ASSESSMENT OF CONSTRUCTION RELATED RISK IN CONSTRUCTION INDUSTRIES IN ILORIN, KWARA STATE.

BY

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2007/1/27289BT

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA.

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION SCHOOL OF SCIENCE AND SCIENCE EDUCTION EDUCATION FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA.

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OCTOBER, 2012.

CERTIFICATION

I Yusuf Ganiyat Olawumi with Matriculation Number 2007/1/27289BT an undergraduate student of the Department of Industrial and Technology Education certify that the work embodied in the project is original and has not been submitted in part or full for any other diploma or degree of this or any other University.

Name

Signature

APPROVAL PAGE

This project has been read and approved as meeting the requirement for the award of B.Tech degree in Industrial and Technology Education, School of Science and Science Education, Federal University of Technology, Minna.

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External Supervisor	Signature/Date

DECLARATION

I Yusuf Ganiyat Olawumi, Matriculation Number 2007/1/27289BT an undergraduate student of the Department of Industrial and Technology Education, declare that the work embodies in this project is original and has not been submitted in part of full for any other Diploma or Degree of this or any other University.

_____ _____

Sign Date

DEDICATION

This project is dedicated to Almighty God who saw me through the course of the programme and to my parent Alhaji G.O Yusuf and Alhaja R. I Yusuf who have make it possible for me to create my own future.

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Abstract

This study focused on the assessment of construction related risk in construction industries in Ilorin, Kwara State. Three research questions and two hypotheses were formulated to guide the study. A survey research design was employed for this study. The target population for this study was 100 consisting of 60 building technicians and 40 professional builders. A questionnaire containing 33 items developed by the researcher and validated by two experts from Industrial and Technology Education department was used for data collection. Statistical mean was used to analyze the data of the study. Standard deviation and t- test were used for the hypotheses and tested at 0.05 level of significance. The findings among others revealed that falling from ladders and other work places, struck by falling loads, crush by collapsing structures and lack of training are the risk that result to accident in construction site. Based on the findings it was recommended that safety posters should be adequately place in construction site to reduce accidental risk, adequate orientation and safety education should be given to both building technicians and professional builders in construction industries and risk should be identified in construction site and its potential impact should be estimated for proper decision making.

CHAPTER I

INTRODUCTION

Background of the Study

Construction Industries are Sector of national economy engaged in preparation of land for construction work, alteration, and repair of buildings structures, and other real property. Gambatese (2008) defined construction industries as those industries connected with site preparation, any excavation or landscaping work done in connection with construction work, assembling or installing prefabricated components for use in construction work, taking part of a structure into its prefabricated components, demolition work or asbestos removal work (prescribed activities). In this industry different types of tools and equipment are involved. The personnel in the construction learn to manipulate these tools and equipments in order to achieve the desire goal. The process of manipulating these tools and equipment during the construction processes subject most of the worker to danger, hazard and high risk in the construction industries.

Related risk in construction refers to the harm realize from a particular hazard or accidents during construction processes. Construction related risk can also be described as the risk encounter during the process of carrying out construction work such as concreting operation, excavations, demolition works painting among others. In theory, most construction injuries can either be prevented or controlled. Unfortunately, achieving this goal has been very slow in practice. To this effect, risk can be defined as the possibility of being exposed to danger or loss. This is an everyday thing in the construction industry as it is no longer a new thing as so many lives are being lost with thousands being injured and some being permanently displaced from the

working sector. To this effect, risk must be properly managed and controlled since managing risks in construction projects has been recognized as a very important management process in order to achieve the project objectives in terms of time, cost, quality, safety and environmental sustainability. However, until now most research has focused on some aspects of construction risk management rather than using a systematic and holistic approach to identify risks and analyses the likelihood of occurrence and impacts of these risks. “No construction project is risk free. Risk can be managed, minimized, shared, transferred or accepted it cannot be ignored” Latham (1994).

Occupational Health and Safety (OHS) in construction industries is all about protecting people from injury at work or from becoming ill through appropriate precautions. A safe, healthy and productive workforce is needed to achieve the objective of national development and economic growth since construction industry is a stimulator for national economy. However, each sector of the industry has its distinct hazards and risks determined by the peculiarities of its labour process.

The importance of the construction industries in the national development cannot be overemphasized considering the fact that at least 50% of the investments in various development plans is primarily in construction. It is the next employer of labour after agriculture in underdeveloped countries, Oyatoye, (1994). In developed countries, activities in construction industries especially the building/civil works are used as indices of economic growth and buoyancy or recession Adetifa, (1994). The output of construction industries in Nigeria accounts for over 70% of Gross Development Product (GDP) Mbachu, (1998) and therefore is a stimulator of national economy. It is against this background that the construction industry has

been recognized concurrently as a major economic force and one of the more hazardous and risk- occurring industries.

In present-day, construction is marked by rapid execution of projects and the extensive use of machinery and mechanized production processes. However, despite a relatively large pool of construction machines and mechanism as well as high level of prefabrication in construction industries and installations, the proportion of manual building technicians remains approximately 50%, Ataevet (1995). Construction industries has many sub-sectors ranging from simple housing to major high-rise construction industries as well as bridge, road, tunnel, and even under water construction. Each sector has its distinct hazard and risks determined by the peculiarities of its professional buildings and building technicians process as indeed every production process does irrespective of whether a good or service is produced.

