**SAFETY PRACTICES AND WORKERS PERFORMANCE ON CONSTRUCTION SITES IN LAGOS STATE, NIGERIA.**

**BY**

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**M.Sc. CONSTRUCTION MANAGEMENT**

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**A DISSERTATION SUBMITTED TO DEPARTMENT OF BUILDING TECHNOLOGY, COLLEGE OF SCIENCE AND TECHNOLOGY, COVENANT UNIVERSITY, OTA. OGUN STATE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE (M.Sc.) IN CONSTRUCTION MANAGEMENT**

**JUNE, 2017**

 **ACCEPTANCE**

We testify that this dissertation titled Safety Practices and Workers Performance on Construction Sites in Lagos State, Nigeria was accepted in partial fulfillment of the requirements for the degree of Master of Science (M.Sc.) in Construction Management.

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I, **OGUNDIPE,** Kunle Elizah declare that this dissertation was completely carried out by me under the supervision of Dr. J. D. Owolabi of the Department of Building Technology, Covenant University, Ota, Ogun State, Nigeria.

I also attest that the dissertation has not been presented, either wholly or in parts, for any degree elsewhere and all sources of scholarly information used were dully acknowledged without any conflict of interest.

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**CERTIFICATION**

The undersigned certify that they have read and hereby recommend for acceptance by Covenant University this dissertation titled Safety Practices and Workers Performance on Construction Sites in Lagos State, Nigeria was carried out by **OGUNDIPE, Kunle E.** Matric No: 15PCB01255 of the Department of Building Technology, Covenant University Ota, Ogun State and that this dissertation is adequate both in depth and quality for the partial fulfillment of the requirements for the award of Master of Science (M.Sc.) in Construction Management.

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**DEDICATION**

This dissertation is dedicated to Almighty God the givers of all good gifts and for His unmerited favour.

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 **ABSTRACT**

Safety practices in construction project have received several attention of the researchers over the years but how safety practices impact workers’ productivity and operation requires some attention on construction projects. The aim of this study is to determine the level of compliance with the use of safety wears and other safety control systems with a view to enhancing safety performance and workers’ productivity on construction projects. A total of one hundred and twenty eight (128) copies of questionnaire were administered to participants with years of experience on construction management in Lagos State, Nigeria. Data obtained based on snowball and random sampling technique were analysed through Statistical Package for Social Sciences (SPSS) version 21 using Mean Scores, Relative Importance Index (RII). The significance of each of the associated variables as impacted on construction workers safety practices on buildings project were determined using Independent Samples Test, Mann-Whitney U Test. Descriptive outcome of the statistical analyses showed a high prevalence need of safety practices. The findings of the study established dissatisfaction with effective use of safety wears and its implementation among site operatives because workers find it difficult to adapt to as it was against their traditional practices **(RII=0.776),** unethical practice of workers due to human attitudinal peculiarities **(RII=0.766),** inadequate engagement of safety managers on sites **(RII=0.764),** inadequate engagement of safety managers and ineffective supervision on site **(RII=0.762)** as well as poor communication between site managers and site operatives **(RII=0.750)** as factors preventing effective use of safety wears among the categories of respondents sampled. The study concluded based on Mann-Whitney U Test result on safety improvement measures and control systems available for safety practices and workers performance on construction sites this include: the use of safety audio, video and visual displaying gadgets on site, daily check of scaffold and ladder etc., inclusion of safety matters from the planning stage, setting safety guidelines into conditions of contract, reward workers that exhibit excellent safety performance, conduct in-house safety training were found to be statistically significant with medium effect. The study recommend minimum of one safety managers on every construction sites.

Keywords: Performance, Productivity, Safety practices, Safety wears, Site operatives.

**CHAPTER ONE**

**INTRODUCTION**

**1.1 Background to the study**

Construction industry in any country is associated with vital contributions to national economic development through strategic planning, design, and construction in transforming various production processes into constructed facilities **(**Isa, Jimoh, and Achuenu, 2013**)**. The industry is unique among all other sectors because it provides the necessary infrastructures that stimulate national development **(**Jackman, 2010 and Olanrewaju and Abdul-Rashid 2015**).** In Nigeria, approximately 25% of the Nigeria’s workforce were attributed to construction industry (Ibrahim and Musa-Haddary, 2010). Construction industry is also viewed as labour intensive because labour cost amounts to 40-65% of the overall cost of a project (Rao, Sreenivasan and Babu, 2015). Therefore, the labour intensive nature of the industry will demands more human involvement at the production stage. However, the industry compared with other sectors of the economy, due to caliber of casualty suffered in execution of building projects across the globe, has made the construction industry the most dangerous or highly hazardous industry in view of (International Labour Organisation, 1999; Smallwood and Haupt 2002).

Ayangade (2000) indicated that the industry is a project-based firms that comprises many parties working together towards achieving common goal. Moreover, the means of achieving this goal is characterised by hazards which pose threat to workers life. Muiruri and Mulinge (2014) noted that the complexities of activities required in the building production process pose different challenges to workers health inherent risks in the production stage. (Smallwood and Haupt 2002) viewed accidents as part of the building production process that is unavoidable because construction industry is inherently dangerous, therefore, compliance or not to safety practices will forfeit the impact of safety regulations. Factors adding to occurrence of construction fatalities were known as the uniqueness of the sector that differentiate it from other industries. This uniqueness include: short life span of projects, location are differs from time to time, workers turnover is high, large number of unseasonal workers which are not familiar with construction processes, workers turnover, high rate of small firms and self-employed workers (Safety Manual for Construction Handbook). These accidents do not only result in pain and physical damage to the workers but also reduce productivity, time, and quality performance, thereby pose treat to project success and escalate production cost (Muiruri and Mulinge, 2014).

Several codes and regulations have been in existence to provide succor in management of health and safety at work. Recently, Nigerian National Building Code empowered registered builder to prepare health and safety plan among other builder’s document in minimizing and managing causes of accident during the construction stage. In the same vein, there are stand out obligation explicitly highlighted in the Construction (Design and Management) Regulations on the stakeholders engagement in execution of project management, and it also seek the support of the client, designer, CDM coordinator, and principal coordinator on construction projects. The goal and essence of establishing safety practices’ code and regulations on construction site is to focus on preventing, eliminating, curbing, limiting and total eradication if possible the occurrence of accidents and injuries during and after the construction processes and as well train site operatives on safety programmes that will put all of these into place. The degree of confidence that accidents will not occur throughout the duration of construction projects may not be ascertain from the inception, but compliance with these specified safety practices will enhance site safety, it will eliminate the causes and reduce the negative impact as well as the level of damage to parties involves. Hinze (1997) asserted that enabling work settings enhances workers productivity at a reduced cost but increase in profit margin.

Diugwu, Baba, and Egila (2012); Okolie and Okoye (2012), Idubor and Oisamoje (2013) and Umeokafor, Umeadi and Jones (2014) contend that the numbers and magnitude of accidents occurring and recorded on construction sites in Nigeria underscored low level of safety practices. According to Dodo (2014) occupational safety is an integral part of construction operation due to the uniqueness of the industry, different trades and skills are needed to be carried in a safe environment, however individual’s contributes determine the successful outcome of the projects. The authors further stressed that compliance with health and safety regulations remains one of the integral parameters to which successful projects delivery can be obtained. This fact is buttressed as health and safety plan/policy is one of the parameters in prequalifying suitable contractors for the award of construction projects in Nigeria (Windapo, 2013 and CDM, 2015).

This dissertation is out to assess safety practices of the construction operatives in Nigeria, it will focus on the effects of safety wear on workers operation. Possible strategies to tackle all the identified problems during the literature review will be recommend at the completion of the work.

**1.2 Statement of the research problem**

Construction accidents remained an ongoing concern in the developing countries, despite the level of awareness in promoting safety practices over the decades. Safety practice is anchored on workers behavior regarding safety provisions, conducts that guides workers attitude in caring out their tasks at work in order to reduce or even eliminate accidental losses and injuries and maximize the nominated objective of the organization (Umoh, 2013). Perceived increment in number of casualties and illnesses reported on project sites are unacceptably high considering the numerous regulatory standards and control systems for construction projects, thereby creating serious menace to construction workers health at work. Thus, proactive step must be taken to identify this factors and be averted accordingly.

Many studies have gone down the line on the subject of construction safety provisions, practices and implementation/enforcement but focus have been on the cause of accidents, condition of work settings, workers attitudes, and provision of health and safety training (Aniekwu, 2007; Ismail, Doostdar and Harun, 2011; Olutuase, 2014; Umeokafor *et al*., 2014; Dodo, 2014). Alinaitwe, Mwakali, and Hansson (2007) studied factors affecting productivity of building craftsmen and found out that improper supervision and inadequate skills among workers are the most significant factors affecting workers productivity. But there exist limited study on safety practices and workers operations performance. Also, in the construction industry how safety practices affect workers productivity are less documented especially in the developing countries like Nigeria (Umoh, 2013).

Unsafe practices have been pronounced among the workers on construction sites. Clark (2006) reported that failure to adhere with the required safety procedures and as well take precautions against hazards such as wearing safety wears are common on project sites. Awwad, *et al.,* (2016) added that safety practices lack necessary implementation due to absence of proper monitoring system, low level of safety awareness and inadequate support from safety managers. Che Hassan, Basha, Wan Hanafi (2007) and Shamsuddin *et al.,* (2015) argued that workers knowledge and understanding of safety at work setting remained vital in promoting safety among themselves on construction site.

One of the top hill always confronted by any construction company is the frequent occurrence of accidents during construction stage, Abdelhamid and Everett (2000) and Shamsuddin *et al.,* (2015) argued that workers omission amounts to cause of construction injuries and this was explained as behavior and human factor approach. Behavior approach underscored that construction operatives are the original reason for fatality due to their unlimited number of costly mistakes at different stages of building production process. However, human factors approach argued that not because of individuals’ unsafe behaviour rather; the emphasis was on nature of workplace settings. However, what remained unknown is how safety practices affect workers output. To ensure optimum productivity of the workers, adequate safety gadgets couple with other necessary safety training must be provided for the site operatives to safeguard them against the possibility of any work related hazards. Though workers related hazard is not a new phenomenon at work, as this has been established in some of the past studies. What remain new is the persistence of accidents and how safety practices are violated in the management of construction project.

Looking at the side effect of construction related injuries on workers and the project success, safety practice should be integral aspect of project management and must be given high priority by the construction participants to ensure human safety against the frequent occurrence of accidents on construction site. Consequently, given the size, the contributions and importance of construction workers in achieving project objectives in the industry, research on safety must go beyond appraising traditional causes of safety problem rather proactive approaches that focus on the unsafe behaviours exhibited by workers before it result into accident. It is against this identified gaps in construction safety practices literature in Nigeria, this study will be focusing on the effective use of safety wears and workers productivity in a bid to reduce causes of accident on construction sites.

**1.3 Research questions**

This study proposed following research questions to give direction to the study.

1. What are the current state of safety practices on selected building construction sites?
2. What are the factors preventing site operatives from using safety wears on construction sites?
3. What are the effects of safety wears on workers operation on construction sites?
4. What are the respondents perception on the importance of integrating Builder’s document and others safety control systems on construction projects?
5. What are the safety improvement measures and control systems available for safety practices and compliance on construction sites?

**1.4 Aim of the Study**

The study aim at determining level of compliance with effective use of safety wears and other safety control systems with a view to enhancing safety performance and workers’ operation on construction sites.

**1.5 Objectives of the study**

To accomplish the stated aim, these objectives are proposed to give direction to this study

1. To examine the current state of safety practices on selected building construction sites;
2. To identify factors preventing site operatives from using safety wears on construction sites;
3. To determine the effects of safety wears on workers operation on construction sites;
4. To investigate respondents perception on the importance of integrating Builder’s document and others safety control systems on construction projects; and
5. To examine safety improvement measures and control systems available for safety practices and compliance on construction sites.

**1.6 Hypothesis Formulation**

This research hypothesis was tested in order to justify the outcome of the study.

Hypothesis one

* H0:-There is no significant difference between professional and site workers perceptions on factors preventing effective use of safety wears on construction sites.
* H1:-There is significant difference between professional and site workers perceptions on factors preventing effective use of safety wears on construction sites.

**1.7 Significance of the study**

In bid to determine the outcome of the various projects executed, construction operatives plays very significant roles Therefore, efforts should be directed at alleviating the effect of work hazard and risk because workers are always at the receiving end and vulnerable to accidents in a bid to ensure their daily target are met. Therefore, this study when concluded will be addition to past researchers effort in addressing safety practices during the execution of construction projects in Lagos State and as well will provides lasting solutions to the challenges confronting compliance with safety practices in management of building production process. It will also provide further suggestion and solutions to construction stakeholders on measures to upgrade safety practices on construction projects. The recommendations proposed at chapter five of this research work will enable government and construction experts to look into sustainable methods to enforce compliance with builder’s document of project health and safety plan and other safety control systems in enhancing workers compliance with safety practices and also in ensuring that construction works are carried out in a safe manners from the planning stage up to handing over stage.

**1.8 Study scope and limitation**

The study scope comprises medium scale categories of construction firms that operate in Lagos State. The choice of Lagos State was based on its fast growing in development and increase in the demands for housing unit both for residential and industrial purposes. The State in recent time have welcomes heavy investment which includes: Eko Atlantic city, Lekki free trade zone, Dangote petroleum refinery, Lekki deep sea port and Island international airport (Ogunde, *et al.*, 2017). Fagbenle, Adeyemi and Adesanya (2004) & Olaleye (2008) added that eighty percent (80%) of the Nigerian construction contractors that registered with the Federal Registration Board of Nigeria have their addresses in Lagos, Abuja and Port Harcourt. It is also believed that Lagos state fairly represent an open market of construction industry for all the sundry, and the fact that the city has suffered building collapse and casualty resulting to loss of life, litigation, regulatory actions, pains, injuries, delayed schedules, loss reputation and loss of property among others.

**1.9 Definition of Terms**

**Occupational Safety and Health (OSH):** is defined according to Alli (2008) as the study of the expectation, acknowledgment, assessment and control of hazards emerging in or from the work environment that could impede safety of operatives.

**Safety policy:** is a strategy and commitment together with the arrangements on ground to create adequate safety education among workers on hazards related to their work and the role an individual/person needs to play at work settings in ensuring healthy working conditions. The goal and essence of establishing safety practices’ code and regulations on construction sites is to prevent, eliminate, curb, limit and total eradication if possible, the occurrence of accidents and injuries during and after the construction processes and as well train site operatives on safety programmes that will put all these in place.

**Health:** Health, as defined by Longman’s Dictionary of Contemporary English, is a point of well-being both in body and mind and free from unknown injury. It is also defined according to Hughes and Ferret, (2005) as the assurance of the body and psyche of individuals from anticipated injury coming about because of materials, procedures or strategies utilized as a part of the working environment.

**Safety:** AccordingGray (1990) safety is key to achieving success in construction project, is a state of being free from harm. In other word Safety is a state of being secured from accidents, hazard, injury or death due to measures put in place to prevent such from happening.

**Accident:** Accident is therefore an impromptu occasion that resort into injury of individual or damages to property, plant, materials or environment or loss of business opportunities (Hughes and Ferrett, 2011).

**Productivity:** Jarkas and Bitar (2012) define productivity as the ratio of using total input such as labour, materials, equipment, energy and capital to produce total output based on two measures.

**Site operatives:** Site operatives in this research work are refers both skilled, semi-skilled and unskilled workers engaged in the physical construction of a building.

**CHAPTER TWO**

 **LITERATURE REVIEW**

**2. 1 Introduction**

The chapter is reviewing renowned authors’ published and unpublished works on issues regarding safety practices, compliance and management on the construction sites. Sub topics will covers area such as the operation of Nigerian construction industry, health and safety management, challenges facing the implementation and compliance with health and safety practices, safety performance and productivity, the roles and importance of various code and regulations on safety practices, among others shall be considered.

Alli (2008) defined Occupational Safety and Health (OSH) as the study of the expectation, acknowledgment, assessment and control of hazards emerging in or from the work environment that could impede the safety of operatives. Safety policy is a strategy and commitment together with the arrangements on ground to create adequate safety education among workers on hazards related to their work and the role an individual/person needs to play at work settings in ensuring healthy working conditions. The goal and essence of establishing safety practices’ code and regulations on construction sites is to prevent, eliminate, curb, limit and total eradication if possible, the occurrence of accidents and injuries during and after the construction processes and as well train site operatives on safety programmes that will put all these in place.

**2.2 Concept of the Study**

According to the proponents, proactive measure plays significant role in achieving safety compliance on construction projects. Ivonne, Andrade, and Herrera (2012) explained meaning of performance indicators as 1) lagging indicators, which refer to what has occurred in the past; 2) current indicators, which refer to what is occurring now; and 3) leading indicators, which refer to what may occur in the future. According to Shamsuddin *et al.,* (2015) proactive safety approach help to maintain workers, reduce claims and delays, save lives, and enhancing operations output and gain while strengthening the company’s reputation. Oostakhan, Mofidi, and Talab (2012) added that proactive measure is a useful tool in raising the level of workers safety behaviours. Khan, Rathnayaka and Ahmed (2015) noted that safety should address issues beyond lagging indicators and focuses more on human behaviour and culture that improved safety performance on construction sites. Safety experts also addressed benefits of lagging indicators and added that they do not give adequate data or understanding to successfully maintain a strategic distance from future mischances. Glendon and Mckenna (1995) recognized various reasons why accidents information, or comparative result information, are poor about safety policy: they are inadequately dedicated, reviewed, and overlooked chance introduction.

Laitinen, Marjamaki, and Paivarinta (1999) expressed that it was practically difficult to utilize accident as a safety policy on construction sites. This was a direct result of arbitrary variety, where many locales would have no mischances, and it was impractical to decide if the destinations with zero casualties are more secure than destinations with minor mishaps. Perceiving such inadequacies, numerous researchers advocated a move to utilizing proactive, driving pointers (Flin, Mearns, O'Connor and Bryden, 2000; Cooper, 2000; Mohamed, 2002; Choudhry and Fang, 2005; Hinze, 2005). Interestingly, driving pointers are measures which were not really authentic in character yet it could be utilized as indicators for future safety execution. This are situations, occasions, or approaches that go before an episode and have a prescient incentive as to a mischance/occurrence/dangerous conditions.

Ismail, Ahmad and Ismail (2012) noted that implementing a proactive safety measures will lead to improved safety performance, significance reduced injury rates and cost to managing it, improvement on co-operation, involvement and communication between management system, ownership of safety by workforce, enhanced acceptance of responsibility for safety and better understanding of the relationship between safe behaviour and accidents. However, from the above literature, it can be observed that studies on proactive measures modified workers safety behaviour on construction sites are hard to come by in Nigeria. This is due to its active role of modifying the behaviour of workers which will reluctantly yield a greater influence in improving safety behaviour (Mat Zin and Ismail, 2011). Hollnagel, Wears and Braithwaite (2015) argued that safety management must look ahead and not only try to avoid things going wrong, but also try and ensure that they all went right.

Shamsuddin *et al.,* (2015) added that developing a proactive safety culture mighty take longer time and required investing large sum of money on planning, investigating and implementation of proactive safety culture into each level within the organization. Once it succeeded, the relative rewards will be achieve in terms of competitive advantage, quality, reliability and profitability within organization. Idoro (2008) added that factors that causes construction accidents and injuries should be controlled by adopting proactive approach that looked ahead in dealing with the problems before they occurred.

On other hand judging from the inspiration of David in the holy bible “*Then Saul dressed David in his garments and put a bronze helmet on his head, and put a coat of armor on him. Then David fastened his sword over his armour and tried to walk, but he could not because he was not used to them. And David said to Saul, “I cannot go with these, because I am not used to them. So David took them off (1 Samuel 17:38-39 Amplified Bible)”.*

**2.3 Historical Background about the Operation of the Nigerian Construction Company**

Construction activities is believed to have been in existence as humanity, while building project in Nigeria started as early as 1930’s. Construction activities were executed via public works department (PWD) and Royal Army Engineers who later became (Nigerian Army Engineers). The only means of project execution then was through direct labour. However, British and Italian construction companies were first to be engaged as contractors in the Nigerian construction industry in the 1940’s (Olowookere, 1985). Construction industry is also considered as labour intensive because, labour cost amounts to 40-65% of the overall cost of a project according (Rao, Sreenivasan and Babu 2015).

The construction companies in Nigeria operate majorly in two categories, multinational construction companies and indigenous construction companies as expressed in Idoro (2007) and Ogbu (2011). Ogbu (2011) and Ogunbanjo (2010) quoted the Nigerian Oil and Gas Industry Content Development Act 2010, definition of Nigerian indigenous company as one who registered under Companies and Allied Matters Act and having not less than 51% of Nigerian shareholding. Ogbu (2011), Ibrahim, Daniel and Alkizim (2014) and Ibrahim, Githae and Stephen (2014) explained that an indigenous construction company can be view as the Nigerian owned firms, whose establishment and man power resources are sourced in Nigeria, and their strength determine their level of operation in terms of project handling. Majority of government financed project and public-private-partnership project enjoy the engagement of foreign firms in execution of their project, due to adequacy of technically demand, skillful managerial competence, good planning, robust financial management, diversity in construction methods compared to indigenous firms who depend on individuals client for the award of building contracts as viewed in (Enshassi, Mohammed, Mayer and Abed 2007; and Idoro, 2007) studies. The activities of the indigenous construction companies contribute significantly to the attainment of national development aim of providing infrastructure, employment and implementation of construction projects in Nigeria (Osei, 2013).

