_{a}	53.4	30.5	39_{a}	52.0	23.4	53_{b}	36.7	31.7	20.250	3	.000	.241	.000

	No	28_{a}	27.2	15.3	61_{a}	58.6	33.3	70_{a}	57.0	38.3	24_{b}	40.3	13.1					
Org 13	Yes	$29_{a, b}$	29.3	14.7	63_{b}	63.0	32.0	45_{a}	61.4	22.8	60_{c}	43.3	30.5	24.625	3	.000	.265	.000
	No	$23_{a, b}$	22.7	15.0	49_{b}	49.0	32.0	64_{a}	47.6	41.8	17_{c}	33.7	11.1					
R1	Yes	30_{a}	26.7	16.7	61_{a}	57.6	33.9	38_{b}	56.1	21.1	51_{a}	39.6	28.3	19.962	3	.000	.239	.000
	No	22_{a}	25.3	12.9	51_{a}	54.4	30.0	71_{b}	52.9	41.8	26_{a}	37.4	15.3					
R 2	Yes	29_{a}	29.3	14.7	54_{a}	63.0	27.4	56_{a}	61.4	28.4	58_{b}	43.3	29.4	15.383	3	.002	.210	.002
	No	23_{a}	22.7	15.0	58_{a}	49.0	37.9	53_{a}	47.6	34.6	19_{b}	33.7	12.4					
R 3	Yes	$30_{a, b}$	28.7	15.5	47_{b}	61.8	24.4	59_{b}	60.1	30.6	57_{a}	42.5	29.5	19.146	3	.000	.234	.000
	No	$22_{a, b}$	23.3	14.0	65_{b}	50.2	41.4	50_{b}	48.9	31.8	20_{a}	34.5	12.7					
R 5	Yes	31_{a}	30.6	15.0	60_{a}	65.9	29.1	55_{a}	64.2	26.7	60_{b}	45.3	29.1	16.037	3	.001	.214	.001
	No	21_{a}	21.4	14.6	52_{a}	46.1	36.1	54_{a}	44.8	37.5	17_{b}	31.7	11.8					
Pln 1	Yes	31_{a}	30.6	15.0	61_{a}	65.9	29.6	52_{a}	64.2	25.2	62_{b}	45.3	30.1	21.423	3	.000	.247	.000
	No	21_{a}	21.4	14.6	51_{a}	46.1	35.4	57_{a}	44.8	39.6	15_{b}	31.7	10.4					
Pln 2	Yes	24_{a}	28.1	12.7	58_{a}	60.5	30.7	54_{a}	58.9	28.6	53_{b}	41.6	28.0	9.201	3	.027	.162	.027
	No	28_{a}	23.9	17.4	54_{a}	51.5	33.5	55_{a}	50.1	34.2	24_{b}	35.4	14.9					
Pln 3	Yes	$35_{a, b}$	31.2	16.7	57_{c}	67.2	27.1	$60_{b,}$	65.4	28.6	58_{a}	46.2	27.6	13.677	3	.003	.198	.003
	No	$17_{a, b}$	20.8	12.1	55_{c}	44.8	39.3	$49_{b,}$	43.6	35.0	19_{a}	30.8	13.6					
Pln 4	Yes	26_{a}	28.5	13.5	50_{a}	61.4	26.0	55_{a}	59.8	28.6	61_{b}	42.2	31.8	24.522	3	.000	.265	.000
	No	26_{a}	23.5	16.5	62_{a}	50.6	39.2	54_{a}	49.2	34.2	16_{b}	34.8	10.1					
Pln 5	Yes	21_{a}	22.7	13.7	41_{a}	49.0	26.8	42_{a}	47.6	27.5	49_{b}	33.7	32.0	16.144	3	.001	.215	.001
	No	31_{a}	29.3	15.7	71_{a}	63.0	36.0	67_{a}	61.4	34.0	28_{b}	43.3	14.2					
Imp1	Yes	32_{a}	25.6	18.6	42_{b}	55.0	24.4	46_{b}	53.6	26.7	52_{a}	37.8	30.2	21.792	3	.000	.250	.000
	No	20_{a}	26.4_{b}	11.2	70_{b}	57.0	39.3	63_{b}	55.4	35.4	25_{a}	39.2	14.0					
Imp2	Yes	21_{a}	26.1	11.9	50_{a}	56.3	28.4	47_{a}	54.8	26.7	58_{b}	38.7	33.0	25.016	3	.000	.267	.000
	No	31_{a}	25.9	17.8	62_{a}	55.7	35.6	62_{a}	54.2	35.6	19_{b}	38.3	10.9	28.56	3	.000	.286	.000
Imp3	Yes	$20_{a,}$	25.0	11.9	39_{b}	53.8	23.2	53_{a}	52.3	31.5	56_{c}	37.0	33.3					
Imp4	Yes	26_{a}	25.3	15.3	40_{a}	54.4	23.5	47_{a}	52.9	27.6	57_{b}	37.4	33.5	28.724	3	.000	.286	.000
	No	26_{a}	26.7	14.4	72_{a}	57.6	40.0	62_{a}	56.1	34.4	20_{b}	39.6	11.1					
Imp5	Yes	23_{a}	26.6	12.8	49_{a}	57.3	27.4	53_{a}	55.7	29.6	54_{b}	39.4	30.2	14.830	3	.002	.206	.002
	No	29_{a}	25.4	17.0	63_{a}	54.7	36.8	56_{a}	53.3	32.7	23_{b}	37.6	13.5					
Imp6	Yes	24_{a}	29.0	12.3	51_{a}	62.4	26.2	59_{a}	60.7	30.3	61_{b}	42.9	31.3	23.984	3	.000	.262	.000
	No	28_{a}	23.0	18.1	61_{a}	49.6	39.4	50_{a}	48.3	32.3	16_{b}	34.1	10.3					
Imp7	Yes	25_{a}	28.1	13.2	49_{a}	60.5	25.9	56_{a}	58.9	29.6	59_{b}	41.6	31.2	21.639	3	.000	.249	.000
	No	27_{a}	23.9	16.8	63_{a}	51.5	39.1	53_{a}	50.1	32.9	18_{b}	35.4	11.2					

Imp8	Yes	28_a	28.4	14.7	57_a	61.1	29.8	51_a	59.5	26.7	55_b	42.0	28.8	12.111	3	.007	.186	.007
	No	24_a	23.6	15.1	55_a	50.9	34.6	58_a	49.5	36.5	22_b	35.0	13.8					
Imp9	Yes	24_a	27.5	13.0	49_a	59.2	26.5	53_a	57.6	28.6	59_b	40.7	31.9	22.903	3	.000	.256	.000
	No	28_a	24.5	17.0	63_a	52.8	38.2	56_a	51.4	33.9	18_b	36.3	10.9					
Imp10	Yes	24_a	27.0	13.2	56_a	58.2	30.8	49_a	56.7	26.9	53_b	40.0	29.1	11.799	3	.008	.184	.008
	No	28_a	25.0	16.7	56_a	53.8	33.3	60_a	52.3	35.7	24_b	37.0	14.3					
Imp11	Yes	24_a	25.0	14.3	40_a	53.8	23.8	49_a	52.3	29.2	55_b	37.0	32.7	24.182	3	.000	.263	.000
	No	28_a	27.0	15.4	72_a	58.2	39.6	60_a	56.7	33.0	22_b	40.0	12.1					
Imp12	Yes	20_a	22.1	13.4	32_a	47.7	21.5	44_a	46.4	29.5	53_b	32.8	35.6					
	No	32_a	29.9	15.9	80_a	64.3	39.8	65_a	62.6	32.3	24_b	44.2	11.9					
MP1	Yes	16_a	19.9	11.9	37_a	42.9	27.6	31_a	41.7	23.1	50_b	29.5	37.3	30.166	3	.000	.294	.000
	No	36_a	32.1	16.7	75_a	69.1	34.7	78	67.3	36.1	27_b	47.5	12.5					
MP2	Yes	19_a	22.6	12.5	35_a	48.6	23.0	43_a	47.3	28.3	55_b	33.4	36.2	33.040	3	.000	.307	.000
	No	33_a	29.4	16.7	77_a	63.4	38.9	66_a	61.7	33.3	22_b	43.6	11.1					
Mp3	Yes	16_a	22.3	10.7	38_a	48.0	25.3	40_a	46.7	26.7	56_b	33.0	37.3	36.490	3	.000	.323	.000
	No	36_a	29.7	18.0	74_a	64.0	37.0	69_a	62.3	34.5	21_b	44.0	10.5					
Mp4	Yes	17_a	21.1	12.0	34_a	45.4	23.9	41_a	44.2	28.9	50_b	31.2	35.2	25.537	3	.000	.270	.000
	No	35_a	30.9	16.8	78_a	66.6	37.5	68_a	64.8	32.7	27_b	45.8	13.0					
Mp5	Yes	20_a	20.2	14.7	38_a	43.5	27.9	31_a	42.4	22.8	47_b	29.9	34.6	22.073	3	.000	.251	.000
	No	32_a	31.8	15.0	74_a	68.5	34.6	78_a	66.6	36.4	30_b	47.1	14.0					
Aud1	Yes	25_a	28.5	13.0	59_a	61.4	30.7	54_a	59.8	28.1	54_b	42.2	28.1	9.677	3	.022	.166	.022
	No	27_a	23.5	17.1	53_a	50.6	33.5	55_a	49.2	34.8	23_b	34.8	14.6					
Aud2	Yes	21_a	22.9	13.6	38_a	49.3	24.7	45_a	48.0	29.2	50_b	33.9	32.5	18.909	3	.000	.232	.000
	No	31_a	29.1	15.8	74_a	62.7	37.8	64_a	61.0	32.7	27_b	43.1	13.8					
Aud 3	Yes	$32_{a,}$	31.2	15.2	51_b	67.2	24.3	65_a	65.4	31.0	62_c	46.2	29.5	23.329	3	.000	.258	.000
	No	$20_{a,}$	20.8	14.3	61_b	44.8	43.6	44_a	43.6	31.4	15_c	30.8	10.7					

Yes = Implementation of health and safety practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with the size of the Nigeria construction companies.

The subscript letter denotes a subset of the Health and Safety practices categories hose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson's column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer's column shows the strength of the relationship existing between each predictor and its corresponding health and safety practice. Furthermore, a moderate positive relationship was found existing between each between each predictor and its corresponding health and safety practice

The result in the Table 7-10 shows that there is a significant difference in the involvement of Health and Safety practices with consideration to the size of the Nigeria construction companies. The result also shows that firms with higher size often gave important considerations to the Health and Safety practices in construction companies and tend to have higher health and safety practices than those with belonging to a lower size limit as presented in Table 7-10 above. The results with the highest crammers' values are presented in Table 7-11 below.

Table 6-37: Highest crammers' values for hypothesis six

		Micro			Small			Medium			Large			Pearson's $\chi 2$			Cramer's φ_c	
H&S Practices	Implementation of practice	Count	Expected Count	%within Practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Imp4	Yes	26_a	25.3	15.3	40_a	54.4	23.5	47_a	52.9	27.6	57_b	37.4	33.5	28.72	3	.000	.286	.000
	No	26_a	26.7	14.4	72_a	57.6	40.0	62_a	56.1	34.4	20_b	39.6	11.1					
MP1	Yes	16_a	19.9	11.9	37_a	42.9	27.6	31_a	41.7	23.1	50_b	29.5	37.3	30.17	3	.000	.294	.000
	No	36_a	32.1	16.7	75_a	69.1	34.7	78	67.3	36.1	27_b	47.5	12.5					
MP2	Yes	19_a	22.6	12.5	35_a	48.6	23.0	43_a	47.3	28.3	55_b	33.4	36.2	33.04	3	.000	.307	.000
	No	33_a	29.4	16.7	77_a	63.4	38.9	66_a	61.7	33.3	22_b	43.6	11.1					
Mp3	Yes	16_a	22.3	10.7	38_a	48.0	25.3	40_a	46.7	26.7	56_b	33.0	37.3	36.49	3	.000	.323	.000
	No	36_a	29.7	18.0	74_a	64.0	37.0	69_a	62.3	34.5	21_b	44.0	10.5					
Mp4	Yes	17_a	21.1	12.0	34_a	45.4	23.9	41_a	44.2	28.9	50_b	31.2	35.2	25.54	3	.000	.270	.000
	No	35_a	30.9	16.8	78_a	66.6	37.5	68_a	64.8	32.7	27_b	45.8	13.0					

The result in Table 7-11 shows that site inductions for workers (.286); measuring H&S performance against set targets (.294); reviewing and updating H&S plans after projects completion (.307); keeping incident records on every project (.323); and investigating the causes of incidents, accidents and near-misses (.270); have the highest crammers' value hence posing a higher relationship on H&S management practices among construction firms in Nigeria.

7.3 RESEARCH HYPOTHESIS ON THE INFLUENCE OF EXTERNAL FACTORS ON THE IMPLEMENTATION OF H&S MANAGEMENT PRACTICES

There are only two hypotheses in section 7.2 and they include:

7.3.4 The Role of Government H&S inspectors to the Site

Research Hypothesis Seven

Ho7: There is no significant relationship between the health & safety practices and Government H&S inspectors to the Site.

The relationship between the health & safety practices and Government H&S inspectors to the Site is shown in table 7.12. Abbreviations of the items used to capture and measure the health & safety practices are used in the table 7.12 and would be explained after the table below.

Table 6-38: Chi-Square Test Showing the Relationship between Health & Safety Practices and Government H&S inspectors to the Site

		Not Often			Often			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Org 1	Yes	102_a	113.1	51.3	97_b	85.9	48.7	5.899	1	.015	.130	.015
	No	97_a	85.9	64.2	54_b	65.1	35.8					
Org 2	Yes	93_a	109.2	48.4	99_b	82.8	51.6	12.292	1	.000	.187	.000
	No	106_a	89.8	67.1	52_b	68.2	32.9					
Org 3	Yes	100_a	114.3	49.8	101_b	86.7	50.2	9.719	1	.002	.167	.002
	No	99_a	84.7	66.4	50_b	64.3	33.6					
Org 4	Yes	86_a	97.8	50.0	86_b	74.2	50.0	6.483	1	.011	.136	.011
	No	113_a	101.2	63.5	65_b	76.8	36.5					
Org 5	Yes	92_a	106.3	49.2	95_b	187.0	50.8	9.603	1	.002	.166	.002
	No	107_a	92.7	65.6	56_b	70.3	34.4					
Org 6	Yes	99_a	112.6	50.0	99_b	85.4	50.0	8.739	1	.003	.158	.003
	No	100_a	86.4	65.8	52_b	65.6	34.2					
Org 7	Yes	102_a	113.7	51.0	98_b	86.3	49.0	6.527	1	.011	.137	.011
	No	97_a	85.3	64.7	53_b	64.7	35.3					
Org 8	Yes	103_a	114.3	51.2	98_b	86.7	48.8	6.065	1	.014	.132	.014
	No	96_a	84.7	64.4	53_b	64.3	35.6					
Org 9	Yes	95_a	116.0	46.6	109	88.0	53.4	21.104	1	.000	.246	.000
	No	104_a	83.0	71.2	42_b	63.0	28.8					
Org 10	Yes	94_a	115.4	46.3	109_b	87.6	53.7	21.938	1	.000	.250	.000
	No	105_a	83.6	71.4	42_b	63.4	28.6					
Org 11	Yes	108_a	124.5	49.3	111_b	94.5	50.7	13.568	1	.000	.197	.000
	No	91_a	74.5	69.5	40_b	56.5	30.5					
Org 12	Yes	81_a	95.0	48.5	86_b	72.0	51.5	9.087	1	.003	.161	.003
	No	118_a	104.0	64.5	65_b	79.0	35.5					
Org 13	Yes	93_a	112.0	47.2	104_b	85.0	52.8	17.105	1	.000	.221	.000
	No	106_a	87.0	69.3	47_b	66.0	30.7					
RA 1	Yes	91_a	102.3	50.6	89_b	77.7	49.4	5.999	1	.014	.131	.014
	No	108_a	96.7	63.5	62_b	73.3	36.5					

RA 2	Yes	95_a	112.0	48.2	102_b	85.0	51.8	13.695	1	.000	.198	.000
	No	104_a	87.0	68.0	49_b	66.0	32.0					
RA 3	Yes	95_a	109.7	49.2	98_b	83.3	50.8	10.223	1	.001	.171	.001
	No	104_a	89.3	66.2	53_b	67.7	33.8					
RA 5	Yes	91_a	117.1	44.2	115_b	88.9	55.8	32.831	1	.000	.306	.000
	No	108_a	81.9	75.0	36_b	62.1	25.0					
Pl 1	Yes	96_a	117.1	46.6	110_b	88.9	53.4	21.467	1	.000	.248	.000
	No	103_a	81.9	71.5	41_b	62.1	28.5					
Pl 2	Yes	97_a	107.5	51.3	92_b	81.5	48.7	5.130	1	.024	.121	.024
	No	102_a	91.5	63.4	59_b	69.5	36.6					
Pl 3	Yes	97_a	119.4	46.2	113_b	90.6	53.8	24.351	1	.000	.264	.000
	No	102_a	79.6	72.9	38_b	60.4	27.1					
Pl 4	Yes	100_a	109.2	52.1	92_b	82.8	47.9	3.951	1	.047	.106	.047
	No	99_a	89.8	62.7	59_b	68.2	37.3					
Pl 5	Yes	65_a	87.0	42.5	88_b	66.0	57.5	22.894	1	.000	.256	.000
	No	134_a	112.0	68.0	63_b	85.0	32.0					
Imp 1	Yes	75_a	97.8	43.6	97_b	74.2	56.4	24.215	1	.000	.263	.000
	No	124_a	101.2	69.7	54_b	76.8	30.3					
Imp 2	Yes	80_a	100.1	45.5	96_b	75.9	54.5	18.765	1	.000	.232	.000
	No	119_a	98.9	68.4	55_b	75.1	31.6					
Imp 3	Yes	78_a	95.5	46.4	90_b	72.5	53.6	14.324	1	.000	.202	.000
	No	121_a	103.5	66.5	61_b	78.5	33.5					
Imp 4	Yes	83_a	96.7	48.8	87_b	73.3	51.2	8.697	1	.003	.158	.003
	No	116_a	102.3	64.4	64_b	77.7	35.6					
Imp 5	Yes	88_a	101.8	49.2	91_b	77.2	50.8	8.844	1	.003	.159	.003
	No	111_a	97.2	64.9	60_b	73.8	35.1					
Imp 6	Yes	100_a	110.9	51.3	95_b	84.1	48.7	5.579	1	.018	.126	.018
	No	99_a	88.1	63.9	56_b	66.9	36.1					
Imp 8	Yes	94_a	108.6	49.2	97_b	82.4	50.8	10.011	1	.002	.169	.002
	No	105_a	90.4	66.0	54_b	68.6	34.0					
Imp 9	Yes	91_a	105.2	49.2	94_b	79.8	50.8	9.406	1	.002	.164	.002
	No	108_a	93.8	65.5	57_b	71.2	34.5					
Imp 10	Yes	89_a	103.5	48.9	93_b	78.5	51.1	9.784	1	.002	.167	.002
	No	110_a	95.5	65.5	58_b	72.5	34.5					
Imp 11	Yes	83_a	95.5	49.4	85_b	72.5	50.6	7.315	1	.007	.145	.007

	No	116_a	103.5	63.7	66_b	78.5	36.3					
Imp 12	Yes	66_a	84.7	44.3	83_b	64.3	55.7	16.691	1	.000	.218	.000
	No	133_a	114.3	66.2	68_b	86.7	33.8					
Mp 1	Yes	61_a	76.2	45.5	73_b	57.8	54.5	11.372	1	.001	.180	.001
	No	138_a	122.8	63.9	78_b	93.2	36.1					
Mp 2	Yes	64_a	86.4	42.1	88_b	65.6	57.9	23.837	1	.000	.261	.000
	No	135_a	112.	68.2	63_b	85.4	31.8					
Mp 3	Yes	69_a	85.3	46.0	81_b	64.7	54.0	12.614	1	.000	.190	.000
	No	130_a	113.7	65.0	70_b	86.3	35.0					
Mp 4	Yes	66_a	80.7	46.5	76_b	61.3	53.5	10.492	1	.001	.173	.001
	No	133_a	118.3	63.9	75_b	89.7	36.1					
Mp 5	Yes	63_a	77.3	46.3	73_b	58.7	53.7	10.061	1	.002	.170	.002
	No	136_a	121.7	63.6	78_b	92.3	36.4					
Aud 1	Yes	93_a	109.2	48.4	99_b	82.8	51.6	12.292	1	.000	.187	.000
	No	106_a	89.8	67.1	52_b	68.2	32.9					
Aud 2	Yes	72_a	87.6	46.8	82_b	66.4	53.2	11.445	1	.001	.181	.001
	No	127_a	111.4	64.8	69_b	84.6	35.2					
Aud 3	Yes	104_a	119.4	49.5	106_b	90.6	50.5	11.510	1	.001	.181	.001
	No	95_a	79.6	67.9	45_b	60.4	32.1					

Yes = Implementation of health and safety practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with the Government H&S inspectors to the Site

The subscript letter denotes a subset of the Health and Safety practices categories whose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson's column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer’s column shows the strength of the relationship existing between each predictor and its corresponding health and safety practice. Furthermore, a moderate positive relationship was found existing between each between each predictor and its corresponding health and safety practice

The result in the Table 7-12 shows that the subscript letter of the frequency of responses to the Health and Safety practices categories shows that the significant differences do not differ from one another at the 0.05 level of significant putting into consideration the Government H&S inspectors to the Site of construction firms in Nigeria. There is a significant difference in the visitation of Government H&S inspectors to the Site between those who are involved in Health and Safety practices and those who do not. The result also shows that firms who often have the visitation of Government H&S inspectors to the Site have higher health and safety practices than those whose construction sites are not visited by government inspectors as presented in Table 7-12 above. The results with the highest crammers’ values are presented in Table 7-13 below.