In all over the world, construction workers are three times more likely to be killed and twice as likely to be injured as workers in other occupations. In Nigeria though there is no reliable data on accident cases in construction industries, because builders don't report accidents at appropriate ministry nor keep proper records on accidents. In 2005, a four-storey building under construction in Port Harcourt collapsed and not less than twenty workers died in incident barely 24 hours after similar incident in Lagos (The Punch, July 2005).Akintunde (1990) The Punch, May 2005, The Punch, June 2003 and Daily Independent, July2005 reported similar incidences. The menace of collapse building during construction is an indicator of unsafe place and system of work in which workers are subjected to and therefore already at risk of accident even where there is no collapse. Many people have met their ultimate death on construction sites in Nigeria while others have become permanently crippled from injury. This emphasized the need for adequate occupational health and safety strategies for workers in their site working environment, because the costs of

accidents are immense to the individual, the employer and the society. Occupational health and safety in construction is all about preventing people from been injured at work or becoming ill through appropriate precaution and providing a satisfactory working environment.

Hazard is something with potential to cause accident with varying severity from cut and bruises to serious illness, disability or death. Risk is the combination of severity of accident with the likelihood of it happening. Accidents are by their nature unplanned and uncontrolled events. Accident can result in direct and indirect cost. Direct costs of construction accident are medical bills, premiums for compensation benefits, liability and property loss. Indirect costs associated with accidents are: Loss time of injured employee, Cost of work stoppage of other employees from curiosity, sympathy, and providing assistance and Lost of supervisory time from assisting injured employee, rearranging work crews because of lost employee.

It has been established that the reduction of hazardous events is fundamental to good construction safety management because it is these events that have the potential to cause accidents which may result in injuries and fatalities, Carter and Smith, (2001). It is therefore pertinent to undertake risk assessment. A risk assessment is a careful examination of those things in the process of work or in the workplace that could cause harm to people. It also covers finding out whether enough precautions have been taken or more should be done to prevent harm. The essence is to ensure that no one gets hurt or becomes ill. What is most important is deciding whether a hazard is significant and if it is covered by satisfactory precautions so that the risk is small. It is against this background that safety assessment and pursuit should be geared towards assessment of risks, determination of their significance, evaluation of the available corrective measures, and the selection of the optimal remedies. Actions to ensure safe access and safe

working areas must also be regularly reconsidered as construction proceeds otherwise safety may be compromised.

Kenneth and Keith (2002) viewed assessment as the process of examining as carefully, thoroughly and objectively as possible, an organization, individual or group of product or programme in order to ascertain strength and weakness. From the foregoing therefore, assessment can be seen as the systematic process of judging the worth, desirability, effectiveness, or adequacy of an organization according to a given criteria.

Statement of the Problem

Risk and accident are no new terms in the construction industry as it is something that occurs on almost daily bases the only difference between various occurrences is the gravity of occurrence, number of people involved and how often workers are exposed to it (Godwin,2006). Over the years, various radio and television stations, newspapers and other forms of communication have given account of various accidents that have occurred on the construction site but till this moment, non have being able to give an exact total of this occurrences, how they have being caused and ways of eliminating or bringing it to its barest minimal. The problem here therefore becomes how construction related risk can be assessed in Kwara State of Nigeria?

Purpose of the Study

The main purpose of the study is to assess the construction related risk in construction industries in Kwara State of Nigeria. Specifically, the study is to determine:

1. The risk that could cause accident in the construction site.
2. The strategies for ensuring accident free construction industries.

3. Operations that are involves in construction activities that are likely to cause risk.

Significance of the Study.

The finding of this study is of benefit to construction industries as it highlights areas where there is likelihood of the workforce to endanger their life during construction work. Therefore, suggesting that proper safety education should be given to the workforces before fully engaging them into the construction activities.

The findings will be of benefit to the contractors as it reviews areas of construction related risks and therefore, the study properly gives an insight on how the construction activities will be free of accident, engaging the contractor to loss time, money and other factor of production during the construction work.

The findings of this study is of benefit to the workforce as they are the people engage in the construction activities and exposed to the accident or danger that are likely to be sustained during construction. Therefore the study educates them on how to conduct themselves in any construction activities they find themselves.

The findings of this study is also of benefit to the general public as it enlightens them the areas where there is likelihood of accident in the construction industries.

Scope of the Study.

The study will delimited to assessment of construction related risk in construction industries in Ilorin, Kwara state. The study hopes to cover the risk in the construction company that could cause an accident, strategies for ensuring accident free on construction site and the operations that are involves in construction activities that are likely to cause risk.

Research Questions

The following research question guided the study.

1. What are the risks that could cause accident in the construction site?
2. What are the strategies for ensuring accident free construction industries?
3. What are the Operations that are involves in construction activities that are likely to cause risk?

Assumption of the Study

The following assumptions were made in carrying out the study:

1. The construction workers will be sincere enough to respond objectively to the items on the instrument administers.
2. Responses from the respondents will provide valid information for realistic decision about assessment on construction related risk in construction industries.

Hypothesis

The following hypothesis that were formulated and will be tested at 0.05 level of significant:

Ho_1. There is no significant difference between the mean response of building technicians and professional builders on the risk that could cause accident on the construction site.

Ho_2. There is no significant difference between the mean response of building technicians and professional builders on the strategies for ensuring accident free on construction industries.

CHAPTER II

LITERATURE REVIEW

Work related to present study will be review under the following sub-headings

1. Historical background of construction industries
2. The risks that could cause accident in the construction site.
3. The measures in making the construction site accidents free.
4. Operations that are involves in construction site that are likely to cause risk.
5. Summary of literature review.