 In addition, Idoro, (2010), Ibrahim, Daniel and Ahmad (2014) and Ibrahim, Githae and Stephen (2014) postulated that about 50-100% public and private clients involves Nigerian Indigenous construction companies in traditional and non-traditional procurement system. These greater percentage of projects executed by indigenous construction company in Nigeria have largely experienced different level of accidents and injuries. Incidences of accidents and injuries are common occurrence on construction sites undertook by indigenous construction companies. However, no reliable figure that can attest to exact numbers of construction accident in Nigeria, but in Idoro (2011), it was established that high rate of accident and injury were noticed among the indigenous companies at a ratios of 2 accidents per 100 workers and 5 injuries per 100 workers. As matter of fact, the risk of serious injuries are almost three times higher than that of foreign contractors operating in the country (Agwu and Olele, 2013; Muiruri and Mulinge, 2014). Indigenous construction companies still represent one of the most dynamic and risky business in Nigeria because of the occurrence of accidents and fatalities compared to multinational companies.

Construction industry have been known for its physical nature due to the activities of works embedded in the building production process. It can be argue that, the physical nature of the industry have direct impact on the operation of workers both in developed and developing countries (Babu, 2015). Health and safety is a major factors in ensuring that, construction project fully attained it objective within the estimated budget with minor or no accident. In the same vein, Muhammad, Abdulateef and Ladi (2015) opined that, workers compliance with health and safety regulations will have a positive influence in assessing workers quality delivery and productivity of construction projects. Dodo (2014) added that health and safety is an unavoidable aspect of construction process with the contributions of different tradesmen and professionals at each production stages. Ogbu (2011) argued that what determines indigenous construction company in Nigeria, is the utilization of indigenous management staff and the joint ownership by the Nigerian. They are mainly seen as ‘medium and small size firms. However, irrespective of the category of their operations, construction industry contributes largely to the economic outcome of every nations; by creating employment opportunity and incomes for the populace as asserted by (Rameezdeen, 2007; Myers, 2008; Dlamini, 2011; and Nyoni and Bonga, 2016).

In view of this, Idoro (2010); Okoye, and Okolie (2012); and Muhammad, Abdulateef and Ladi (2015) stated that multinational construction company are better than the indigenous construction company in quality performance based on this three criteria: ‘workmanship’, ‘percentage of retention fees collected for the projects when completed’ and quality of materials used for the projects. Multinational construction company’ was considered to have better advantage to indigenous construction company in terms of performance and compliance. There exist some critical factors that need assessment. The operation of works both in the multinational construction company and indigenous construction company are being carried out by the same workers who are Nigerian. Idoro (2007) and Ogbu (2011) contended that multinational construction company have been considered to have better knowledge about safety regulations than indigenous construction company but it can be established that none of them have performed better than another in terms of safety practices and compliance.

**2.4** **Current State of Construction Safety Practices and Performance**

Safety can be viewed as a point at which all associated risks with a particular job are well managed in a reasonable manner (Brueggman, 2001). Weick (1991); Brueggman (2001) and Ahmad, Iqbal, Rashid, Iqbal and Roomi (2016) defined safety as unique event that is paramount to continuous attainment of productivity. In the same vein, Ahmad, Iqbal, Rashid, Iqbal and Roomi (2016) opined that safety focus on curbing accidents at work setting and its negative effect on the workers in all manner. Assessment of various researchers such as: Aniekwu (2007); Idoro 2011; Okolie and Okoye (2012); Idubor and Oisamoje (2013); Dodo (2014); and Umeokafor *et al.,* (2014); on provisions and management of safety in construction project reveals that adoption and compliance with health and safety provision served as catalyst in optimizing construction production process. On the other hand, without compliance to health and safety practices, more accident will result in pains, accidents and legal actions thereby escalating production cost. Based on this, Famakin & Fawehinmi (2012) stated that safety practices are parameter to measure successful project delivery which is most paramount to the client because they greatly influenced in achieving efficiency and effectiveness amongst professionals and even workers in the construction industry.

The anomalies as seen in the construction firm’s failure to comply with minimum requirement of health and safety practices might cause the victim waste of time and loss of money to the firms. Although construction firms may be covered with life assurance for their staffers from certain direct costs resulting from injury suffered, however some tectonic cost may be involved which cannot be insured against, such as loss of trained personnel, loss of production hours due to other operatives stopping the progress of the work out of concern or assisting the injured persons (Aniekwu, 2007). Thus, the lack of adherence to safety practices will delay the production process of construction activities.

Several attempts have been considered by the construction industry towards improving its safety performance. However, the paradigm shift from monitoring safety performance to preventive measures of improving safety performance. Ikechukwu, and Dorothy (2013) and Muhammad, Abdulateef and Ladi (2015) stated that some of the developing nations like Nigeria among the developing nations that lacks adaptive laws and regulations on health and safety practices. The study added that, effective management of safety practices are aided by various factors such as: socio-humanitarian perspective, and financial-economic perspective. George, Geoffrey and Matthew (2013) added that construction company should provide awareness particularly on each project, that covers an outline of the project, a top to bottom survey of the safety necessities and desires, clearing arrangements and systems, disciplinary activities, substance manhandle testing policy and proactive management methods needed for the project.

A nationwide survey was conducted by Boustras, Hadjimanolis, Economides, Yiannaki and Nicolaides (2015) on management of health and safety of micro-firms in Cyprus. The study looked at the determinants factors of safety performance at the work environment in small scale firms. The study was purposive in nature, therefore copies of structured questionnaire were used to gather data needed. Going by the outcome of the study, work settings safety in small scale firms can be improved by embracing “training”, “risk assessment,’ and “safety policy formulation.” The research findings showed that, the nature and characteristic of management systems demonstrated in an organisation, methods designed for attaining work objectives, and resources available have significant influence on small scale firm. The study contradict some previous research outcome on the ground that adoption of “quality management system” cannot be said to have significance collaboration with safety outcome in the final model.

Awwad, El Souki and Jabbour (2016) examined construction safety practices and challenges in a Middle Eastern developing country. Face to face survey were conducted using structured questionnaire with the construction practitioners, insurance firms and government agencies. The findings of the study however showed the availability of construction labour safety law but lack necessary implementation, absence of monitoring, failure of safety awareness and inadequate support from all the participant concerned with implementations of safety practices on construction sites. This study called for appropriate awareness within the construction firms’ which mighty be of helpful in curbing this challenges.

Kolawole (2014) assessed safety measures on building sites: a case study of Minna, North Central Nigeria. The study examined safety approach adopted in Minna construction firms, it also evaluates if implementation of safety regulation will reduces workers claim for accident on sites or motivate them for better performance. Population needed for the study were randomly selected among building construction firms through copies of structured questionnaire. Result from the analysis noted that site workers embraced “safety training” as this enhances their performances and reduced accidents on site and also government did not have well defined safety act for construction activities. The study recommended training and re-training of their workers on the relevance of safety practices, while government should develop and enact “safety act” for controlling site based injury.

Idoro (2011) studied effect of mechanization on Occupational Health and Safety (OHS) performance of the Nigerian construction industry. This study evaluated the level of mechanisation and its relationship to the Occupational Health and Safety (OHS) performance in the industry and also established impact of mechanisation on OHS performance and implored the commitment of contractors to effective OHS management. Questionnaire was adopted and analysed by percentages, means, *t*-tests and Spearman’s correlation tests. The results of the study indicated that increase in mechanisation also increased the rates of accident and injury occurrences. This study concluded that failure to effectively manage mechanisation worsen OHS performance on project sites. However, construction managers should devise means of effective measures that will implement control of OHS performance before using new or additional safety wears.

Agwu (2012) conducted a study on total safety management (TSM) an approach for improving organisational performance in selected construction firms in Nigeria. The study adopted stratified and random sampling technique for the copies of questionnaire distributed among the selected six most famous construction firms operating in Nigeria, they include: (Julius Berger Nigeria Plc, Setraco Nigeria Ltd, Fourgerolle Nigeria Ltd, Arab-Contractors Nigeria Ltd, Dantata & Sawoe Nigeria Ltd and Costain Nigeria Ltd). The outcome of the research suggested that integration of total safety management as part of the organisational policy would lead to improving safety practices on construction projects. The study therefore recommended that, to sustain the advantage of total safety practices in Nigerian, operatives need to maintain good attitudinal behavior and structural modifications in management of construction safety. Babu (2015) study aimed at investigating safety performance on the construction sites. The study soughed the opinion of construction participant using copies of structured questionnaire to appraised safety performances on their construction sites. The outcome revealed inadequate support from the government, insurance companies, ministry of labour, and construction participant.

Okoye, Ezeokonkwo, and Ezeokoli (2016) studied building construction workers’ health and safety knowledge and compliance on sites in Anambra State, Nigeria. The research employed Mean Score Index and Pearson’s Product-moment Correlation Coefficient (**r**) to analyze the data randomly sampled from the fifteen (15) selected construction sites in the study area. However, the outcome of the research showed that, low safety awareness and compliance among the sites operatives, this resort into low project performance. The study recommended that, knowledge and compliance with health and safety practices alone cannot achieve optimum project performance, it would require safety culture which encompassed other factors are as follows: management commitment, workers involvement and strict enforcement of safety regulation should be adopted. In view of this, Akinwale and Olusanya (2016) studied implications of occupational health and safety intelligence in Nigeria via cross-sectional research design and risk society and sense-making theories’. The study conducted 15 in-depth interviews ranges from the managers and senior staffer of the selected organizations in Lagos State, Nigeria. Data were subjected to content analysis and ethnographic technique. However, the study affirmed that managers and employees are the major target of occupational health hazards, such as loss of man-hours, productivity, and job security. High level of awareness on the importance of occupational safety was recorded but inadequate investment in the capacity building on safety’ programmes in the organisation. The study therefore recommends good policy on occupational health with adequate investment in precautions and safety intelligence will enhance individual and organizational development in Nigeria.

 **2.5 Construction Operatives’ in Nigeria**

Construction industry always attract different participants working together to perform one tasks or the other which are interdependence and each of this operative input are required in meeting up clients satisfaction in all ramification. Wahab (1991) cited in Fagbenle *et al.,* (2011) viewed site operatives as core that linked other construction resources together (materials resources, plants and equipment, and finance) to achieved project expected outcome. Assessment of projects success is incomplete without mentioning their contributions. In addition to site operatives’ contribution to success factor of construction industry, they also facilitates high productivity, less supervision, ensure company’s competitiveness and reduction of accidents rate.

Site operatives are needed to perform specific tasks which could or/and could not be done mechanically. Currently, construction industry employs different categories of operatives on site for the executions of building production process. This includes: skilled and unskilled labours that falls undertake the following tasks Masons and plasterers of walls, Carpenters/Joiners, Electricians, Painters, Glaziers, Roofers, Tilers, Floorers, Steel benders & fixers, Scaffolders, Plumbers, Plants and Equipment operators, Plants and Equipment etc. their operations are under the supervision and control of the professionals in the built environment in ensuring stated objectives of the project are met. Since each items of work comes with their associated risks, (NBC, Sect.13.12.4) specifically empowered registered builder to take up the responsibility managing construction of building works including supervision of artisans and tradesmen.

Previous studies conducted by Fagbenle (2004); Alinaitwe *et al.,* (2007); Ruchi (2012); Kuroshi andLawal (2014); Durdyev and Mbachu (2011); Bilau, Ajagbe, Kigbu and Sholanke (2015) established the importance of site operatives and their vital contributions to the industry. They jointly opined that construction sector is the major users’ of human resources after agriculture however, they are confronted with shortages of technically required of skilled craftsmen which affected productivity, work quality, projects duration and company’s’ profit.

**2.5.1 Skilled labour Operatives’**

Wikipedia defined skill labour as one capable of working independently and efficiently and turning out accurate working. Skilled labour are characterised by the virtue of their training. They involves complicated tasks that need special skills, education, training and experience that must be demonstrated on any given task. The personnel under the skilled labour are of different abilities ranging from apprentices to trades foremen or supervisor. The apprentices can be regarded as beginner who is willing and interested in learning a certain trades. The three possible avenue of training people are school, workshop and field (Husseini, 1991). Those that falls under this category are Masons and plasterers of walls, Carpenters/Joiners, Electricians, Painters, Glaziers, Roofers, Tilers, Floorers, Steel benders & fixers, Scaffolders, Plumbers, Plants and Equipment operators, Plants and Equipment.

**2.5.2 Semi-Skilled Operatives’**

Semi-skilled operatives’ are regarded as people who are able to work under adequate supervision and control. Though they have vast knowledge of the task to be undertaken but they cannot be regarded to as tradesmen. Semi–skilled operatives’ are knowledgeable enough to follow instructions, take direction and safety rules and work with caution. This category comprises assistant operator, security guard, assistant electricians, iron-benders’ helper.

**2.5.3 Unskilled Operatives**

Unskilled operatives’ are the workers that require no definite or specials skill to carry their tasks (Wahab, 1991). They are the category of operatives that of low skills or limited economic value for the work they performed. They are categorized by the levels of their wages and education at times because e their task require no specific training, experience, or education.

Their performance remained the yardstick to measures their wages, though due to familiarity or judging by the previous similar job experience it might help in setting a standard of work to justify their wages. Labourers on site fall into this category

**2.6 Gaps between worker competence and productivity**

Though, the importance of site operatives cannot be over emphasized in the industry, because they can single handedly eliminate inconsistence arising from poorly constructed projects (Bilau, *et al.,* 2015). In Nigeria, high demand for aestheticism and quality by the clients has also raised some concern amongst contractors about inadequacy of skilled and qualified manpower, needed for construction activities this has warrant kin interest in further training and development of workers. Kuroshi (2015) define skills gap as a point when worker did not have all the necessary skills to perform his/her job effectively, it can also be refer to as the situation where a firm has employees but they are not skillful enough to meet the organizations’ quality expectation.

Kuroshi (2015) noticed skill gaps in Nigerian construction industry, especially on lack necessary knowledge, skills and experience required from the Artisans and Craftsmen to undertake their duties competently. He stressed that what most of the artisan possesses are simple skills that was learnt informally and/or on-the-job, and there still exit gaps between the skills required on the job and the actual skills possessed by the employees. Abiola (2004) added that the problem of rework of defective or unsatisfactory work done are mostly attributed to poor level of workmanship by incompetent skilled craftsmen.

According to Kuroshi (2015) professional that will manage building production process is expected to possess the following technical skills namely: Building drawing skills, Surveying, landscaping and site preparation skills, Foundation skills, Ability to use machines for construction, Ability to use hand tools for practical work, Brick and block Laying skills, Roofing skills, Masonry skills in building, Concreting and reinforcement skills, Carpentry and Joinery skills, Final Finishes skills, Plumbing skills. While advanced skill required are as follows: Technical skills, Leadership skills, Multi skilling, Team-working skills, Customer skills, Safety implementation skills, regulation compliance and customer relations. Otherwise construction activities will always resort in poor workmanship and building failure.

**2.7 Workers productivity**

Safety practices in construction projects have received several attention of the researchers over the year, but how safety compliance affect worker productivity and performance requires some attention. Productivity is as simple as getting output from input. Jarkas and Bitar (2012) defined productivity as the ratio of using total input such as labour, materials, equipment, energy and capital to produce total output based on two measures namely: total factor productivity (TFP) and partial factor productivity (PFP) as parameter commonly used to determine productivity on construction projects.

Expression in as shown in Equation 1:

Eq. 1 TFP = Total output

Σ[labour+materials+equipment+energy+capital]

The second measure of productivity is the partial factor productivity (PFP), which is expressed as the ratio of the outputs to a single or selected set of inputs. One of the most commonly used PFP measures in construction is labour productivity, which is defined as the ratio of output to labour input; the output is measured in terms of the quantities installed, and labour input is measured as work-hours.

Expression in as shown in Equation 2:

Eq. 2 Labour productivity Output quantity

Labour hours

The data for computations of the total factor productivity are relatively difficult to obtain, but the measurement process becomes much easier and more controllable when a partial factor measure such as labour productivity is used (Jarkas and Bitar, 2012). Umoh and Torbira (2013) added that Profitability is a quantitative or factually weighted measure of how effective a given arrangement of destinations are.

**2.8 The perception of safety practices and** **workers productivity.**

Attar, Gupta and Desai (2012) viewed productivity as one of the key performance to measure the significant of every organization, irrespective of their size in today‘s competitive market. It is believed that, workers daily activities can go on smoothly when available safety wears are used. The use of safety wears would absolutely protect and reduce the level of damage to the affected workers. However, contractors do overlook their workers compliance to the use of safety wears because they perceived using safety wears would increase the time taken by the workers to complete their daily output, which in turn impedes their productivity (Irizarry, Simonsen, and Abraham, 2005).

Umoh and Torbira (2013) worked on safety practices and the productivity of employees in manufacturing firms. The study uncovered that there is certain and critical connection between the availability of safety wears and workers productivity. Famakin & Fawehinmi (2012) stated that provision of safety plan and policies/programs such as welfare facilities, workers motivation, enabling working tools and environment, provisions and use of safety wears has positive result on productivity, hence increase profit.

Thomas and Sudhakumar (2014) studied factors influencing construction labour productivity an Indian case study. The study methods includes discussions with construction stakeholders on project sites to identify factors impeding labour productivity in Kerala. The study questionnaire were structured into three sections, preliminary pilot-tested on a small sample and analyses by multiplication of the importance and frequency indices which in turn yielded a severity index (SI). The top five factors identified as having a significant impact on productivity: (i) timely availability of materials on worksites, (ii) delayed in material delivery by the suppliers, (iii) strikes caused by political parties, (iv) frequent change in design resulting into additional work/rework and (v) prompt available of drawings on worksites.

Umoh and Torbira (2013) contended that accidents does not just diminish profitability, it added directly and indirectly to the cost of production. Therefore, a huge connection between legitimate institutional safety policies and the production output formed a critical connection between employer’s compliance to safety control and man hour put in place for workers operation. However, safety personnel ought to be utilized to deal with safety challenges confronting the operations of workers. Umoh and Torbira (2013) stressed that enhancing safety strategies for operatives’ has incredibly affected and still impacts productivity, however this is not without some noticeable deficiencies. Safety at work in this regards has throughout the years been viewed as the hob of expanded operatives’ profitability.

Rao, Sreenivasan and Babu (2015) defined productivity in construction as the units of work output per man hour, thus the rate of effective output to available resources on each task. Resources is made up of labour, capital, man power, raw materials. Yisa, Holt and Sakari (2000); Adnan (2009); Adjei (2009); Fagbenle, Ogunde, and Owolabi (2011) noticed decline in productivity on construction projects. There are number of literatures that extensively discussed factors affecting workers productivity on construction sites take for example, Lim and Alum (1995) noticed seventeen factors that affected workers productivity in Singapore of which difficulty in appointing site managers and workers output topped the list. In Malaysia, shortage of materials on sites was ranked first out of fifty factors that affected workers productivity as researched by (Abdul Kadir, Lee, Jaafar, Sapuan, and Ali 2005). Consequently, in New Zealand the most significant factors affecting workers productivity were re-work, skills and experience of the workers according to (Durdyev and Mbachu 2011).

In Uganda, Alinaitwe, Mwakali, and Hansson (2007) studied factors affecting productivity of building craftsmen. Thirty six factors that have direct link to time, cost and quality were ranked, improper supervision and inadequate skills among workers were the most significant factors affecting workers productivity. The study concluded that, productivity of worker is very important, especially in developing countries, where most of the building construction works are manually operated. Shashank Supata, Kabin, and Nath (2014) categorized factors affecting workers productivity into eight, such as: environmental, manpower, managerial, material/ equipment, motivation, safety, and quality. The study concluded that out of these eight categories, motivation is the most significant of all on workers in enhancing productivity.

Rao *et al.,* (2015) did similar study on ‘Labour productivity-analysis by ranking’, noticed sixty one (61) factors and they were classified into six group, namely: i. labor ii. management iii. Design / build-ability iv. Tools and equipment v. Natural vi. Miscellaneous, they were later divided into client and contractor factors. Reliability analysis test showed the factors that are significant to workers productivity include: political influence, economic slowdown/Recession, government regulations, accidents during construction, health and safety factors and poor co-ordination between different departments were enumerated. Dozzi and AbouRizk (1993) and Funso, Samml and Gerryshom (2016) opined that, workers motivation, safety practices at work, environmental factors and physical limitation are regarded as factors that increases labour productivity. From the fore-going, there is no consensus in the previous studies on if wearing safety wears was part of the identified factors that affect workers productivity on construction projects. However, the focus of this study is on the perceived effects’ of safety wears on site operatives’ daily output.