Table 6-39: Highest crammers’ values for hypothesis seven

		Not Often			Often			Pearson’s $_{\chi}2$			Cramer’s $^{\varphi}$ c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Org 10	Yes	94_a	115.4	46.3	109_b	87.6	53.7	21.938	1	.000	.250	.000
	No	105_a	83.6	71.4	42_b	63.4	28.6					
RA 5	Yes	91_a	117.1	44.2	115_b	88.9	55.8	32.831	1	.000	.306	.000
	No	108_a	81.9	75.0	36_b	62.1	25.0					
Pl 1	Yes	96_a	117.1	46.6	110_b	88.9	53.4	21.467	1	.000	.248	.000
	No	103_a	81.9	71.5	41_b	62.1	28.5					
Pl 5	Yes	65_a	87.0	42.5	88_b	66.0	57.5	22.894	1	.000	.256	.000
	No	134_a	112.0	68.0	63_b	85.0	32.0					

Imp 1	Yes	75_a	97.8	43.6	97_b	74.2	56.4	24.215	1	.000	.263	.000
	No	124_a	101.2	69.7	54_b	76.8	30.3					

The result in Table 7-13 shows that display of company H&S policy on construction sites, company website, and head/branch offices (.250); informing employees about hazards on sites before work starts (.306); preparing H&S plans for every construction project (.248); Setting H&S performance targets (.256) and Implementing site H&S rules and measures (.263) have the highest crammers' value hence posing a higher relationship on H&S management practices among construction firms in Nigeria.

7.3.5 The Role of Company's client Demands on Health and Safety

Research Hypothesis Eight

Ho_8: There is no significant relationship between the health & safety practices and the company's client Demands on Health and Safety

The relationship between the health & safety practices and the company's client on health and safety is shown in table 7.14. Abbreviations of the items used to capture and measure the health & safety practices are used in the table 7.14 and would be explained after the table below.

Table 6-40: Chi-Square Test Showing the Relationship between Health & Safety Practices and the Priority of Company's Client on Health and Safety

		Moderately important			Very important			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Pol 2	Yes	74_a	89.8	56.5	57_b	41.2	43.5	14.183	1	.000	.201	.000
	No	166_a	150.2	75.8	53_b	68.8	24.2					
Org 1	Yes	128_a	136.5	64.3	71_b	62.5	35.7	3.866	1	.049	.105	.049
	No	112_a	103.5	74.2	39_b	47.5	25.8					
Org 2	Yes	122_a	131.7	63.5	70_b	60.3	36.5	4.993	1	.025	.119	.025
	No	118_a	108.3	74.7	40_b	49.7	25.3					
Org 3	Yes	122_a	137.8	60.7	79_b	63.2	39.3	13.586	1	.000	.197	.000
	No	118_a	102.2	79.2	31_b	46.8	20.8					
Org 7	Yes	124_a	137.1	62.0	76_b	62.9	38.0	9.351	1	.002	.163	.002
	No	116_a	102.9	77.3	34_b	47.1	22.7					
Org 9	Yes	128_a	139.9	62.7	76_b	64.1	37.3	7.703	1	.006	.148	.006
	No	112_a	100.1	76.7	34_b	45.9	23.3					
RA 5	Yes	129_a	141.3	62.6	77_b	64.7	37.4	8.225	1	.004	.153	.004
	No	111_a	98.7	77.1	33_b	45.3	22.9					
Pl 1	Yes	130_a	141.3	63.1	76_b	64.7	36.9	6.938	1	.008	.141	.008
	No	110_a	98.7	76.4	34_b	45.3	23.6					
Pl 2	Yes	119_a	129.6	63.0	129.6	59.4	37.0	5.997	1	.014	.131	.014
	No	121_a	110.4	75.2	40_b	50.6	24.8					
Imp 3	Yes	104_a	115.2	61.9	64_b	52.8	38.1	6.663	1	.010	.138	.010
	No	136_a	124.8	74.7	46_b	57.2	25.3					
Imp 9	Yes	118_a	126.9	63.8	67_b	58.1	36.2	4.174	1	,041	.109	.041
	No	122_a	113.1	73.9	43_b	51.9	26.1					
Imp 11	Yes	102_a	115.2	60.7	66_b	52.8	39.3	9.255	1	.002	.163	.002
	No	138_a	124.8	75.8	44_b	57.2	24.2					
Mp 1	Yes	80_a	91.9	59.7	54_b	42.1	40.3	7.927	1	.005	.150	.005
	No	160_a	148.1	74.1	56_b	67.9	25.9					

Mp 2	Yes	92_a	104.2	60.5	60_b	47.8	39.5	8.069	1	.005	.152	.005
	No	148_a	135.8	74.7	50_b	62.2	25.3					
Mp 3	Yes	90_a	102.9	60.0	60_b	47.1	40.0	8.949	1	.003	.160	.003
	No	150_a	137.1	75.0	50_b	62.9	25.0					
Mp 4	Yes	85_a	97.4	59.9	57_b	44.6	40.1	8.416	1	.004	.155	.004
	No	155_a	142.6	74.5	53_b	65.4	25.5					
Aud 2	Yes	90_a	105.6	58.4	64_b	48.4	41.6	13.094	1	.000	.193	.000
	No	150_a	134.4	76.5	46_b	61.6	23.5					
Aud 3	Yes	132_a	144.0	62.9	78_b	66.0	37.1	7.955	1	.005	.151	.005
	No	108_a	96.0	77.1	32_b	44.0	22.9					

Yes = Implementation of health and safety practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with the Priority of Company's Client on Health and Safety

The subscript letter denotes a subset of the Health and Safety practices categories whose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson's column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer's column shows the strength of the relationship existing between each predictor and its corresponding health and safety practice. Furthermore, a moderate positive relationship was found existing between each between each predictor and its corresponding health and safety practice

The result in the Table 7-14 shows that the subscript letter of the frequency of responses to the Health and Safety practices categories shows that there is no significant differences of health and safety practices with respect to the level of the priority of company's Client on Health and Safety at the 0.05 level. There is a significant difference in the involvement of Health and Safety practices as to whether the priority of company's Client on Health and Safety is given either high or moderate important consideration. The result also shows that firms who gave important considerations to the priority of company's Client on Health and Safety have higher health and safety practices than those who gave moderate priority to the company's Client on Health and Safety as presented in Table 7-14 above. The results with the highest crammers' values are presented in Table 7-15 below.

Table 6-41: Highest crammers' values for hypothesis eight

		Moderately important			Very important			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Pol 2	Yes	74_a	89.8	56.5	57_b	41.2	43.5	14.183	1	.000	.201	.000
	No	166_a	150.2	75.8	53_b	68.8	24.2					
Org 3	Yes	122_a	137.8	60.7	79_b	63.2	39.3	13.586	1	.000	.197	.000
	No	118_a	102.2	79.2	31_b	46.8	20.8					
Org 7	Yes	124_a	137.1	62.0	76_b	62.9	38.0	9.351	1	.002	.163	.002
	No	116_a	102.9	77.3	34_b	47.1	22.7					
Imp 11	Yes	102_a	115.2	60.7	66_b	52.8	39.3	9.255	1	.002	.163	.002
	No	138_a	124.8	75.8	44_b	57.2	24.2					
Aud 2	Yes	90_a	105.6	58.4	64_b	48.4	41.6	13.094	1	.000	.193	.000
	No	150_a	134.4	76.5	46_b	61.6	23.5					

The result in table 7-15 shows that a company director with overall responsibility for H&S (.201); engaging with workers on H&S issues e.g. health and safety meetings and suggestion schemes (.197); assessing the competence of workers and subcontractors (.163); assignin

H&S supervisor(s) on site (.163); and use of external consultant for undertaking safety management auditing (.193) have the highest crammers' value hence posing a higher relationship on H&S management practices among construction firms in Nigeria.

7.4 RESEARCH HYPOTHESIS ON INFLUENCE OF IMPLEMENTATION OF MANAGEMENT PRACTICES ON PERFORMANCE

This section provides the factors influencing the H&S performances and there are three major hypotheses to this effect in this section hence there are three sub-sections.

7.4.1 The Role of Health and Safety Behaviours of the Site Workers

Research Hypothesis Nine

Ho_9: There is no significant relationship between the health & safety practices and the level of Health and Safety Behaviours of the Site Workers.

The relationship between the level of Health and Safety Behaviours of the Site Workers and health & safety practices is shown in Table 7-16. Abbreviations of the items used to capture and measure the health & safety practices are used in the Table 7-16 and would be explained after the table below.

Table 6-42: Relationship between Health & Safety Practices and the level of Health and Safety Behaviours of the Site Workers

		Bad			Good			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Org 1	Yes	19_a	26.7	9.5	180_b	172.3	90.5	5.976	1	.015	.131	.015
	No	28_a	20.3	18.5	123_b	130.7	81.5					
Org 2	Yes	19_a	25.8	9.9	173_b	166.2	90.1	4.566	1	.033	.114	.033
	No	28_a	21.2	17.7	130_b	136.8	82.3					
Org 3	Yes	20_a	27.0	10.0	181_b	174.0	90.0	4.914	1	.027	. 118	.027
	No	27_a	20.0	18.1	122_b	129.0	81.9					
Org 4	Yes	14_a	23.1	8.1	158_b	148.9	91.9	8.138	1	.004	.152	.004
	No	33_a	23.9	18.5	145_b	154.1	81.5					
Org 6	Yes	15_a	26.6	7.6	183_b	171.4	92.4	13.434	1	.000	.196	.000
	No	32_a	20.4	21.1	120_b	131.6	78.9					
Org 10	Yes	19_a	27.3	9.4	184_b	175.7	90.6	6.884	1	.009	.140	.009
	No	28_a	19.7	19.0	119_b	127.3	81.0					
RA 2	Yes	18_a	26.5	9.1	179_b	170.5	90.9	7.139	1	.009	.143	.009
	No	29_a	20.5	19.0	124_b	132.5	81.0					
RA 4	Yes	20_a	27.4	9.8	184_b	176.6	90.2	5.527	1	.019	.126	.019
	No	27_a	19.6	18.5	119_b	126.4	81.5					
RA 5	Yes	18_a	27.7	8.7	188_b	178.3	91.3	9.476	1	.002	.165	.002
	No	29_a	19.3	20.1	115_b	124.7	79.9					
Pl 2	Yes	16_a	25.4	8.5	173_b	163.6	91.5	8.705	1	.003	.158	.003
	No	31_a	21.6	19.3	130_b	139.4	80.7					
Pl 5	Yes	10_a	20.5	6.5	143_b	132.5	93.5	11.109	1	.001	.178	.001
	No	37_a	26.5	18.8	160_b	170.5	81.2					
Imp 1	Yes	12_a	23.1	7.0	160_b	148.9	93.0	12.110	1	.001	.186	.001
	No	35_a	23.9	19.7	143_b	154.1	80.3					
Imp 3	Yes	16_a	22.6	9.5	152_b	145.4	90.5	4.237	1	.040	.110	.040
	No	31_a	24.4	17.0	151_b	157.6	83.0					
Imp 4	Yes	14_a	22.8	8.2	156_b	147.2	91.8	7.669	1	.006	.148	.006
	No	33_a	24.2	18.3	147_b	155.8	81.7					
Imp 6	Yes	16_a	26.2	8.2	179_b	168.8	91.8	10.334	1	.001	.172	.001

	No	31_a	20.8	20.0	124_b	134.2	80.0				
Imp 9	Yes	18_a	24.8	9.7	167_b	160.2	90.3	4.618	1	.032	.115	.032
	No	29_a	22.2	17.6	136_b	142.8	82.4					
Aud 2	Yes	12_a	20.7	7.8	142_b	133.3	92.2	7.515	1	.006	.147	.006
	No	35_a	26.3	17.9	161_b	169.7	82.1					

Yes = Implementation of health and safety practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with the level of Health and Safety

Behaviours of the Site Workers

The subscript letter denotes a subset of the Health and Safety practices categories whose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson's column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer's column shows the strength of the relationship existing between each predictor and its corresponding health and safety practice. Furthermore, a moderate positive relationship was found existing between each between each predictor and its corresponding health and safety practice

The result in the Table 7-16 shows that there is a significant difference in the involvement of Health and Safety practices with consideration to the level of Health and Safety Behaviours of the Site Workers among Nigeria construction companies. The result also shows that firms who had good Health and Safety Behaviours among its Site Workers often gave important considerations to the Health and Safety practices in construction companies and tend to have higher health and safety practices than those who have bad site workers behaviour towards health and safety issues as presented in Table 7-16 above. The results with the highest crammers' values are presented in Table 7-17 below.

Table 6-43: Highest crammers' values for hypothesis nine

		Bad			Good			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected count	%within Practice	Count	Expected Count	%within practice	Value	Df	P (2-Sided)	Value	P
Org 6	Yes	15_a	26.6	7.6	183_b	171.4	92.4	13.434	1	.000	.196	.000
	No	32_a	20.4	21.1	120_b	131.6	78.9					
RA 5	Yes	18_a	27.7	8.7	188_b	178.3	91.3	9.476	1	.002	.165	.002
	No	29_a	19.3	20.1	115_b	124.7	79.9					
Pl 5	Yes	10_a	20.5	6.5	143_b	132.5	93.5	11.109	1	.001	.178	.001
	No	37_a	26.5	18.8	160_b	170.5	81.2					
Imp 1	Yes	12_a	23.1	7.0	160_b	148.9	93.0	12.110	1	.001	.186	.001
	No	35_a	23.9	19.7	143_b	154.1	80.3					
Imp 6	Yes	16_a	26.2	8.2	179_b	168.8	91.8	10.334	1	.001	.172	.001
	No	31_a	20.8	20.0	124_b	134.2	80.0					

The result in Table 7-17 shows that a designated H&S department (.196); informing employees about hazards on sites before work starts (.165); setting H&S performance targets (.178); implementing site H&S rules and measures (.186); and carrying out site H&S inspections regularly (.172) have the highest crammers' value hence posing a higher relationship on H&S management practices among construction firms in Nigeria.

7.4.2 The Role of Health and Safety attitudes of the Site Workers

Research Hypothesis Ten

Ho10: There is no significant relationship between the health & safety practices and the level of Health and Safety attitudes of the Site Workers.

The relationship between the health & safety practices and the level of Health and Safety attitudes of the site workers is shown in table 7.18. Abbreviations of the items used to capture and measure the health & safety practices are used in the Table 7.18 and would be explained after the table below.

Table 6-44: Chi-Square Test Showing the Relationship between Health & Safety Practices and the level of Health and Safety attitudes of the Site Workers

		Bad			Neutral			Good			Pearson's χ2			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected Count	%within	Count	Expected count	%within	Count	Expected Count	%within	Value	Df	P (2-Sided)	Value	P
Pol1	Yes	29_a	29.3	58.0	14_b	21.7	37.8	162_a	154.0	61.6%	7.554	2	.023	.147	.023
	No	21_a	20.7	42.0	23_b	15.3	62.2	101_a	109.0	38.4					
Org1	Yes	22_a	28.4	44.0	13_a	21.0	35.1	164_b	149.5	62.4	13.730	2	.001	.198	.001
	No	28_a	21.6	56.0	24_a	16.0	64.9	99_b	113.5	37.6					
Org2	Yes	20_a	27.4	40.0	14_a	20.3	37.8	158_b	144.3	60.1	11.677	2	.003	.183	.003
	No	30_a	22.6	60.0	23_a	16.7	62.2	105_b	118.7	39.9					
Org3	Yes	25_a	28.7	50.0	11_a	21.2	29.7	165_b	152.0	62.7	15.772	2	.000	.212	.000
	No	25_a	21.3	50.0	26_a	15.8	70.3	98_b	112.0	37.3					
Org4	Yes	19_a	24.6	38.0	9_a	18.2	24.3	144_b	129.2	54.8	14.915	2	.001	.206	.001
	No	31_a	25.4	62.0	28_a	18.8	75.7	119_b	133.8	45.2					
Org5	Yes	22_a	26.7	44.0	13_b	19.8	35.1	152_b	140.5	57.8	8.777	2	.012	. 158	.012
	No	28_a	23.3	56.0	24_b	17.2	64.9	111_b	122.5	42.2					
Org6	Yes	20_a	28.3	40.0	14_a	20.9	37.8	164_b	148.8	62.4	14.458	2	.001	.203	.001
	No	30_a	21.7	60.0	23_a	16.1	62.2	99_b	114.2	37.6					
Org7	Yes	25_a	28.6	50.0	14_a	21.1	37.8	161_b	150.3	61.2	8.455	2	.015	.155	.015
	No	25_a	21.4	50.0	23_a	15.9	62.2	102_b	112.7	38.8					
Org8	Yes	24_a	28.7	48.0	12_a	21.2	32.4	165_b	151.0	62.7	14.306	2	.001	.202	.001
	No	26_a	21.3	52.0	25_a	15.8	67.6	98_b	112.0	37.3					
Org9	Yes	25_a	29.1	50.0	11_b	21.6	29.7	168_c	153.3	63.9	17.204	2	.000	.222	.000
	No	25_a	20.9	50.0	26_b	15.4	70.3	95_c	109.7	36.1					
Org10	Yes	24_a	29.0	48.0	12_a	21.5	32.4	167_b	152.5	63.5	15.245	2	.000	.209	.000
	No	26_a	21.0	52.0	25_a	15.5	67.6	96_b	110.5	36.5					
Org11	Yes	$25_{a, b}$	31.3	50.0	17_b	23.2	45.9	177_a	164.6	67.3	10.252	2	.006	.171	.006
	No	$25_{a, b}$	18.7	50.0	20_b	13.8	54.1	86_a	98.4	32.7					
Org13	No	$22_{a, b}$	23.9	44.0	12_b	17.7	32.4	133_a	125.5	50.6	4.600	2	.100	.115	.100
	Yes	$28_{a, b}$	26.1	56.0	25_b	19.3	67.6	130_a	137.5	49.4					
Org 14	Yes	21_a	28.1	42.0	8_a	20.8	21.6	168_b	148.0	63.9	28.378	2	.000	.285	.000