Historical Background of Construction Industries

Before looking into the historical background of the construction industry, it is necessary to look at what exactly constitutes the construction industry. In trying to define the construction industry, it may not be easy to come up with a universal definition. This is because of the fact that the definition bestowed to the phrase in different societies tend to contain different aspect pertinent to that society of the definitions given, the definition to the given to the phrase by Australian Bureau of Statistics to its construction industry is described as including : " All units mainly engaged in construction building (including the on – site assembly and erection of prefabricated buildings), roads, railroads, aerodromes, irrigation projects harbor or river works, gas, sewage or storm water drains or mains, electricity or other transmission lines or towers, pipelines, oil refineries or other specified civil engineering projects. In general, unit mainly engaged in the repair of buildings or other structures are also included as are those engaged in the alteration renovation of buildings, preparation of mine sites, demolition or excavation

Construction has been an aspect of life since the beginning of human existence. The first buildings were huts and shelters construction by hand or with simple tools. As cities grew during the Bronze Age, a class of professional craftsmen likes bricklayer and carpenters appeared occasionally, slaves were used for construction work. Traditionally, construction might be considered as having properly commenced between 4000 and 2000 BC in Ancient Egypt and Mesopotamia when humans started to abandon a nomadic existence that caused the construction of shelter. The construction of pyramids in Egypt (2700-2500 BC) might be considered the first instance of large structure construction. Other ancient historic constructions include the Parthenon by Iktinos in Ancient Greece (449-438 BC). The Apian way by Raman engineers (312 BC) and the Great Wall of China by Emperor Shih Huang Ti (C 220 BC). Similarly, the Romans developed civil structure throughout their empire includes aqueducts, insulea, harbors bridges, dams and roads.

Population growth and urbanization led to an increasing need for shelter developments and focused attention on the importance of local building materials and techniques. Accordingly, the construction industry in many parts of the world started to grow this construction companies are growth at a fast pace all over the world. With this growth of the construction industry and subsequent growth of construction companies contractual relationship related to construction are increasing. This there is a dire need for a coherent and efficient law to deal with such contractual relationships.

Coming to our country, the growth and increasing demand for the construction industry has followed a similar pattern as observed in the tend of world. Currently, construction is one of the sectors leading the way towards modernization and industrialization in Ethiopia. The

construction sector in Ethiopia generally in the world, contribution to the realization of about fifty percent of the total capital. Being the second largest employer in the country, it's also an engine for technology innovation and overall development.

In the past history of Ethiopia, the construction industry was not considered as an independent sector of the national economy. It was rather considered as incapable of generating national wealth. As a result, no comprehensive strategy for its development was considered. This is turn has led to the undesirable features of the current construction sector. These features include lack of development objectives for the industry inadequate co-ordination of planning between the industry and infrastructure programs in the various sectors of the economy heavy dependence on foreign resource such by material equipment and expertise representation of the role players in the construction sector by inadequate and ineffective organization inadequate numbers of suitably qualified and experienced personnel at all levels that include engineers, technicians mechanics, operators and foreman etc. inadequate relevant local construction regulations and standards and inadequate consideration given to the use of local resources (including community participation in labor- based works)

Ethiopia witnessed a decline in the performance of almost all sectors of economy during the various periods of government prior to 1991. The post-world war period in Ethiopia registered significant changes from the time of Emperor Haile Selassie (1941-1974) to that of the Derg government of Ethiopia (hereinafter TGE). Even though various market based economic reforms have been introduced to the various industry, since the downfall of the Derg regime in 1992, the domestic construction industry has still faced several hindering factors in its development.

In New Economy Policy Statement issued in 1992, the TGE made clear is intention to transform from its predecessors into a functioning market- based economy. This transformation is sought to be achieved through an Agricultural Development Led-Industrialization (hereinafter ADLI) strategy for the country is well endowed with among the lowest in Africa nations and other developing countries. Furthermore, the existing road network has deteriorated to the extent that only eleven percent of paved roads and nineteen percent of gravel roads are in good condition, making it the worst in comparison with other developing countries. It is evident from the above that the success of the Agricultural Development Led-Industrialization (ADLI) strategy and the restoration of the country's roads infrastructure.

With the above consideration in mind, the construction industry is being given special focus in policies of the country. The construction industry is one of the three sectors of economy identified by the Ethiopia Government for special consideration to faster the country's economic development. However, the general state of the domestic construction industry in Ethiopia is still characterized by equipment low levels base old and availability and utilization, deficiencies in technical, managerial, financial and the private sectors limited experience and participation of the private sectors in construction and consultation works and insufficient and in effective use of labor- based road construction and maintenances technology.

The history of the construction industry dates back to the early days of civilization, when people would trade their strength and ability to build crude structures for something else of value. As time went on, the first skilled artisans began to barter their services or accept money as payment for their construction work.

The construction industry over the past 200 years has been rapidly changing, in large part due to the technological advances starting with the Industrial Revolution and the explosive growth of the global population. Construction Industry growth has been stunted in recent years due to the global economic downturn, but it stands to reason that it will increase again in the near future.

Construction industry was changed with the creation of factories and improvements in metal working in the late 18th and early 19th centuries. These improvements meant there was less work that had to be done by hand, rapidly increasing the rate at which buildings could be completed. Architectural advancements also played a role in this boom.

With the creation of new materials like steel and concrete, the history of the construction industry was greatly altered again. Concrete is a material cheap enough to be used for virtually any type of project and is strong and durable. Steel provides the strength needed for the interior of large scale building projects, with concrete providing much of the outside support that was too costly to do using brick or other older materials.

Another momentous event in the history of the construction industry occurred after World War II, when the American interstate highway system was created. This allowed for easier access to cities and the creation of suburbs, which led to a housing boom. Using generic designs and cheaper materials, houses began to be built at a furious rate around the country. The home building market has continued to grow over time, with home builders specializing in the building of certain types of houses doing business across the nation. The home building market took a beating in the late part of the first decade of the 21st century, when the home loan market collapsed on the weight of millions of defaulted loans, but is in the process of slowly recovering.

Risks that Could Cause Accident in the Construction Site.