**2.9 Causes of Accident on Construction Sites**

The causes of occupational accidents have been classified into unsafe conditions and unsafe behaviour. Elufidipe (2009) believed that accidents occurrence can be attributed to either unsafe working conditions or unsafe acts. The study stressed that some accidents occur by giving operatives task that they are not trained to undertake, such tasks could be summarized as follows: improper handling of tools or equipment, failure to use safety wears/personal protective equipment, Unsafe loading, arranging and placing, unsafe exposure to hazardous materials or tools. In arguing the cause of accidents and injuries on projects sites, the artistic perceptions of the causes of accidents on construction sites were viewed in diverse opinions such as ‘accident is an act of God,’ ‘accident is as a result of unknown causes, unsafe conditions, and unsafe acts (Idubor and Oisamoje 2013), ‘accidents happen due to bad luck or people’s ignorance’ (Guldenmund, Cleal and Mearns 2013).

However, Abdelhamid and Everett (2000), Mullen (2004), Sadullah and Kanten (2009), Mui Zin and Ismail (2011), Oostakhan, Mofidi, and Talab (2012) and Solis-Carcano and Franco-Poot (2014) argued that though accidents occurred due to combination of various factors, the largest proportions of the accidents causes are attributed to unsafe behaviours rather than unsafe conditions. This was corroborated with Sherratt (2014) argument that, people that operates in the industry are responsible for the problem of the industry. Smallwood (2002) viewed accidents as part of the building production process that is unavoidable because construction industry is inherently dangerous, therefore, compliance or non-compliance with safety regulations will abridged the importance of safety regulations. The research of Aniekwu, (2007) on accidents and safety violations in Nigerian construction sites identified human factors as the major cause of accident and it will require pro-activeness of safety managers to effectively coordinate both human and materials resources on site. This was against the view of Kolawole (2014) as workers indiscipline, inadequate communication and site characteristics were expressed as causes of accidents. Okoye (2012) listed out the following: working bare footed, use of bamboo scaffolds, hand mixing of concrete without protective safety wears as some of the unsafe practices among workers on construction sites in Nigeria.

In arguing the cause of accidents on construction sites in Nigeria, Lehaney, Diugwu, Willemyns and Hosie (2012) noted that the failed occupational health and safety system in Nigeria could be traced back to weak statutory regulations and provisions. Umeokafor *et al*., (2014) study unearthed key issues affecting health and safety compliance in Nigeria as owner`s character and lack of clarity in the health and safety provisions, inadequate enforcement and lack of adequate regulations. The outcome of Okeola (2009) study articulated that, workers are prone to injuries at work setting because they lack appropriate approach and right attitude in which contractors disregarded compliance with Occupational Health and Safety (OHS). According to Dodo (2014) meaningful safety practices for construction workers has not been embraced.

Interestingly, numerous authors has contributed to the issues of safety practices in managing building production process with different view on causes of construction accident, but there have been little effort to bring together major causes and factors responsible for construction fatality in unified state. Therefore, all the identified causes are brought together and classified from the literature in order to establish the critical factors responsible for the cause of construction casualty.

**Table 2.1 Different categories causes of construction casualty**

**Factors Authors**

**Artistic perception**

Accidents are acts of God. (Idubor and Osiamoje , 2013)

Accidents are the results of bad luck or ignorant of workers. (Guldenmund, 2000)

Unknown causes, unsafe conditions, unsafe act. (Human Performance Technologies, 1998)

Organizational, weather conditions and cultural factors. (Reese and Eidons, 1999).

Individual competence and attitudes, Project characteristics. (Torner and Pousette, 2009)

Organization and structures Collective values, norms, and behaviors.

Accidents are caused by physical natures of the construction (Hinze, 1997)

sites and worker actions.

**Managerial category**

Subcontractors lacks safety commitment due to resource limitations. (Wong and So, 2002).

Lack of awareness, absence of personal protective equipment, (Berger, 2008 and Farooqui, first aid and safety managers. Arif, and Rafeeqi, (2008).

Indiscipline, inadequate communication and site characteristics. (Kolawole, 2014)

The repetitive nature of the construction projects, the transient nature of (Rowlinson and Lingard, 1996)

work, patronage of uneducated workers and high levels of subcontracting.

Inadequate supervision of safety and health on construction site. (Reese and Eidons, 1999).

**Technical category**

Knowledge gap, lack of will, and especially lack of means (Champoux and Brun, 2001).

Lack of resources (technical and financial) to identify, address, and (Rigby and Lawlor, 2001).

control risks and operational hazards.

Heavy machinery and working under unfavorable conditions. (Hallowell and Gambatese, 2009)

The use of migrant workers in construction. (Balch and Geddes, 2003).

**Work environment and condition**

Organizational structure, ineffective channels of communication,

unclear instructions, lack of safety culture, (Ismail, Doostdar and Harun,

codes and standards, training, leadership and responsibility. 2011)

“Lack of clients support, and inadequate work procedures” (Bust and Gibb, 2006, Awwad *et al.,* 2016)

Willingness of low wage workers to ignorantly take risks in keeping (Koehn and Reddy, 1999;

their jobs. Guldenmund *et al.,* 2013).

**Regulations enforcement**

Corruption, improper enforcement of laws and regulations. (Koehn *et al.,* 1995)

Lack of enforcement of construction labour safety law, absent of (Awwad, Souki, and Jabbour

monitoring or follow-up, and lack of safety education and commitment 2015)

from all parties involved.

Inefficacy of regulations and policies. (Alkilani *et al.,* 2013).

Weak safety regulatory authority or non-existent, and workers (Lee and Halpin, 2003)

cursorily support regulations”.

Weak statutory OSH regulations and provisions. (Diugwu, Baba, and Egila, 2012).

“Limited legislation governing Occupational Health and Safety (OHS) (Enshassi *et al.,* 2008)

and lack of attention for general conditions of workers”

Sources: *Author literature survey, 2016*

**2.10** **Overview of Personal Protective Equipment (Safety Wears)**

Safety management and accident prevention remained an issue of debate in construction industry. Personal protective equipment (PPE) is a preventive safety wears against the occurrence of injuries at work. According to the International Labour Organization (ILO) codes of practice, it is important for employers to make available personal protective equipment (Safety Wears) appropriate for the nature of work to be carried out. Safety wears should fit perfectly and be suitable to work with. In order to properly use safety wears the nature and degree of the anticipated risk must be studied, known and then selection of appropriate safety wears should be in conformity with the specified standards. Users must be trained on right usage and adequate maintenance must be provided for safety wears after use.

Farooqui *et al.* (2007) opined that, unsafe conditions coupled with the use of improper safety wears contributed to high rate of accidents in construction industry. In the same vein Abdelhamid and Everett (2000) believed that, continuous monitoring of safety wears compliance and framing comprehensive purchase policy are the responsibility of safety department. In Prasad and Rao (2013) study, safety wears was at the last stage of hierarchy of controls and its enforcement will be implemented after engineering and administrative controls**.** Management is responsible for training, monitoring and compliance with the use of safety wears in ensuring workers safety on construction sites. The provision and use of safety wears can be significant element in terms of accident prevention and control on construction sites. Krishnamurthy (2006) conducted study on safety in high rise design and construction, the study argued that workers ignorance, negligence, carelessness and over-confidence were the major perceived reasons workers disregard wearing of safety wears properly.

Winder and Makin (2006) and Prasad and Rao (2013) opined that, safety can be achieve through systematic approach (engineering controls, administrative controls and implementation of personal protective equipment usage) or hierarchy of control (elimination, substitution; isolation; administrative controls and personal protective equipment). Systematic approach to occupational health safety management system offers better approach than the five traditional treatment options agitated by the hierarchy of controls. Safety wears can enhance the safety of worker as indicated in some of the past research studies.

Abdel Hamid and Everett (2000) conducted depth study by arranged causes of low use of safety wears into human and physical elements. Human elements neglected to wear individual defensive hardware such as: safety wears, clowning around, working at risky speed, individual component, evacuate security gadget, overhauled moving and empowered wears, took hazardous position or stance, and utilized inadequate device or hardware, and other dangerous activity. While, physical elements were because of perilous demonstration of someone else dismiss known endorsed strategies, deformities of mischance source, dress or attire risk, ecological danger, fire danger, dangerous course of action, risky strategy, housekeeping peril dishonorable task of work force, insufficiently protected, open danger, and other hazardous conditions.

Safety wears is not necessary, not adequate, and inconvenience were some of the reasons responsible for non-compliance with effective use of safety wears among the workers. In Osonwa, Eko and Ozah (2015) study of utilization of safety wears among wood factory workers in Calabar municipality, Southern Nigeria. However, the finding further revealed the need for training on the use of safety wears this could create awareness on the implications of inhaling wood dust on workers’ health.

**2.11 Some of the Personal protective equipment (Safety wears) for construction work.**

The choice of selecting appropriate safety wears is based on the anticipated hazards. However, some of the safety wears for the construction work include: hardhat, safety glasses or face shield, respirator, body protective wears, gloves and safety foot wears.

1. **Head Protective wear**

Safety helmets or hard hats is the name of safety wear use to protect human head from injury of falling or flying objects, or due to striking against objects or structures”. Most of the safety Regulations clearly include the use of safety helmet before visitor or workers can gain entrance to construction site, especially where the possibility of falling object is high to avoid head injury.

Safety helmets or hard hats has reinforced ribs on top for impact strength, a rain gutter round the side and rear to guide water away, and can be fitted with a chin-strap. Helmet also has an adjustable in-built safety visor, which can be easily pushed up out of the way if required. The whole helmet is light and quite comfortable (ILO Construction OS&H). Manufacturers have adapted hardhats so that ear protection and face shields may be easily attached. Hardhats are adjustable so a liner can be worn during cold weather. A chin strap is advantageous when work involves bending and ducking. It also helps secure the hardhat to the head when full-face masks are worn. Face shields that attach to hardhats provide added protection. A combination that leaves no gap between the shield and the brim of the cap is best because it prevents overhead splashes from running down inside the face shield.



Figure 2.1 Hard hat

1. **Eye Protective wear**

A face or clear goggles, shield and other suitable gadgets must be use used when there is possibility of physical hazards or the eyes is being exposed to face injury from airborne dust or flying particles, in particular during welding, flame cutting, rock drilling, concrete mixing dangerous substances, harmful heat, light and other hazardous work. There should be standard safety wear for respiratory protection is a half-face mask with no face shield. Both safety glasses/goggles and a faces shield are recommended so far they are transparent. However, it is not advisable to wear contact lensesin situations where workers are to use hazardous chemical. Face shields and gogglesmust be worn in combinations in a situation where work operations such as grinding that involves flying particles or corrosive materials are to be carried out.



Figure 2.2 Eyes protection wear

1. **Ear Protective wears**

Ear protective wear is good for workers working under the exposure to high levels of noise, which could lead to irritability. Noise reduces workers’ ability to concentrate and hearing damage can lead to accidents. Earplugs or muffshelp when noise coming from a particular task become unbearable and problematic, such as working around heavy machinery and impact tools. Hearing protection gadgets must be used, especially for persons working in areas such as high-volume pumps, power drilling machine, skid units, pile drivers, jack hammers, impact tools, grinders, saws.



Figure 2.3 Ear protection wear

1. **Foot Protective wear**

Building construction process generates lot of waste on sites, workers are prone to accidents due to penetration of sharp objects like nails which have not been knocked down and crushing by falling materials, this could be drastically reduced with the use of foot protective boot. The type of safety shoes or boots to be used depend absolutely on nature of the work (e.g. the presence of ground water on construction sites), but all safety footwear must have an impenetrable sole and uppers with a steel toe-cap. There are two available styles of safety boot, they are called: pullover and shoe boot. Pullovers may be inexpensive enough to be considered disposable; otherwise they must be completely decontaminated. With chemical resistant boots, the pant leg should be outside and over the boots to prevent liquids from entering. All boots are expected to have steel toe while steel shanks must be included for the workers expected to climb ladders or travel over sharp protruding objects.



Figure 3.4 Safety foot wear

1. **Hand Protective wear**

Protective glove is highly recommended for a good tactile sense, elasticity and dexterity and as well provide necessary chemical resistance. The gloves must have ability to resist puncturing, must not be slippery, easy to use and removed. They are made of materials such as cotton, latex, nylon or leather. The nature of work anticipated determine the appropriate kind of gloves that must be used. The only place gloves may not be used are situations where the gloves might get tangled up in moving parts of machinery such as drill spindles and revolving cutting tools. The hands are as susceptible to contamination as the feet.



Figure 2.5 safety hand glove

1. **Body Protective wear**

Protective clothingagainst bodily damage from hazardous substances, gases, or vapors are available in a variety of styles and materials. The materials can be made of Tyvek which are disposable or Nomex which are durable. Both are available as overalls suitable for field use. As the hazards to the body increase, so also the level of protection needed. A splash suit made of PVC is suitable for a liquid such as an acid or base or when there will be minimal contact with organic materials. Some are inexpensive enough to be disposable. If the material is more toxic, then more protection must be utilized. Splash suits similar in design to the PVC splash suits are good barriers against toxic hazards. These are made of neoprene and butyl rubber. Toxic vapor/gases require the most complete protection, the best being fully encapsulating suits. The suit must not allow any penetration or permeation. Zippers must be properly sealed and seams properly connected and sealed to protect against vapors. Fully encapsulating suits also require the basic safety items such as safety boots and hardhat, along with a source of breathing air.



Figure 2.6 Body protective wear

1. **Orange safety vest**: Is worn where visibility is necessary.
2. **Cloth coveralls:** they are used to protect street clothes from getting soiled and are not for protection against exposure to hazardous material. They are made with an open weave that allows particles, liquids and vapors to pass through easily.
3. **Chemical splash suits:** There selection is based on the hazard anticipated.
4. **Tyvek suits**: Offers protection against particulate contaminants and other nuisances. It provided limited protection against liquids.

**g. Safety belt:** working at heights mighty be challenging with possibility of falling. However, safety regulations require employers to adopt basic safety precautions including the provision of suitable scaffolding, safe access and egress and the erection of suitable guardrails at hazardous locations. All of this must be use with safety belt.



**Figure 2.7 Body protective wear**

**h. Breathing Protective wear:** An air-purifying respiratoris a protective gadgets used to control airborne contaminants that cannot be reduced to safe levels by engineering control. It allows work to be done in a confined spaces. An emergency escape pack should be used in conjunction with an air-purifying respirator.



Figure 2.8 Breathing Protective wear.

**2.12 Factors Responsible for non-compliance with Safety Practices on Construction sites.**

The importance of operational safety regulations has been taken with a levity hand due to individual acceptance that construction accidents is an unavoidable act due to the characteristic of activities involved on project sites, thus making non-compliance with operational health and safety a common believe (Smallwood, 2002). Several authors has worked on health and safety management on construction site, but adequate consideration have not be given to the effect of safety wears on workers output. Olutuase (2014) studied safety management in the context of Nigerian industry with an intention to compare level of compliance with the international standards.The study outcome established existence of safety regulations in the management of construction projects. However, the system seems to be poorly characterised by ineffectiveness and poor documentation. The study called for urgent attention on construction managers to strictly adhere with the provisions safety regulation requirements for site management.

Ismail, Doostdar and Harun (2011) evaluated factors influencing the implementation of safety management system for construction sites. The study was conducted using structured questionnaire designed for the construction workers and as well interviewed skilled labourers. The result from the survey found personal awareness and communication to be the most influential safety management factors. It became imperative for the site managers to conduct enlightenment programs among their workers to get them familiar with the necessities safety consciousness on site. The study recommended the use of personal protective gadgets, reduction of manual work without neglecting the appropriate use of equipment and tools.

Umeokafor *et al.,* (2014) adopted strategic overview of past researchers effort on the subject of health and safety, they study unearthed reasons regarding not compliance with health and safety requirement in Nigerian construction sites, as owner’s impact and weak implementation. The study concluded that, safety personnel should consider importance of implementing safety provision to attract construction manager and contractors in building a robust safety management on construction site, while client should use health and safety records as a required document for prequalifying contractors.

Okoye, Okolie and Aderibigbe (2014) conducted exploratory study on the cost of health and safety performance of building contractors in south-east Nigeria and the correlation between the cost of performance and projects outcome. 150 copies of structured questionnaire were randomly distributed to the respondents involving the clients, contractor sand professionals across the study area and the data obtained were statistically analysed using Chi Square statistics to test the correlation. The findings shown the impact of safety performance of contractors on successful projects delivery. Similarly, it also supported opinion of the construction practitioners that, implementation of programmes and policies regarding safety management would resort in increasing the overall project cost.

Famakin and Fawehinmi (2012) studied perceptions of quantity surveyors’ on construction health & safety regulations in Nigeria. The study argued that, the industry lacks health and safety regulations and challenges like low quality, time overrun, cost overrun, absenteeism of workers due to injuries etc. affected projects objectives. Recommendation was made on the importance and inclusion of health and safety policies and programmes at the design stage, up through the completion stage because of its influence on projects delivery.

Olanrewaju, Sharafadeen, and Akinpelu (2014) conducted their study on the impact of national building code on workers’ health and safety. The study analysed divers mean by which national building code can provide succor for builders to practice and monitor the challenges associated with safety policies in construction industry. The result showed importance of National building code on safety practices and management on construction projects. However, the study scope did not cover the aspect of adoption and compliance of the code by individual construction firms sampled, and as well the impact on those firms that complied with the provision of the code. Interestingly, the level of awareness among the construction workers on safety practices have been on increase level over the year, as supported by (Muhammad, Abdulateef and Ladi, 2015; Ezeokonkwo, and Ezeokoli, 2016 and Akinwale and Olusanya, (2016). Muhammad *et al.,* (2015) assessed cost implication of health and safety on construction projects. The study affirmed high rate of accidents in the Nigerian construction industry and high cost incurred as a result of injuries and hazards on site. However, any attempt to implement health and safety programs on construction site would increase the overall cost of the projects. Therefore, non-conformance to the policy gives possibility of accidents and also will increase the overall cost of the projects. The study recommended the following: health and safety policies, safety managers/supervisor must be appointed to ensure compliance, while severe punishments should be place on any contractors who violate the said safety policy.

**2.13 Workers Perception on the Importance of safe Working Environment in enhancing Projects’ Delivery.**

In understanding and defining operational health and safety competency on construction sites using workers opinion, Dingsdag, Biggs and Sheahan (2007) assessed the feelings, skills, behaviors and knowledge of construction participants that contribute to safety culture. The study adopted structured questionnaire via e-mail and self-addressed pre-paid envelopes to obtained needed data. However, results of the study revealed that workers have four most “influential safety critical positions to be at construction sites and not at head office, workers opinion on safety culture promotion via training and education, a strong knowledge of rules and regulations, good communication and interpersonal skills, behaviour and actions that could enforce and monitor safety. The study called for an improvement on workers training and as well maximise safety practices.

Che Hassan, Basha, Wan Hanafi (2007) and Shamsuddin, Ani, Ismail, Ibrahim (2015) argued that workers knowledge and understanding of safety practices at work setting remain vital in promoting safety among themselves on construction site. Abdelhamid (2000) and Shamsuddin, *el al*., (2015) added that worker omission is the cause of construction injuries and can be view under behavior and human factor approach. Behavior approach underscores that construction workers are the original reason for fatality due to their unlimited number of costly mistakes at different stages of building production process. However, human factors approach makes suggestion that workers are the original victim of construction fatality not because of individuals’ unsafe behaviour rather, the emphases was on the working environment settings.

Hinze and Gambatese (2003) study aimed at identifying factors that impact the safety commitment of specialty contractors. The work surveyed three different specialty contractor populations through structured questionnaires by e-mail. The outcome of research shows that safety performance of specialty contractor were often affected by numerous factors that reduce workers profit. However, staff motivation were not seen as better means of safety performance. Thestudyrecommendstraining and suggest that, safety motivations shouldbe embraced with caution.

Cheng, Ryan, and Kelly (2011) studied the impact of safety and health practices on construction output. The study examined three safety management practice categories “information, process and committees”; safety management process was seen by the construction gaffers as most important, seconded by safety management information and committees. However, by testing the impact of the “three safety management practice categories on a composite projects performance the result showed that the safety management information and safety management panel categories have positive significant to project performance. The study recommended that, construction industry should embrace health and safety committee’ in managing site safety.

**2.15 Perceived Safety Education and Knowledge Development**

Neale (2013) opined that adequate training of students on occupational safety and health via cognitive education will go a long way in helping stakeholders improve the level safety awareness. In a bid to improve occupational safety and health, Kolawole (2014) assessed safety measures on building sites: a case study of Minna, north central Nigeria. The study found out that site workers embraced safety training as this enhances their performance and reduces accidents on site. In agreement, Okolie and Okoye (2012) studied building construction workers’ health and safety knowledge and compliance on site in Anambra State, Nigeria. The findings of the study underscored low level of safety awareness and compliance among the sites operatives in the State, this resort into low projects performance. Hughes 2010; and Abdullah and Wern (2011) opined that the role of academia in creating necessary awareness, knowledge, skills and values in construction students during their training is vital in developing safety culture. Hughes (2010) stressed that a paradigm shift in thinking, values addition and change of believes will boost healthy and environmentally sustainable society. According to Stephens, Hernanadez, Roman, Graham and Scholz (2008) assertion about the construction programmes being a core of any nation’s economy development. However, improper handling of safety education as part of the students training will forfeit the objectives of building a safe construction industry.