	No	29_a	21.9	58.0	29_a	16.2	78.4	95_b	115.0	36.1				
RA1	Yes	23_a	25.7	46.0	11_a	19.0	29.7	146_b	135.3	55.5	9.321	2	.009	.163	.009
	No	27_a	24.3	54.0	26_a	18.0	70.3	117_b	127.7	44.5					
RA2	Yes	19_a	28.1	38.0	13_a	20.8	35.1	165_b	148.0	62.7	17.971	2	.000	.227	.000
	No	31_a	21.9	62.0	24_a	16.2	64.9	98_b	115.0	37.3					
RA4	Yes	20_a	29.1	40.0	16_a	21.6	43.2	168_b	153.3	63.9	13.703	2	.001	.198	.001
	No	30_a	20.9	60.0	21	15.4	56.8	95_b	109.7	36.1					
RA5	Yes	24_a	29.4	48.0	9_a	21.8	24.3	173_b	154.8	65.8	25.859	2	.000	.272	.000
	No	26_a	20.6	52.0	28_a	15.2	75.7	90_b	108.2	34.2					
PL1	Yes	30_a	29.4	60.0	8_a	21.8	21.6	168_b	154.8	63.9	23.950	2	.000	.262	.000
	No	20_a	20.6	40.0	29_a	15.2	78.4	95_b	108.2	36.1					
PL2	Yes	16_a	27.0	32.0	18_a	20.0	48.6	155_b	142.0	58.9	12.748	2	.002	.191	.002
	No	34_a	23.0	68.0	19_a	17.0	51.4	108_b	121.0	41.1					
PL3	Yes	27_a	30.0	54.0	10_a	22.2	27.0	173_b	157.82	65.8	21.172	2	.000	.246	.000
	No	23_a	20.0	46.0	27_a	14.8	73.0	90_b	105.2	34.2					
PL4	Yes	25_a	27.4	50.0	6_a	20.3	16.2	161_b	144.3	61.2	27.080	2	.000	.278	.000
	No	25_a	22.6	50.0	31_a	16.7	83.8	102_b	118.7	38.8					
PL5	Yes	11_a	21.9	22.0	5_a	16.2	13.5	137_b	115.0	52.1	30.798	2	.000	.297	.000
	No	39_a	28.1	78.0	32_a	20.8	86.5	126_b	148.0	47.9					
IM 1	Yes	13_a	24.6	26.0	5_a	18.2	13.5	154_b	129.2	58.6	38.831	2	.000	.333	.000
	No	37_a	25.4	74.0	32_a	18.8	86.5	109_b	133.8	41.4					
IM2	Yes	22_a	25.1	44.0	9_b	18.6	24.3	145_c	132.3	55.1	13.238	2	.001	.194	.001
	No	28_a	24.9	56.0	28_b	18.4	75.7	118_c	130.7	44.9					
IM4	Yes	17_a	24.3	34.0	11_a	18.0	29.7	142_b	127.72	54.0	12.602	2	.002	.190	.002
	No	33_a	25.7	66.0	26_a	19.0	70.3	121_b	135.3	46.0					
IM5	Yes	24_a	25.6	48.0	7_a	18.9	18.9	148_b	134.5	56.3	18.345	2	.000	.229	.000
	No	26_a	24.4	52.0	30_a	18.1	81.1	115_b	128.5	43.7					
IM7	Yes	25_a	27.0	50.0	11_a	20.0	29.7	153_b	142.0	58.2	10.942	2	.004	.177	.004
	No	25_a	23.0	50.0	26_a	17.0	70.3	110_b	121.0	41.8					
IM9	Yes	23_a	26.4	46.0	9_b	19.6	24.3	153_c	139.0	58.2	16.017	2	.000	.214	.000
	No	27_a	23.6	54.0	28_b	17.4	75.7	110_c	124.0	41.8					
AU1	Yes	21_a	30.7	37.5	28_a	24.7	62.2	143_b	136.6	57.4	8.464	2	.015	.156	.015
	No	35_a	25.3	62.5	17_a	20.3	37.8	106_b	112.4	42.6					

Yes = Implementation of health and safety practice

No = Non-Implementation of health and safety practices

All the health and safety practices shown in this table have significant relationship with the level of Health and Safety

Behaviors of the Site Workers

The subscript letter denotes a subset of the Health and Safety practices categories whose column do not significantly differ from one another at the 0.05 level of significant.

The Pearson's column shows the significant relationship between the predictors and their respective health and safety practices

The Cramer's column shows the strength of the relationship existing between each predictor and its corresponding health and safety practice. Furthermore, a moderate positive relationship was found existing between each between each predictor and its corresponding health and safety practice

The result in the Table 7-18 shows that there is a significant difference in the involvement of Health and Safety practices with consideration to the level of Health and Safety attitude of the Site Workers among Nigeria construction companies. The result also shows that firms who had good Health and Safety attitude among its Site Workers often gave important considerations to the Health and Safety practices in construction companies and tend to have higher health and safety practices than those who have bad site workers behaviour attitude towards health and safety issues as presented in Table 7-18 above. The results with the highest crammers' values are presented in Table 7-19 below.

Table 6-45: Highest crammers' values for hypothesis ten

		Bad			Neutral			Good			Pearson's $\chi 2$			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected Count	%within	Count	Expected count	%within	Count	Expected Count	%within	Value	Df	P (2-Sided)	Value	P
Org 14	Yes	21_a	28.1	42.0	8_a	20.8	21.6	168_b	148.0	63.9	28.38	2	.000	.285	.000
	No	29_a	21.9	58.0	29_a	16.2	78.4	95_b	115.0	36.1					
RA5	Yes	24_a	29.4	48.0	9_a	21.8	24.3	173_b	154.8	65.8	25.89	2	.000	.272	.000
	No	26_a	20.6	52.0	28_a	15.2	75.7	90_b	108.2	34.2					
PL4	Yes	25_a	27.4	50.0	6_a	20.3	16.2	161_b	144.3	61.2	27.00	2	.000	.278	.000
	No	25_a	22.6	50.0	31_a	16.7	83.8	102_b	118.7	38.8					
PL5	Yes	11_a	21.9	22.0	5_a	16.2	13.5	137_b	115.0	52.1	30.78	2	.000	.297	.000
	No	39_a	28.1	78.0	32_a	20.8	86.5	126_b	148.0	47.9					
IM 1	Yes	13_a	24.6	26.0	5_a	18.2	13.5	154_b	129.2	58.6	38.81	2	.000	.333	.000
	No	37_a	25.4	74.0	32_a	18.8	86.5	109_b	133.8	41.4					

The result in table 7.19 shows that providing training programmes for H&S manager(s) (.285); informing employees about hazards on sites before work starts (.272); preparing method statements (.278); setting H&S performance targets (.297); and implementing site H&S rules and measures (.333) have the highest crammers' value hence posing a higher relationship on H&S management practices among construction firms in The Role of Rate of Occurrence of Accidents

7.4.3 The role of the Rate of Occurrence of Accidents on Construction Sites

Research Hypothesis eleven

Ho11: There is no significant relationship between the health & safety practices and the rate of occurrence of accidents in the Nigeria construction industry.

The relationship between the health & safety practices and the rate of occurrence of accidents in the Nigeria construction industry is shown in Table 7-20. Abbreviations of the items used to capture and measure the health & safety practices are used in the Table 7-20 and would be explained after the table below.

Table 6-46: Chi-Square Test Showing the Relationship between Health & Safety Practices and the level of accidents in the Nigeria construction industry

		Below 20			21-100			Above 101			Pearson's χ2			Cramer's φ c	
H&S Practices	Implementation of practice	Count	Expected Count	%within	Count	Expected count	%within	Count	Expected Count	%within	Value	Df	P (2-Sided)	Value	P
Org7	Yes	25_a	32.0	44.6	19_a	25.7	42.2	156_b	142.3	62.7	10.748	2	.005	.175	.005
	No	31_a	24.0	55.4	26_a	19.3	57.8	93_b	106.7	37.3					
Org11	Yes	$28_{a, b}$	35.0	50.0	24b	28.2	53.3	167_a	155.8	67.1	7.569	2	.024	.147	.023
	No	$28_{a, b}$	21.0	50.0	21_b	16.8	46.7	82_a	93.2	32.9					
IM6	No	$39_{a, b}$	31.2	69.6	19_b	25.1	42.2	137_a	138.7	55.0	7.772	2	.021	.149	.021
	Yes	$17_{a, b}$	24.8	30.4	26_b	19.9	57.8	112_a	110.3	45.0					
AUD1	Yes	21_a	30.7	37.5	28_a	24.7	62.2	143_b	136.6	57.4	8.464	2	.015	.156	.015
	No	35_a	25.3	62.5	17_a	20.3	37.8	106_b	112.4	42.6					

The result in the Table 7-20 shows that there is a significant difference in the involvement of Health and Safety practices with respect to the rate of occurrence of accidents in the Nigeria construction industry. The result also shows that firms with higher records of accidents tend to deploy various health and safety management practices to be able to cushion the high rate of accidents in construction companies.

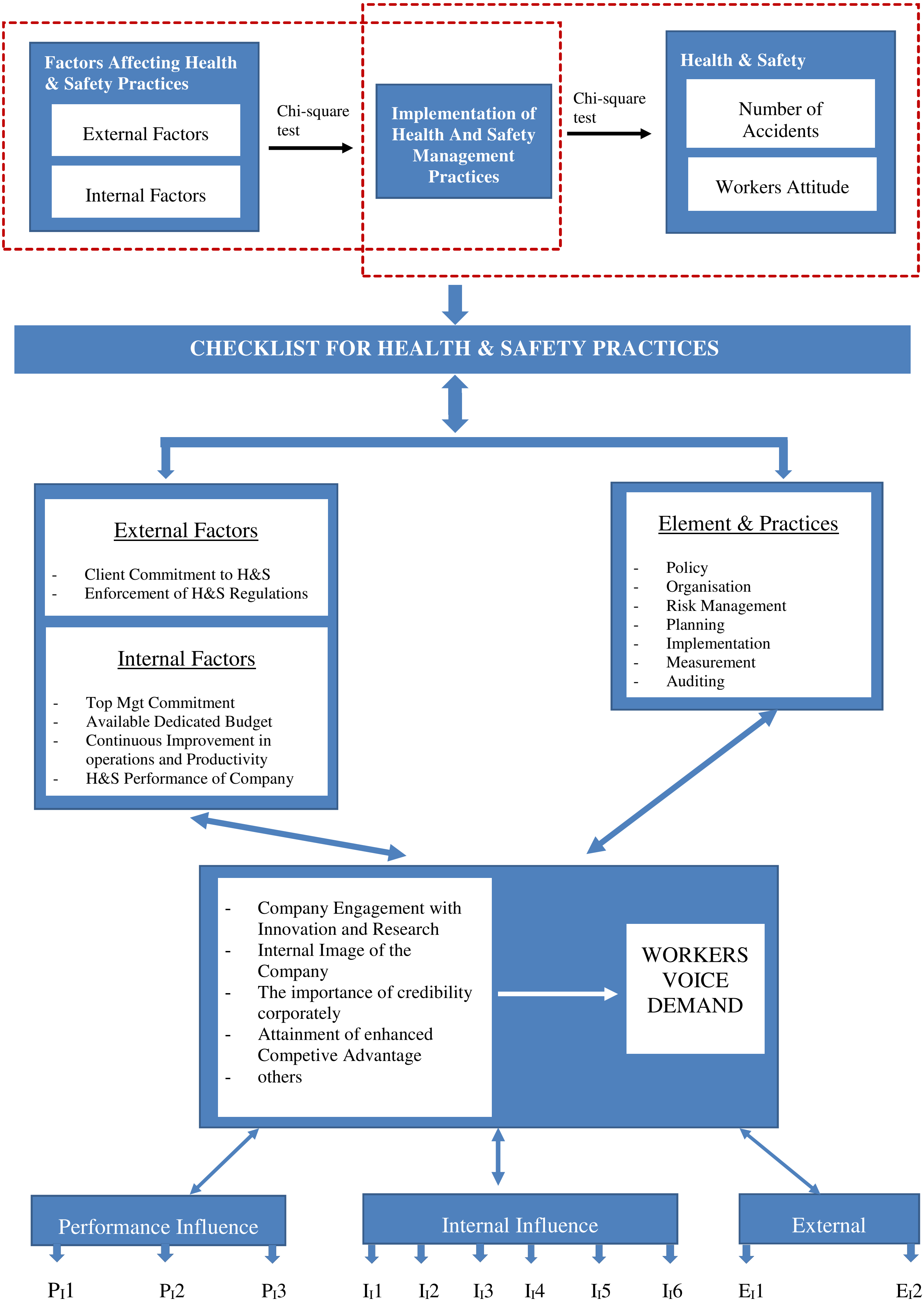

Figure 7.1 The Research Framework for Implementation of H&S

P_I1 – Behaviour of site workers.

P_I2 – Attitude of site workers

P_I3 – Rate of occurrence of accidents on the construction site.

I_I1 – the Company's annual turnover

I_I2 – the company's Health and Safety Policy review

I_I3 – Advocacy for Health and Safety Improvement

I_I4 – Frequency discussion of Health and safety Practices during board meeting.

I_I5 – Age of Nigerian construction companies

I_I6 – the companies' size

E_I1 – government H&S inspectors to site

E_I2 – Clients participation.

7.5 SUMMARY OF FINDINGS

The study investigated the internal and external factors that could influence the Health and Safety management practices among contractors in Nigeria. In summary, the findings of this study showed that both the internal and external factors used in this study are found to be significant and influence the Health and Safety management practices among contractors in Nigeria. The internal factors found to influence health and safety management practices among contractors in Nigeria are: company's annual turnover; company's H&S policy review; advocacy for H&S improvement; frequent discussion of H&S during board meeting; age of Nigeria construction companies; companies' size; and company's annual turnover.

Also, the external factors found to influence health and safety management practices among contractors in Nigeria are the role of government H&S inspections and the role of client demands on H&S. In addition, there are certain factors related to the implementation of H&S management practices that are also found to influence H&S Performance among contractors in Nigeria; these includes: H&S behaviours of the site workers; H&S attitudes of the site workers; and rate of occurrence of accidents on site.

7.6 VALIDATION OF FINDINGS

In order to ensure the findings of this study are reliable, it was further subjected to a validation test among selected contractors in the Nigeria construction industry. The findings of the validation results are presented in this section.

7.6.1 Types of Validation

According to Shuttleworth (2019), there are two major types of validity: internal and external. The internal validity is a measure which ensures that a researcher's experiment design closely follows the principle of cause and effect and could be subdivided into criterion, construct and face validity. The external validity is about generalization and measures to what extent can affect or a result in research, be generalized to population, settings, treatment variables, and measurement variables. It could either be population validity or ecological validity and they are both essential elements in judging the strength of an experimental design or result. This study adopted the external validity because it tends to find to what extent the findings of the study could be generalized to the population of the study.

7.6.2 Procedure Adopted – Expert Survey

The validation exercise was done by locating several experts in the Nigeria construction industry and a separate questionnaire was designed with respect to the findings of the study and the potential respondents were asked to provide their opinion on the validity of the findings provided by the result or findings in the study. Hence, respondents were asked to tick whether they agree or disagree to the findings of the study.

The study took the form of a descriptive survey design by explicitly focusing on the perception of various stakeholders in the Nigeria construction industry to validate the results from the study as regards to the major factors that could enhance or affect the health and safety management practices in the Nigeria construction industry. The study adopted the use of questionnaires to obtain information from the respondents of interest in this study. Hence, an Expert survey was adopted using a total of 120 respondents who are highly experienced in the Nigeria construction industry. However, only 88 questionnaires were retrieved. Information obtained were subjected to analysis using the bar charts to explain the phenomena of interest in the study.

7.6.3 Validation Results

Demographic Characteristics

The demographic characteristics of the respondents used in this study were presented in Fig. 7-1 below.

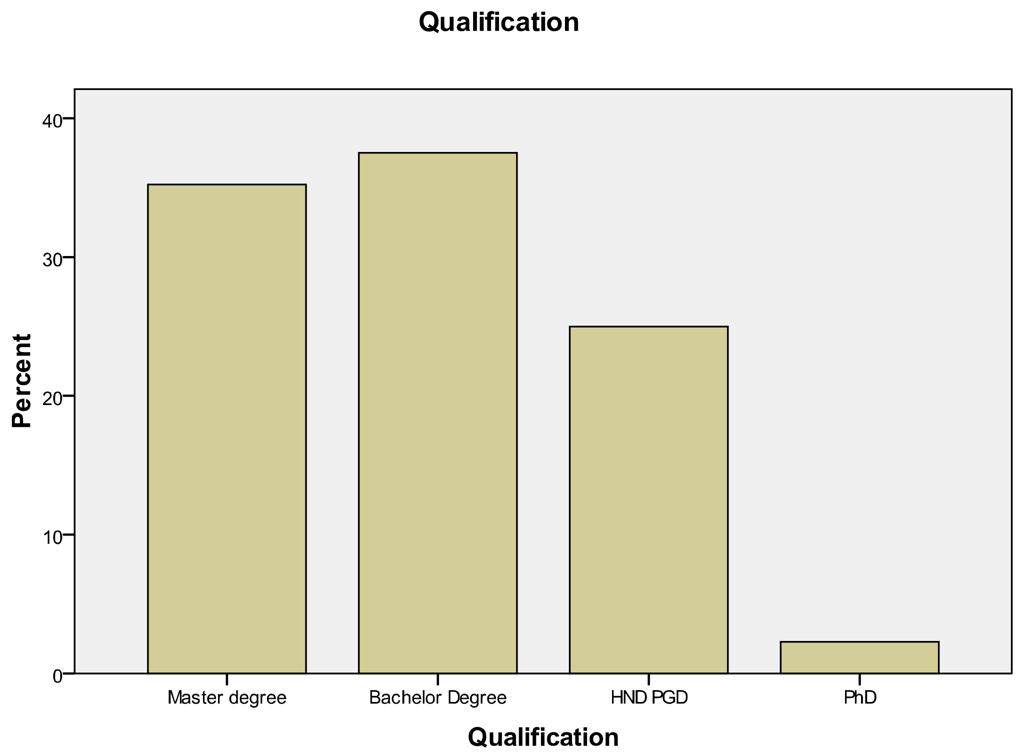

Figure 7-1: The qualification of the Respondents

The result in Figure 7-1 shows that majority of the respondents have a bachelor’s degree while master’s degree also has a higher frequency, and those who have PhD are low. Hence, it shows that most of the construction professionals used have higher qualifications. Also, the role of the respondents played in the various construction industries are also presented in Figure 7-2 below.