Construction sites are full of potential dangers that could hurt workers and passersby if proper safety precautions are not taken. In many cases, accidents occur because of the negligence of the construction company or the workers. A construction accident may occur suddenly and unexpectedly, hurting or killing one or many workers. Those who work near a construction site or are simply passing by may also be at risk. Some common causes of accidents on or around construction sites include

- falling through fragile roofs and roof lights
- falling from ladders, scaffolds and other work places
- being struck by excavators, lift trucks or dumpers
- being struck by falling loads and equipment
- being crushed by collapsing structures
- Heavy equipment malfunction
- Crane collapse
- Lack of training
- Failing to follow safety protocols

Any of these hazards could cause workers or bystanders to be severely injured. If you or a loved one has been hurt in a construction accident, it is important to know that you have the right to hold the liable company or other party accountable. You may be able to recover compensation for any expenses incurred because of your accident, including medical bills, lost wages, and pain and suffering. This will depend upon the nature of the accident and your affiliation or lack thereof with the company.

The Measures in Making the Construction Site Accidents Free

This basically has to do with investigating the health and safety measures that are currently in place to reduce accidents and injuries on construction sites. In order to prevent accidents in construction it is not just a matter of setting up a list of rules and making safety inspections, although both of these have their place (Holt, 2001). He suggests that a system for managing health and safety is required that meets the needs of the business and complies with the law. This intends to identify the strategies used in making the construction site accident free and highlight the benefits to the industry in implementing them.

Although construction is one of the worst industries in Kwara State in terms of safety, there have been, and are, various groups working towards improving construction conditions and safety. Construction conditions have improved ten-fold from 15 years ago, and as technology increases, so does the safety and working conditions of construction jobs.

Many construction sites cannot completely exclude non-workers. Road construction sites must often allow traffic to pass through. This places non-workers at some degree of risk. This sign and advisory plate penetrated the windshield and roof of a car in a side-impact test crash. A safer sign would have stiffer uprights, no advisory plate and the flashing light would be moved to the point of the sign to spread the impact force.

Road construction sites are blocked-off and traffic is redirected. The sites and vehicles are protected by signs and barricades. However, sometimes even these signs and barricades can be a hazard to vehicle traffic. For example, improperly designed barricades can cause cars that strike them to roll over or even be thrown into the air. Even a simple safety sign can penetrate the windshield or roof of a car if hit from certain angles. The majority of deaths in construction are

caused by hazards relating to construction activity. However, many deaths are also caused by no construction activities, such as electrical hazards. A notable example of this occurred when Andy Roberts, a father of four, was killed while changing a light bulb at a construction site when he came into contact with a loose bare wire that was carrying two thousand volts of electricity and died. (August 1988 New York (U.S.A)). Events like this motivated the passing of further safety laws relating to non-construction activities such as electrical work laws.

The leading safety hazards on site are falls from height, motor vehicle crashes, excavation accidents, electrocution, machines, and being struck by falling objects. Some of the main health hazards on site are asbestos, solvents, noise, and manual handling activities.

Falls from heights is the leading cause of injury in the construction industry. fall protection is needed in areas and activities that include, but are not limited to: ramps, runways, and other walkways; excavations; hoist areas; holes; formwork; leading edge work; unprotected sides and edges; overhand bricklaying and related work; roofing; precast erection; wall openings; residential construction; and other walking/working surfaces.

The height limit where fall protection is required is not defined. It used to be 2 metres in the previous issue of Work at Height Regulations. It is any height that may result in injury from a fall. Protection is also required when the employee is at risk to falling onto dangerous equipment.

Fall protection can be provided by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, and warning line systems.

All employees should be trained to understand the proper way to use these systems and to identify hazards. The employee or employer will be responsible for providing fall protection systems and to ensure the use of these systems.

Motor Vehicle Crashes are another major safety hazard on construction sites. It is important to be safety cautious while operation motor vehicles or Equipment on the site. Motor vehicles shall have a service brake system, emergency brake system, and a parking brake system. All vehicles must be equipped with an audible warning system if the operator chooses to use it. Vehicles must have windows and doors, power windshield wipers, and have a clear view of site from the rear window.

Equipment on the job site must have light and reflective if intended for night use. The glass in the cab of the equipment must be safety glass. The equipment must be used for their intended task at all times on the job site.

Operations that are Involves in Construction site that are likely to Cause Risk

If you live in a large city it is likely that you walk or drive past several construction sites each day. Usually these sites are closed to the public and you can see workers wearing protective gear like hard hats or goggles, but construction sites are still one of the most dangerous places to work. In fact, every year thousands of people are injured or killed on construction sites. Even though many construction workers and supervisors do their very best to ensure that workers abide by the rules, many employees ignore them at their own peril.

The truth is that construction workers operate dangerous heavy machinery and tools all day long and without proper protection an injury will likely occur. If, for example, you are using a

jack hammer and you do not have protective goggles, it is possible that a piece of concrete or macadam will shoot up and injure your eye. Eye and hand injuries are common accidents on construction sites. But by far the most dangerous injuries are head injuries. Most of these injuries could have been prevented if the worker would have simply worn his hardhat. In fact, hard hats are required on all construction sites because people know that falling objects such as bricks and concrete are common there. And if a worker is not wearing his helmet it is likely that he will be injured, perhaps even fatally, by falling debris. While safety of workers is obviously important, it is also essential that construction companies and crews pay close attention to public safety. If a construction site is located in an urban area, it is likely that work is being done in close proximity to the public. When this is the case, it is important that both the construction crew and the public are aware of the steps they must take to ensure everyone's safety.

Signs

The first thing a construction company must do is to make the public aware of possible danger. All sites should display the appropriate signs that let pedestrians know construction is in progress along the perimeter of the site. There should also be signs that let both workers and the public know that hardhats are required on site.