**2.16 The Missing links and Suggested Measures in Improving Safety Practices and Safety Education.**

This section identified possible missing links in the construction related programmes for the provision of occupational health and safety education and the duration allotted for the course in the tertiary institution in south-west, Nigeria using National Universities Commission (NUC) and National Board for Technical Education (NBTE) requirement. There is no designated course titled occupational health and safety management in the curriculum rather the subjects of safety were briefly discussed in the professional practice and workshop practice I and II. It is important that the safety education given to intending professional is adequate in all ramifications. According to Che Hassan, Basha, Wan Hanafi (2007) and Shamsuddin, Ani, Ismail, Ibrahim (2015) workers knowledge and understanding of safety practices at work setting remained vital in promoting safety among themselves on construction site. This can be achieved according to Pisaniello *el al.,* (2013) opinion that by a standardizing the engagement of students and using case studies approach in student learning curricula, occupational safety teaching in high schools would greatly impact students.

It was also discovered that the objectives of National Universities Commission (NUC) on six (6) weeks Student Work Experience Programme (SWEP) designed for 200level of construction and engineering students at various tertiary institutions don’t include occupational health and safety education, this is a basis to prepare students for six (6) months industrial attachment and their construction management career later in life. Schunk and Zimmerman (2012) noted that promotion of skill, development knowledge and positive views of ability could be achieved by individual-motivation and self-regulatory behaviors of students through positive performance outcomes in schools such as adaptive behavior in the face of challenges, sustainable habits study.

**2.17 Assessing the Importance of Some of the Safety Codes**

**2.17.1 Safety Code of Practice in Construction Company**

The purpose of building codes and construction regulations cannot be over emphasized in project development and management, they ensure health and safety of workers, it provide habitable facilities and commercial property, promotion of energy efficiency, it also facilitate sustainable development and contribute greatly to meeting the demands construction stakeholders. Ratay (1997) asserted that code and regulations is not stand alone to improve construction safety at reduce cost, rather poor codes and regulations can only add to project cost without any solution to construction safety compliance. The cost arises from delays in construction progress include both direct and indirect cost on the employers and employees.

“*Health and Safety at Work Act (1974) is an* [*Act*](http://en.wikipedia.org/wiki/Act_of_Parliament) *of the* [*Parliament of the United Kingdom*](http://en.wikipedia.org/wiki/Parliament_of_the_United_Kingdom) *that defined the fundamental structure and authority for the encouragement, regulation and enforcement of workplace* [*health, safety and welfare*](http://en.wikipedia.org/wiki/Occupational_safety_and_health) *within the* [*United Kingdom*](http://en.wikipedia.org/wiki/United_Kingdom)*. The Act defines general duties on* [*employers*](http://en.wikipedia.org/wiki/Employer)*,* [*employees*](http://en.wikipedia.org/wiki/Employee)*,* [*contractors*](http://en.wikipedia.org/wiki/General_contractor)*, suppliers of goods and substances for use at work, persons in control of work premises, and those who manage and maintain them, and persons in general”*.

Bamisile (2004) recommended adoption of project health and safety plan, as part of building production documents. The numerous numbers of codes and regulations that support management of health and safety practice includes: The provision and use of Equipment Regulation (1992), ILO code of practice-International Labour Office (1992), The Manual Handling Operations Regulations (1992), The Personal Protective Equipment at Work Regulations(1992), The occupational safety and health act of (2007), The Health and Safety (Display Screen Equipment) Regulations (1991), [Health and Safety (First-Aid) Regulations (1981](http://en.wikipedia.org/w/index.php?title=Health_and_Safety_%28First-Aid%29_Regulations_1981&action=edit&redlink=1)), [Management of Health and Safety at Work Regulations (1999](http://en.wikipedia.org/w/index.php?title=Management_of_Health_and_Safety_at_Work_Regulations_1999&action=edit&redlink=1)), [Control of Substances Hazardous to Health Regulations (2002](http://en.wikipedia.org/wiki/COSHH)), Construction Design and Management Regulations 2015 (CDM 2015), Nigerian National Building Code (2007) (Bamisile, 2004 and Muiruri and Cornelius, 2014).

**2.17.2** **The Overview of Nigerian National Building Code**

The Nigerian National Building Code came on board after several debates and agitation by the representative of stakeholders in the built environment and government under the headship of the Minister of Housing and Urban Development. The code intended to serve as means of enhancing construction project, by disengagement of quacks and the use of ‘non-tested’ materials in the execution of building production. The objectives of the code is to provides solution to current challenges confronting the Nigerian building industry, this include: Inadequate town planning in Nigerian cities, occurrence of building collapse and accident related issues, dearth of construction standards for regulating building designs and production, and the poor maintenance culture in the industry.

**2.17.2.1**  **The** **Provision of Nigerian National Building Code**

The code stated in section 2 (32) the contract documents, this include: i. contract drawing and specification prepared by registered architects and engineers ii. Priced bill of quantities prepared registered quantity surveyor, iii. Construction programme, project quality management plan, project health and safety plan prepared by registered builder, iv. Conditions of contract and v. all risk insurance for the building works, personnel and equipment.

However, section 7 (49) stated the need to protect the general public and workers anytime a building production process, demolished and maintenance work are to be carried out. The following provisions were made in the code to ensure safety compliance of the operatives involved during production works on site: Section 7 (55) stated the requirement for the use of scaffolds and their components should provide support without failure at least four times the maximum intended loads.

Section 7 (60) stated the requirement for managing health hazards, every construction or maintenance operation which results in the diffusion of noise,dust, stone and other small particles, toxic gases or other harmful substances in quantitieshazardous to health shall be safeguarded by means of local ventilation or other protective wearsto ensure the safety of the workers and the public as required by this Code.

Section 13 (12) stated that upon the completion of the building, certificate of fitness to use and habitation shall be issued by the Code Enforcement.This shall made available a certificate of use/habitation within ten (10) days after written application. The certificate shall state compliance with the provisions of this Code and the purpose for which the building or structure will be used in its several parts. All building works shall be executed, installed and completed in a skillful and acceptable manner so as to conform to the provision of the code. The supervision of the building works shall be the responsibility of a registered architect and engineer in line with their inputs. The management of building production process, including supervision of artisans and tradesmen will be the responsibility of a registered builder.

**2.17.3 Builder’s Document of Project Health and Safety Plan**

Builder’s document explicitly discussed the obligations of builders by the provision of Nigerian National Building Code who places responsibility to prepare project health and safety plan among others document for effective production process of building project. Bamisile (2004) ascribed that project health and safety plan is essential for all the construction project starting from the measures that needs to be put in place right from the planning, design, construction, completion and maintenance of the building. Thus, all the risks associated with each items of work can be examined and planned ahead right from the project inception. Kennedy (2014) stated that accident prevention plan on construction sites predicts the occurrence of future accidents and possible characteristics of those accidents regarding the nature of the site and its adjoining environment.

Similarly, in evaluating the effectiveness of safety programme in the Thailand construction industry Aksorn and Hadikusumo (2008) established that safety programmes did not require extensive elements, but critical elements such as: safety record keeping, safety inductions, control of sub-contractors, safety committees and safety training.

There are twenty (20) listed parameter in the project health and safety plan, these include: Project safety policy, objective plan, risk and hazard assessment, duties of employers’, duties of site personnel, health and safety briefing, health and safety committee, site accommodation and welfare facilities, accident preventives measures, protective clothing and equipment, permit to work, Access and egress to work, underground observations and buried services, First aid, control of hazardous substances, emergency response plan and safety records (Bamisile, 2004).

However, some of the minimum requirement of the builders’ document project health and safety plan on construction projects are discussed in details below:

1. **Project Safety Policy**

‘Safety policy are statements developed as a general strategy and commitment together with the arrangements put in place to make all who are at risk aware of the health hazards associated with their work and the role individual persons have to play in maintaining a safe and healthy safety at work (Operational Safety and Health Code of Practice, 2002 and 2007). The policy must therefore be prepared in an understandable manner for the employees, which must be signed by the employers. It is worthy of note that, it is cost effective to prevent an accidents than to cure it occurrences once it has happened.

Construction professionals should seek to provide at all times, the safest and healthiest working conditions that are reasonably practicable by adopting health and safety regulations of the international standard with emphasis on the company/construction firms with the desires to accept responsibility safety practices on construction project, while the employees will reflects their acceptance of the understanding to protect life and property of themselves, colleagues and properties of their employer.

1. **Objectives of project health and safety plan**

The objective of establishing the health and safety policy as contain in the Builders document is as follows: (i) ‘providing health and safety in relation to workplaces and hazards, activities and things at workplaces’; (ii) ‘providing for the safe operation of major hazard facilities and mines in order to reduce the likelihood of a serious incident occurring’; (iii) ‘providing for the registration of certain people engaged in construction work at workplaces’; (iv) ‘providing for the licensing of certain people engaged in high risk work at workplaces’; (v) ‘providing procedures for the resolution of health and safety issues at workplaces’ as extracted from (Corbon Builders’ document).

1. **Safety First Aid**

The availability of first Aid materials becomes imperative both on the site and in the workshop with a trained personnel assigned for the treatment of the following: injuries that require no medical attention accept from the one provided on site, and as well provided temporary solution until help is been sought nearby hospital. First aid is rendered subject to a secondary medical treatment or any subsequent redressing (Ameachi, 1990).

1. **Safety Training**

The accident trend in the construction industry can only be influence positively by providing adequate safety education training and management to control the workers, plants and equipment and the working environment. In contradiction, the study conducted by Roelofs, Martinez, Brunette and Azaroff (2011) on construction workers perception regarding factors impacting worksite safety. The study contends that workers attitude towards training is alarming because their goal is to get their work done and be rewarded.

1. **Emergency Response Plan**

To this effect, (Corbon MCPDP, 2014) specified the following measures are to be taken into consideration on site and at the workshop as a catalyst to optimizing project health and safety plan.

* Each worker should be adequately trained and informed of the activities lie is expected to perform and be made aware of the entire inherent hazard.
* He or she should be made to use the protective clothing and equipment provided.
* He or she should be made aware of cost of an accident.
* The contractors should be mandate to register with nearby clinic for emergency services and ensure the doctor telephone no is obtained as well know the shortest route from the site to the clinic.

First guide is "what is rendered subject to an auxiliary therapeutic treatment or any ensuing changing "(Ameachi, 1990). In a perfect world, sufficient arrangements ought to be made on destinations for the treatment of harm or ailments (Blake, 1990), he exhorted that keeping in mind the end goal to accomplish an attractive working emergency treatment benefit on locales, it is important to have the accompanying set up.

1. **Template for Investigating Accidents**

A well-developed policy must be in place for investigating causes of accident on site; this will leads to inaugurating of health and safety committee to be headed by safety manager/total quality manager and representative of each section of work. While it will be the duty of the TQM/SM to monitor the safety of all site personnel, the committee will assist him in the implementation and compliance with the health and safety regulation on the building production process.

1. **Site Accommodations and Welfare Facilities**

The objective of every construction project is to make quality a desirable, therefore quality requires well trained, well-motivated workers which will foster the compliance with the laid down health and safety plan for the workers. Mcgregor “X and Y” theory suggested that work can be a source of satisfaction or punishment according to the conditions associated with it. Quality production can only be achieved where workers 100% input were given towards the assigned tasks. A divided mind can cause injury to his/her person and that of the co-workers. Therefore, the following facilities must be provided to aid safety compliance on project site; shelter for the workers on site, drinking water, canteen, washing facilities, sanitary conveniences, and welfare facilities both financial and non-financial incentives.

1. **Safety Wears/Personal Protective Equipment**

Section (18.1.1) of International Labour Organisation [ILO] ‘Code of Practice-International Labour Office (1992) specified the need for general provision of adequate protection against the risk of accident or injury to workers health, including exposure to adverse conditions. Suitable safety wears must have regard to the nature of work while workers ensured adequate maintenance are provided after used.

1. **Permit to work**

Construction activities are in stages, a formal permit to carry out work especially when working in a confined spaces, installation and the use of scaffolding, use of electrical operated hand tools, crane, electrical control room etc. warrant the need to obtained permit before work can progress on such activities due to the inherent risk of such activities. This may require construction manager of such project to prepare the necessary document which building control agency will request for when they come to site before work can start or continue on site.

1. **Erection and Inspection of Scaffolds**

Scaffolds and working platform are installed to ensure proper working at a convenient height. Scaffolds are erected, modified, or dismantled under the supervision of trained personnel who his/her duty is to ensure the installation is done according to the specifications. The materials used must be sufficient enough to carry all the load designed for. Upon the completion, scaffold supervisor will ensure Scaffold Erection Form is filled and signed by the person that installed the scaffold and supervisor or safety manager respectively to ensure the adequacy of the scaffold.

1. **Safety Signs and colour control of hazardous substances**

Safety signs are non-verbally communicated on construction sites with the use of reflective signs and appropriate colour code, spoken communication and the marking of dangerous substances. The sign are marked with different colours for different purposes, such as (i) prohibition signs (red colour, authorized personnel only, smoking prohibited) (ii) warning signs (yellow signs, danger of electric shock, flammable liquid) (iii) mandatory signs (blue colour, safety helmets must be worn, protective clothing must be worn) (iv) Safe Conditions Signs (Green colour, Emergency escapes, Treatment area and Safe area) (Chudley and Greeno, 2001).

**2.17.4 Construction (Design and Management) Regulation (CDM)**

**2.17.4.1 Some of the Key Issues Arising from the Construction (Design and Management) Regulations 2007 and 2015**

‘The Construction (Design and Management) Regulations 2015’ (CDM 2015) replaced CDM 2007 on 6 April 2015. This regulations emphasized on project planning and management of construction activities and their on the legal implementations as related to all aspect of building production process from the inception to handover. Specific obligation were explicitly spread out on the client and designers in the context of management of construction health and safety, and it also sought for cooperation among all the key stakeholders involved (client, designer, CDM coordinator, and principal coordinator).

The regulation refers to notifiable construction projects as those with a non-domestic client and a construction works involving 500 person per days. While for projects involving more than one contractor, these regulations empowered the client to appoint a ‘principal designer and a principal contractor’ to ensure their duties are well carried out. (H&SE, 2007, 2015)

**2.17.4.2**  C**DM** **roles of the Client in Managing Building Production Process**

Clients are individual person or organisation who carry out building project. The responsibility confers on client by the regulation is summarized here. He ensure workable organisation of project, in terms of availability and provision of resources and enough time to deliver the project safely. A client is saddle with the responsibility to make available additional information as soon as is practicable to the designer and contractor appointed throughout the duration of the project. Constantly, before the commencement of the project that adequate welfare facilities and health & safety plan are is prepared, the sum to manage this will be included into the contract sum to avoid the liability of the contractor on who bears the financial implication of the process.

The client will ensure that CDM coordinator is appointed to advise and co-ordinate activities on notifiable projects. The appointment of the CDM coordinator and principal contractor must be on their proficiency. All the issue relating to project health and safety file are kept in the custody of the client and update the file with any latest information. However in case of notifiable projects where there is no appointment of CDM coordinator or principal contractor, the client will be deemed to be the CDM coordinator and/or the principal contractor and will be responsible to carry out their duties.

The code further stated domestic clients are the persons whom carried construction project in their premises or that of their family member, their scope of operation in CDM 2015 can be delegated to contractor on a single project and principal contractor on a project that has more than one contractor (H&SE, 2007; 2015).

**2.17.4.3 CDM** **roles of the designer in Building Production Process**

Underthis provision the duties of designers and principal designer were explicitly outlined, such as to ‘eliminate’, ‘reduce’ and implement health and safety plan all through the design process, in order to for see possibility of accident that may want to arise during production process of the project, maintenance and the habitation of the building upon completion. Principal designer are appointed by the client at the planning stage to point out foreseeable risk assessment that designer may not see. They can be individual persons or an organisation with relevant competency to do the job.

The designer ensure co-operation with CDM coordinators and others, and make available relevant information for the health and safety file as he maybe prompted. Ensuring eradication of hazards by cross examination that the client has appointed competent CDM coordinator and co-exist with the CDM coordinator, principal contractor and other designers the objective of protecting the interest of the client in smooth running of planning and production process. Interestingly, the duties of the designer don’t end there but provide collective risk reduction measures priority over individual measures and take into consideration the Workplace (Health, Safety & Welfare) Regulations 1992 in the designing a formidable work setting environment that will be accident free.

**2.17.4.4 CDM** **roles of the principal contractor in Building Production Process**

Principal contractors are the individual person or an organisation appointed to carry out the project by the client. The roles of the principal contractors at the production stage covers planning, managing, monitoring, welfare facilities and coordinating health and safety of the site activities and ensure it implementation. He will further make available relevant information to the CDM coordinator for the health and safety file and Liaise with the CDM coordinator in relation to design and changes in design, if any. Ensuring that all workers have been provided with suitable health and safety induction, information and training before the commencement of the job and also carry workers along on health and safety related matters. Contractor are the actual person that carry out the work under the watch of principal contractor and other client appointed professional. They must comply with all the formulated plan of the client appointed team.

**2.17.4.5 Roles of CDM coordinator in Building Production Process**

Some adjustment were made in the CDM 2015, there is no provision for CDM coordinator as stated in 2007 edition. However, principal designer is not a substitute to CDM coordinators. The scope of work differ to that of CDM coordinators under the CDM 2007. Under the CDM 2007 CDM coordinators advise the suitability of the construction planning stage for preparation of health and safety documents. Their roles could be transfer to that of client, principal contractor, designer or a full-time principal contractor because they are only needs for notifiable projects. He can render professional advises to the client about the selection of suitable designers and contractors not to approve their appointments.

**2.17.4.6 CDM** **roles of workers in Building Production Process**

Workers represent individual site operative that carried out different task and job to facilitate smooth running of production process. The must be carry along on any issue related to their health, safety, and welfare. Take responsible for their health, safety and that of their fellow colleagues. Give the contractor feedback on anything that may their health and that of the co-workers. Work in harmony with other persons on site to achieve common goal.

**2.18. Enforcement of Safety Regulations**

The Factories Act Cap 126, Laws of the Federation of Nigeria, 1990 is the legislation set aside for the enforcement of safety regulations in Nigeria. ‘This provides for the enforcement of the Act by occupational safety officers in the inspectorate department of the Federal Ministry of Labour and Productivity, Ministry of Health, Ministry of Works and Transport’. Olutuase (2014) studied ‘safety management in the Nigerian construction industry’ but the scope of the work did not cover the effects of safety wears on workers productivity. In the same vein, Umeokafor *et al*., (2014) conducted study on “review of Nigeria’s Construction industry compliance with occupational health and safety regulations.” The study scope did not cover the cost implication of managing compliance with the health and safety provision on sites. Dodo (2014) worked on extent of implementing safety plan in Nigerian construction sites. However, the study articulated that, some construction firms neither have safety insurance plan for their workers nor facilitate payment of compensation for their injured staff.

As matter of fact, Awwad, Souki, and Jabbour (2015) opinion that, lack of enforcement of construction labour safety law is due to absent of monitoring, and inadequate safety knowledge and commitment from construction participant. Muiruri and Mulinge (2014) study stated that, there is a limited effect of all institutions and government on the implementation of ‘occupational health and safety’ in developing nations. Nzuve and Lawrence (2012) ascribed that compliance with health and safety rule in Nairobi Kenya construction sites is as a result of low level of supervision and examination at work settings environment. Political influence and corruption are part of the major challenges confronting the implementation of any laws in Nigerian, while most laws appear to fulfill all righteousness Onyeozili (2005).

In the same vein, the opinion of Kheni, Dainty, and Gibb (2007) and Muhammad *et al.,* (2015) revealed that legislation on safety practices are endorsed by parliament including International Labour Organization (ILO) however the implementation of the law is the responsibility of the government bodies. The researcher added that, construction sector of developing countries performed poorly regarding safety practices as a result of weak enforcement mechanism.

**Fowode** (2016) suggested that, Lagos State Government should make effort towards having a standing list of certified HSE professional to manage the accreditation process in order to prequalify contractor on health and safety compliance and their level of competence over the years of building construction practices. He further stressed that, it became imperative to initially consult the building regulators at the planning stage of a building project since every project is first constructed on the drawing board and safety must start from the planning stage, so as to integrate foreseeable methods to be adopted for the building production process. Compliance with health and safety regulations remains one of the integral parameter to which successful projects delivery can be obtained, but despite the numerous benefits attached to the compliance with health and safety regulation, it become worrisome why it is difficult for the constructions companies to comply with health and safety regulations.

**2.19 Lagos State Building Control Agency (LASBCA)**

Lagos State Building Control Agency (LASBCA) came to existence during the tenure of His Excellency, Gov. Babatunde Raji Fashola (SAN) under the wing of Lagos State Urban and Regional Planning and Development Law of 2010 and the Nigerian National Building Codes. However, the Agency became operational officially on 12th of August, 2012. The agency was established to ensure building construction and renovation is in conformity with the minimum standards by maintaining compliance with safety and health practices, accessibility and habitable of both the existing and new buildings for populace. The Agency scope of operation is to works in harmony with all parties to building contract in meeting specified quality design standard and ensure all building works are satisfactorily executed. LASBCA also work with other government agencies such as Lagos State Emergency Management Authority (LASEMA).