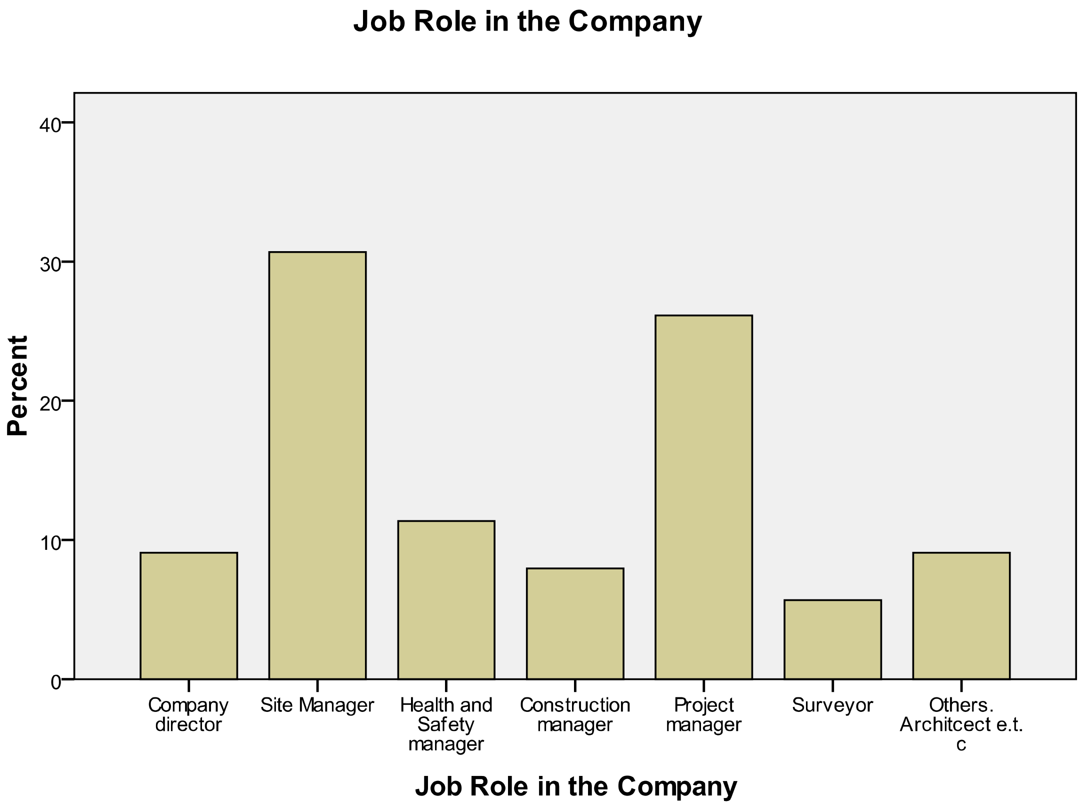

Figure 7-2: Roles and Responsibilities for Respondents

The result in Figure 7-2 shows that respondents who are site managers are more than other job roles in the various construction companies used in this study. Also, the professional membership of the respondents is presented in Figure 7-3.

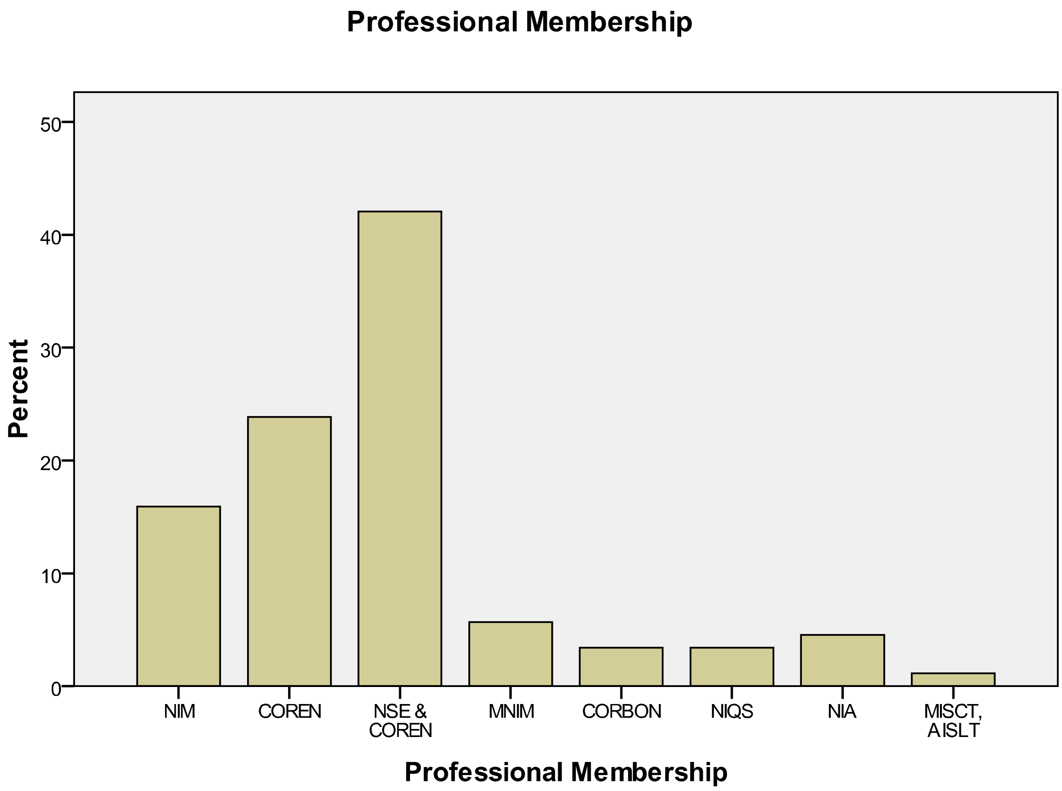

Figure 7-3: Professional qualification for Respondents

The result in Figure 7-3 shows that respondents who have NIM and COREN are highest; followed by respondents who possess only COREN. MISCT, AISLT has the lowest certified respondents. The level of experience in the present construction company is presented in Figure 7-4.

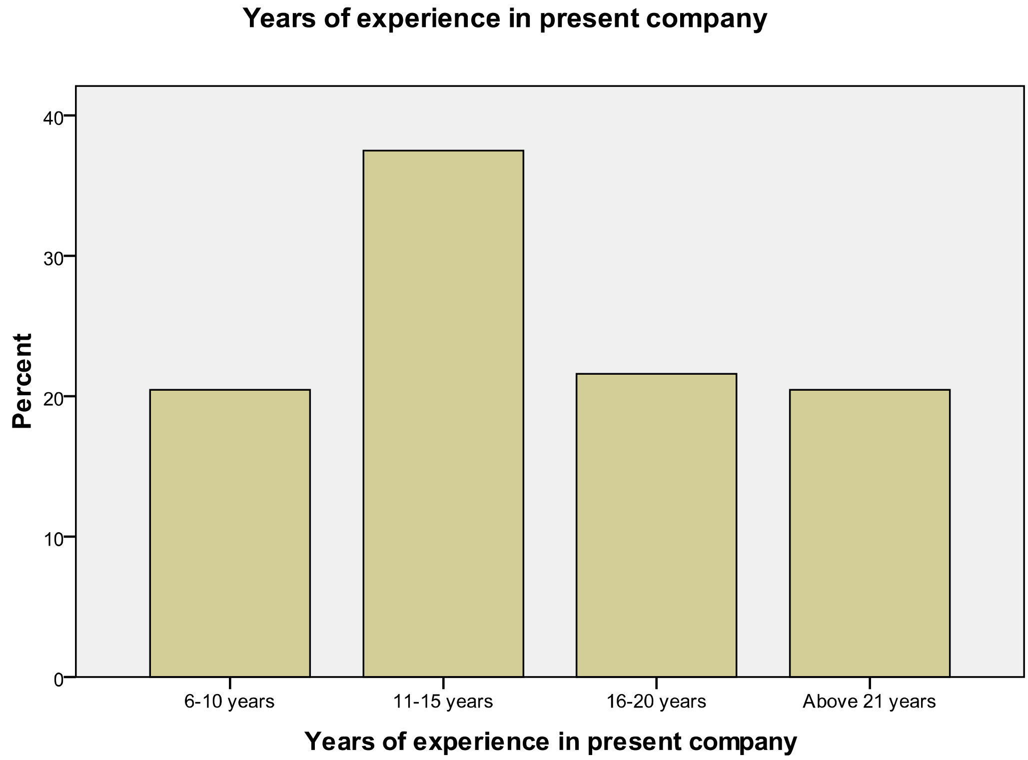

Figure 7-4: Level of experience of Respondents in present company

The result in Figure 7-4 shows that respondents who possess between the years brackets of 11-15 years of experience are highest, while those with between the year brackets of 6 - 10 years of experience and above 21 years of experience are low. This implies that respondents used in this study have higher level of experience in the construction company they presently worked. The level of experience in the construction industry among respondents is presented in Figure 7-5.

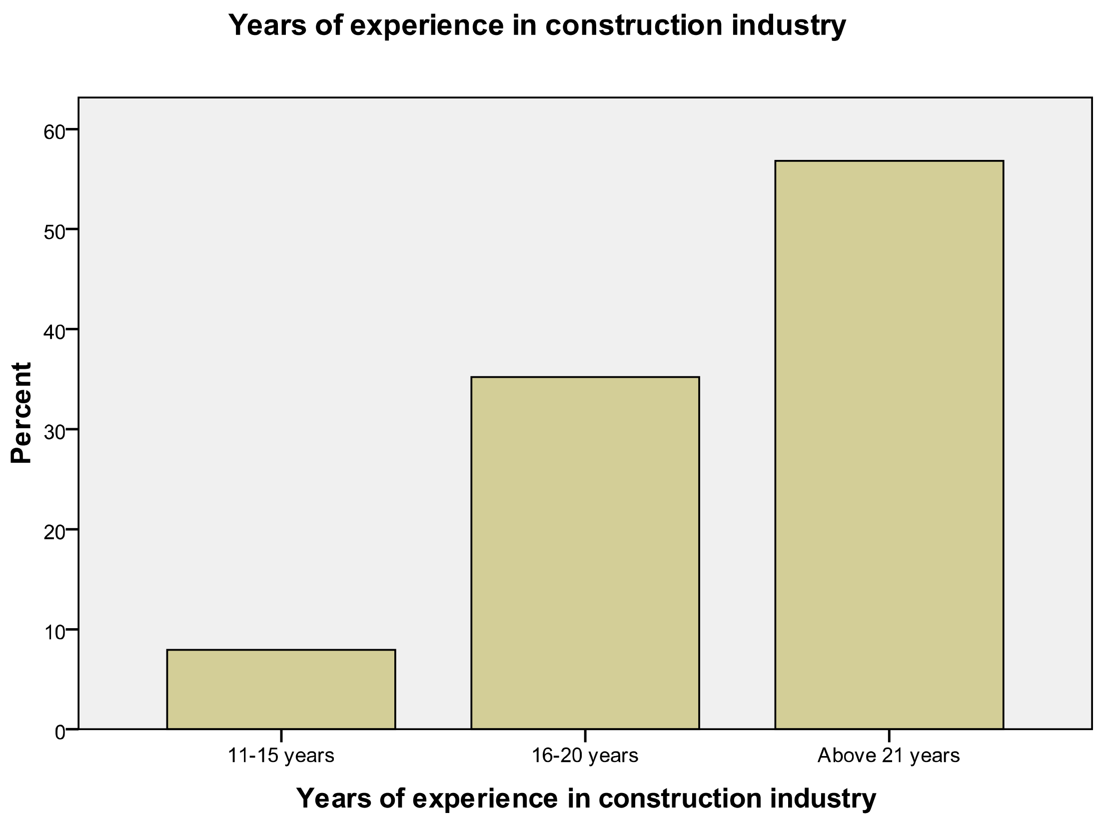

Figure 7-5: Level of experience of Respondents in the construction industry

The result in Figure 7-5 shows that respondents who possess above 21 years of experience is highest, while those with between the year brackets of 11- 15 years of experience is low. This implies that respondents used in this study have higher level of experience in the construction industry.

Validity of Findings

This section provides the validation result to the internal and external factors affecting H&S management practices among contractors in Nigeria construction industry.

Validity of Findings - Internal Factors - Company's Annual Turnover

From our research, company's annual turnover was found to be significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian construction industry. The result in Figure 7.6 shows the extent to which the Nigeria construction professionals agree to the fact that company's annual turnover is an important indicator influencing the implementation of Health & Safety management practices among contractors in the Nigerian construction industry.

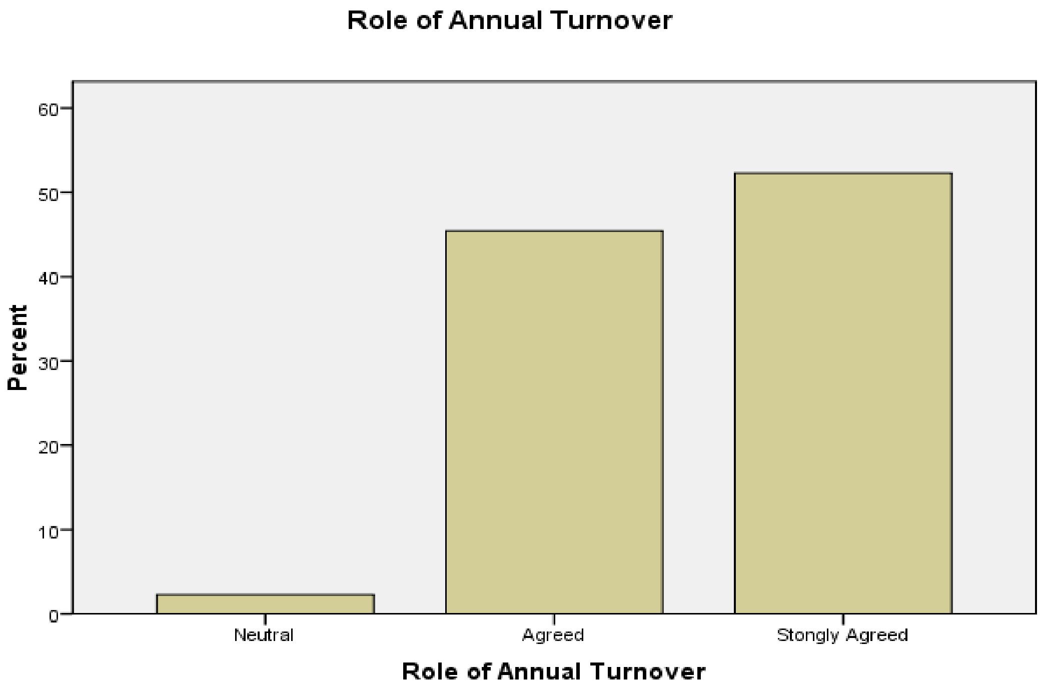

Figure 7-6: Company's annual turnover and the implementation of Health & Safety management practices among contractors in the Nigerian construction industry.

The result in Figure 7-6 shows that approximately all the respondents agreed to the fact that company's annual turnover is an important indicator and factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian construction industry

Size of Nigerian construction companies

The size of Nigerian construction companies was found to be a determinant factor of the implementation of Health & Safety management practices among contractors in the Nigerian construction industry. The result in Figure 7-7 shows the extent to which the Nigeria construction professionals agree to the fact that the size of Nigerian construction companies could be a major determinant factor affecting the implementation of Health & Safety management practices among contractors in the Nigerian construction industry

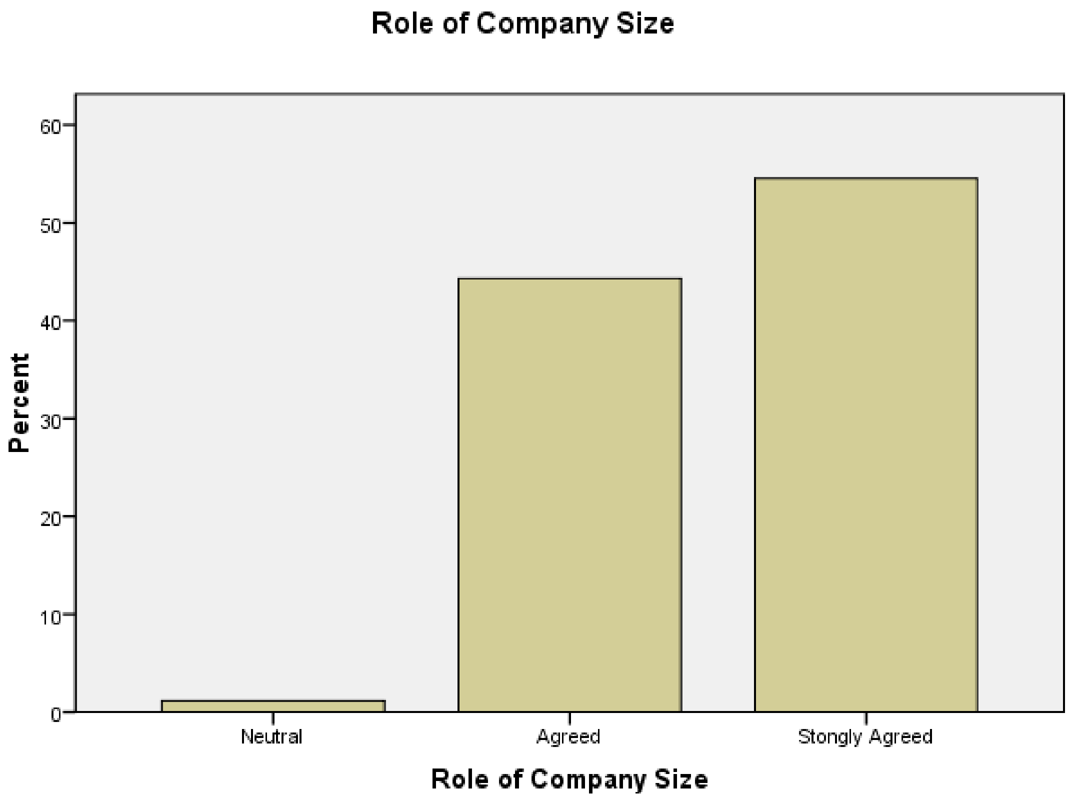

Figure 7-7: Company's size and the implementation of Health & Safety management practices among contractors in the Nigerian construction industry.

The result in Figure 7-7 shows that approximately all the respondents agreed to the fact that Nigerian construction company's size could be an important indicator and factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian construction industry.

Age of Nigerian construction companies

The age of Nigerian construction companies was found to be significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian construction industry. The result in Figure 7-8 shows the extent to which the Nigeria construction professionals agree to the fact that age of Nigerian construction companies is a significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian construction industry.

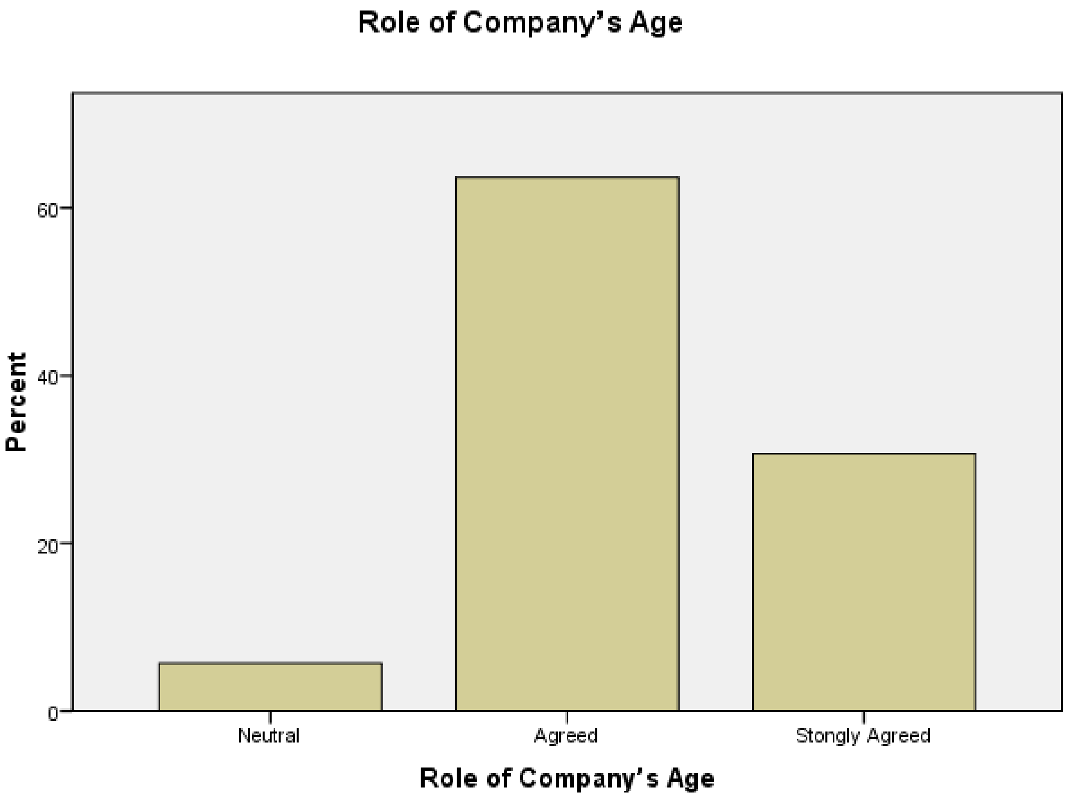

Figure 7-8 : Company's age and the implementation of Health & Safety management practices among contractors in the Nigerian construction industry

The result in Figure 7-8 shows that approximately all the respondents agreed to the fact that company's age of existence of the Nigeria construction companies is an important indicator and factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian construction industry

Health & Safety policy review

From our research, implementation; measuring; and auditing related factors are the most influential factors on the Health & Safety policy review among construction companies in the Nigerian construction industry. The result in Figure 7.9 shows the extent to which the Nigeria construction professionals agree to the selected factors such as implementation; measuring; and auditing related factors as the most influential factors on the Health & Safety policy review among construction companies in the Nigerian construction industry.