Fencing

The most common sense safety measure a construction company can implement is to properly fence off a construction site. This lets the public know that potentially dangerous work is being down inside and that they should keep their distance. It also lets the workers know that they are doing a dangerous job that they should always properly prepare for. And as long as construction crews keep all of the work inside the fence, the public should be safe. Note: When cranes or other heavy machinery are being utilized to transport material to the site, they should never travel

in or through areas that are open to the public and that have not been properly condoned off beforehand.

Falling Materials

Most pedestrians who are injured near a construction site are injured by falling objects. The reason for this is simple: it is difficult to calculate just how far a falling object can travel when dropped from an immense height. That is why most construction companies fence and condone off areas far larger than is necessary when working on a building or skyscraper. They also make certain that their men keep close track off all of their tools and that they don't leave anything lying around.

In the end, safety on construction sites is a two way street. The company must do its job and put up the appropriate signs and fence off areas and the public must take heed of these signs, and, when necessary, give the work zone a wide berth.

The leading operations on site are falls from height, motor vehicle crashes, excavation accidents, electrocution, machines, and being struck by falling objects.Falls from heights is the leading cause of injury in the construction industry. In the OSHA Handbook (29 CFR), fall protection is needed in areas and activities that include, but are not limited to: ramps, runways, and other walkways; excavations; hoist areas; holes; formwork; leading edge work; unprotected sides and edges; overhand bricklaying and related work; roofing; precast erection; wall openings; residential construction; and other walking/working surfaces.

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Fall protection can be provided by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, and warning line systems. All employees should be trained to understand the proper way to use these systems and to identify hazards. The employee or employer will be responsible for providing fall protection systems and to ensure the use of these systems. Before any excavation has taken place, the contractor is responsible for notification of all applicable companies that excavation work is being performed. Location of utilities is a must before breaking ground. During excavation, the contractor is responsible for providing a safe work environment for employees and pedestrians. The contractor shall comply with all standards set forth in 29 CFR Subpart P. Access and Egress is also an important part of excavation safety. Ramps used by equipment must be designed by a competent person, qualified in structural design. No person is allowed to cross underneath or stand underneath any loading or digging equipment. Employees are to remain at a safe distance from all equipment while it is operational.

Trenching: Trench collapses cause dozens of fatalities and hundreds of injuries each year. Trenching deaths rose in 2003.

Forklifts: Approximately 100 employees are fatally injured and approximately 95,000 employees are injured every year while operating powered industrial trucks. Forklift turnover accounts for a significant number of these fatalities.

Summary of Literature Review

From the literature review above, it shows that a lot of risks are associated with the construction industry, such as falling from ladders, scaffolds and other work places, crane collapse, lack of

training and being crushed by collapsing structures. It shows that making the construction site safe and free from accident entails a lot risk assessment to reduce this ugly trend even though it may seem difficult as so many professional builders and building technicians pay little or no attention to the safety of their workers. Also, to reduce risk and accidents in construction industries to its barest minimal, workers are to be properly orientated on the use of safety materials and to properly carry out their duties under safety conditions. The leading operation on construction site that can lead to accident are falls from height, motor vehicle crashes, excavation accidents, electrocution, machines and being struck by falling objects.

Construction industry is one worse industries in Ilorin, Kwara State in terms of safety, many construction can not completely exclude non-workers. This places non-worker at some degree of risk. This intends to identify the strategies used in making the construction site accident free and highlight the benefits to the industries implementing them. To make this possible, safety materials such as helmets, safety goggles, safety boots, hand gloves, overall and other safety materials should be made readily available for workers in various construction industries.

CHAPTER III

METHODOLOGY

This chapter describes the procedures used in carrying out the study which is focused under the following sub-headings; Design of the study, Area of the study, Population of the study, Instrument for data collection, Validation of the instrument, Method of data analysis and Decision rule.

Design of the Study

In carrying out the study, survey research was considered the best design method to be adopted due to the type of information needed to carry out the investigation. In support of this statement, Nworgu (2001) stated that "a survey research is one which a group of people or items are studied by collecting and analyzing data from only a few people or items considered being representatives of the entire group".

Area of the Study

The study is carried out in construction industries in Ilorin, Kwara State. This area was considered appropriate because of various construction industries situated therein and various construction operations taking place in these industries. The industries are:

1. Charvet Construction Industries
2. Yolas Consultant
3. Bulletin Construction Industries
4. Bal Construction Industries
5. Alaco Construction Industries

Population

The target population used for this study comprises of sixty building technicians (bricklayers, concretors, tailers) and forty professional builders from five construction industries in Ilorin, Kwara State.

Table 1.1

Population distribution of building technicians and professional builders in Ilorin Kwara State

S/NO	Construction industries	Building technicians	Professional builders	Total
1	Charvet Construction	13	7	20
2	Yolas Consultant	10	10	20
3	Bulletin Construction	13	7	20
4	Bal Construction	12	8	20
5	Alaco Construction	12	8	20
	Total	60	40	100

Instruction for Data Collection

A structured questionnaire titled assessment of construction related risk on construction industries in Ilorin Kwara State on four rating scale was use to collect data for the study. The questionnaire items were generated based on the information gathered from the review of related literature, the questionnaire was developed by the researcher and divided into four sections A, B,C and D. Section A contains items designed to obtain personal data or information of the respondents. It has only an item and consists of options and blank spaces to enable the respondents tick or complete as appropriate. Section B of survey instrument comprises of twelve

(12) items (1-12). It seek answer to research question on the risks in the construction company that could cause an accident. Section C will answer research question two (2) on the strategies for ensuring accident free in construction industries. It contains nine (9) items that is (13-21). In the same vein, Section D will answer question three (3) on the Operations that are involves in construction activities that are likely to cause risk. It contains nine (9) items that is (14-30).