**2.19.1 The Major Objective of the Agency** **Includes**

1. To make sure compliance with health and safety practices on site all the times.
2. To make sure building production stage are executed in conformity with specification and minimum provision of the Building Codes.
3. To make sure that adequate means are put in place for supervision in eliminating anticipated inherent risk.
4. To make sure there is flow of information between staff of the Agency and the Public.
5. Promptly acknowledgement the receipt of all correspondence within ten working days and where the issue cannot be resolved within the time frame, provide an interim response and provide a date for a comprehensive response.
6. To promote awareness among the Public on technical issues involving construction, developments and building control services.
7. To ensure that all Commercial and Public buildings comply with fire safety codes, and carry out annual Portable Appliance Testing (PAT) electrical testing, gas safety (for dwelling using gas) and electrical safety.
8. To ensure compliance of the ‘Lagosians’ with National Building Codes, 2010 Law and building regulations.

**2.19.2 Professionals involved in the Monitoring and Control of Construction Projects in Lagos State**

Building construction is a process that involved systematic engagement of professionals for the effective management of human and materials resources. Over the years, it has long being emphasized and appreciated that building production process requires trained and tested skilled participant to deliver required quality product promptly. In other to adhere with the provisions of the Agency, the professionals’ required in the monitoring process include:

1. **The Architect**

Architects are engaged in monitoring process periodically for inspections to ensure that architectural designs and specifications are totally conformed to the standards architectural designs codes.

1. **Engineering Consultants**

The production stage will involves the engagement of engineers (geotechnical, structural, electrical and mechanical) frequently for the inspections to ensure compliance with the engineering drawings, schedules and specification. A Structural Engineer ensured monitoring and testing of the materials to determine strength and characterization of the materials are in line with what being specified. Consequently, the mechanical and electrical engineers monitor types and process of installing mechanical and electrical appliances in order to ensure that it complies with their designs and specifications.

1. **The Builder**

Builder remained the Production Manager of the whole building process. Since builder was trained to takes the responsibility of physical construction of the project. He ensure that all set of paper instructions are converted into a physical structure in conformity with the design standard. A builder must be a generalist in order to relate well with all the construction professionals and their corresponding documents so as to facilitate properly monitoring and evaluation process. Ability to demonstrate different monitoring techniques to achieve the objectives.

1. **The Quantity Surveyor**

A Quantity Surveyor is concerned with the quantities and cost associated in a construction project. As a cost expert, the Quantity Surveyor monitors the cost of every aspects of a construction project. He does this so that the total cost of production does not exceed the estimated cost and also plan.

**2.20 Submission between Construction (Design and Management) Regulation (CDM), Nigerian National Building Code and Lagos State Building Control Agency (LASBCA)**

Table 2.2: Submission of building codes and regulation agency in the study area

 **Code Summary of the provision of the codes**

**Nigerian National Building Code**

The code served as means of enhancing the construction project, by disengagement of quacks and the use of ‘non-tested’ materials in the execution of building production process.

The objectives of the code is to provides solution to current challenges confronting the Nigerian building industry, this include: Inadequate town planning in Nigerian cities, occurrence of building collapse and accident related issues, dearth of construction standards for regulating building designs and production, and the poor maintenance culture in the industry.

Only registered builder’ was recongnised as worthy person to manage construction activities, including training of artisans, craftsmen and possibly manage safety implementation.

**Construction (Design and Management) Regulation (CDM)**

This regulations emphasized on project planning and management of construction activities and their legal implementations as related to all aspect of building production process from the inception to handover.

The code further outlined responsibility of all the stakeholders in project execution, despite the fact that each of the stakeholders has their different role, management of safety are inter-related to all the professional on site include the clients as against the provision of National building code

The code stated the needs for cooperation among the client, designers, CDM coordinator and principal coordinator in management of construction health and safety, and ensure hazard are identified and eliminated without causing damage.

**Lagos State Building Control Agency (LASBCA)**

(LASBCA) in a government agency established to facilitate and ensure building construction and renovation is in conformity with the minimum standards by maintaining compliance with safety and health practices, accessibility and habitable of both the existing and new buildings for populace.

The operation of (LASEMA) is to ensure construction operation are carried out in uniformity with adopted code, apart from working towards attaining quality standard, safety of workers must be put in place.

The agency construction firms working in the state obtained necessary permission and adequate inspection were carried out before, during and after execution of public project.

The Agency have all the professionals in their monitoring team to carried out their operations in harmony in meeting specified quality design standard and ensure all building works are satisfactorily executed in a safe manners.

LASBCA also work with other government agencies such as Lagos State Emergency Management Authority (LASEMA).

Source: *Author review, 2017*

**2.21 Available insurance cover for the management of construction project**

There are various insurance policy available for the execution of building project in the Nigerian construction industry, such as Builder’s liability insurance, Occupiers Liability under the Insurance Act 2003, Employers Liability, (Group Life) under the Pension Reform Act 2004; Construction All Risks insurance, Healthcare Professional Indemnity under the National health Insurance (NHIS) Act 1999. However, emphasis will be laid on Builder’s liability insurance and Construction all risks insurance to properly situate their necessity for successful project delivery.

Builder’s liability insurance policy was established under the Insurance Act 2003, demanding client and contractors of buildings project under construction that have more than two floors to obtain insurance cover that will provide succor in case of death, damage to the property under construction and injury to workers (skilled and unskilled labours) who are vulnerable to accident on sites, without neglected passerby and adjoining client around the site provided there is a case of building collapse and other associated risks (Nwoji, 2016).

Construction all risks insurance policy provide against all risks of loss/damage by fire, theft, or any other unforeseen losses as expressed under the policy. The policy require details information about the inventory of items material resources available be insured and their corresponding values as written in receipt or invoice from the supplier. This insurance policy is imperative to successful project delivery because contractors are safeguard against all possibility of financial loses that may come up as a result of unforeseen damage to the building production stage. The policy covers certain compensation to the following: i) ‘Employees’ personal effects, if required’. ii) ‘Damage to plant and equipment of the contractor on site’. iii) ‘Material Damage to the insured properties’. iv) ‘Damage to the existing properties of the principal’. v) ‘Insured’s liability to third parties (death, .injury to person body and loss or damage to properties) due to the execution construction on site (Babington-Ashaye, 2016)

**2.22 Improvement strategy on safety practices in construction industry**

The issue of safety on construction project should be a concern to every construction participant, especially client and their representative need to avert the risk associated with their project right from the planning stage by adopting sustainable strategies that will eliminate possibility of accident. However any improvement strategy proposed must be capable of offering practical solutions in the developing countries.

Bust, Finneran, Hartley and Gibb (2014) stated that professionals’ interests must be enhanced towards safety practices and usage of awareness measures, must be put in place and demonstrated by the operatives as one of the real needs to upgrade construction project safety. McDonald (2003) added that safety manager must be employed on all construction site to ensure both behaviour and operatives’ practices conform to safety requirements thereby, positively influenced by his/her role. Hence, safety manager should be empowered to play their roles in ensuring safety management system.

Mitropoulos, Cupido, and Namboodiri (2009) expressed why conventional use of the exterior way to deal with safety good for making safety practices, it overlooks how the inside attributes of the individual and the associations impact the work practices and influence the likelihood of errors and injuries. Firstly, it doesn't represent the individual elements that all in all characterize a specialist's expectation for security, Then again, the approach does not represent the social components that shape the workplace.

Dedobbeleer and German (1987) assessed the connections between site operatives safety performance file and attitudinal variables identified with safety. The study concluded that inclining component alone clarified the vast majority of the variety in safety performance. Majority of workers under the age group of 26 years had generally low sense, moderately little information about safety and a troublesome state of mind towards safety performance. The researcher considered three elements; strengthening variables, empowering elements, and inclining elements. Strengthening components measure the demeanors of different towards security; empowering variables measure the accessibility of safety elements (e.g. safety wears) at the work put; inclining variables measure the information and states of mind towards security of the individual specialist. Some different components like statistic were likewise utilized for connection.

Agwu and Olele (2014) worked on fatalities in the Nigerian construction industry. The study believed that, inclusion of positive safety culture by investing in machines and technology (socio-technical investments) in the Nigerian construction industry would resort in better safety performance of employees (reduced rate of unsafe acts) and the company (reduced rate of fatalities). This was conducted for a year, with the respondents randomly selected from twelve construction industry, two each across the six geopolitical zones in Nigeria. There is significant different between poor safety culture and increased rate of fatalities in the Nigerian construction industry. Agwu and Olele (2014) recommended regular staff training could improve hazard identification skills, engage managers and workers in addressing safety related issues, regular site safety, safety committees and eliminate potential workplace hazards and making hazard identification/reporting everyone’s duties.

**2.23 Overview of Lagos State**

Lagos State is an African megacity that is located in Southwestern Nigeria on the West Coast of Africa, within latitudes 6°23′N and 6°41′N and longitudes 2°42′E and 3°42′E. The State is flanged from the north and east by Ogun State, in the west by the Republic of Benin and the south by the Atlantic Ocean/Gulf of Guinea. Lagos was establish as a state on 27th of May, 1967 as a result of State Creation and TransitionalProvisions Decree No. 14 of 1967 that restructured then Nigeria’s Federation into 12 states. Lagos therefore, have been known to be the Nigeria's ‘premier city’ since the year 1861. Lagos is best known for her pivotal role as a distribution center for the whole West African coast as judged by geography. Lagos served as Federal capital until the relocation of the Federal capital to the Federal Capital Territory, Abuja on December 12th, 1991.

‘Lagos has a total of 1380.7 square miles (3577 square kilometers), of which 303.8 square miles (787 square kilometers) is made up of lagoons and creeks’. However, the geometric increase in the estimated population of Lagos state since the first census in the year 1871 from over 28,000 people to 6,000,000 (1990 census) suggest Lagos city to be one of the most migrant’s city. The city of Lagos is deemed to grow up to 24.5 million population mark and become one of the top ten most populous cities in the world come year 2015 according to (UN study 1999 and Iwugo, D’Arcy and Andoh, 2003). Population densities is also high as 20,000 per square mile in some places. Over two-thirds or 70 percent of the city's population are Yorùbá-speaking, with the remainder divided between non-Yorùbá speaking Nigerians, Africans, and non-African residents (Encyclopedia.com).

Construction activity makes some parts of Lagos city seem poorly planned physically. The City comprises of both the modern and the traditional, with skyscrapers and glass houses sitting alongside old residential buildings. ‘Lagos remain Nigeria’s economic, commercial and industrial centre housing more than 2,000 manufacturing industries and more than 200 financial institutions (Banks, Insurance companies etc) without neglecting the Nigeria Stock Exchange. It also houses the nation’s monetary authority, the Central Bank of Nigeria (CBN) and the Security and Exchange Commission. Adelekan, (2009) opined that the Lagos is the economic and financial capital of Nigeria. The State alone control 60% of the Federation’s total industrial investments and foreign trade while also attracting 65% of Nigeria’s commercial activities. It also accounts for more than 40% of all labour emoluments paid in the country. Indeed, the headquarters of multinational conglomerates like UAC, Unilever, John Holts, BEWAC/VYB, Leventis, Churchgate, Chevron, Shell, Mobil and the nation’s giant public enterprises are all located within the State (Lagos state government)



Map of Lagos state showing some notable places

Source: www.google.com Retrieved September 2nd 2016.

**2.23 Chapter summary**

In summary, health and safety is an on-going debate because of the direct impact it has on construction project. Several articles reviewed under this section provide needed insight to properly situate the current knowledge on the study of health and safety practices. It is believed that related articles reviewed under this chapter has given the study direction towards the research questions and problems. Several factors discussed, showed current practices of health and safety in the Nigerian construction industry and the relevant code that could be adopted. Effort of the various researchers reviewed also contributed greatly on the causes of construction related accidents and strategies to curb high rate of fatal injuries and ill-health at work settings.

**2.24 Summary of some empirical studies**

Table 2.3: Literature overview matrix some selected empirical literature on subject matter, to give clearer direction from existing studies.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S/n | Article Citations | Study Area | Objectives | Methods | Critique of findings / identified gaps |
| 1 | Awwad, *et al.,* (2016). | Lebanese | The study provided an insightful observation on factors affecting development of safety practices in the Lebanese construction industry. | Direct interviews were conducted with the different construction participant including contractors, consultants, clients, insurance companies and governmental authorities with the aid of questionnaire. | Safety practices lacks necessary implementation due to absence of monitoring, failure of safety awareness and inadequate support from safety managers.**But** the study did not assess the role of safety managers in ensuring proper monitoring system, this problem is peculiar to Nigeria construction industry. |
| 2 | Kolawole (2014) | Nigeria | Evaluated if implementation of safety practices reduced accident on sites or motivate workers for better safety performance. | Study population was randomly selected among building construction firms and structured questionnaires were administered to collect the necessary data analysed. | It was observed that site workers embraced training as this enhance their performance and reduces accidents on site. **However**, government did not have well defined safety act for construction activities |
| 3 | Boustras, *et al.,* (2015). | Cyprus | The study looked at the determinants factors of safety performance at the work in small scale firms, which are also peculiar to developing country. | Purposive sampling was used to obtained data via structured questionnaire while pilot study was conducted before the administering of the questionnaire. | Study findings suggested training, risk assessment, and safety policy formulation b**ut** contradicted previous study as adoption of quality management system could not be said to have significance collaboration with safety outcome in the final model. |
| 4 | Dodo (2014) | Nigeria | Worked on the limit of implementation of health and safety provisions in the Nigerian construction industry. | A purposive sampling technique through structured questionnaire was adopted to collect data. | **The study scope did not** establish whether there was an insurance cover for the construction workers (skilled and unskilled labours) who are vulnerable to accident on construction site.  |
| 5 | Umeokafor *et al.,* (2014) | Nigeria | Reviewed activities of Nigeria’s Construction industry compliance to occupational health and safety regulations. | Adopted desk review of related literature on the subject of health and safety and unearthed reasons responsible for disregarding safety practices on Nigerian construction sites. | **The study did not establish the cost implication** of managing compliance to safety practices on sites, nor stated the financial implication on contract sum. |
| 6 | Idoro (2011) | Nigeria | The study evaluates level construction mechanization and its relationship to the Occupational Health and Safety (OHS) performance | Questionnaire survey was adopted and analysed by percentages, means, *t*-tests and Spearman’s correlation tests. | It was discovered that an increase in mechanisation would also increase the rate of accidents and injury occurrences. Because failure to effectively managed mechanization can worsen the OHS performance in the developing countries. |
| 7 | Olutuase, (2014) | Nigeria | Studied safety management in the context of Nigerian industry with an intention to compare level of compliance with the international standards. | The findings of the study articulates the existence of safety regulations in the management of construction project. | The study found out existence of safety regulations in the management of construction project. **Generally** there have been limited study carried out on effects’ of safety wears on workers operation and productivity. |
| 8 | Agwu, (2012) | Nigeria | Conducted a study on total safety management (TSM) an approach for improving organisational performance in selected construction firms in Nigeria.  | The study adopted stratified random sampling technique to survey six selected most famous construction through questionnaires. | Study outcome suggested the need to maintained good attitudinal behavior and structural modifications in construction safety management. |
| 9 | Babu, (2015) | Nigeria | Aimed at investigating safety performance on the construction sites | The study soughed the opinion of construction participant using structured questionnaire to appraise the safety performance on their construction sites. | The outcome revealed inadequate support from the government, insurance companies, ministry of labour, and construction participants. **But** performance can only be assessed as a comparative study. |
| 10 | Okoye, Ezeokonkwo, & Ezeokoli (2016) | Anambra State, Nigeria | Studied construction workers’ health and safety knowledge and compliance on site. | Mean Score ranking and Pearson’s Product-moment Correlation Coefficient (**r**) were used to analyze data randomly sampled from the fifteen (15) selected construction sites. | Study outcome showed low level of safety awareness and compliance among the sites operatives, thus resorted in low project performance. Knowledge alone cannot achieve optimum project performance. It require safety culture which encompass other factors such as: management commitment, workers involvement and strict enforcement of safety regulation should be adopted. |
| 11 | Akinwale & Olusanya, (2016) | Nigeria | Studied implications of occupational health and safety intelligence in Nigeria | Cross-sectional research was design and risk society and sense-making theories’. The study conducted 15 in-depth interviews ranges from the managers and senior site managers. The data were subjected to content analysis and ethnographic technique. | The study affirmed that managers and employees are the major target of occupational health hazards, such as loss of man-hours, productivity, and job security. **A gap** was identified regarding the impact of safety wears on workers output |
| 12 | Famakin and Fawehinmi, (2012) | Nigeria | The study argued that, construction industry lacks health and safety regulations and challenges such as low quality, time overrun, cost overrun, and absenteeism of workers due to injuries. | Survey research design was adopted and wad analyzed and ranked using mean items scores, Mann-Whitney U Test | It advocated for inclusion of health and safety policies and other control programmes from the design stage, up through the completion stage because of its influence on project delivery. |
| 13 | Thomas and Sudhakumar (2014) | Indian | An Indian case study | The study method includes: interview with construction practitioners to identify factors influencing labour productivity, followed by design of questionnaire into three sections, preliminary pilot-tested on a small sample was conducted and final analyses by multiplication of the importance and frequency indices which in turn yielded a severity index (SI). | Five factor considered peculiar to the study includes: timely availability of materials at the worksite, delayed material delivery by the supplier, strikes called by political parties or hardtails, frequent revisions of drawings/design, resulting in additional work/rework and timely availability of drawings at the worksite. |
| 14 | Olanrewaju, Sharafadeen, Akinpelu (2014) | Nigeria | Conducted a study on impact of national building code on health and safety of worker in construction industry. | The study analysed divers mean by which national building code can provide succor for builders to practice and monitor the challenges associated with the health and safety policies on construction projects. | **However, scope** of many study did not establish feedbackon impact of health and safety plan from builder’s document on those firms that adopted the provision of the code. |
| 15 | Muhammad *et al,* (2015) | Nigeria | Assessed cost implication of health and safety on construction projects |  | The study recommended that in a place where provision are made for health and safety policies, a supervisor should be appointed to ensure compliance, while Several measures and punishments should be meted out to contractors who violate safety policy.  |
| 16 | Ismail, Doostdar & Harun (2011) | Nigeria | Evaluated “factors influencing the implementation of a safety management system for construction sites | The study used structured questionnaire designed for construction staffers and as well interviewed skilled labourers. | The study found work place settings and the use of safety wears, reduce of manual work, and appropriate use of equipment and tools. **But scope of this work** did not cover the effects of safety wears on workers productivity. |
| 17 | Okoye, Okolie & Aderibigbe, (2014) | Nigeria | Survey research design, randomly selected sample among stakeholders in the study area and the data obtained were statistically analysed using Chi Square statistics to test the correlation. | Exploratory study on the cost of health and safety performance of building contractors in south- east Nigeria | The findings showed the impact of safety performance of contractors on successful projects delivery. |
| 18 | Dingsdag, Biggs & Sheahan. (2007) | Nigeria | The research adopted structured questionnaire via e-mail and self-addressed pre-paid envelopes to obtained needed data. | Perception study on workers feelings, skills, behaviors and knowledge of construction participants that contribute to “safety culture | The study established four most influential factors for safety practices as worker opinion on safety culture promotion via training and education, a strong knowledge of rules and regulations, good communication and interpersonal skills, behaviour and actions that enforce and monitor safety. |
| 19 | Hinze & Gambatese. (2003) | Nigeria | The study aimed was to identified factors that impact the safety commitment of specialty contractors | Survey was conducted on three different specialty contractor populations through structured questionnaire by e-mail | The outcome of research showed that safety performance of specialty contractor were often affected by numerous factors that reduces worker productivity. However, staff motivation were not seen as better means of safety performance. |
| 20 | Cheng, Ryan, & Kelly (2011) |  | Studied impact of safety and health practices on construction output through three safety management practices categories: information, process and committees. | Descriptive study using survey design to gathered data needed for the study. | **But** the study did not link safety practices and workers output to test the impact. General assessment was used to collect the data instead observation and comparative study by using time to set target for each operations of the workers to know the impact of safety wears either positive or negative. |
| 21 | Muiruri and Mulinge (2014) | Nairobi Kenya  | Study investigates health and safety measures used on construction site, enforcement mechanisms and examined difficulties experienced in the management of health and safety on project sites. | Descriptive study using survey design to gathered data needed for the study. | Major findings were inadequate enforcement mechanism, inadequate support on safety management on construction project, absent of motivation facilities, absent of committees on safety, unawareness of safety matters among workers. |
| 22 | Umoh & Torbira (2013) |  | Conducted a study on safety practices and the productivity of employees in manufacturing firms | Descriptive study using survey design to gathered data needed for the study. | The study uncovered that there is certain and critical connection between the availability of safety wears the workers productivity. The study stressed that enhancing safety strategies for operatives’ has incredibly affected and still impacts productivity. |
| 23 | Alinaitwe, Mwakali, & Hansson (2007) | Uganda | Studied factors affecting productivity of building craftsmen | Thirty six factors that have link to time, cost and quality were ranked via descriptive statistic. | Improper supervision and inadequate skills among workers were the most significant factors affecting workers productivity. **But** the study did not establish whether workers compliance with safety practices affected their operations. |
| 24 | Supata, Kabin, and Nath (2014) |  | Study factors affecting workers productivity. | Exploratory study was conducted to factors affecting productivity in eight categories. The factors were rank using RII | Out of the eight categories, motivation is the most significant of all on workers in enhancing productivity. |
| 25 | Rao *et al.* (2015) |  | Conducted study on Labour productivity. | Exploratory study was conducted to identify sixty one (61) factors. Data were analysed by ranking and Reliability analysis test. | The factors that were significant to workers productivity include: political influence, economic slowdown government regulations, accidents during construction, health and safety factors and poor co-ordination between different departments. |
| 26 | Osonwa, Eko & Ozah 2015 | Calaba,Nigeria | study of utilization of personal protective equipment (PPEs) among wood factory workers in  | Survey research and data were analysed by ranking. | Safety wears are not necessary, not adequate, and inconvenience were some of the reasons responsible for not using safety wears among the workers. **But the study** was therefore limited to wood factory workers. |

**CHAPTER THREE**

**RESEARCH METHODS**

**3.1 Introduction**

This section justified the procedures the study adopted to achieve research aim and the formulated objectives. The literature review findings informed survey components of this research work and this includes a review of journals, articles, textbooks, and other published and unpublished materials which were considered relevant to the stated aim of this research work. The procedure for data collection and analysis were explained. The study is descriptive in nature and designed to obtain information from operatives concerning safety practices and the effects of safety wears on their operation in building production process. It also described the research configuration, contemplate populace, the sample frame, sample size and its qualities, the inspecting strategies received, sources and instruments of data accumulation, data analysis and presentation.