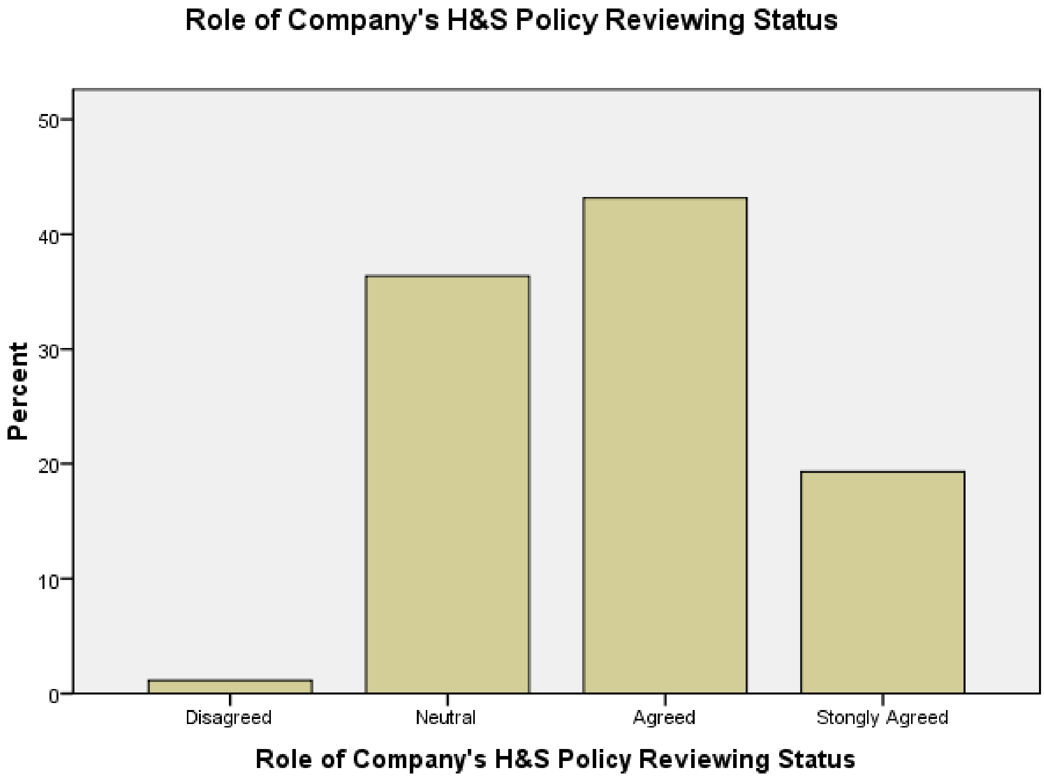

Figure 7-9: Correlates of the Health & Safety policy review among construction companies in the Nigerian construction industry

The result in Figure 7-9 shows that approximately all the respondents agreed to the fact that the implementation; measuring; and auditing related factors are the most influential factors affecting the Health & Safety policy review among construction companies in the Nigerian construction industry.

Company motivation (Frequent discussion of H&S during board meeting)

Based on the research, company motivation (Frequent discussion of H&S during board meeting) is an important factor affecting the Health & Safety management practices among construction companies in the Nigerian construction industry. The result in Figure 7-10 shows the extent to which the Nigeria construction professionals agree to this result.

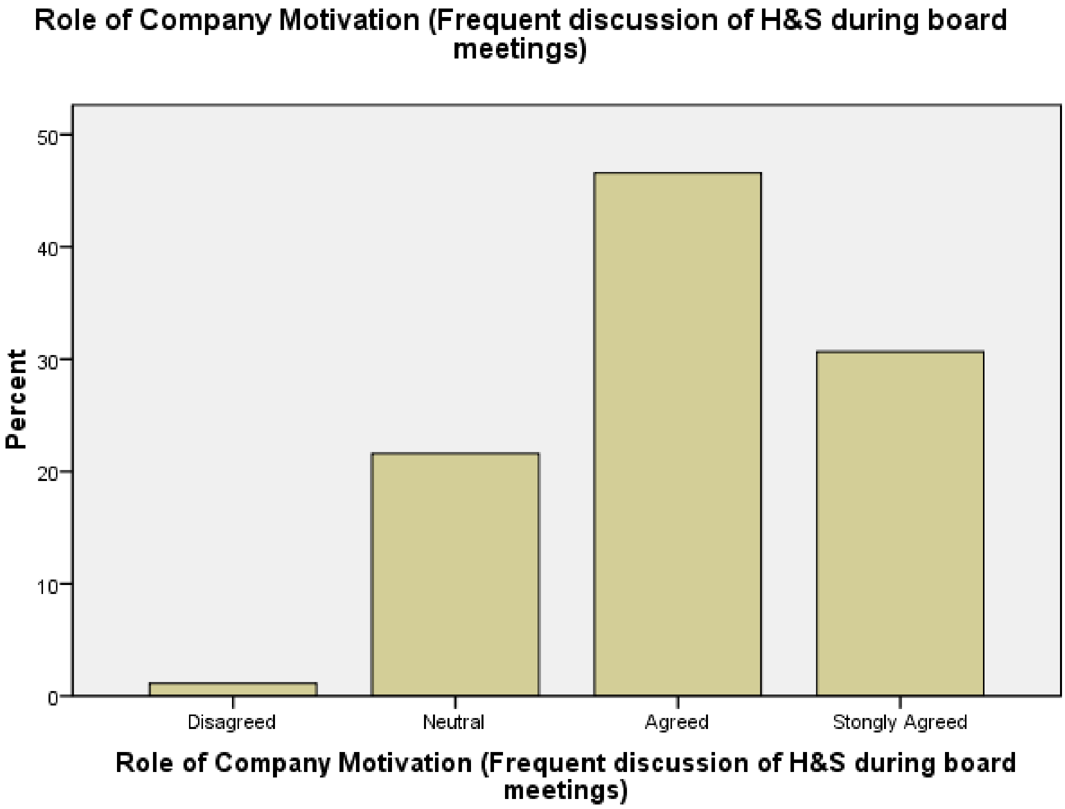

Figure 7-10: Company motivation (Frequent discussion of H&S during board meeting) and H&S management practices among construction companies in the Nigerian construction industry

The result in Figure 7-10 shows that approximately 90% of the respondents agreed to the fact that company motivation (Frequent discussion of H&S during board meeting) is an important factor affecting the Health & Safety management practices among construction companies in the Nigerian construction industry.

Role of Advocacy for H&S improvement

From our research, advocacy for H&S improvement is an important factor affecting the Health & Safety management practices among contractors in the Nigerian construction industry. The result in Figure 7-11 shows the extent to which the Nigeria construction professionals agree to this result.

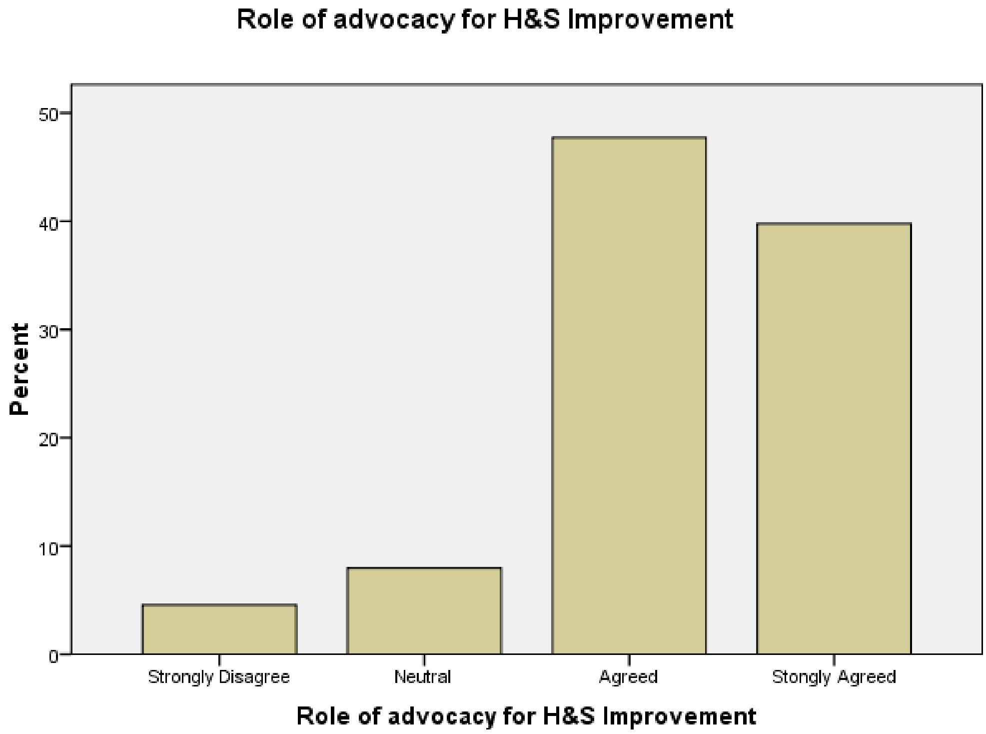

Figure 7-11: Role of Advocacy for H&S Improvement

The result in Figure 7-11 shows that approximately 90% of the respondents agreed to the fact that advocacy for H&S improvement is an important factor affecting the Health & Safety management practices among contractors in the Nigerian construction industry.

Validity of Findings - External Factors

Government H&S inspectors to the Site

From our research, Government H&S inspectors to the Site was found to be significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian construction industry. The result in Figure 7.12 shows the extent to which the Nigeria construction professionals agree to the fact that Government H&S inspectors to the Site was found to be significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigeria construction industry

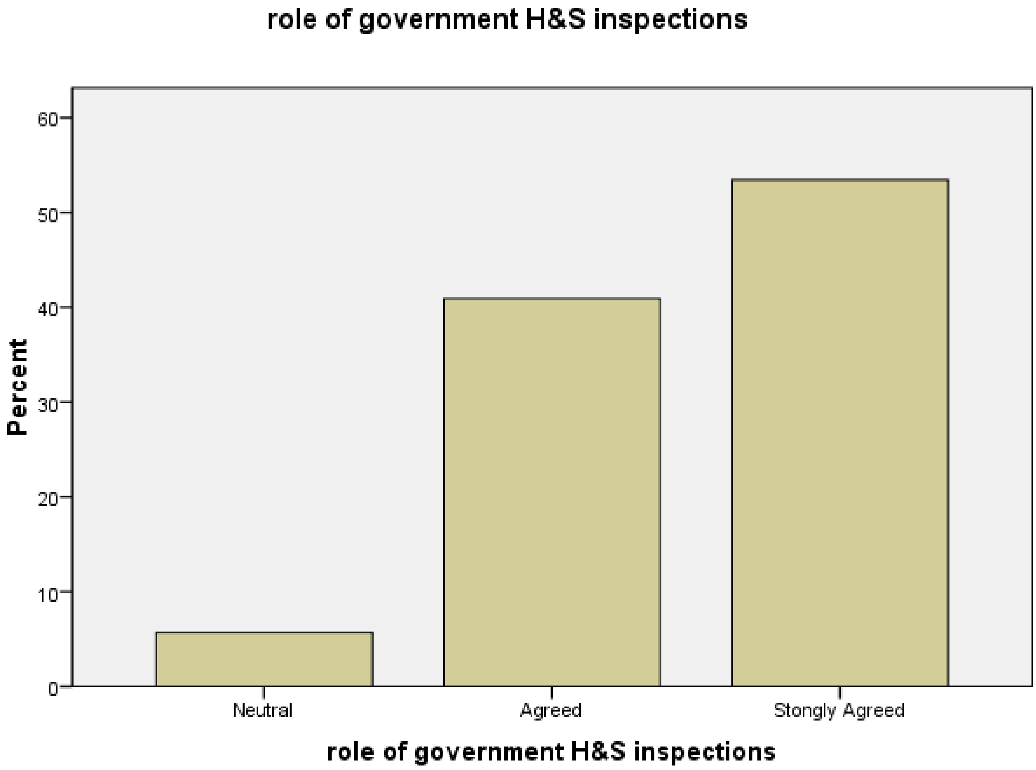

Figure 7-12: Position of Respondents to whether Government H&S inspectors to the Site is a significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian

The result in Figure 7-12 shows that approximately all the respondents agreed to the fact that Government H&S inspectors to the Site was found to be a significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian.

Role of client demands on H&S

From our research, client demands on H&S was found to be significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian construction industry. The result in Figure 7-13 shows the extent to which the Nigeria construction professionals agree to this fact.

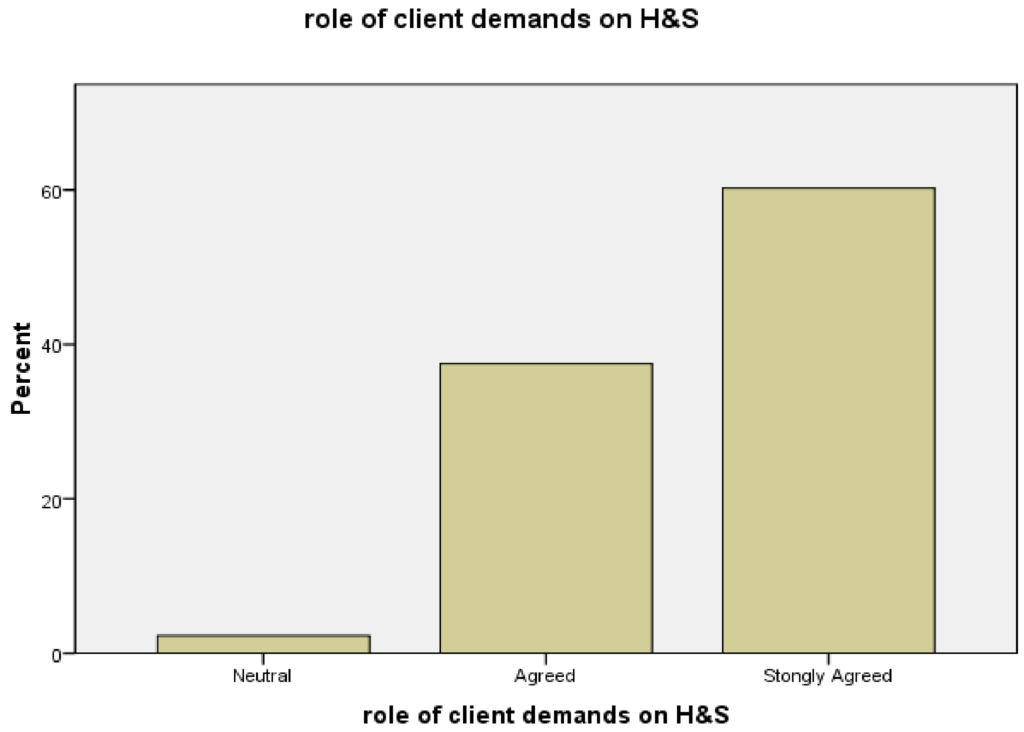

Figure 7-13: Position of Respondents to whether role of client demands on H&S is a significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian

The result in Figure 7-13 shows that approximately all the respondents agreed to the fact that client demands on H&S **i**s a significant factor influencing the implementation of Health & Safety management practices among contractors in the Nigerian.

Validity of Findings - Level of Implementation of H&S Management Practices

Impact on H&S Behaviours of the site workers

From our research, H&S Behaviour of the site workers was found to be significant influenced by the implementation of Health & Safety management practices among contractors in the Nigerian construction industry. The result in Figure 7-14 shows the extent to which the Nigeria construction professionals agree to this fact.

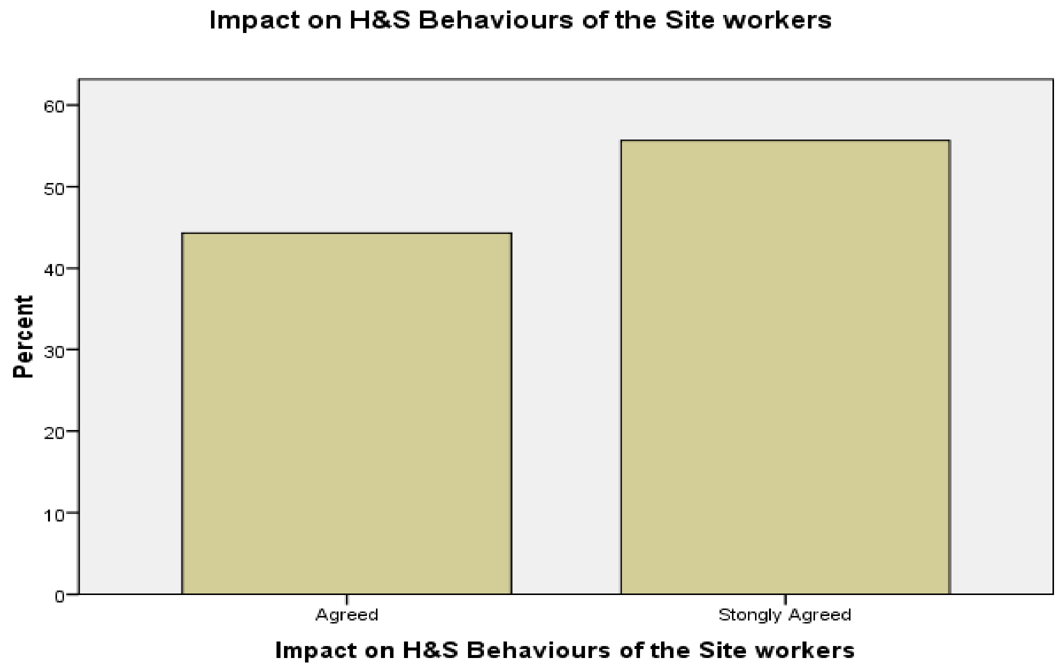

Figure 7-14: Position of Respondents to whether H&S Behaviour of the site workers is significantly influenced by the implementation of Health & Safety management practices among contractors in the Nigerian

The result in Figure 7-14 shows that approximately all the respondents agreed to the fact that H&S Behaviour of the site workers **i**s a significant factor influenced by the implementation of Health & Safety management practices among contractors in the Nigerian.

Impact on H&S Behaviour of the site workers

From our research, H&S attitude of the site workers was found to be significant factor influenced by the implementation of Health & Safety management practices among contractors in the Nigerian construction industry. The result in Figure 7-15 shows the extent to which the

Nigeria construction professionals agree to this fact.