Validation of the Instrument

The questionnaire drafted by the researcher under the consultation of the study's supervisor and validated by two lecturers in the Department of Industries and Technology Education, Federal University of Technology, Minna Niger State for proper and necessary correction. In order to produce relevant information needed for answering research question all observations and corrections raised where effected in the final copy of the questionnaire before administering to the respondent. The validated questionnaires were used to collect data for this study.

Administration of Instrument

The researcher administered the copies of the validated questionnaires to the respondents by visiting all the construction industries listed in the area of study. Thirty (30) questionnaires were used to administer the building technicians (bricklayers, concretors, tailers.) and the professional builders. 100% of retrievers of fully completed questionnaires were returned.

Method of Data Analysis

The Data collection was analyzed using statistical mean score. Standard deviation and t-test, to agree or disagree on the respondent opinion on a particular item contain in the instrument.

The mean score of each item will be obtained by using the following

$$Ms = \frac{£fx}{N}$$

Where Ms = means response to each item

£ = Sum of

X = Normal valve of options

F = Frequency of response to an item

Four point rating scale will be used with the following response option

Strongly Agree (SA) = 4 point

Agree (A) = 3 point

Disagree (D) =2 point

Strongly Disagree (SD) = 1 point

The mean valve of each item before is $= \frac{4+3+2+1}{4} = \frac{10}{4} = 2.5$

Decision Rule

To determine the acceptance level a mean score of 2.50 was used as decision point for every questionnaire item, however any with a means response of 2.50 below was considered as disagree.

CHAPTER IV

DATA PRESENTATION AND ANALYSIS

This chapter deal with the data collection for the purpose of answering the research questions and testing of hypothesis posed in the study. The finding are presented according to the research questions and hypothesis tested.

Research Question 1

What are the risk that could cause accident in the construction site?

Table 2.1: mean responses of building technicians and professional builders on the risk that could cause accident in the construction site.

N1 = 60, N2 = 40

S/NO	Item Statement	X_1	X_2	X_t	Remark
1	Roadslide can cause an accident in construction site while transporting building material	2.88	3.13	3.01	Agreed
2	Fire outbreak is a construction risk that can cause accident	2.80	3.05	2.93	Agreed
3	Wind can cause accident in a construction industries	2.57	3.00	2.79	Agreed
4	Structural failure is a construction risk that could cause an accident in the construction site	2.75	2.90	2.83	Agreed
5	Equipment failure is a construction risk that could cause an accident in the construction industries	2.92	2.78	2.85	Agreed
6	Defective design is a construction risk that could result to	2.42	2.18	2.30	Disagreed

	accident				
7	Incomplete scope is a construction risk	2.37	2.33	2.35	Disagreed
8	Lack of safety orientation can be risky in construction industries	3.07	3.40	3.24	Agreed
9	Non- compliance to specification to quality requirement can cause accident in a construction industries	3.17	2.88	3.03	Agreed
10	Workers engaging in drugs and alcoholism could lead to accident in a construction site	2.67	2.65	2.66	Agreed
11	Sign of dangers not displayed on the construction site can cause accident	3.35	3.03	3.19	Agreed
12	Non- fencing of construction site is a form of risk	3.00	2.88	2.94	Agreed

Key:

X_1 = Mean responses of building technicians

X_2 = Mean response of professional builders

X_t = Average mean of building technicians and professional builders

N_1 = Number of building technicians

N_2 = Number of professional builders.

d.f represents degree of freedom

That is $(N_1 + N_2) -2$

(60+40) -2

100-2=98

Table 2.1; Revealed that 10 out of 12 items investigated obtained a mean response above 2.5, while the other 2 item obtained a mean response below 2.5, which is the cut off point for agree in the decision rule.

Research Question 11

What are the strategies for ensuring accident free in construction industries?

Table 3.1: mean response of building technicians and professional building on the strategies for ensuring accident free in construction industries.

S/N0	Item Statement	X_1	X_2	X_t	Remark
13	Safety posters and sign post of adequately place will reduce possibility of accidently risk	3.27	3.08	3.18	Agreed
14	Adequate safety orientation at the beginning of construction project tend to reduce accidental risk	3.13	3.28	3.21	Agreed
15	Evaluation the losses and cost of alternative way of handling risk	2.95	3.10	3.03	Agreed
16	By identifying risk and handling the impact of risk	2.87	2.80	2.84	Agreed
17	By estimating potential impact of risk and making decision	2.75	2.50	2.63	Agreed
18	Competent supervisor encourage safety when in work	3.17	3.23	3.20	Agreed
19	By carefully controlling operation that could cause accident	3.15	3.13	3.14	Agreed
20	Mitigating the effect of risk and ascertaining some of the	3.10	2.93	3.02	Agreed

	consequences				
21	By consulting an advisory personnel on risk reduction	2.87	3.00	2.94	Agreed

Table 3; Reveal that all items investigated obtained a means response of above 2.5 which is the cut off point for agree in the decision rule.

Research Question 111

What are the operations that are involves in construction site that are likely to cause risk.

Table 4.1; mean response of building technicians and professional builders on the operations that are involves in construction activities that are likely to cause risk.

S/No	Item Statement	X_1	X_2	X_t	Remarks
22	Timbering to trench operation	3.00	3.23	3.12	Agreed
23	Scaffolding operation	3.03	3.35	3.19	Agreed
24	Flooring operation	2.73	2.63	3.18	Agreed
25	Excavation operation during building construction	3.28	3.28	3.28	Agreed
26	Concrete mixing machine operation	3.13	3.28	3.21	Agreed
27	Vibration machine operation	2.88	3.15	3.02	Agreed
28	Erection of precast material operation	3.27	3.28	3.28	Agreed
29	Forklift operation	3.15	3.05	3.10	Agreed
30	Forming operation	3.05	2.85	2.95	Agreed
31	Concreting operation	3.05	3.03	3.04	Agreed

32	Crane operation	2.90	2.97	2.94	Agreed
33	Welding operation	2.78	2.60	2.69	Agreed

Table 4; Reveal that all items investigated obtained a means response of above 2.5 which is the cut off point for agree in the decision rule.