**3.2 Research Design**

Research design is a template for testing an outcome of a study in order to exercise control over factors that may stand against the validity of the findings Burns and Grove, (2003). This research engaged desk review of related literature covering a period of 16 years (2000-2016). The study adopted survey research design, with the help of structured questionnaire to the Professionals, Contractors and Artisans (both skilled and unskilled) that operate in Lagos State, Nigeria. By adopting survey research author believed that it is proper as accumulation of information will not be more than one case and at a particular point in time to gather a group of quantitative or quantifiable information regarding at least two or more variables (Bryman, 2012). This research critically assessed and analyzed health and safety practices in relation to effects of safety wears on workers operation in execution of construction projects. The research methods was designed into three phases, the preliminary phase, established background information on the subject of health and safety through literature search and reviews. The next phase focuses on direct observation and interview, based on the established background and literature review. The third phase developed some of the key issues captured in the previous phases into Likert scale questionnaire.

**3.3 Study Population**

The need to select the representative sample from the population size that will be dealt with in this research study cannot be over emphasized. The population for this study covers medium scale construction companies that operate in Lagos State. The choice of Lagos State was based on its fast growing in development and increase in the demands for housing unit both for residential and industrial purposes. Lagos Islands being a coastal zone has enjoyed tremendous increase in modern construction activities and development such as: Eko Atlantic city, Lekki free trade zone, Dangote petroleum refinery, Lekki deep sea port and Lagos Island international airport (Ogunde, *et al.,* 2017). However, the choice and distribution of the questionnaire were limited by space of time require to complete the study.

Furthermore, Lagos State fairly represent an open market of construction companies for all and sundry. Thus, most of the Nigerian locally owned construction contractors that register with the Federal Registration Board of Nigeria shown that over 80% have their addresses in Lagos, Abuja and Port Harcourt as adopted by Fagbenle, Aderemi, and David (2004) and Olaleye (2008).

It can be stressed further that a standard construction site will have a Site Manager, Supervisors to manage activities of workers on their various sites (CDM, 2007:2015)

**3.4 Sample Frame**

In order to generate statistics data and generalize study findings to a larger population sampling strategies are usually employed. Osuala (2005) defines sampling frame as the list of members of the population under investigation from which sample size are obtained. The sample frame refer to the number of individual that made up the study population that can be sampled by the researcher. The sample frame for this study therefore, comprises of professionals, contractors and artisans (both skilled and unskilled) randomly selected from the study area.

**3.5 Sampling Techniques**

Sampling is the statistical procedure for choosing a subset (sample) from population of interest for purposes of observations statistical inferences about that population. This study adopted both probability and non-probability sampling techniques (Mbeche, 2004).

Since the research is purposive in nature, it required data from the on-going construction sites and not the number of Construction Company in the study area, snowball sampling techniques was used to locate medium scale construction sites that engaged in construction project at some selected location in Lagos State before choosing the targeted respondents. However, in bid to reduce the degree of bias of the respondents’ opinion to ensure adequate coverage of targeted population and to gain clarity of data, questionnaire were personally administered to the respondents while he ensured that all artisans and labourers involved were capable enough to answers the questions.

Snowballing sampling is a form of non-probability sampling in which the researcher begins by identifying an individual perceived to be an appropriate respondent.
Faugier and Sargeant (1997) defined snowball as sampling technique capable of providing efficient and economical ways of finding cases that otherwise are difficult or impossible to locate and contact. This opinion is married with (Alexander, Kurlander and Wynia 2005) as snowball sample techniques are used in survey where participants are recruited through other potential participants, by asking physicians in retainer medical practices to name other physicians in similar type practices that might be contacted to participate in the survey.

**3.6 Sample Size**

Sample size is difficult in determining, due to the ability of the researcher to study the whole population. However, the sample size are considered based on geographical location of construction activities in the study area thus: Lagos Mainland, Lagos Island and Sand pits such as Victoria Island, Lekki and Ajar; and Lagos suburb which covers Badagry and Ikorodu. Though there is no readily available data to show the number of construction sites in Lagos and their geographical distribution but Lagos mainland and Barrier Islands (Victoria Island, Lekki and Ajar) house the larger percentage of construction activities in Lagos state. Sample size for the study was determined through (Sediary, 1994) as adopted by (Fagbenle *et al.,* 2007),

n = n’/ (1+ (n’/N))

Where, n= sample size n’= s/v,

N = total estimated population,

v = standard error of the sampling population.

Total error= 0.1 at a confidence level of 95%

s = (p) X (1- p) = (0.5) X (0.5) = 0.25.

Therefore, the construction sites were selected via snowballing sampling as thus:

**Table 3.1: Selected study population by geographical location**

|  |  |  |
| --- | --- | --- |
| **Geographical Distribution of respondents****Location** | **Projects**  | **Administered Questionnaire** |
| Lagos Mainland | 6 | 24 |
| Lagos Island (Victoria Island, Lekki and Ajar) | 21 | 84 |
| Lagos Suburb (Badagry, Ikorodu) | 5 | 20 |
| Total | 32 | 128 |

Source: *Researcher data collection 2017*

Therefore, based on the above formula thirty two (32) construction project sites were selected from the sample frame and four (4) i.e. two professional, one skilled and one unskilled respondents were randomly sampled from each of the project sites these equals to **128 copies of** structured questionnaire administered.

**3.7 Data Collection Instruments**

According to (Ojo, 2003) research instruments are tools used to collect data for propose study in order to test hypothesis and proffer answers to research questions. Oral interview and questionnaire were used as research instrument for this study because it assures opinion of the targeted respondent. Questionnaires were administered to professionals, contractors and artisans (both skilled and unskilled).

**3.7.1 Pilot Studies**

Research questionnaire was subjects to pilot test for sanctity and validity of data. This provide the authors with necessary improvement on the questions raised before administering the main survey. The stage one involved two senior researchers, one project manager and one safety manager were engaged to vet the questionnaire with relevant contributions and suggestions. On the second stage, a professor and safety managers of which they did not involve in the final survey. All the necessary corrections and suggestions were included in the questionnaire administered.

**3.7.2 Questionnaire Design**

Questionnaire is a research instrument used to assess data beyond the physical phenomenon of the researchers (Leedy, 1997). The study obtained quantitative data via the administration of structured questionnaire, in order to sample the opinion of respondents. Researcher firstly brief the intending respondent about the objectives of the study and also stressed the need to provide adequate and unbiased responses. All question were closed from a set of fixed appropriate options where respondents were to choose from. The first part of the questionnaire were designed to capture the demography statistic information such as higher academic qualification attained, category of operation, age of respondent and industry experience of the respondents’.

Follow by the first objective of the study that assessed respondents’ level of agreement on current state of safety practices on building construction projects site in Lagos State using some selected safety performance criteria on a Likert scale 1 – 5 (1. not practiced, 2= less practiced, 3=sometime practiced, 4= moderately practiced, 5=often practiced).

Second objectives identified factors preventing site operatives from using safety wears on construction sites on a Likert scale 1 – 5 (1= not affected, 2= less affected, 3= sometime affected, 4= moderately affected, 5=Mostly affected)

Third objectives rank workers responses on variables that best describe effects’ of wearing safety wears on workers operation in the study area. These was measured by using a five-point Likert scale 1=very insignificant, 2= of less significant, 3= slightly significant, 4= moderately significant, 5=very significant.

Forth objectives ranked respondents’ perception on the importance of integrating Builder’s document and others safety control systems for project management. These was measured by using a five-point Likert scale 1=very insignificant, 2= of less significant, 3= slightly significant, 4= moderately significant, 5=very significant.

In the quest to examine safety improvement measures and control systems available for safety practices and compliance on construction sites. Objectives five ranked respondents opinion using the following scale 1= totally disagreed, 2= disagreed, 3=slightly agreed, 4= moderately agreed, 5= highly agreed.

**3.8 Methods of Data Analysis**

According to Ofo (1999) where the questionnaire survey method is used, the entire analysis procedure usually involves calculation and interpreting descriptive analysis. For the purpose of this research, the data obtained were presented and analyzed by statistical package for social sciences (SPSS v21) and Microsoft Excel, 2016 using descriptive and inferential analytical tools such as, frequency percentage distributed table, mean, Relative Important Index.

**3.8.1 Demographic Information**

In this study, the demographic information provides general information on participants involved in the survey. Descriptive statistics were utilized to summarize participants’ information. The demographic information does not focus on specific questions but provides general information about employees. Such information includes: education background, respondents years of experience etc.

**3.8.2 Frequency Distribution Tables**

It is usually arranged in rows and columns each displaying specific information. This was used in the study to display both collected data and analyzed information. In other words, frequency distribution tables will be employee in generating the distribution characteristics of the variables and data analyzed. The descriptive statistics like mean and standard deviation were use in addition to frequency and percentage distribution.

**3.8.3 Relative Important Index**

Under relative Important Index measure, variables are to be rated against a scale to assist in assessing the significance of each factor. The scale was then transformed into an index otherwise known as Relative Important Index (**RII**) for each factor to determine the ranks of the different factors. The analysis for this study employed Relative Important Index or RII formula which is evaluated as:

**RII = 1n1+2n2+3n3+4n4+5n5 = ( ∑5i=1 Wi × Fxi ) (1)**

 **5(n1+n2+n3+n4+n5)**

Where, **n1**- **n5** represent lower integer to highest integer

**RII = ( ∑5i=1 Wi × Fxi ) x100 (2)**

 **N**

Where, **w**= the weight age of the respondents **i = 1, 2, 3, 4, 5**

 **Fxi=** the frequency of every respondent

 **Fx1**= lower integer up to **Fx5**= highest integer

 **N** = total number of respondents

Formula **(1)** and **(2)** are derived from (Tawil *et al,.* 2011). According to past studies the mean and standard deviations are not suitable statistics for testing overall ranking of a phenomenon (Doloi, 2008). Relative Importance Index **RII** gave a constant descriptive meaning to the critical factor based on the (Doloi and Young, 2009). According to (Mbamali, 2012) RII values are interpreted as follows: RII˂0.60: Connotes item has low rating. 0.60≤ RII ≤ 0.8: Connotes item has high rating. RII ≥ 0.80: Connotes item has very high rating.

**3.8.4 Independent-Samples T-Test**

An independent-samples t-test is adopted in order to compare the mean score, on some continuous variable, between two different groups of respondents. The result of the test would tell if there is a statistically significant difference in the mean scores between the groups (Cohen, 1988; Pallant 2013).

The column marked Sig. (2-tailed), under the section labelled t-test for Equality of Means. Two values are given, one for equal variance, the other for unequal variance. The help in decision making for the test result,

There exist significant difference if the mean scores on the dependent variable for each of the two groups in the **Sig. (2-tailed)** column is equal or less than .05 (e.g. .03, .01, .001). Otherwise, there is no significant difference between the two groups if the value is above .05 (e.g. .06, .10) (Cohen, 1988; Pallant 2013)..

Eta squared formula was used to determine effect size of independent sample t-test

Eta squared = t2

t2 + (N1 + N2 – 2)

The result is interpreted as follow: .01=small effect, .06=moderate effect, .14=large effect (Cohen, 1988; Pallant 2013)

**3.8.5 MANN-WHITNEY U TEST**

The Mann-Whitney U Test was used to test for differences between two independent groups on continuous measure. The test of non-parametric is an alternative to t-test for independent samples. The Mann-Whitney U Test compared medians score as against means scores of the two groups in the T-test (Pallant, 2013).  It transferred the scores on the continuous variable to ranks across the two groups. It then measures if the ranking of the two groups have significantly difference. However, the outcome of Mann-Whitney U Test also checked the effectiveness of each statistically significant difference variable using (Pallant 2013) and Cohen (1988) criteria .1=small effect, .3=medium effect, .5=large effect. However, the test have been adopted by past researcher, take for example Adewuyi and Otali (2013), Famakin and Fawehinmi (2012)

**3.9 Chapter Summary**

This chapter used survey research design, the study population, sample frame and how sample size was determined were also stated. It also states that snowball and random sampling technique was used in the curse of the research, and the data collection instrument used was questionnaire. This chapter also explained the method of data analysis adopted.

**3.9.1 Summary of Data analysis and Presentation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Objectives | Variables requirement | Measurement of variable | Measurement scale | Analytical tool |
| Section A |   |   |   |   |
| Background information | Name of institution, category of respondents, level, sex, discipline, number of years | Descriptive statistic | Nominal scale | Frequency and percentage  |
|  Objective 1 |   |   |   |   |
| Examined current state of safety practices on building construction projects. | 18 variables were listed  | Likert scale of 5-l | Ordinal scale | SPSS (Mean score and ranking) |
| Objective 2 |   |   |   |   |
| Factors affecting site operatives from using safety wears on construction sites. | 13 variables were listed | Likert scale of 5-l | Ordinal scale | SPSS ( RII and ranking)) |
| Objective 3 |   |   |   |   |
| Effects of wearing personal protective equipment/safety wears on the productivity of workers on site in the study area. | 13 variables were listed | Likert scale of 5-l | Ordinal scale | SPSS (Mean score and ranking) |
| Objective 4 |   |   |   |   |
| The importance of integrating Builder’s document and others safety controlling safety in project management | 10variables were listed | Likert scale of 5-l | Ordinal scale | SPSS (Mean score and ranking) |
| Objectives 5Safety improvement measures and control systems available for safety practices and compliance on construction sites | 18 variables were comparedbetween the two category of respondents | Likert scale of 5-l | Ordinal scale | Mann-Whitney U Test |
| Test of Hypothesis |  |  |  |  |
| There is no significant difference between professional and site workers perceptions on factors preventing effective use of safety wears on construction sites. | 13 variables were listed | Likert scale of 5-l | Ordinal scale | Independent sample T-test |
|  |  |  |  |  |

**Table 3.2: Summary of Data analysis and Presentation**

Source: *Researcher’s Field survey (2017)*

**CHAPTER FOUR**

**ANALYSES, PRESENTATION AND INTERPRETATION OF RESULTS**

**4.1 Introduction**

This chapter was centered on data analyses, presentation and discussion of results obtained from the field survey as detailed in chapter three. The analyses and argument are in line with the stated aim and objectives in an attempt to answers the research questions raised in chapter one. Secondly, the section provided statistically test on whether to accept or reject the proposed hypotheses and relationship among the listed variables for the study.

**4.2 Objectives of the Study**

Following the research objectives proposed in the first chapter, this section therefore determine whether the aim of the study have been achieved, and also discussed and compared contribution of findings to existing knowledge.

1. To examine the current state of safety practices on selected building construction sites;
2. To identify factors preventing site operatives from using safety wears on construction sites;
3. To determine the effects of safety wears on workers operation on construction sites;
4. To investigate respondents perception on the importance of integrating Builder’s document and others safety control systems on construction projects; and
5. To examine safety improvement measures and control systems available for safety practices and compliance on construction sites

**4.3 Data Presentation**

**4.3.1 Geographical locations and response rate of the respondents**

Table 4.1 Geographical locations and response rate of the respondents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Location** | **Projects**  | **Administered Questionnaire** | **Returned Questionnaire** | **Percentage** |
| Lagos Mainland | 6 | 24 | 19 | 17.00 |
| Lagos Island (Victoria Island, Lekki and Ajar) | 21 | 52 | 77 | 68.00 |
| Lagos Suburb (Badagry, Ikorodu) | 5 | 20 | 17 | 15.00 |
| Total | 32 | 128 | 113 | 100.00 |
| **Classification of Respondents**  |  |  | **Frequency** | **Percentage** |
| Professional |  |  | 50 | 44.00 |
| Site Operatives |  |  | 63 | 56.00 |
| Total |   |   | 113 | 100.0 |

Source: *Researcher survey 2017*

From one hundred and twenty eight (128) copies of structured questionnaire administered to the respondents for this research work i.e. sixty four (64) copies of structured questionnaire were distributed to the professional (site manager or supervisor) and sixty four (64) copies to site operatives (skilled and unskilled labourers) that operate in Lagos State, Nigeria**.** One hundred and thirteen (113) copies of questionnaire distributed were returned and analyzed justifying eighty eight percent (88%) response rate. The data were further separated into the category of professional and site operatives, this represent 40(44%) and 63(56%) respectively.

**4.3.2 Demography information of the respondents**

**Background information of respondents**

Table 4.2: Background information of respondents

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Professional |  |  |  |  **Site operatives** |  |  |  |
| **Demographic Information** | **Freq.** | **Pert.** |  | **Demographic Information** | **Freq.** | **Pert.** |  |
| **Academic qualification** |  |  |  | **Academic Qualification** |  |  |  |
| HND | 16 | 32.0 |  | SSCE | 21 | 33.0 |  |
| Pgd/BSc/B.Tech | 15 | 30.0 |  | National vocational training | 30 | 48.0 |  |
| MSc/MBA/MPM | 19 | 38.0 |  | Advance craft certificate | 12 | 19.0 |  |
| **Category of operation** | **Category of operation** |
| Site manager | 41 | 82.0 |  | Skilled Labour | 32 | 51.0 |  |
| Safety manager | 7 | 14.0 |  | Unskilled Labour | 15 | 24.0 |  |
| Project manager | 2 | 4.0 |  | Sub-Contractors | 10 | 16.0 |  |
| **Age of respondent** | Foreman | 6 | 9.0 |  |
| 15-20 | 1 | 2.0 |  | **Age of respondent** |
| 21-30 | 18 | 36.0 |  | 15-20 | 11 | 8.0 |  |
| 31-40 | 16 | 32.0 |  | 21-30 | 25 | 35.0 |  |
| 41-50 | 13 | 26.0 |  | 31-40 | 29 | 45.0 |  |
| 51-60 | 2 | 4.0 |  | 41-50 | 1 | 2.0 |  |
| **Industry years of experience** | **Industry years of experience** |
| 1-5 | 15 | 30.0 |  | 1-5 | 23 | 36.0 |  |
| 6-10 | 10 | 20.0 |  | 6-10 | 15 | 24.0 |  |
| 11-15 | 8 | 16.0 |  | 11-15 | 23 | 37.0 |  |
| 16-20 | 14 | 28.0 |  | 16-20 | 1 | 2.0 |  |
| 20 years above | 3 | 6.0 |  | 20 years above | 1 | 2.0 |  |
| **Number of men working in a gang** | **Number of men working in a gang** |
| 1-4 | 16 | 32.0 |  | 1-4 | 20 | 32.0 |  |
| 5-8 | 19 | 38.0 |  | 5-8 |  27 | 43.0 |  |
| 9-12 | 5 | 10.0 |  | 9-12 | 11 | 15.0 |  |
| 13-16 and above | 10 | 20.0 |   | 13-16 | 5 | 8.0 |  |

Source: *Researcher’s Field survey (2017)* Professional (N= 50) Site operatives (N=63)

Table 4.2 showed that 16(32%) of the professional respondents had HND certificate, 15(30%) with B.Tech./B.Sc. certificate while respondents with M.Sc. scored the highest 19(38%) compared to 21(33%) of the site operatives had SSCE, 30(48%) possess National Vocational training certificate and 12(19%) advance craft certificate respectively. This justified that larger percentage of the respondents were highly qualified and knowledgeable enough to answer the questions. On the category of their operations, 41(82%) of the professional respondents were site managers only 7(14%) were safety managers while 32(51%) of the site operatives respondents were skilled labourers, followed by 15(24%) unskilled labourers, 10(16%) sub-contractors and 6(9%) that are foreman.

Furthermore, percentage distribution of the respondents based on their age bracket showed that (68%) of the professional respondent age range between 21-40 years as against (26%) whose age range are above 41 years. It was a different case as (81%) of the site operatives respondents were within the age range of 21-40 years. It can be established that the respondents for this study have good knowledge of building construction because (44%) of the professional respondents have more than ten years of working experience compared to (20%) that have more than six years of working experience. Meanwhile, (39%) of the site operatives have more than ten years of working experience compared to (36%) that have less than 6 years of experience. Lastly, table 4.2 also explored number of men working in a gang from the study area. Sixty eight percent (68%) of the professional and site operatives respectively have more than 5 men in their gang.