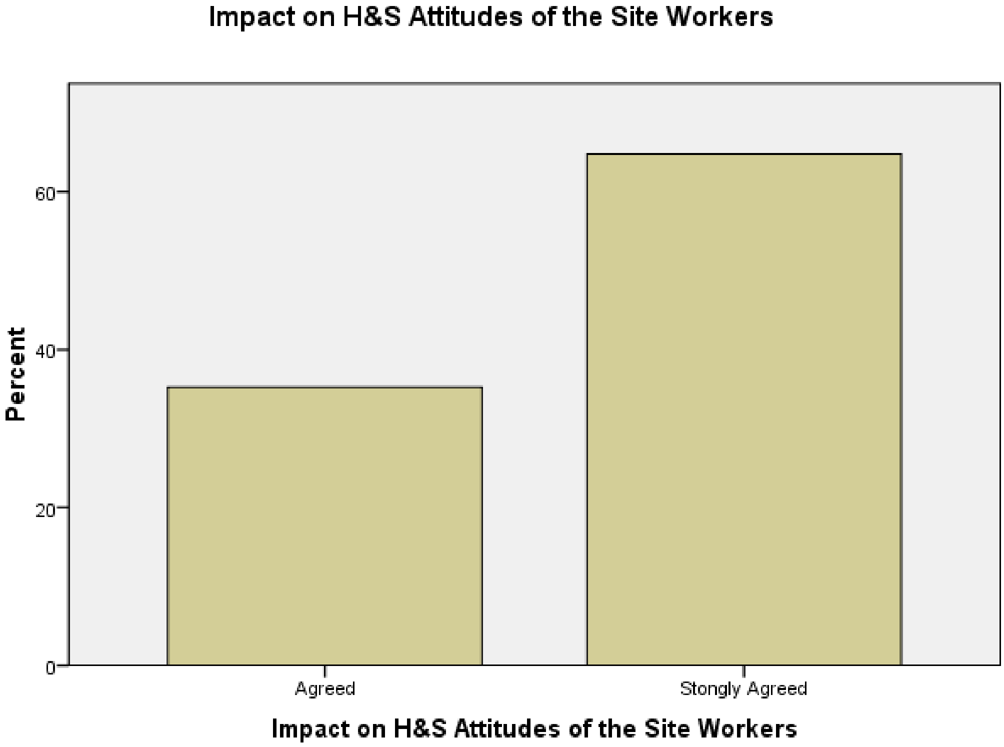

Figure 7-15: Position of Respondents to whether H&S attitude of the site workers is significantly influenced by the implementation of Health & Safety management practices among contractors in the Nigerian

The result in Figure 7-15 shows that all the respondents agreed to the fact that H&S attitude of the site workers **i**s a factor significantly influenced by the implementation of Health & Safety management practices among contractors in the Nigerian.

Rate of accident occurrence

From our research, accident occurrence was found to be factor significantly influenced by the implementation of Health & Safety management practices among contractors in the Nigerian construction industry. The result in Figure 7-16 shows the extent to which the Nigeria construction professionals agree to this fact.

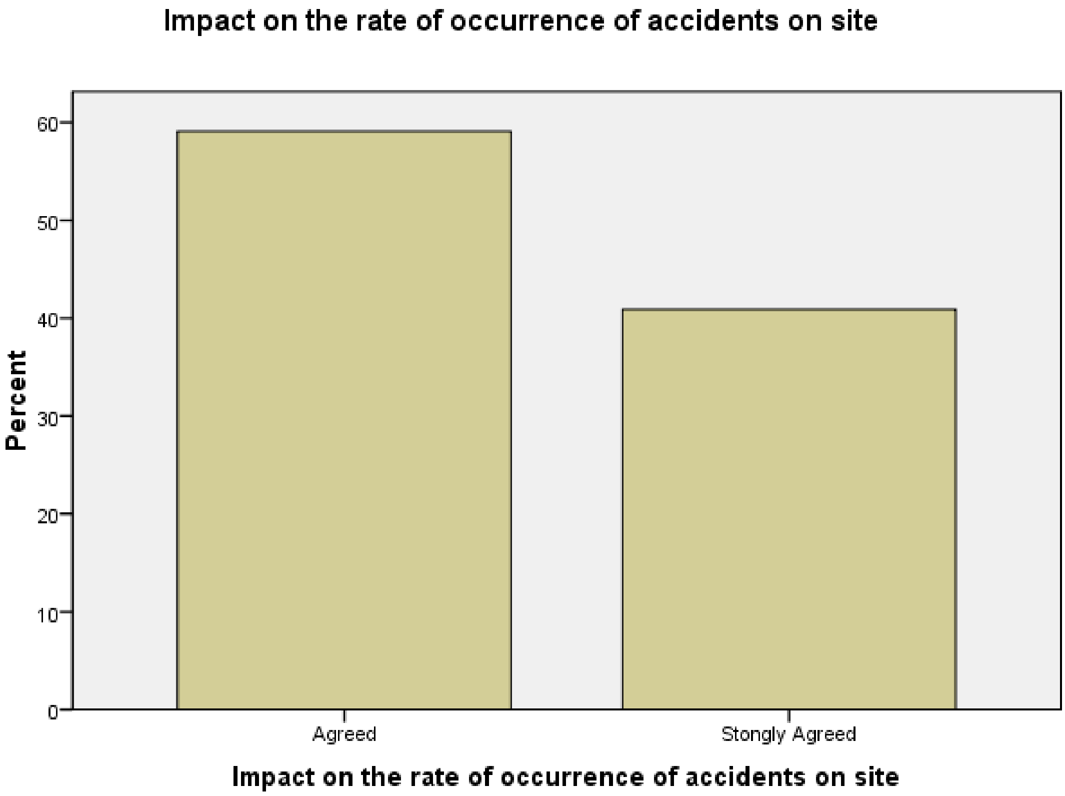

Figure 7-16: Position of Respondents to whether accident occurrence is a factor significantly influenced by the implementation of Health & Safety management practices among contractors in the Nigerian

The result in Figure 7-16 shows that all the respondents agreed to the fact that accident occurrence **i**s a factor significantly influenced by the implementation of Health & Safety management practices among contractors in the Nigerian.

Validity of Findings – Impact of Implementation on Performance

From our study, it is suggested that the implementation of Health & Safety management practices among contractors could influence the performance of construction companies in Nigerian construction industry. The result in Figure 7-16 shows the extent to which the Nigeria construction professionals agree to this fact.

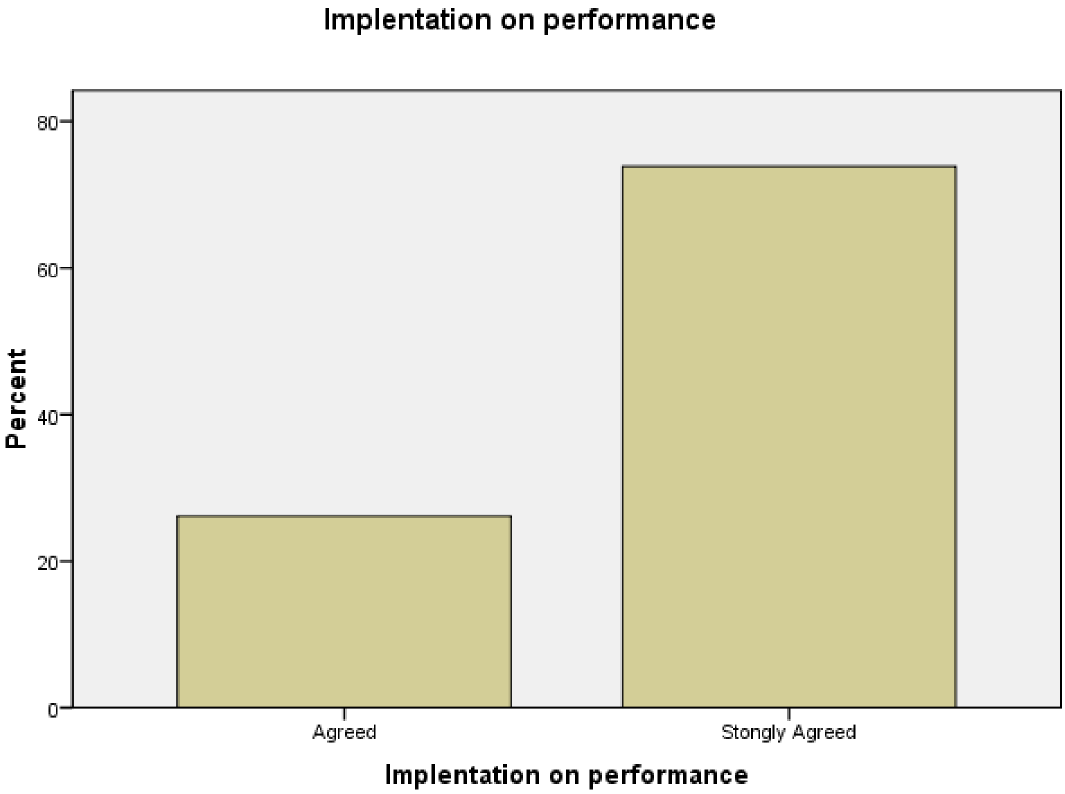

Figure 7-17: Position of Respondents to whether the implementation of Health & Safety management practices among contractors is a significant factor affecting the performance of construction companies in Nigerian.

The result in Figure 7-17 shows that all the respondents agreed to the fact that the implementation of Health & Safety management practices among contractors is a major factor which influences the performance of construction companies in Nigerian.

7.6.4 Factors Affecting Implementation of Health and Safety Practices in Nigeria

In summary, the findings of the factors in this study revealed the specific issues that affects the H&S implementation in Nigeria as follows:

1. There is a difference between the working experiences of the respondents compared with the years of establishment of the construction companies in which they work. All the companies involved in the research have been established for over 10 years.

2. Construction firm workers in Nigeria regard NSE and COREN as the most preferred professional engineering bodies. While a very high percentage does not belong to any membership of construction associations.
3. Nigeria construction firms are involved in many types of constructive activities such as general civil work, general work in oil & gas, transportation, among others; which require to be staffed with designated H&S officials.
4. The construction companies have an average annual turnover of above 1billion naira. Meannwhile, on the average, the construction companies have below 200 direct employees. Which is likely due to the involvement of supply chain operation in the industry.
5. Construction companies claim to renew their health and safety policies either yearly or every two years. Analysis of findings however reveal that moderate priority was given to health and safety management practice.
6. About 60% respondents claim that health and safety issues are usually discussed at construction company's senior management meetings; as well as in H&S management committee or working group with the inclusion of a site worker representation in the working group. On the contrary, 89.7% of the construction companies have been prosecuted for breach of H&S regulations within the past 3 years.
7. The findings also show that construction firms in Nigeria have moderate importance attached to attaining high performance with respect to H&S issues. Also, there are no appropriate channels for reporting H&S accidents in Nigeria construction companies.
8. On the average, there are more non-fatal accidents among the Nigeria construction firms than fatal accidents.
9. There is a wide range of challenges affecting the H&S management practices among Nigeria construction firms. These include, the lack of knowledge and techniques of health and safety issues; Nigeria construction firms not complying to rules and regulations;

carelessness; not placing high premium on H&S issues. In addition, not well equipped; insufficiency of kit, first aids, funds and stealing; the lack of H&S staffs and supervision; worker not comfortable with H&S issues and policies and regulations; employing unqualified workers; poor planning and less importance placed on H&S issues by top management.

10. The study reveals that: proper training; enforcement and supervision; respect for H&S; forced to submit kits; need for government intervention; good relation between management and workers; and proper planning should be provided to enhance H&S management and practices among Nigeria construction firms.
11. The findings of this study revealed that it is better when construction firms put into consideration all the practices such as auditing, policy, measuring and reviewing performance, implementation, planning, risk assessment, and organisation together to ensure H&S management practices in Nigeria. However, when construction companies treat them separately, it was observed that only policy; organisation; implementation; and auditing were significant to influence H&S management implementation among Nigeria construction companies.
12. Implementation, measuring and reviewing as well as auditing were observed to be major factors that could influence company's Health and Safety Policy Review among construction companies in Nigeria. The need for measuring and reviewing was a major factor that influence advocacy of health and safety improvement among construction companies; while planning is a major factor that could influence the level of behaviour of site workers towards health and safety management practices.
13. Atitude of workers towards ensuring health and safety management implementation was also observed to be a significant factor affecting H&S management implementation. Moreover, it serves as a control variable for the influence between the independent variable

of interest in this study (which are policy, organisation, risk assessment, planning, implementation, and measuring and reviewing performance) and H&S management implementation.

14. Government intervention was not a significant variable to H&S management implementation. However, it serves as a control variable for the influence between the independent variable of interest in this study (which are policy, organisation, risk assessment, planning, implementation, and measuring and reviewing performance) and H&S management implementation.
15. The health & safety practices in Nigeria construction firms affect the rate of occurrence of accidents in the industry.

7.7 GUIDE TOWARDS THE DEVELOPMENT OF AN EFFECTIVE HEALTH AND SAFETY MANAGEMENT SYSTEM FOR NIGERIAN CONSTRUCTION INDUSTRY

H&S management system is the joint responsibility of the government as external driver; the client as the owner, sponsor and resources provider of the facility to be constructed; the contractor as the CEO of the construction company who constructs the facility with his workmen. The government, the client and the contractor have the duty of ensuring a safe environment for the workmen-on-duty in the construction industry. This principle has been adopted by the provincial government of Alberta, Canada, in 1989, when they established the 'Partnerships in Health and Safety program' now known as 'Partnerships in Injury Reduction' (Partnerships, 2020). In Nigeria where the construction activity is about 16% of the GDP, an effective H&S management system is paramount to ensure the delivery of projects with no or low accidents. According to Work Safe BC, (2020), having an effective management system improves your ability to continuously identify hazards and control risks in your workplace.

This research hereby submits a document that will be a guide towards the development, implementation and continuous review of an effective H&S management system for the Nigerian construction industry.

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

The following elements are the basic components of a Health and Safety Management System; and are all very much interdependent.

1. Management Leadership and Organizational Commitment
2. Hazard Identification and Assessment
3. Hazard Control
4. Work Site Inspections
5. Workers Competency and Training
6. Incident Reporting and Investigation
7. Emergency Response Planning
8. Program Administration

The joint commitment and partnership between Government, Contractors, and Client would ensure that appropriate legislation, policy documents and requirements/conditions are established to achieve the desired effective and sustainable H&S management system. The contents of each of the eight elements listed above are further highlighted below.

1. Management Leadership and Organizational Commitment

A clear demonstration of the partnership should be detailed in government gazettes and development of company policies.

Government:

- Set up regulatory policy for H&S requirement, supervision, monitoring and auditing.
- Appropriate professional and monitoring bodies to be set up to achieve this.
- Framework of operation and clear method of measurement of effectiveness of the bodies should be established.
- H&S Method Statement to be developed unique to each and its sites, as a requirement for submission to the relevant bodies before approval can be given for any project. The template of such report should be developed by appropriate professionals as a guide to be used by the contractors – this guide to be updated every three (3) years, based on up-to-date research conducted from data collected from site H&S inspections carried out by inspectors in offices located in every geo-political region of the nation.
- Professional Engineering, Construction and Health & Safety officers to be part of the team
- These operational and regulatory bodies to be backed by law and adequately funded.

Client:

- The clients demand for company H&S policies, as well as valid certificate of recognition received from appropriate bodies, as part of the documents to be considered while evaluating bidders' responsiveness to every invitation to tender.
- Clients would be required to satisfy the government that every H&S requirement would be followed before approval is given for project implementation.

- Big corporations required to have an inhouse H&S officer to ensure H&S implementation and practices.

Contractors:

- Required by legislation to develop and maintain an up-to-date organisational H&S policy.
- Required to obtain and maintain a Certificate of Recognition (COR), renewable every 3 years after going through required system audit.
- The company to show management commitment and budgets to ensure compliance to H&S process, programs, standards, training and regular joint meetings among management, professionals, and general workers, to ensure no or low accident rates in their operations.
- Supply of appropriate and adequate PPE for all workers on site.
- Employees must be ready to participate in H&S training and practice before being engaged.

2. Hazard identification and assessment at the work site.

- Site manager/agent/supervisor/H&S officer to identify and assess work site hazards to ensure provision of job safety analysis worksheet to each worker in the construction site
- This report should be done as part of the construction method-statement, to be supplied by contractors as part of bidding document to the client.
- This document is also to be made available to inspectors before site take-over is approved.
- The management of the construction company to ensure this process is continuous, by designating an H&S officer to routinely carry this out and produce report to be submitted to management at regular interval, and the folder kept available on site.
- This folder is part of the document to be reviewed by external H&S inspectors when conducting their regular inspections as established in the government policy

3. Control measures to eliminate or reduce the risks to workers from hazards

- Designated Safety Officer to set up site communication through site induction, memos stickers signs and postal.
- This activity is carried out and reported regularly to the management and copy kept in a folder on site, for the review by external inspectors.

4. Work site Inspection programme

- Government, Client and Contractor agents to ensure workmen compliance to implementation of H&S programmes on site.
- Regular report of the inspection kept on site through the project and reviewed by external H&S inspectors.
- Standard templates to be developed by H&S office and adapted by every company.

5. Worker competency, Orientation and training

- Employer to ensure professional competence of his workmen to reduce job hazards
- Must give the relevant orientation and training to the workmen on their specific jobs, before resuming on site, at every change of assignment and on a regular basis for the entire site.
- Record of this is kept, presented to company management regularly and kept in a folder on site for the review by external H&S inspector.

6. Incident Reporting and investigation

- Every incidence on site must be recorded, reported and investigated.
- Workmen on the site are made to declare commitment to zero incidence as well as to reporting every incidence.
- Adequate workers compensation plan to be included in this report.

7. Emergency Response Planning

- Organisation must plan and budget for unforeseen risk/Act of God like thunderstorm, etc.
- This would be part of the Risk-Response plan included in the construction method-statement, provided at the time of tender submission and submitted for approval before approval of construction commencement and site-possession by successful contractor.
- Evacuation plan for the construction site, including the muster points, must be planned, documented and made available for site use and reference for H&S inspectors.

8. Program Administration

- Program Administration ensures that all aspects of an operation's Health and Safety Management System are recorded, tracked, and maintained. As indicated in some of the sections above, a record tracking system should be set up to allow for statistical analysis, and the identification of trends that may identify system areas in need of improvement.
- Examples of records that need to be maintained include:
    - employee training records
    - work site inspection records
    - incident investigation reports
    - preventative maintenance records
    - health and safety meeting minutes

    These H&S program records should be kept for a minimum of three years and are part of the documents to submit for the renewal of the COR (certificate of recognition).
- Communication among all stakeholders must be maintained, and opportunity given to everyone, including the workers, to give feedbacks and suggestions that will affirm inclusiveness of all team members, for training purposes, and for recognition of workers compensation, etc.

- Accountability of every stakeholder (employers, supervisor, client, government institutions, and workers) must be identified and emphasized. Everyone must understand their responsibilities for workplace health and safety
- All H&S statistics gathered through a defined period must be kept and analyzed as required.

This guide to serve as a starting point for the development of a Health and Safety Management System across the Nigerian Construction Industry.

7.8 CHAPTER SUMMARY

In summary, the implementation of H&S management practices in the Nigeria construction industries are affected by a wide range of both internal and external factors. The internal factors of construction industries that could affect the implementation of H&S management practices in the Nigeria construction industry are annual turnover, company size, company's age, company's H&S policy reviewing status, company motivation (Frequent discussion of H&S during board meetings), and advocacy for H&S improvement. The external factors include government H&S inspections and client demands on H&S. In addition, the implementation of H&S management practices in the Nigeria construction industries was also observed to influence wide range of factors such as the H&S Behaviours of the site workers, H&S attitudes of the site workers, and rate of occurrence of accidents on site. Furthermore, it was also observed that the attitude of implementation of H&S management practices could influence the performance of construction companies in the Nigeria construction industries.