Hypothesis 1

Ho_1 : There is no significant difference in the mean response of both the building technicians and the professional builder on the risk that could cause accident in the construction site.

Table 5.1: t-test analysis of building technicians and professional builders on the risk that could cause accident in the construction site.

$N_1 = 60,\ N_2 = 40$

S/NO	Item Statement	$S.D_1$	$S.D_2$	t-cal	Remark
1	Roadslide can cause an accident in construction industries while transporting building material	0.99	0.75	1.45	NS
2	Fire outbreak is a construction risk that can cause accident	1.00	0.80	-1.37	NS
3	Wind can cause accident in a construction industries	1.14	0.70	-2.34	NS
4	Structural failure is a construction risk that could cause an accident in the construction site	1.19	0.99	0.68	NS
5	Equipment failure is a construction risk that could cause an	1.01	1.03	0.67	NS

	accident in the construction industries				
6	Defective design is a construction risk that could result to accident	1.21	0.97	1.10	NS
7	Incomplete scope is a construction risk	1.14	0.97	0.19	NS
8	Lack of safety orientation can be risky in construction industries	0.99	0.92	-1.72	NS
9	Non- compliance to specification to quality requirement can cause accident in a construction industries	0.94	0.96	0.70	NS
10	Workers engaging in drugs and alcoholism could lead to accident in a construction site	1.39	1.01	0.09	NS
11	Sign of dangers not displayed on the construction site can cause accident	1.06	0.90	2.54	S
12	Non- fencing of construction site is a form of risk	0.75	0.80	0.12	NS

KEY

N_1 = Number of building technicians

N_2 = Number of professional builders

T = t-test

SD_1 = Standard deviation of building technicians

SD_2 = Standard deviation of professional builders

NS = Not significant

S = Significant

The result shown in table 5 above indicates the comparism between building technicians and professional builders. Data revealed that items 1,2,3,4,5,6,7,8,9,10,and 12 has a calculated t-valve less than the t-critical valve of ±1.98, hence hypothesis HO_1 for these items were upheld at 0.05 level of significance. While items 11 has a t-calculated valve above the t-critical value of ± 1.98, thus the hypothesis HO_1 was accepted for the items.

Hypothesis 2

Ho_2: there is no significant difference in the mean response of the both building technicians and professional builders on the strategies for ensuring accident free in construction industries

Table 6.1: t-test analysis of building technicians and professional builders on the strategies for ensuring accident free in construction industries.

$N_1 = 60$, $N_2 = 40$

S/N0	Item Statement	$S.D_1$	$S.D_2$	t-cal	Remark
13	Safety posters and sign post of adequately place will reduce possibility of accidently risk	0.76	1.17	0.22	NS
14	Adequate safety orientation at the beginning of construction project tend to reduce accidental risk	0.95	0.55	-0.10	NS
15	Evaluation the losses and cost of alternative way of handling risk	1.05	0.94	-0.33	NS
16	By identifying risk and handling the impact of risk	1.02	0.75	0.40	NS
17	By estimating potential impact of risk and making decision	1.11	0.75	1.34	NS

18	Competent supervisor encourage safety when in work	0.97	0.98	-0.35	NS
19	By carefully controlling operation that could cause accident	0.70	1.01	0.11	NS
20	Mitigating the effect of risk and ascertaining some of the consequences	1.06	1.07	0.78	NS
21	By consulting an advisory personnel on risk reduction	0.70	0.90	-0.78	NS

Table 6 revealed that the t-test analysis fail to accept the null hypothesis of all the items at 0.05 level of significance. Meaning that there is no significant different for items accepted but there is significant different for items rejected in the mean rating of building technicians and professional builders on the strategies for ensuring accident free in construction industries.

Findings:

Findings related to the risk in the construction company that could cause an accident. Both respondents generally agreed that:

1. Roadslide can cause an accident in construction industries while transporting building material.
2. Structural failure is a construction risk could cause an accident in construction industries.
3. Equipment failure is a construction risk that could an accident in construction industries
4. Lack of safety orientation can be risky in construction industries.
5. Sign of dangers not displayed in the construction site.

Findings related to the strategies for ensuring accident free in construction industries. Both respondents generally agreed that:

1. Safety posters and sign post if adequately place will reduce possibility of accidently risk.
2. Adequate safety orientation at the beginning of construction project tends to reduce accidental risk.
3. Competent supervisor encourage safety when in work.
4. Mitigating the effect of risk and ascertaining some of the consequences.
5. By consulting advisory personnel on risk reduction.

Discussion of Findings

The discussion is based on the mean response realized by the respondents on the items of the research question and hypothesis. The findings in table 2.1 reveal that roadslide structural failure and equipment failure are the causes of accident in construction industries. Also lack of safety orientation and danger sign not displayed during construction operation are the cause of accidents in construction sites.

Moreso, the findings in table 3.1 reveal that encouragement from competent supervisors to his or her workers can bring about safety and accident-free in construction industries. The finding also reveals that mitigating the effect of risk and ascertaining some of its consequences reduce risks and accidents in construction industries.

Moreover, consulting advisory personnel on risk reduction also assist both the professional builders and building technicians to prevent themselves from dangers or hazards involve in construction site by adapting to lay down safety rules and regulations.