**4.4 Objective one examined current state of safety practices on building construction projects.**

Table 4.3: Current state of safety practices on building construction projects.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Safety practice parameter | Site operative  | Scores  | Professional | Scores | Overall  |  Scores |
|  | Mean | Rank | Mean | Rank |  Mean | Rank |
| Provision of temporary fence at the boundary of the site | 3.94 | 1st | 4.26 | 1st | 4.07 | 1st |
| Provision of accidents prevention procedure and safety consciousness on site | 3.92 | 3rd | 4.12 | 2nd | 3.96 | 2nd |
| Development and frequently review of safety policy for building production projects. | 3.94 | 1st | 3.68 | 7th | 3.90 | 3rd |
| Daily safety briefing | 3.92 | 3rd | 3.72 | 5th | 3.74 | 4th |
| First aid box and welfare facilities are always made available on site. | 3.19 | 15th | 3.78 | 4th | 3.73 | 5th |
| Engaging safety committee in investigating and auditing cause of accidents | 3.52 | 8th | 3.60 | 10th | 3.59 | 6th |
| Examination of scaffold, equipment and tools before the start of work Safety manager. | 3.57 | 6th | 3.66 | 8th | 3.58 | 7th |
| The use of personal protective equipment/ safety wears | 3.13 | 17th | 3.60 | 10th | 3.51 | 8th |
| Training of the new staff on their related jobs and the use of tools and equipment | 3.57 | 5th | 3.56 | 15th | 3.50 | 9th |
| Testing the competence of the skilled labour and their adaptability to working environment | 3.32 | 13th | 3.75 | 5th | 3.47 | 10th |
| Engaging employees planning issues relating to health and safety organisation | 3.33 | 12th | 3.60 | 10th | 3.44 | 11th |
| Setting safety guidelines into the body of conditions of contract. | 3.40 | 10th | 4.10 | 3rd | 3.44 | 11th |
| Engaging resident safety manager on construction sites. | 3.14 | 16th | 3.58 | 13th | 3.41 | 13th |
| Availability of the internal and external health and safety department | 3.40 | 10th | 3.58 | 13th | 3.40 | 14th |
| Proper arrangement of waste on site. | 3.21 | 14th | 3.66 | 8th | 3.34 | 15th |
| Use of safety net where the height of building exceeded two storeys | 3.56 | 7th | 3.08 | 18th | 3.32 | 16th |
| Construction and contractors all risk insurance for the project, staff and site operatives | 2.94 | 18th | 3.48 | 16th | 3.25 | 17th |
| Obtaining of health and safety clearance/ certificate. | 3.48 | 9th | 3.24 | 17th | 3.21 | 18th |

Source: *Researcher’s Field survey (2017)*

The first objective of the study assessed respondents’ level of agreement on current state of safety practices on building construction projects site in Lagos State using some selected safety performance criteria on a Likert scale 1 – 5 (1. not practiced, 2= less practiced, 3=sometime practiced, 4= moderately practiced, 5=often practiced).

Table 4.3 ranked and compared the mean scores of the professional respondents and site operatives’ perception on how safety is currently practiced on their site with the overall mean score ranking. Five most frequently embraced among the parameters listed on project sites according to overall mean were: provision of temporary fence at the boundary of the site **(1st,4.07),** provision of accidents prevention strategy and safety consciousness on site **(2nd, 3.96),** development and frequent review of safety policy for building projects **(3rd, 3.90),** daily safety briefing **(4th, 3.74),** and provision of first aid box and welfare facilities **(5th, 3.73).**

However, there was no agreement in the response rate among the group of the respondents on the current state of safety practices on building construction projects. Take for example First aid box and welfare facilities are always made available on site was ranked **(15th, 3.78)** by the workers and **(4th, 3.74)** by the professional respondents. That showed the level of disagreement in their responses.

Secondly, the use of personal protective equipment/ safety wears was perceived as irrelevant to the site operatives as it was ranked **(17th, 3.60)** compared to that of professionals respondent **(10th,3.59).** Engaging resident safety manager on construction sites was ranked (13th, **3.41),** this also conformed to the outcome of low percentage of professional respondents who are safety managers as shown in t**able 4.2**. Furthermore, the result of professional respondents’ revealed that setting safety guidelines into the body of conditions of contract are often practiced as it was ranked **(3rd, 4.10),** compared with site operatives responses that was ranked (10th**, 3.10)**. Meanwhile, others factors tested are equally important as their mean scores above (3) points out of (5) points in the Likert scale.

**4.5 Objective two examined factors affecting site operatives from using safety wears on construction sites.**

Table 4.4: Factors preventing site operatives from using safety wears on construction sites

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Site operative** | **Scores** | **Professional** | **Scores** |  **Overall**  | **Score** |
|   | RII | Rank | RII | Rank | RII | Rank |
| Adaptability of workers to safety practices as it was against the traditional practices. | 0.780 | 3rd | 0.784 | 7th | 0.776 | 1st |
| Unethical practices of worker due to human attitudinal peculiarities and traditional practices. | 0.790 | 1st | 0.764 | 10th | 0.766 | 2nd |
| Insufficient instructions about the working condition and environment. | 0.762 | 4th | 0.800 | 4th | 0.764 | 3rd |
| Inadequate engagement of safety managers and ineffective supervision on site. | 0.720 | 7th | 0.868 | 1st | 0.762 | 4th |
| Unsafe practices of worker due to religious assertions. | 0.762 | 4th | 0.786 | 9th | 0.756 | 5th |
| Workers inadequate or lack of understanding about the workplace safety rules | 0.714 | 8th | 0.804 | 2nd | 0.742 | 6th |
| Lack of proper knowledge on hazards management.  | 0.692 | 10th | 0.804 | 2nd | 0.734 | 7th |
| Lack of proper training on the use of safety wears provided for use at work. | 0.784 | 2nd | 0.712 | 11th | 0.732 | 8th |
| Safety wears is not comfortable to work with. | 0.696 | 9th | 0.792 | 5th | 0.730 | 9th |
| Operatives engagement in improper conduct that could influence others workers. | 0.688 | 11th | 0.784 | 7th | 0.716 | 10th |
| Ineffective communication between safety personnel and workers | 0.750 | 6th | 0.684 | 12th | 0.714 | 11th |
| Lack of training on key issues pertaining health and safety consciousness | 0.666 | 12th | 0.788 | 6th | 0.706 | 12th |
| Willingness of the workers to meet their daily output. | 0.650 | 13th | 0.624 | 13th | 0.622 | 13th |

Source: *Researcher’s Field survey (2017)*

Second objectives identified factors preventing site operatives from using safety wears on construction sites on a Likert scale 1 – 5 to test respondents opinion on the listed variables (1= not affected, 2= less affected, 3= sometime affected, 4= moderately affected, 5=Mostly affected).

Table 4.4 presents Relative Important Index rakings of the responses on the factor that prevent site operatives from using safety wears on construction sites. Five top ranked from the overall **(RII)** among the factors were: adaptability of workers to safety practices as it was against the traditional practices of workers (**RII=0.776**), closely followed by unethical practices of worker due to human attitudinal peculiarities and traditional practices (**RII=0.766**) insufficient instructions about the working condition (**RII=0.764**), inadequate and ineffective supervision by safety personnel on site (**RII=0.762**), unsafe practices of worker due to religious assertions (**RII=0.756**).

In contradictions, adaptability of workers to safety practices as it was against the traditional practices of workers was ranked 3rd (**RII=0.780**) by site operatives to showed their reason for not using safety wears as against the thought of professional ranking 7th, (**RII=0.784**). Secondly, workers’ believed that their unethical practices of due to human attitudinal peculiarities and traditional practices 1st, (**RII=0.780**) as against the professionals 10th, (**RII=0.766**) was the reason.

All of these factors are within the control of the Safety or Site Manager and if averted they will go a long way to address the issues of safety practices. Furthermore, safety wears is not comfortable to work with was ranked 9th (**RII 0.696**) and 5th, (**RII=0.792**) by the workers and professionals respectively. However, judging by the ranking of Relative Important Index score of the professional respondents from **table 3** ineffective supervision by safety personnel on site **(RII 0.868)** and lack of proper knowledge on hazards management **(RII 0.804)**, lack of proper training on the use of personal protective equipment **(RII 0.804)** were ranked first and second as factors that prevent effective use of safety wears. This means more importance must be attached to supervision and control of workers on the use of safety wears, while workers must have adequate knowledge on associated risks to their tasks.

It is also important to stressed the fact that site operatives lacked proper training on the effective use of safety wears on sites as this was ranked 2nd, **(RII 0.784),** while ineffective communication between safety personnel and workers was ranked (6th) **(RII 0.750)**. This simply implies that for Construction Company to avert this current challenges, good safety policies, workable hazard management and construction programme must be properly communicated to the operatives that will use them. Consequently, willingness of the workers to meet their daily output was ranked 13th, **(RII 0.622**), this meant the factor slightly affected operatives from using safety wears.

**4.6 Objective three identified respondents’ level of agreement on the effects of using safety wears on workers operations.**

Table 4.5: Effects of using safety wears on workers operations

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variables  | Site operative  | Scores  | Professional | Scores | Overall  | Scores |
|   | Mean | Rank | Mean | Rank | Mean | Rank |
| Safety wears will improve safety among workers | 4.1 | 1st | 4.54 | 1st | 4.20 | 1st |
| Safety wears will reduce accident impact on operatives' | 4.08 | 2nd | 4.5 | 2nd | 4.14 | 2nd |
| Enhances safety participation of site operatives | 3.92 | 3rd | 4.1 | 3rd | 3.89 | 3rd |
| Workers compliance can be better if trained on the use of safety wears. | 3.81 | 5th | 4.04 | 4th | 3.87 | 4th |
| Safety wears are adequate enough to provide necessary safety at work | 3.75 | 6th | 3.7 | 6th | 3.71 | 5th |
| Workers tend to get more premiums if there is absent of injury by wearing safety wears. | 3.87 | 4th | 3.56 | 8th | 3.64 | 6th |
| It attracts extra cost of training safety officer. | 3.62 | 7th | 3.64 | 7th | 3.58 | 7th |
| Workers output cannot be affected or declined through the use of safety wears | 3.43 | 10th | 3.84 | 5th | 3.53 | 8th |
| Reduce workers level of work output and productivity | 3.52 | 8th | 3.28 | 10th | 3.51 | 9th |
| It attracted benefits that outweigh its costs of managing safety. | 3.27 | 11th | 3.54 | 9th | 3.28 | 10th |
| Shortage of workers' wages at the end of daily work as a result of wearing safety wears | 2.9 | 13th | 3.06 | 12th | 3.08 | 11th |
| The use of safety wears is good but impractical for construction workers | 3.24 | 12th | 3.14 | 11th | 3.06 | 12th |
| Use of safety wears will require more working time from operatives | 3.46 | 9th | 2.7 | 13th | 3.02 | 13th |

Source: *Researcher’s Field survey (2017)*

Third objectives ranked workers responses on variables that best describe effects’ of wearing safety wears on workers operations in the study area. This was measured by using five-point Likert scale 1=very Insignificant, 2= of less Significant, 3= slightly Significant, 4= moderately significant, 5=very significant.

The result from Table 4.5 showed that there was general agreement between the overall means score and the two categories of respondents mean scores ranking on effect of using safety wears on workers operations. Firstly ranked was safety wears will improved safety among workers with overall mean score of 1st, (**4.20)**. Followed by it reduced accidents impact on operatives with overall mean score of 2nd, (**4.14).** It enhances safety participation of site operatives was ranked 3rd, (**3.89)**, workers compliance will be better when trained on the use of safety wears was raked 4th, (**3.87).** Safety wears were adequate enough to provide necessary safety at work was ranked 5th, (**3.71).**

Critical observations on the Table 4.5 also revealed that workers output cannot be affected or declined as a result of using of safety wears, this was ranked 8th, (**3.53).** However, the use of safety wears attracted extra cost of training safety managers was ranked 7th, (**3.58),** while reduction of workers level of work output was ranked 9th, (**3.51)** as effects’ of using safety wears on workers operations.

Safety managers must look into the best strategy to implement effective use of safety wears on site. As part of effect of safety wears on workers operations, amazingly shortage of workers' wages at the end of daily work as a result of wearing safety wears would not increase workers output, as this was ranked 11th, (**3.08)**.Factor with the least raking among the variables was the use of safety wears would require more working time from operatives 12th, (**3.02).** The use of safety wear is good but impractical for site operatives in the study area scored overall mean of 13th, (**3.06)**. However,caution must be taken on this as the overall mean score of all the variables above 3 points out of (5) point of the Likert scale used which connote all the factors are slightly significant.

**4.7 Objective four examined respondent perception on the importance of integrating Builder’s document and others safety control systems in project management.**

Table 4.6: Importance of integrating Builder’s document and others safety control systems

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variables | Site operative  | Scores | Professional  | Scores | Overall | Mean |
|   | Mean | Rank | Mean | Rank | Mean | Rank |
| Provide helpful information to all construction participants | 3.9 | 4th | 4.62 | 1st | 4.19 | 1st |
| Gives understanding about the importance of safety practices | 3.97 | 2nd | 4.62 | 1st | 4.17 | 2nd |
| Ensure continuous improvement of safety performance | 3.86 | 6th | 4.24 | 6th | 4.02 | 3rd |
| It takes into consideration health and safety matters right from the design phase. | 3.89 | 5th | 4.32 | 4th | 4.00 | 4th |
| Effective coordination of construction activities in a safe manners | 4.00 | 1st | 4.10 | 9th | 3.97 | 5th |
| Facilitate action plan to manage construction safety | 3.76 | 7th | 4.28 | 5th | 3.94 | 6th |
| Provides information about all the construction stakeholder duties in managing safety | 3.94 | 3rd | 4.14 | 8th | 3.90 | 7th |
| Establishes need for safety training and orientation for site operatives | 3.51 | 10th | 4.40 | 3rd | 3.83 | 8th |
| Inbuilt safety guidelines into the conditions of contract for the project. | 3.62 | 8th | 4.06 | 10th | 3.77 | 9th |
| Unifies the practices of safety irrespective of location, size and volume of project handling | 3.56 | 9th | 4.22 | 7th | 3.74 | 10th |

Source: *Researcher’s Field survey (2017)*

Table 4.6 addressed forth objectives concerning respondents’ perception on the importance of integrating Builder’s document and others safety control system on project management. These was measured by using a five-point Likert scale 1= very insignificant, 2= of less significant, 3= slightly significant, 4= significant, 5=very significant.

The result of survey from Table 4.6 showed that four variables had overall mean score that is above (**4.00)** on the level of significance of integrating Builder’s document and others safety control system in project management and they were ranked accordingly. Firstly it provided helpful information to all construction participants (**4.19)**, secondly it gave understanding about the importance of safety practices (**4.17)**, thirdly it ensured continuous improvement of safety performance (**4.02)** and fourthly it takes into consideration health and safety matters right from the design phase (**4.00).**

However, professional respondent perceived that integrating Builder’s document and others safety regulations in controlling safety on project sites will provide helpful information to all construction participants and gives understanding about the importance of safety practices as it was ranked first with mean score of (**4.64).** Contrary to this, it can be said that tradesmen had little knowledge about the safety code of practice because effective coordination of construction activities in a safe manners was ranked first, while the least ranked was its established the need for safety training and orientation for site operatives with the means score (**3.51)**.

**4.8 Mann-Whitney U Test on safety improvement measures and control systems available for safety practices and compliance on construction sites.**

Table 4.7: Mann-Whitney U Teston safety improvement measures and control systems.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  **Mann-Whitney U** | **Z** | **Sig.**  | **Professional Median** | **Site Operative Median** | **R** | **Decision**  |
| Routine check on plant and equipment. | 1,417.50 | -1.029 | 0.303 | 5 | 5 | 0.10 | SE |
| Use of safety audio, video and visual displaying gadgets on site. | 1,058.50 | -3.234 | 0.001 | 4 | 5 | 0.30 | ME |
| Daily check of scaffold and ladder etc. | 1,173.50 | -2.474 | 0.013 | 4 | 4 | 0.23 | SE |
| Daily consciousness of safety practice on site | 1,384.00 | -1.217 | 0.224 | 4 | 4 | 0.10 | SE |
| Daily health and safety briefing | 1,547.00 | -0.170 | 0.865 | 4 | 4 | 0.00 | VSE |
| Workers obtaining safety clearance before start of work | 1,372.00 | -1.223 | 0.221 | 3 | 3 | 0.10 | SE |
| Deduct wages of workers who failed to use PPE | 1,371.00 | -1.223 | 0.222 | 4 | 4 | 0.10 | SE |
| Inclusion of safety matters from the planning phase | 1,138.00 | -2.695 | 0.007 | 4 | 4 | 0.30 | ME |
| Improved site layout planning | 1,376.50 | -1.224 | 0.221 | 4 | 4 | 0.10 | SE |
| Assigning safety responsibility to all levels | 1,344.50 | -1.417 | 0.157 | 4 | 4 | 0.10 | SE |
| Setting safety guidelines into conditions of contract.  | 1,243.00 | -2.046 | 0.041 | 5 | 4 | 0.20 | SE |
| Institute safety awards to motivation workers.  | 1,526.00 | -0.301 | 0.763 | 4 | 4 | 0.30 | ME |
| Reward workers that exhibit excellent safety performances | 1,254.00 | -1.942 | 0.052 | 4 | 3 | 0.20 | SE |
| Allocate budget for safety management | 1,385.00 | -1.157 | 0.247 | 4 | 4 | 0.10 | SE |
| Conduct in-house safety training | 1,215.00 | -2.017 | 0.044 | 4 | 4 | 0.20 | SE |
| Provision of safety booklet in various languages  | 1,091.50 | -2.292 | 0.004 | 3 | 4 | 0.30 | ME |
| Distribute pocket size copy of safety ethics to workers | 1,400.00 | -1.074 | 0.283 | 4 | 3 | 0.10 | SE |
| Proper waste management on site  | 1,141.50 | -2.632 | 0.008 | 4 | 4 | 0.20 | SE |

Source: *Researcher’s Field survey (2017)*

Cohen (1988); Pallant (2013) criteria.1=small effect, .3=medium effect, .5=large effect.

From Table 4.7, Mann-Whitney U Test result showed that there exist statistically difference on safety improvement measures and control systems available for safety practices and compliance on construction sites.Out of eighteen (18)listed variable, there was no significant difference on routine check on plant and equipment between site manager (***Md* = 5, *n* =50)** and site operatives **(*Md* =5, *n* = 63), *U* = 10416, *z* = –1.03 *p* = .30, *r* = .10** and this would general small effect. There was a significant difference on the use of audio, video and visual displaying gadgets between site manager **(*Md* = 4, *n50* =)** and site operatives **(*Md* =5, *n* = 63), *U* = 1058, *z* = –3.23,*p* = .30, *r* = .03,** and this could generatemedium effect, no significant difference on daily check of scaffold and ladder etc. between site manager (***Md* = 4, *n* =50)** and site operatives **(*Md* =, *n* = 63), *U* = 1173, *z* = –2.47 *p* = .01, *r* = .23.,** and this would general small effect. There was a significant difference on inclusion of safety matters from the planning phase site manager **(*Md* = 4, *n* =50)** and site operatives **(*Md* =, *n* = 63), *U* = 1138, *z* = –2.70 *p* = .01, *r* = .30,** and it would generate medium effect, institute safety awards to motivation workers site manager **(*Md* = 4, *n* =50)** and site operatives **(*Md* =, *n* = 63), *U* = 1526, *z* = –0.30 *p* = .30, *r* = .30,** medium effect, there was a significant difference on provision of safety booklet in various languages site manager **(*Md* = 3, *n* =50)** and site operatives **(*Md* =4, *n* = 63), *U* = 1092, *z* = –2.29 *p* = .00, *r* = .30,** this will generate medium effect.

**4.9 Test of Hypothesis**

H0:-There is no significant difference between professional and site workers perceptions on factors preventing effective use of safety wears on construction sites.

H1:-There is significant difference between professional and site workers perceptions on factors preventing effective use of safety wears on construction sites.