CHAPTER 8: DISCUSSIONS OF FINDINGS

8.0 INTRODUCTION

This chapter presents the discussions of findings by juxtaposing the findings of this study with the literature review in the previous chapters of this study. The chapter is divided into three sectioSns: the first discusses findings with respect to factors influencing implementation of Health and Safety management practices among contractors in Nigeria, the second discusses the findings with respect to level of implementation of Health and Safety management practices among contractors in Nigeria, while the third discusses the findings with respect to influence of the implementation of Health and Safety management practices on performance.

8.1 DISCUSSION OF FINDINGS WITH RESPECT TO FACTORS INFLUENCING IMPLEMENTATION OF HEALTH AND SAFETY MANAGEMENT PRACTICES

8.1.1 Internal factors

The findings of this study showed that construction firms with a larger turnover, such as the bigger firms, are more involved in health and safety management practices than smaller firms with lower annual turnover. Such health and safety management practices include company policy for health and safety practices, organisational practices, risk assessment, planning practices, implementation practices, measuring and reviewing of H&S performance, and auditing practices. This implies that larger construction firms take health and safety practices more seriously than small construction firms. This reinforces the works Fonteyn et al. (1997), Kheni et al. (2007), Kheni (2008), Baldock et al. (2005) and Windapo and Jegede (2013), among others, that the size of the company in terms of annual turnover could be a factor influencing the implementation of H&S management practices among construction companies.

The findings of this study revealed that there is a significant relationship between the implementation, measuring and reviewing and auditing factors and company's health and safety policy review among construction companies in Nigeria. This bolstered the work of Adeagbo (2014) that there is need for strategic review in the construction firms to enhance health and safety management practices. This also supports the work of Hamid *et al.* (2004) that a reviewing system which cuts across the Health and Safety Policy Review is a major element in ensuring a better health and safety management practices among construction firms. This assertion was also supported by the UK Health and Safety Executive (HSE) (1997; 2013), McDonald et al. (2000), the ILO (2001), Pérezgonzález (2005), BSI (2007), among others. The findings of this study also bolstered the works of Shen et al. (2001), Baloi and Price (2003), Lingard and Rowlinson (2005) **a**nd Wells and Hawkins (2014) that company’s Health and Safety policy review can influence the health and safety management practices among construction companies.

The findings of this study revealed that the advocacy for Health and Safety improvement in construction companies had a significant influence on the level of involvement of Health and Safety management practices. This implies that construction companies that give high priority or importance to the advocacy for Health and Safety improvement in construction companies tend to be more involved in health and safety practices providing company policy for health and safety practices, organisational practices, risk assessment, planning practices, implementation practices, measuring and reviewing of H&S performance, and auditing practices.

This supported the work of Puplampu and Quartey (2012) that, when workers are ignorant, it might lead to the neglect of occupational health and safety practices and investment in among construction firms. This also supported the work of ILO (2003) that such ignorance among workers could disallow construction firms to refuse to provide OHS services for its workers.

This could be one of the responsible for the assertions of Mcintosh et al. (2001, cited in Dodo, 2014) and Okeola (2009) that a construction worker is three times more likely to be killed and twice more likely to be injured than workers in other occupations. This also supports the work of Al-Kilani (2011) that, on many sites, there are no training programs and re-orientation for the staff and workers as employees are required to learn from their own mistake or experience, which could lead to grave consequence to the employees and also to the construction firms in the long run. This also supported the work of Al-Kilani (2011) that there is a low rate of injury among companies that give incentives to workers and foremen and companies that employed full-time safety representatives such as advocacy of health and safety issues by workers in the companies.

It was also found that the frequent discussion of H&S during board meetings in Nigerian construction companies had a significant influence on the level of involvement of Health and Safety practices with a focus on company having policy for health and safety practices, organisational practices, risk assessment, planning practices, implementation practices, measuring and reviewing of H&S performance, and auditing practices. The result also shows that firms who often had a frequent discussion of health and safety during board meetings often gave important considerations to the Health and Safety practices in construction companies, and tend to have better health and safety practices than those who do not consider the topic important in the board meetings with emphasis on considerations to the company policy for health and safety practices, organisational practices, risk assessment, planning practices, implementation practices, measuring and reviewing of H&S performance, and auditing practices. This contrasts with the work of Bennet (2002) and Machabe and Indermun (2013) that construction firms do not take into account opinions on health and safety issues. This also contrasts with the works of Diugwu et al. (2012), Idoro (2008), Umeokafor et al. (2013), Umeokafor et al. (2014), and Umeokafor et al. (2014), that occupational health and safety

(OHS) among construction firms is poor in the developing countries such as Nigeria. This also contrasts with the work of Iden (2010) that the construction industry in Nigeria is negligent with occupational health and safety issues that affect their health and safety management practices.

Moreover, the age of the Nigeria construction companies tends to have a significant influence on health and safety management practices. This showed that firms with a *higher age* are often involved in H&S practices with respect to a company having a policy for health and safety practices, organisational practices, risk assessment, planning practices, implementation practices, measuring and reviewing of H&S performance, and auditing practices. This supports the works of Baldock et al. (2005), Alli (2008) and Windapo and Jegede (2013) that the demographic characteristics of construction firm, among which could be the age of the construction firm, is an important factor influencing health and safety management.

In addition, the size of Nigerian construction companies also tends to have a significant influence on H&S management practices. This shows that construction firms with higher size often gave important considerations to the H&S management practices in construction companies, with an emphasis on the company having a policy for health and safety practices, organisational practices, risk assessment, planning practices, implementation practices, measuring and reviewing of H&S performance, and auditing practices. This supports the works of Baldock et al. (2005), Alli (2008) and Windapo and Jegede (2013) that the demographic characteristics of construction firm, among which could be the size of the construction firm, is an important factor influencing health and safety management.

8.1.2 External Factors

The visit of Government H&S inspectors to construction sites has a significant effect on Health and Safety management practices among construction companies. This showed that construction firms who are often visited by Government H&S inspectors tend to have higher health and safety practices than those whose construction sites are not visited by government inspectors, with respect to health and safety, variables used in this study such as company policy for health and safety practices, organisational practices, risk assessment, planning practices, implementation practices, measuring and reviewing of H&S performance, and auditing practices were put into consideration. This supports the findings of Dantata (2008) that, over the past few years, the Nigerian Construction Industry still depends on the government. The findings of this study contrasts with the work of Kheni et al. (2006), Cotton et al. (2005), Puplampu and Quartey (2012) and Windapo and Rotimi (2012) that, in Nigeria, occupational health and safety issues are not given adequate attention by the government. This could be why Enhassi et al. (2008) affirmed that, in many developing countries such as Nigeria, legislation governing OHS is significantly limited when compared to those of developed countries such as the UK. Furthermore, this supports why Lee and Halpin (2003) and Enhassi et al. (2008) have noted that, in developing countries such as Nigeria, provisions for such legislation, which could be a contribution from the government into the construction industry, are not put in place.

There is a significant relationship between the priority of company's client on Health and Safety and the involvement of Health and Safety practices among construction companies in Nigeria. This implies that construction companies that give high priority or importance to the company's client on Health and Safety practices tend to be more involved in health and safety practices with respect to company policy for health and safety practices, organisational practices, risk assessment, planning practices, implementation practices, measuring and reviewing of H&S

performance, and auditing practices. This contrast with the work of Al-Kilani (2011) that argues that in the construction industry of most developing countries such as Nigeria, occupational accidents and injuries are high due to the fact that safety consideration in construction projects delivery is not given a priority and the employment of safety measures during construction is considered a great burden among construction firms in Nigeria. This also supports the work of Windapo and Rotimi (2012) and Hassan (2012) that the lack of consideration on client on health and safety issues can affect the level of health and safety practices in construction companies.

8.2 DISCUSSIONS OF FINDINGS WITH RESPECT TO LEVEL OF IMPLEMENTATION OF HEALTH AND SAFETY MANAGEMENT PRACTICES

The findings of this study also revealed that many of the construction companies are involved in core construction works that have active health and safety components, as more than half are in building construction companies, few are in civil construction companies and very few are in other types of construction companies. The findings of this study also showed that most of the construction companies often review their H&S policy every year; every 2 years or more while very few review their H&S policy every 3 month or 6 months respectively. Very few state a lack of H&S policy review. This bolsters the works of McDonald *et al.* (2000), Shen et al. (2001), ILO (2003), Pérezgonzález (2005), Lingard and Rowlinson (2005) and BSI (2007) that construction companies in African countries such as Nigeria have poor OHS review mechanisms which could affect their health and safety management practices. This buttresses the work of Hamid *et al.* (2004) who assert that reviewing of health and safety system of a construction company is a major element of a good health and safety management system. This could be the major reason why Koehn et al. (2000), Idoro (2008), Enhassi et al. (2008), Diugwu et al. (2012), Umeokafor et al., (2013), and Umeokafor et al. (2014) have all stated that occupational health and safety (OHS) is poor in Nigeria when compared to those of developed countries such as the UK.

Moreover, it was observed that moderate priority was given to health and safety management practices among Nigeria construction companies which reflect a poor health and safety management practices. It also bolstered why Bennet (2002) and Machabe and Indermun (2013) affirmed that construction industry do not take into account workers' opinions on health and safety. This could be disastrous for site workers and hence increased accidents during construction projects. This bolstered the work of Hämäläinen et al. (2006), Farooqui et al. (2008), and Okoye and Okolie (2014) that the health and safety performance of construction industry in Nigeria remains a glaring challenge. This also supports the works of Diugwu et al. (2012), Idoro (2008), Umeokafor et al. (2013), Umeokafor et al. (2014), that occupational health and safety (OHS) is poor in developing countries such as Nigeria.

Most of the construction companies are not members of Nigeria construction industry association, while very few claim to be part of the association. This high statistic could also be indicative of the lack of strong supervisory agencies from the government overseeing construction activities. Consequently, contractors do not feel the need to belong to any association or body. Also, most of the Nigeria construction companies' clients consider the health and safety status not to be an important criterion for selecting the contractors to undertake the project. This statistic is not farfetched as the tender analysis panels and boards in Nigeria are structured around the Public Procurement Act 2007, (Public Procurement Act 2997 No 14) which has no mandatory requirements on health and safety competencies for prospective tenderers. This implied a poor attitude towards health and safety in the Nigeria construction industry. This supports the works of Ofori (2000), Al-Kilani (2011), Umeokafor et al. (2014); Okoye and Okolie (2014), Kawuwa et al. (2018) and Ihua-Maduenyi (2019) that a major challenge in the construction companies, especially in Nigeria is poor health and safety management practices. This also bolstered the work of Amweelo (2000); Toole (2002); Awodele and Ayoola (2005); Dimuna (2010); Idoro (2011); Ayedun et al. (2012) and Dadzie (2013) that poor attitude towards health and safety of among employees constitutes a major obstacle in the Nigerian construction industry.

The findings of this study also showed that more than half of Nigerian construction companies have a designated budget for health and safety management, while most of the remaining half do not have such a designated budget. Considering the low awareness of clients in providing for health and safety management compared to the dire need for Nigeria construction companies to have designated budget for health and safety management, clients could make their selection of contractor wrongly and hence cause a high level of health and safety issues during or after construction works. This supports the work of Akanni et al. (2014) and Jarkas (2015) that the construction activities and profession operate in an extremely tight budgets and time frames. Giving considerations to the work of Ali et al. (2014) that budgeting in the construction company could influence the implementation of safety and health practices, it deems fit to draw attention to the fact that the lack of or poor budgeting can affect the implementation of safety and health practices in any construction company in Nigeria.

Government H&S inspectors' inspection to construction sites was not frequent; up to one out of every four projects while some indicated the inspection to be often. Most of these site workers rarely advocate for health and safety improvement, while others that the advocating for health and safety improvement is often. Taking into consideration the work of Dantata (2008) that, over the past years, the Nigerian Construction Industry has recorded considerably transformation, it is still heavily dependent on government expenditure. Despite this, Government H&S inspectors' inspection to construction sites is poor and not encouraging. This supports the work of Kheni et al. (2006), Cotton et al. (2005), Puplampu and Quartey (2012) and Windapo and Rotimi (2012) that in Nigeria, occupational health and safety issues are not given adequate attention by the government. Putting into consideration the assertion of Dantata (2008) that the government plays a significant role in the construction industry, it is important to draw attention to the fact that this poor government H&S inspectors' inspection to construction sites could affect the health and safety practices and hence the performance Nigeria construction industry negatively.

More than half of Nigeria construction companies claimed not to have any accident occurrence, while few claimed an occurrence. Also, there are a maximum number of 25 fatal accidents in the year 2016-2017, with an average of one per person and standard error of 0.145. This result differs from that provided by other studies such as Idoro (2008), Okolie & Okoye (2012), and Umeokafor et al. (2014), among others. The findings of this study contrast that of Umeokafor et al. (2014) that occupational accidents are under-reported as the regulatory and enforcement systems of OHS are ineffective and dysfunctional. The findings of this study prop up the reason why Idoro (2008) and Okolie & Okoye (2012) state that there are no reliable accident data in Nigeria. On average, there are more non-fatal accidents among the Nigeria construction firms than fatal accidents. This bolsters the findings of Ahmed et al. (2000) cited in Farooqui et al. (2008), Ezenwa (2001), Rowlinson (2003), of Kapp et al. (2003), Hamalainen et al. (2006), Okeola (2009), Idoro (2011), Al-Kilani (2011), Godwin (2011), Umeokafor et al. (2014),and Okoye et al. (2016) that there are still substantially high numbers of injuries on construction sites in Nigeria. This supported why ElSafty et al, (2012), clearly opined that the lack of recording and reporting of health hazards and illnesses is common among construction firms.

The behaviour and attitude of the site workers towards health and safety issues was considered to be good, but few exhibit bad behaviour and attitudes towards health and safety issues. The findings of this study show that most site workers have positive attitudes but some have a bad attitude towards H&S issues in construction firms in Nigeria. The findings of this study also showed that, with respect to internal motivation mechanism on H&S issues, very few construction companies have breached H&S guidelines and thus have escaped with a warning. This may actually be a reflection of the current reality that there are few agencies saddled with the responsibility of enforcing acceptable minimum standards and penalizing offenders. Also, site worker representations on company's H&S management committee" on H&S issues are moderate. This reinforces the work of Idoro (2011) that there is a poor attitude among staff towards health and safety. However, Nigerian construction companies are becoming aware of bringing workers into management decisions.

The attainment of enhanced competitive advantage and continuous improvement in operation and productivity are considered as highly important for external motivation. Also, entry into construction market of another state in Nigeria, another country in Africa, and another country outside Africa are all important as external motivation of construction companies. This supports the works of Banfield et al. (1996), cited in Attabra-Yartey, (2012), Mayhew (1997), Vassie et al. (2000), Al-Kilani (2011), Machabe and Indermun (2013), Akanni et al. (2014) and Jarkas (2015) that the construction sector operates in an extremely competitive environment.

The findings of this study showed that with, respect to policies about Health and Safety, very few construction companies do not have a specific director charged with overall responsibility on H&S. The lack of a specific director primarily charged with H&S responsibilities among construction companies could weaken the implementation of Health and Safety policies and undermine the potential advantage of having a formal policy if there is no drive towards implementation. However, some companies claimed to have a formal company health and safety policy statement. To this end, it can be inferred that policy formulation with respect to H&S among construction companies in Nigeria is still inadequate. This is further revealed by the findings of this study as construction companies ranked the implementation of site H&S rules and measures, amending and correcting H&S plans during construction, rewarding workers for safe work behaviour, site induction for workers and conducting regular health check for employees, as low. This buttresses the works of Bennet (2002) and Machabe and Indermun (2013) that the construction industry in Nigeria lack an adequate health and safety policy. It also supports the works of Idoro (2004) and Enhassi et al. (2008) that Nigerian construction firms lack statutory regulations on H&S and that those regulations that serve as points of reference are either British or American ones. This also supports the findings of Adeogun and Okafor (2013) that construction firms in Nigeria continue to lag behind in the implementation of occupational H&S management practices.

This also supported the works of Tam et al. (2004), Hassouna (2005), Abdul-Rashid et al., (2007), Omran, et al (2008), Abdul Rahim et al. (2008) and Al-kilani (2011) that poor safety awareness, even among the top management leaders and poor safety awareness of projects managers, are the major causes of occupational accidents and injuries in construction industry. This supports why Machabe and Indermun (2013) stated that workers in the construction industries often find themselves compelled to follow the rules and policies of the organization. This could be the reason why Idoro (2011) affirms that the contractors' management efforts on occupational health and safety in the construction industries in Nigeria do not reflect in their scope of operations, and hence why the accident and injury rates are high.

The findings of this study prop up the work of Haupt (2001) that lack of supervision by line managers in the industry, and inadequate equipping of workers to identify dangers and protect themselves are major challenges to health and safety management practices among Nigeria construction industry. It also bolstered the work of Cesarini et al. (2013) that the lack of trained workers for safety constitutes another major challenge. In addition, this supports the work of Fang et al. (2004) that the lack of safety inspection is another salient challenge to health and safety management implementation. However, proper training, enforcement and supervision, respect for H&S, forced to submit kits, need for government intervention good relation between management and workers and proper planning should be provided to enhance H&S management and practices among Nigeria construction firms.

This helps supports the work of Toole (2002), Kheni et al. (2006), Al-Kilani (2011), Pupulampo and Quartey (2012), Dadzie (2013), Okoye and Okolie (2014), and Gaceri (2015) that training and workshops should be introduced and used to create awareness and teach the labour force in the Nigerian construction companies the relevance of health and safety and the need to provide safety and health mechanisms for workers. This also buttresses the work of the Sustainable Built Environment Research Centre (2012) that educating employees is a major factor affecting health and safety management in construction industries. This supports the work of Lee and Halpin (2003), Ali et al. (2014), Huang and Fang (2003) and Vitharana et al. (2015), that a lack of training is an important factor influencing health and safety management implementation in the construction industry.

The findings showed that construction companies are organized for their health and safety management but very few companies showed a lack of networking with other companies/institutions (insurance companies, government offices) about H&S issues. This is a phenomenon common to Nigerian companies due to the fierce competitive nature of individuals and companies in the construction industry. This trend is characterized by secrecy and confidentiality by companies, who also view every little information, technique and solution at their disposal as a competitive edge or industrial advantage over their competitors. Also, construction recorded an average level of risk assessment. This could be inadequate when one considers the level of annual turnover of construction companies in Nigeria. This supported the work of Wong et al. (2010), Akanni et al. (2014), Akanni et al. (2014), Jarkas (2015), Jarkas (2015,Ofori (2015), that the construction industry operates in a dynamic, complex and competitive environment which makes every player in the industry keep themselves to themselves.

Furthermore, there is a moderate level of policy formulation, assessment of the organisation of health and safety implementation among construction companies as regards health and safety issues. Many construction companies see risk, planning, implementation, measuring and review and auditing as important to health and safety implementation. However, companies' ability to practice this is low. Hence, health and safety planning, practices, implementation and reviews in the Nigerian Construction Company is assessed as being between low and moderate. This could be inadequate when one considers the level of annual turnover of construction companies in Nigeria. Health and safety practices among construction companies in Nigeria are low and there exist various difficulties as cited by the site workers, which include non-compliance and carelessness of the site workers and lack of adequate knowledge and technique. In addition, proper training, respect for health and safety practice, inclusion of health and safety requirement in the quotation, and enforcement and supervision are the most preferred proposals that are considered to improve the health and safety practice in the industry. This supports the works of Ofori (2000), Al-Kilani (2011), Umeokafor et al. (2014), Okoye and Okolie (2014), Kawuwa, Adamu, Shehu, and Abubakar (2018), and Ihua-Maduenyi (2019) that the performance of the construction companies in Nigeria are very low when compared to those of developed countries such as UK, USA Japan.