Table 4.8: Independent Samples Test on factors preventing construction workers from using safety wears on construction sites.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Levene's Test for Equality of Variances | t-test for Equality of Means |   |   |
| F | Sig. | t | Df | Sig. (2-tailed) | Mean | Std. Deviation |
|   |   |
| Unethical practices of worker due to human attitudinal peculiarities and traditional practices. | 4.693 | 0.032 | -0.095 | 111 | 0.924 | 3.82 | 0.873 |
|  |  | -0.100 | 106.434 | 0.920 | 3.84 | 1.370 |
| Unsafe practices of worker due to religious assertions | 2.616 | 0.109 | 0.534 | 111 | 0.595 | 3.84 | 1.235 |
|  |  | 0.518 | 90.379 | 0.606 | 3.73 | 0.954 |
| Willingness of the workers to meet their daily output. | 0.149 | 0.701 | -0.968 | 111 | 0.335 | 3.56 | 0.972 |
|  |  | -0.976 | 108.232 | 0.331 | 3.75 | 1.047 |
| Inadequate engagement of safety managers and ineffective supervision on sites. | 19.184 | 0.000 | 4.668 | 111 | 0.000 | 4.34 | 0.772 |
|  |  | 4.918 | 105.145 | 0.000\* | 3.40 | 1.251 |
| Insufficient instructions about the working condition and environment. | 4.520 | 0.036 | 1.601 | 111 | 0.112 | 4.00 | 0.926 |
|  |  | 1.639 | 110.895 | 0.104 | 3.68 | 1.133 |
| Safety wears is not comfortable to work with. | 0.208 | 0.649 | -0.045 | 111 | 0.965 | 3.10 | 1.359 |
|  |  | -0.044 | 102.403 | 0.965 | 3.11 | 1.284 |
| Workers inadequate or lack of understanding about the workplace safety rules. | 18.847 | 0.000 | 2.488 | 111 | 0.014 | 4.02 | 0.869 |
|  |  | 2.617 | 105.686 | 0.010\* | 3.46 | 1.389 |
| Carelessness and over-confidence of workers | 14.863 | 0.000 | 0.387 | 111 | 0.700 | 3.92 | 0.853 |
|  |  | 0.403 | 109.380 | 0.688 | 3.84 | 1.221 |
| Lack of proper training on the use of safety wears. | 7.969 | 0.006 | 3.256 | 111 | 0.002 | 3.94 | 0.956 |
|  |  | 3.382 | 109.768 | 0.001\* | 3.21 | 1.346 |
| Ineffective communication between health and safety managers and workers. | 1.513 | 0.221 | -1.345 | 111 | 0.181 | 3.42 | 0.906 |
|  |  | -1.378 | 110.949 | 0.171 | 3.68 | 1.119 |
| Adaptability of workers to safety practices as it was against the traditional practices | 1.208 | 0.274 | 3.026 | 111 | 0.003\* | 3.96 | 0.880 |
|  |  | 3.075 | 110.007 | 0.003 | 3.41 | 1.010 |
| Operatives’ engagement in improper conduct that could endanger their safety.  | 0.991 | 0.322 | 3.424 | 111 | 0.001\* | 3.92 | 0.966 |
|  |  | 3.415 | 104.176 | 0.001 | 3.30 | 0.944 |
| Lack of proper knowledge on the hazards management. | 15.204 | 0.000 | 2.569 | 111 | 0.012 | 4.02 | 1.078 |
|   |   | 2.650 | 110.807 | 0.009\* | 3.40 | 1.420 |

Source: *Researcher’s Field survey (2017)* \*Significant at 5% level (p≤.05)

Cohen (1988); Pallant (2013) criteria, .01=small effect, .06=moderate effect, .14=large effect.

From the table above all the variables that have their level of significant below 0.05 prevented workers majorly from using safety wears more than those that have their significant above 0.05 on construction sites.

An independent samples t-test was conducted to compare the factors preventing the effective use of safety wears on construction sites scores of professionals and site workers. Out of thirteen variables tested. There was significant difference on inadequate engagement of safety managers and ineffective supervision on site scores for professional respondents’ **(*M* = 4.34, *SD= 0.772)*** and site workers **(*M* = 3.4, *SD* = 1.25; *t* (105.15) = 4.92, *p* = .00 two-tailed).** The magnitude of the differences in the means (mean difference **= .94, 95% *CI*: .56 to 1.32)** was large effect **(eta squared = .18).** There was also significant difference on workers inadequate or lack of understanding about the workplace safety rules scores for professional respondent’s **(*M* = 4.02, *SD= 0.87)*** and site workers **(M = 3.46, SD = 1.39; t (105.69) = 2.62, p = .01 two-tailed).** The magnitude of the differences in the means **(mean difference = .56, 95% CI: .14 to .98)** was moderate effect **(eta squared = .06).**

There exist significant difference on lack of proper training on the use of safety wears scores for the professional respondents’ **(*M* = 3.94, *SD= 0.956)*** and site workers **(*M* = 3.21, *SD* = 1.35; *t* (109.77) = 3.38, *p* = .001 two-tailed).** The magnitude of the differences in the means **(mean difference = .734, 95% *CI*: .304 to 1.16)** was moderate effect **(eta squared = .09).**

There was significant difference on adaptability of workers to safety practices as it was against the traditional practices, professional respondents’ recorded **(*M* = 3.96, *SD= 0.88)*** as against site workers **(*M* = 3.41, *SD* = 1.01; *t* (111) = 3.03, *p* = .003 two-tailed).** The magnitude of the differences in the means **(mean difference = .54, 95% *CI*: .184 to 0.906)** was moderate effect **(eta squared = .08).**

There was significant difference on operatives engagement in improper conduct that could influence others workers, professional respondents’ recorded **(*M* = 3.92, *SD= 0.966)*** and site workers **(*M* = 3.30, *SD* = .944; *t* (111) = 3.42, *p* = .001 two-tailed).** The magnitude of the differences in the means **(mean difference = .618, 95% *CI*: .26 to .98)** was large effect **(eta squared = .10).**

There was significant difference on lack of proper knowledge on hazards management, professional respondents’ recorded **(*M* = 4.02, *SD= 1.1.08)*** and site workers **(*M* = 3.40, *SD* = 1.08; *t* (110.81) = 2.65, *p* = .009 two-tailed).** The magnitude of the differences in the means **(mean difference = .6632, 95% *CI*: .157 to 1.09)** was large effect **(eta squared** = .06).

**CHAPTER FIVE**

**SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION**

**5.1 Introduction**

This chapter summarised findings of the study with a view to give closing remarks of the research, recommendations and also identified area for further research.

**5.2 Discussion of Findings and Justification of Research Objectives**

**5.2.1** **Objective one examined current state of safety practices on building construction projects**

The result presented on Table 4.3 compared the mean scores of the professional and site operatives’ perception on how health and safety are currently practiced on construction sites with the overall mean score ranking. Out of eighteen listed parameters, five most frequently embraced among the site practice parameters listed on project sites were provision of temporary fence at the boundary of the site and provision, provision of accidents prevention strategy and safety consciousness on site, development and frequent review of safety policy for building projects, daily safety briefing, provision of first aid box, safety gadgets site accommodation and welfare facilities. All of these are within the capacity of the construction company, any attempt to improve and subscribe to this practices the longer way it will go in solving the challenges confronted by the industry. This consistence with George, Geoffrey and Matthew (2013) finding that stressed the need for construction company to provide adequate awareness particularly on each project, that will covers an outline of the project, a top to bottom survey of the safety are necessitated and desired, clear arrangements and systems, disciplinary activities, substance manhandle testing policy and proactive management methods needed for the project.

In contradiction to recommendation of Construction (Design and Management) Regulations (CDRM, 2005:2015) engaging resident safety manager on construction sites was lowly ranked, it was not surprising but only justified the outcome of low percentage of respondents who are safety managers, effort must be focused on engaging safety managers on each construction projects, because they are trained to implement construction safety and ensure workers compliance with safety practices on site. This supported Bust, Finneran, Hartley and Gibb (2014) finding that professionals’ interests must be enhanced towards management of safety and use of safety education programs must be put in place for projects executions within construction participants as one of the real needs to upgrade construction project safety, but against the recommendation of McDonald (2003) that all site should have safety manager, they must demonstrate strong will to ensure both behaviour and compliance of employees with safety requirements are positively influenced by his/her role.

Furthermore, setting safety guidelines into conditions of contract was found to be averagely practiced in the construction industry this was contrary to provision of Construction (Design and Management) Regulations (CDRM, 2005:2015); Famakin and Fawehinmi (2012) and Umeokafor *et al.*, (2014) recommendation that client should use health and safety records as a required document for prequalifying contractors. In order to prevent equipment failure from overuse and overload examination of scaffold, equipment and tools before the start of work by safety manager was in agreement with (Asfahl, 1999) finding.

**5.2.2 Objective two Examined on Factors Preventing site Operatives from using Safety wears on Construction sites**

Result presented in Table 4.4 on the factor affecting site operatives from using safety wears. Five top ranked using Relative Important Index from thirteen listed factors are: adaptability of workers to safety practices as it was against the traditional practices and training, unethical practices of worker due to human attitudinal peculiarities and traditional practices, insufficient instructions about the working condition, inadequate and ineffective supervision by safety personnel on site, unsafe practices of worker due to religious assertions. All of these factors are within the control of the safety or site manager and if averted it will go a long way in addressing the issues of safety practices.

It is therefore not surprising that workers have problem adapting to safety practices especially the use of safety wears, firstly it was not part of their training during apprenticeship, and subjecting them to use this gadgets mighty requires time, training and close monitoring techniques, this was in agreement with Osonwa Eko and Ozah (2015) finding as training on the use of safety wears would create awareness on the implications of hazards on workers’ health.

However, there is still a gap on effective supervision by safety personnel on siteand knowledge on hazards management, proper training on the effective use of safety wears by site/safety managers as they were perceived factors preventing safety practices as suggested. This was contrary to Abdelhamid and Everett (2000) recommendation as contained that safety department of each contracting company should ensure continuous monitoring of safety wears and to also frame comprehensive purchase policy.

This call for more importance to be attached to supervision and controlling of workers on the use of safety wears, while workers must have adequate knowledge on associated risk to their tasks. This stressed the need to agree with Ismail, Doostdar and Harun (2011) finding that site managers need to conduct enlightenment programs among their workers to get them familiar with the necessities safety consciousness on site.

It is also important to stress the fact that site operatives lacked proper training on the effective use of safety wears on sites as this has resort into ineffective communication between safety personnel and workers. Olele (2014) recommended that regular workers training on skills would enable safety managers and workers in identifying hazards and addressing safety related issues. This simply means, for Construction Company to avert this current challenges, good safety policies, workable hazard management and construction programme must be properly communicated to the operatives that will use them. Consequently, willingness of the workers to meet their daily was disregarded as it was least ranked this mean the factor slightly affected operatives from using safety wears, as against Aniekwu (2007); Koehn, Kothari and Pan cited in Awwad, *et al.,* (2016); Guldenmund, Cleal, Mearns (2013) and Umeokafor *et al.,* (2014) opinion, that unemployment have made workers to disregard compliance with OSH in accepting risky jobs.

**5.2.3 Objective three on Respondents’ level of Agreement on the Effects of using Safety wears on workers Operations on Construction sites.**

Respondent’s level of agreement on the effects of using safety wears on workers operations. There was agreement between the professional and site operatives’ respondent on the effects of using safety wears on workers operation on construction sites, this includes: safety wears will improved safety among workers, this is consistence with the outcome of Shamsuddin *et al.,* (2015) as established that safety wears played vital rolls in protecting workers on construction sites, thus necessary tools and safety wears should be made available. It would reduce accidents impact on the victims, enhances safety participation of site operatives justified Muhammad, Abdulateef and Ladi (2015) finding as workers compliance with health and safety regulations was observed to have great impact in determining workers quality and productivity on construction projects. Also Dodo (2014) added that health and safety was an unavoidable part of construction process with the contributions of different tradesmen and professionals at each production stages.

On second note,workers can perform better if trained on the use of safety wears also top ranked thereforeworkers will give their best when trained on the use of safety wears and when adequate facilities are provided, thereby reducing cost of managing accidents was in support of (Diugwu, Baba, and Egila 2012) study.

Furthermore, workers output cannot be affected or declined through the use of safety wears was contrary to Irizarry, Simonsen, and Abraham (2005) finding that contractors always overlooked workers compliance to the use of safety wears because they perceived that it will increase the time taken by the workers to complete their daily output, which in turn impedes their productivity.

However, construction will incurred extra cost on training safety officer to update his knowledge of safety practices otherwise lack of knowledge to use safety wears may reduce workers level of work output. Umoh and Torbira (2013) contended that accident does not just diminish profitability, it added directly and indirectly to the cost of production. Meaning, there is a huge connection between cost of safety implementation and the production output which form a critical connection between workers compliance to safety control and man hour put in by operatives for effective work output.

There also was uniform agreement on how the two category of the respondents perceived the use of safety wears as being good but impractical for site operatives on construction sites, though it was ranked low but it must be given second thought. Safety manager must look into the best strategy to implement the use of safety wears on sites. This collaborated with Osonwa, Eko and Ozah (2015) finding as safety wears was considered not necessary, non-adequate, and inconvenience for workers on site.

**5.2.4 Objective four Respondent’s Perception on the Importance of Integrating Builder’s Document and others Safety Control Systems on Construction Projects.**

It can be said that integrating Builder’s document and others safety control systems on construction projects would provide helpful information to all construction participants, gives understanding about the importance of safety practices, ensure continuous improvement of safety performance and help construction participants to takes into consideration health and safety matters right from the design phase this was against (Nagarajan, 1976; Ayorinde, 1990; and Phelan, 2014). Ratay (1997) findings that code and regulations is not stand alone to improve construction safety at reduce cost, rather poor codes and regulations can only add to project cost without any solution to construction safety compliance.

However, professional respondent perceived that integrating Builder’s document and others safety regulations in controlling safety on construction projects would provide helpful information to all construction participants and gives understanding about the importance of safety practices, this finding was in agreement with (Bamisile, 2004); Kennedy, 2014; Construction (Design and Management) Regulations (CDRM, 2005:2015) recommendations that project health and safety plan is essential for every single construction project starting from the measures that needs to be put in place from the planning, design, construction, completion and maintenance of the building and taken into consideration individual stakeholders responsibility. Contrary to this, it can be said that tradesmen had little knowledge about the safety code of practice because effective coordination of construction activities in a safe.

**5.2.5 Objectives five on Safety Improvement Measures and Control Systems Available for Safety Practices and Compliance on Construction Sites.**

The use of safety audio, video and visual displaying gadgets on site, daily check of scaffold and ladder etc., inclusion of safety matters from the planning phase, setting safety guidelines into conditions of contract, reward workers that exhibit excellent safety performances, conduct in-house safety training, provide safety booklets in various languages and waste management on site were found to be statistically significant difference and will generate medium effects using Cohen (1988) and Pallant (2013). criteria .1=small effect, .3=medium effect, .5=large effect.

Bust, Finneran, Hartley and Gibb (2014) stated that professionals’ interests must be enhanced towards safety practices and usage of awareness procedures that must be provided and executed among the participants, this would serve as one of the real needs to upgrade construction project safety practices. Charles *et al.,* (2007) noticed few difficulties against the issue of safety management on site, this could be avoided if due thought and exertion would be put in place right from the planning stage. Edwin, Shamil and Daniel (1999) finding showed that there was a strong relationship between safety performance and output bonus paid. Muhammad, Abdulateef and Ladi (2015) added that, workers compliance with health and safety regulations would have a great impact in assessing the quality and workers rate of output on construction projects. This was supported by Dodo (2014) finding as health and safety practices remained an unavoidable part of construction process with the contributions of different tradesmen and professionals at each production stages.

Dozzi and AbouRizk (1993) and Funso, Samml and Gerryshom (2016) opined that, workers motivation, safety practices at work, environmental factors and physical limitation amount to factors that can increase labour productivity. From this assessment, there was no consensus in the previous studies on if using safety wears is part of the identified factors that affect workers productivity on construction project.

Umoh and Torbira (2013) stressed that enhancing strategies for operatives’ has incredibly affected and impacted productivity, however this is not without some noticeable deficiencies. Safe at work in this way has throughout the years been viewed as the hob of expanded operatives’ profitability.

Winder and Makin (2006) and Prasad and Rao (2013) opined that, safety can be achieve through systematic approach i.e. engineering controls, administrative controls and implementation of safety wears usage. Farooqui *et al.,* (2007) therefore stated that, unsafe conditions coupled with the wrong use of safety wears added to increase rate of construction accidents.

**5.2.7 Summary of** **Findings and Contribution to Knowledge**

Generally, there have been limited study carried out on effects’ of safety wears on workers productivity, therefore this study will add to availability of literature materials on health and safety practices. This will assist the industry in:

The findings of the study are therefore summarized below:

1. Alleviating the problem of workers adapting to safety practices especially the use of safety wears, because it was not part of their training during their apprenticeship.
2. The study found out that training of construction workers’ have significant impact on the effective use of safety wears.
3. As a result, constant training of workers on the use of safety wears would go a long in improving operatives’ safety practices.
4. The study established low and inadequate engagement of safety managers on constructions sites for project execution.
5. Willingness of workers to meet their daily output was disregarded as factor preventing operatives from using safety wears.
6. The study also noticed poor channel of communication between site managers and workers
7. And finally suggested safety improvement strategy that are significant to safety practices on construction sites.

**5.3 Conclusion**

In conclusion, the outcome of the study showed the need for constant re-evaluation of safety practices of the construction companies in the study area because of its vital contributions to economy development. It is evident that this study outcomes explored advantage of proactive approach in managing safety practices by examining effects of using safety wears on workers operation thereby curtailed possibility of accidents on counteractive action against future mishaps. Assumption must not be made when recruiting workers especially for companies that have workable control systems and safety policy. It is of utmost importance to ensure that every new workers employed on project sites are given necessary awareness talk regarding safety practices and use of safety wears.

More proactive measure must be put in place right from the planning stage by the clients and their representative to avert possible risk associated with their project this is a stage where all contract documents such as priced bills of quantities by registered Quantity surveyor, Contract drawings by Architect, Builders’ document by licensed builder, condition of contract etc. are prepared. Therefore adopting sustainable strategies that will eliminate possibility of accident and the builders or contractors stating the degree of confidence at which the work could be executed will go a long way in addressing the issue of safety practices.

However, based on personal observation on sites, safety implantation and compliance has been so much neglected and suffered great set-back due to the willingness of the workers to meet their daily output and the goal of site manager in ensuring workers’ wages justified their output, secondly, level of hunger also contributed to workers willingly undertaken risky jobs as means of survival or maximize their wages on construction site

 The findings of this study has pointed out the need for the construction industry to review their safety policies and make systematic approach to accommodates some of the critical points raised regarding the issue of safety practices challenging Nigerian construction companies. This depicted that the variables influenced each other greatly and cannot work in isolation. It equally underscored the importance of their collective interplay in improving safety performance of construction workers.

Furthermore, high demand for improvement of safety practices and use of prescribed safety wears on construction site, safety training must be taking serious most especially the site operatives that are more vulnerable to accidents, this will help them to know the safety demands of each construction projects. Safety inspections should be conducted on sites and any identified hazards should be taken care of as soon as detected

Therefore workers must be trained on safety awareness, risk identification, hazard management, use of safety wear, use of first aid and proper use of varieties of safety equipment, such as fall arrest systems because no matter how good safety policy of construction companies is without passing knowledge or safety awareness to the workers the policy may failed and accident will persist. The study established positive relationship which suggest that training of workers on safety knowledge and use of safety wears were related.

**5.4 Recommendation**

The following recommendations were made on improvement strategy on safety practices among the construction workers as a rationales for this study and to serves as additions to existing knowledge, availability of literature and reference documents on the subject of health and safety practices in Nigeria and world at large.

1. Clients are advised to use past record on health and safety performance to prequalified contractors.
2. Construction managers should engage the use of safety audio, video and visual displaying gadgets on site to demonstrate safety consciousness among workers. Workers who are majorly vulnerable to accident on site can be controlled with this approach on sites, this might include appointing a personnel that will keep reminding workers about their safety.
3. Construction managers should be embraced strategic approach on site such as: creating safety awareness, safety briefing, include safety matters right from the planning phase, set safety guidelines into conditions of contract, reward workers that exhibit excellent safety performances.
4. Training and appointment of resident safety personnel/manager that will implement safety policy and form a monitoring control system that will keep reminding workers that they are absolutely responsible for their safety on site using public address system throughout the working hours.
5. Also in-house safety training, provision of safety booklets in various languages and ensure effective waste management on site can reduced accident to barest minimum on site.
6. The industry can also form partnership with the government and Professional bodies’ regulatory team for site inspection at a regular interval on construction stage this will collaborates the effort of contractors’ safety manager to ensure safety practices are compiled with and documentation of any case of accident, towards building a safe working environment in enhancing successful project delivery.
7. Construction manager should adopt require site base training for the operatives especially on the use of safety wears while safety managers should regularly attends safety training course.
8. The study also seek for improvement on the involvement of safety managers’ and suggest at least one safety managers each on every project site.
9. It is on this note the study call for an improved channels of communication between site managers and workers, to ensure that the objectives and safety needs for each of the projects are well communicated to site operatives
10. However, in improving safety practices among the workers, non-financial rewards and award could be instituted to workers that exhibited excellent safety performance among others. Lastly, implementation of safety code in execution of building production process should be improved, considering the manner workers disregard safety practices as pointed out by the finding of the study.
11. Finally, Government should intensive their effort towards safety implementation by partnership with professional bodies in the built environment to organizing special training on health and safety practice on construction site for the tradesmen, Nigerian Institute of Building (NIOB) has started already.

**5.6 Areas for further research**

This same research should be further carried out covering a large scope especially at the various geopolitical zones of Nigeria. Also, area such as link between safety education and safety practices, public private partnership (PPP) concept for implementing safety practices on site can as well be explored. Lastly a comparative study must be carried to assess effects of safety wears on work output of each of the construction tradesmen.

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