8.3 DISCUSSIONS OF FINDINGS WITH RESPECT TO IMPACT OF IMPLEMENTATION OF HEALTH AND SAFETY MANAGEMENT PRACTICES ON PERFORMANCE

The findings of this study revealed that the involvement of Health and Safety management practices among Nigeria construction companies do have a significant effect on the level of health and safety attitude and behaviour of the site workers. The result also showed that construction firms who are more involved in Health and Safety management practices recorded good Health and Safety attitude and behaviour among its site workers than those who are less involved in Health and Safety management practices. This supports the works of Okojie (2010), Diugwu et al. (2012), Idubor and Oisamoye (2013), and Okoye *et al.,* (2016) that the high rate of accidents and injuries in the Nigeria construction industry was attributed to the lack of compliance and implementation of H&S management practices which could be a major attribute of attitude among workers. This also reinforced the works of Amweelo (2000) and Idoro (2011) that important stakeholders (such as contractors and workers) in the construction industries in Nigeria have poor attitudes towards health and safety, which affect health and safety management practices.

The findings of this study also support the work of Amweelo (2000), Toole (2002), Awodele and Ayoola (2005), Dingsdag et al. (2006), Dimuna (2010), Ayedun et al. (2012), Charehzehi and Ahankoob (2012), Ssegawa-Kaggwa *et al.,* (2013), and Vitharana et al., (2015), that bad attitudes of workers in the construction industry in Nigeria are manifest in the high rate of fatalities and injuries in Nigerian construction firms. This supported the works of Al-Kilani (2011) that major causes of accidents in the construction industry are related to human behaviour which in this study is conceptualized as attitudes. The findings of this study directly support the work of the Sustainable Built Environment Research Centre (2012) that employees' beliefs and attitudes are major factors influencing health and safety management practices among construction industries.

The findings of this study revealed that t*he* involvement of Health and Safety management practices among Nigeria construction companies does have a significant effect on the rate of occurrence of accidents in the Nigerian construction industry. Hence, construction firms with higher records of accidents indicate that they have a very low level of health and safety management practices. This supported the work of Okojie (2010), Diugwu et al. (2012), Idubor and Oisamoye (2013), and Okoye et al. (2016) that the high rate of accidents and injuries in the Nigeria construction industry attributable to the lack of compliance and implementation of H&S management practices.

8.4 CHAPTER SUMMARY

In summary, it has been affirmed that both internal and external factors affect the health and safety management practices among construction firms in Nigeria. In addition, the level of health and safety management practices among construction firms in Nigeria do have a significant influence on the performance of the firms such as the level of attitude, behaviour towards H&S issues at site and also the level of occurrence of accidents in construction firms.

CHAPTER 9 CONCLUSION AND RECOMMENDATIONS

9.0 INTRODUCTION

This chapter provides the conclusion and recommendation from findings in this study and is divided into six sections as presented below.

9.1 SUMMARY OF RESEARCH AND CONCLUSION

The study investigated the internal and external factors that influence the health and safety management practices among contractors in Nigeria. In summary, it was found that internal factors which influence health and safety management practices among contractors in Nigeria are: company's annual turnover; company's H&S policy review; advocacy for H&S improvement; frequent discussion of H&S during board meeting; age of Nigeria construction companies; companies' size; and company's annual turnover. The external factors found to influence health and safety management practices among contractors in Nigeria are the role of government H&S inspections and the role of client demands on H&S. Furthermore, the rate of implementation of H&S management practices among contractors was found to influence H&S performance in the Nigeria construction industry which in turn includes: H&S behaviours of the site workers; H&S attitudes of the site workers; and the rate of occurrence of accidents on site.

9.2 REVIEW OF OBJECTIVES

With respect to the objectives of this study, which were to investigate the factors affecting implementation of H&S management practices among contractors in Nigeria construction firms and to further develop a framework/model towards ensuring an enhanced occupational health and safety in the Nigeria construction industry, this study has found out that annual turnover, company size and age of construction firms company's H&S policy reviewing status, the frequent discussion of H&S during board meetings, and advocacy for H&S improvement are the major internal company's factors that could influence H&S management implementation practices. In addition, some external factors to the construction firms were also found to be significantly important such as government H&S inspections and client demands on H&S. Furthermore, the implementation of H&S management practices was also observed to affect performance of construction firms with respect to H&S attitude and behaviour of the site workers and the rate of occurrence of accidents on site.

9.3 CONTRIBUTION TO KNOWLEDGE

From the research findings, the present study would contribute to knowledge in the following ways, to enhance the H&S management practices and to reduce the rate of accidents in the Nigeria construction industry. In addition, in the academia, this study could be of significance in that it could pave way for various frontiers of knowledge, especially with regards to the field of construction. The findings of this study could assist managers-contractors and staff to see how important H&S issues are in the Nigeria construction industry. It is also important that managers-contractors and staff in the construction industries in Nigeria are the major bridge between the organisation and objectives of the organisation. Hence, when high premium is attached to H&S issues among managers-contractors and staff of Nigeria construction industries, the rate of accidents and injuries would be reduced.

9.4 LIMITATIONS OF THE STUDY

This study investigated the internal and external factors that influence the health and safety management practices among contractors in Nigeria. However, selected internal and external factors were used in this study. In addition, the study was unable to involve all the states in Nigeria due to the high incident of unrest in the northern part of the country. Also, quantitative information was obtained and used in this study, hence, responses from responded were restricted due to the structured closed ended questions provided by the questionnaire.

9.5 RECOMMENDATIONS

9.5.1 Further Research

The study investigated the factors affecting the implementation of health and safety management practices by contractors in Nigeria. However, there might be other areas that the study could not address and which need further investigation. For example, the study only used few factors to provide a model such as policy, measuring and reviewing performance, implementation, planning, risk assessment and organisation. Other factors include the attitude of workers towards ensuring health and safety management implantation and government intervention. However, further studies could be designed to investigate other factors, such as strategies put in place by the organisation, the structure of the organisation, the culture of H&S management practices in the organisation - which is referred to as organisational culture, staff factors and environmental - factors which could include organisational environments, leadership styles and communication patterns, among others. In addition, the study could be replicated in other geo-political areas of Nigeria that were not included in this study, to further provide the scenarios of the construction industry in those locations. Further studies could focus on employees or staff to provide a wider range of factors from the demand side of staff on factors affecting H&S management practices in Nigerian construction companies.

9.5.2 To Policy and Practice

From the study, various recommendations could be provided. These recommendations include:

i. A national policy towards addressing the H&S management practices in the Nigeria construction industry should be provided by the government and also

ii. Policymakers so as to curtail the high rate but unknown number of accidents in the construction industry.

iii. In addition, every construction firms should endeavour to measure and review a performance evaluation strategy which is to be deployed to evaluate the firm's H&S management practices and how stated policies have affected the rate of management of H&S in firms.

iv. Construction firms of an organisation should also put in place various strategies for the implementation of H&S management policies in Nigeria construction industry.

v. Construction firms should put in place the various planning process within the organisation policy to curtail the rate of accidents in Nigerian construction industries.

vi. There should be various risk assessment strategies and policies that could address the lack of risk assessment among Nigeria construction industries.

vii. Construction firms as separate organisations should deem it fit to fulfil all necessary organisational needs that would assist employees, increase H&S and also reduce the rate of accidents in Nigerian construction firms.

viii. Strategies to enhance the attitudes and commitment of staff towards H&S in the Nigeria construction industry to reduce rate of accidents should be adopted, such as incorporating them into most of the health and safety meetings, providing them with the necessary tools to use so as to reduce the rate of accidents, providing necessary trainings for them to enhance their literacy level on the issue of H&S and also in the use of the various tools and machines provided by the organisation.

ix. The government should deem it important to intervene where and when need be to assist Nigeria construction industry in the management of H&S practices so as to reduce the rate of accidents in the industry.

9.6 CHAPTER SUMMARY

In summary, with respect to the objectives of this study, a framework/model towards ensuring an enhanced occupational health and safety in the Nigeria construction industry has been developed. In addition, the study has presented a document that will serve as a guide to the development of an effective H&S management system for the Nigerian construction industry.

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APPENDIX (A) COVERED LETTER

RESEARCH INTO H&S MANAGEMENT IN THE NIGERIAN CONSTRUCTION INDUSTRY

INFORMATION SHEET

This survey is part of a doctoral research investigating the factors affecting the implementation of H&S management by construction firms in the Nigerian construction industry.

The questionnaire comprises of **four** parts. **Part 1** requests respondent's background information. **Part 2 request information about your company.** **Part 3** focuses on information about your company's H&S management practices. Finally, **Part 4** requests general comments.

We would be very grateful if you could answer all questions to the best of your ability. There are no "correct" or "incorrect" answers. You are not required to provide any data that will make you identifiable. Information you provide is strictly for research purposes and aimed at providing recommendations that would help to improve occupational safety and health management in the Nigerian construction industry. Participation in this research is voluntary and you may withdraw from the research project at any time prior to when all the questionnaire data from this research is being analyzed. All information collected will be stored securely. You will not be able to be identified at any point in this research because the data collection is anonymous.

The questionnaire should take you approximately **20-25 minutes** to complete. If you have any questions or should you require/prefer an electronic version of the questionnaire, please contact the research team using the contact information below. Kindly take note of the unique identifier code on the top right corner of your consent form for the purpose of any confidential future correspondence you may wish to have with the research team about your completed questionnaire. If you wish to withdraw from the research, you would have to email the Doctoral Researcher or the Director of studies stating your unique identification code.

Thank you very much for your time.

Yours faithfully,

Doctoral Candidate

Jacob Oladejo (Doctoral Researcher) |Email: Jacob.Oladejo@uwe.ac.uk |Mobile: 00447443717954

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APPENDIX (B) PARTICIPANT CONSENT FORM

This study is granted ethical approval by the university of the West of England ethics committee. If you have any queries that you want to be addressed by an independent person, you may contact the ethics committee at UWE. Email: FETresc.enquiries@uwe.ac.uk, Phone 00 44 (0)1173284250.

Please respond to the following statement by checking the corresponding boxes.

I confirm that I have read the Information Sheet for the above study and understood the information provided therein.	☐
I understand that I will never be identified as a person at any point, as identity of participants will be completely anonymised.	☐
I understand that participation is voluntary and I may withdraw from the research project at any time prior to when all the questionnaire data from this research is being analysed.	☐
I understand the reason for this study and agree to participate.	☐

Participant Signature……………… Date…………………………………..

Please keep copy and return copy of signed consent

APPENDIX (C) PART 1 – RESPONDENT INFORMATION

1. **What is your professional role in your company?** (Please choose *ONE* option only)

☐ Company director/manager ☐ Site manager

☐ H&S manager / supervisor ☐ Construction manager

☐ Project manager ☐ Site engineer

☐ Quantity Surveyor/Estimator Other (please specify):_____

2. **How long have you worked in your current role within your company?** (Please choose *ONE* option only)

☐ 0-5 years ☐ 6-10 years ☐ 11-15 years

☐ 16-20 years ☐ 21-25 years ☐ Over 25 years

3. **How long have you worked in the Nigerian construction industry?** (Please choose *ONE* option only)

☐ 0-5 years ☐ 6-10 years ☐ 11-15 years

☐ 16-20 years ☐ 21-25 years ☐ Over 25 years

4. **If you are a member of a professional body, please specify the name of the body. Specify here: ________________________________**

PART 2. COMPANY INFORMATION

1. **What type of construction work does your company undertake?** (Please choose *ALL* applicable options)

   ☐ General civil works

   ☐ Mechanical, electrical or plumbing works

   ☐ General building works

   ☐ Others; specify……………….

2. **In which sector does your company operate?** (Please choose *ALL* applicable options)

   ☐ Private only

   ☐ Public only

3. **In which category of contractor is your company registered.** (*Please choose only one*) **(A=less than N1m; B=less than N10m; C=less than N30; D=less than N50m; E=N100m and above)**

   ☐ A

   ☐ B

   ☐ C

   ☐ D

   ☐ E

4. **What was your company's annual turnover for 2016-2017 financial year?**

☐ ≤ NGN₦ 50 million

☐ NGN₦ 101 ≤ NGN₦ 500

million

☐ > NGN₦ 1 billion

☐ NGN₦ 51 ≤ NGN₦100 million

☐ NGN₦ 501 ≤ NGN₦1 billion

5. **<u>How many direct employees does your company have in your company?</u>**

☐ 1 - 50 ☐ 201-250

☐ 51-100 ☐ Above 250

☐ 101-150

☐ 151-200

6. **<u>How long has your company been established?</u>**

☐ 0 – 5 years ☐ 16 – 20 years

☐ 6 – 10 years ☐ 21 – 25 years

☐ 11 – 15 years ☐ 25 – 35 years.

☐ Above 35 years.

7. **<u>What state in Nigeria is your company's registered location?</u>**

Please specify: ________________________________

8. **<u>In what state in Nigeria does, your company undertakes works.</u>**

Please specify ________________________________

9. **Is your company a member of any Nigerian or international construction industry association?** (Please choose *ONE* option only)

☐ Yes. If yes, please specify the name of the association: ______________________

☐ No

10. **How often are your company's H&S policies reviewed?** (Please choose *ONE* option only)

☐ Every 3 months

☐ Every 6 months

☐ Every year

☐ Every two years or more

☐ Never being reviewed

11. **Generally, what level of importance has your company's clients placed on H&S as a criterion for selecting a contractor to undertake projects?** (Please choose *ONE* option only)

☐ No importance

☐ Little importance

☐ Moderate importance

☐ High importance

☐ Very high importance

12. **Does your company have a designated budget for H&S management?** (Please choose *ONE* option only)

☐ Yes ☐ No

13. **Please indicate your agreement to the following statements.** (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree) (Please choose *ONE* option only for

14. each statement)

Statement	1	2	3	4	5
1. H&S management is often discussed at company senior management meetings e.g. board meetings.	☐	☐	☐	☐	☐
2. There is a H&S management committee or working group within my company.	☐	☐	☐	☐	☐
3. There is site worker representation on company H&S management committee or working group.	☐	☐	☐	☐	☐
4. Company invests into or engages in innovation and research activities in H&S.	☐	☐	☐	☐	☐
5. Within the past 3 years, my company has been prosecuted or fined for breach of H&S regulations.	☐	☐	☐	☐	☐
6. Within the past 3 years, my company has received a warning for breach of H&S regulations.	☐	☐	☐	☐	☐
7. There is usually a client clerk of works/representative attached to the projects my company undertakes to oversee H&S on the projects.	☐	☐	☐	☐	☐

15. **Please rate the extent to which the following items are important to your company's top management.** (Please choose *ONE* option only for each statement).
(1 = not important at all; 2 = slightly important; 3 = moderately important; 4 = important; 5 = highly important)

Statement	1	2	3	4	5
a) Attainment of enhanced competitive advantage	☐	☐	☐	☐	☐
b) Continuous improvement in operations and productivity	☐	☐	☐	☐	☐
c) Enhanced external corporate image/credibility	☐	☐	☐	☐	☐
d) Entry into the construction market of another state in Nigeria.	☐	☐	☐	☐	☐
e) Entry into the construction market of another country in Africa.	☐	☐	☐	☐	☐
f) Entry into the construction market of another country outside Africa.	☐	☐	☐	☐	☐

16. **What is the frequency of visits by government H&S inspectors to your company's project sites?** (Please choose *ONE* option only)

☐ Never

☐ Rarely (up to one out of every four projects)

☐ Moderately (up to two out of every four projects)

☐ Often (up to three out of every four projects)

☐ Very often (almost every project)

17. **Which organisations does your company report accidents to when they occur?** (Please choose *ALL* applicable options)

☐ Federal Ministry of Labour and Productivity

- ☐ Local government H&S body
- ☐ Local Hospital / Clinic
- ☐ Local police Office
- ☐ Do not report anywhere

18. How many accidents occurred in your business in the year 2016-2017? (Please specify. If you do not know how many cases occurred, please tick "*Do not know*")

Accident type	Number	Do not know
☐ Non-fatal accidents	______	☐
☐ Fatal accidents	______	☐
☐ Tick this if no accident occurred.		

19. How often do site workers advocate for H&S improvements e.g. through boycotts and strikes? (Please choose *ONE* option only)

- ☐ Never
- ☐ Rarely
- ☐ Sometimes
- ☐ Often
- ☐ Very Often

20. In general, what is the attitude of your site workers towards H&S? (Please choose *ONE* option only)

☐ Very bad

☐ Bad

☐ Cannot tell/do not know

☐ Good

☐ Very good

21. In general, what is the level of H&S behaviour of your site workers? (Please choose *ONE* option only)

☐ Very bad

☐ Bad

☐ Cannot tell/do not know

☐ Good

☐ Very good

PART 3. COMPANY PRACTICES

From the list of all H&S practices below, please select by ticking the practices your company undertakes.

POLICY

- ☐ A formal company H&S policy statement
- ☐ A company director with overall responsibility for H&S

ORGANISATION

- ☐ Providing H&S supervisors on sites
- ☐ Communicating H&S information to workers through newsletters, leaflets, posters, etc.
- ☐ Engaging with workers on H&S issues e.g. H&S meetings and suggestion schemes
- ☐ Networking with other companies' / institutions' (insurance companies, government offices) about H&S issues
- ☐ Propagating H&S practices to external stakeholders e.g. clients
- ☐ A designated H&S department
- ☐ Assessing the competence of workers and subcontractors
- ☐ A company designated H&S budget
- ☐ Display of regulatory H&S posters on construction sites
- ☐ Display of company H&S policy on construction sites, company website, and head/branch offices
- ☐ Provision of H&S annual reports

☐ A designated H&S manager

☐ Providing H&S training for site H&S supervisors & site managers

☐ Providing training programmes for H&S manager(s)

RISK ASSESSMENT

☐ Undertaking overall project risk assessments before projects starts

☐ Designing site rules and measures to mitigate assessed risks

☐ Undertaking risk assessments for work packages/operations before they start

☐ Reviewing and updating risk assessments during construction

☐ Informing employees about hazards on sites before work starts

PLANNING

☐ Preparing H&S plans for every construction project

☐ Provision of H&S insurance cover for sites

☐ Pricing to cover H&S requirements for projects

☐ Preparing method statements

☐ Setting H&S performance targets

IMPLEMENTATION

☐ Implementing site H&S rules and measures

☐ Amending and correcting H&S plans during construction

☐ Rewarding workers for safe work behaviour

☐ Site inductions for workers

☐ Training programmes for site workers

☐ Carrying out site H&S inspections regularly

☐ Provision of sanitation and welfare facilities on sites (e.g. toilets, canteens, drinking water)

☐ Provision of personal protective equipment

☐ Provision of first aid equipment on sites

☐ Disciplining workers for unsafe work behaviour

☐ Assigning H&S supervisor(s) on site

☐ Conducting regular health checks for employees

MEASURING AND REVIEWING PERFORMANCE

☐ Measuring H&S performance against set targets

☐ Reviewing and updating H&S plans after projects completion

☐ Keeping incident records on every project

☐ Investigating the causes of incidents, accidents and near-misses

☐ Publishing or sharing lessons learnt from incident investigations across the company or on projects

AUDITING

☐ Undertaking periodic safety management auditing

☐ Use of external consultant for undertaking safety management auditing

☐ Use of in-house personnel for undertaking safety management auditing

PART 4 – GENERAL COMMENTS

1. **In your opinion, what difficulties does your company face in managing H&S on construction sites?** (Please specify)

2. **What solutions would you suggest to help contractors improve management of H&S on construction site?** (Please specify)

3. **If you are available to take part in a further phase of this study, please provide your contact information below.**

THIS IS THE END OF THE QUESTIONNAIRE. THANK YOU FOR YOUR TIME.

THE DOCTORAL RESEARCHER WILL RETURN TO COLLECT THE COMPLETED QUESTIONNAIRE