Discussion of Hypothesis

Ho1:-The table of hypothesis 1 is clearly indicated that there is no significant difference. Significant difference between the mean response of both the building technicians and the professional builders on the risk that could cause accident in the construction site. This was achieved or accepted because the calculated t-test does not equal or exceed the critical value (1.98).

Ho_2:- The table of Hypothesis 2 proved that there is no significant difference between the mean response of both the building technicians and the professional builders on the strategies for ensuring accident free in construction industries. This was because of the calculated t-test exceeded the t value (1.98) therefore the hypothesis is not rejected.

CHAPTER V

SUMMARY, CONCLUTION AND RECOMMENTATION

Summary of the Study

Risk has been described as a variation from possible future outcome. There is no aspect of life that does not involve in substantial amount of risks. The purpose of the study is to assess the construction related risk in construction industries in Ilorin Kwara State, related literature were reviewed in the under the following sub-headings: historical background of construction industries, the risk that could cause accident in the construction site, the measures in making the construction site accident free, operations that are involves in construction activities that are likely to cause risk. Statistical tools such as mean, standard deviation and t-test were used tom analyze the data by using both building technicians and professional as respondents. A 33 items questionnaire was used as instruction for data collection and was analyzed according to each of the research questions.

A survey research design was used in carrying out the study. three research questions were formulated for the specific purpose of guiding the study, the hypothesis were tested at 0.05 level of significance. The study among others revealed that, falling from ladders, scaffolds and other work places, struck by falling loads and equipment; crush by collapsing structures, lack of training and failing to follow safety protocols are the risk that result to accident in construction site.

However, certain measures to prevent these accidents have been described, among which are:-

Displaying appropriate signs that let pedestrians know construction is in progress, proper fencing of a construction site, keeping close track of all the tools and that they are not lying around.

The provision of guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, and warning line systems are all safety gadget employed assist in reducing risk in construction sites.

Implication of the study

The result obtained from the findings of the study indicates a lot of implications for building technicians and professional builders and the public at large. The study provides vital information on planning and organizing practices of construction process that can enhance safety productivity and effective usage of human and material resource to reduce risk in construction industries. The findings of the study will expose building technicians and professional builders to number of factors that can lead to risk and uncertainty in construction industries. Likewise, the study also unveiled several assessments on construction related risks in construction industries. Thus, assessing risks and strategizing ways of ensuring accident free in construction industries after identifying and analyzing operations and activities that involve risk in construction sites.

Above all, the findings of the study will go a long way to educate both building technicians and professional builders in construction industries in Ilorin, Kwara state on how to manage construction risks.

Conclusion

The findings of the study provide a clear and concise answer to the research questions and hypotheses stated previously to assess the construction related risk in construction industries, strategies for accident free, operations and activities that can cause risk in construction industries.

From the result obtained so far, roadslide can cause an accident in construction site, structural failure, equipment failure, defective design, non compliance to quality specification and lack of safety orientation are the causes of construction risk in construction industries. However, certain measures have been provide among which are displaying appropriate signs, proper fencing of a construction site, keeping close track of all tools and machinery help in reducing risks and accidents on construction sites.

The provision of guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, and warning line systems are all safety gadget employed assist in reducing risk in construction sites. This can be achieved if findings obtained from the study are implemented and use.

Recommendations

Based on the findings of this study, it is recommended that;

- Safety posters and sign post should be adequately place in construction site to reduce accidental risk.
- Adequate orientation and safety education should be given to both building technicians and professional builders in construction industries.
- Risk should be identified in construction site and its potential impact should be estimated for proper decision making.
- Supervisors in construction site should competently supervise and encourage safety practices.
- Operations in construction sites that can lead to accident should be carefully controlled.

- Finally, timely consultation of advisory personnel on risk reduction should be put in place to ensure the mitigation of risk and ascertain its consequence.

Suggestion for Further Research

The following suggestions were made for further studies.

- This study should be carried out in other industries.
- The scope of the risk assessment should be widen to cover management staffs and contractors.

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APPENDIX A

APPENDIX B

QUESTIONNAIRE

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE

SCHOOL OF SCIENCE AND SCIENCE EDUCATION

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

QUESTIONNAIRE ON THE ASSESSMENT OF CONSTRUCTION RELATED RISK IN CONSTRUCTION INDUSTRIES IN ILORIN, KWARA STATE.

SECTION A. GENERAL INFORMATION

Please kindly complete this questionnaire by ticking (√) the column that best represents your perception about the topic. All information provided will be highly confidential and strictly used for academic purpose of this research work.

Status: Building technicians ( ) Professional Builders ( )

Please indicate the level of your agreement/disagreement by ticking (√) in the appropriate column which describes the extent to which you agreed with the statement by using the following keys.

Strongly Agreed SA

Agreed A

Disagreed D

Strongly Disagreed SD

PART TWO

SECTION A

What are the risk that could cause accident in the construction site?

S/NO	ITEMS	SA	A	D	SD
1.	Roadside can cause an accident in construction site while transporting building material				
2.	Fire outbreak is a construction risk that can cause accident				
3.	Wind can cause accident in a construction industries				
4.	Structural failure is a construction risk that could cause an accident in the construction site				
5.	Equipment failure is a construction risk that could cause an accident in construction industries				
6.	Defective design is a construction risk that could result to accident				
7.	Incomplete design scope is a construction risk				
8.	Lack of safety orientation can be risky in construction industries				
9.	Non-compliance to specification to quality requirement				
10.	Workers engaging in drugs and alcoholism				
11.	Signs of dangers not displayed on the construction site				
12.	Non-fencing of construction site is a form of risk				

SECTION B

What are the strategies for ensuring accident free in construction industries?

S/NO	ITEMS	SA	A	D	SD
13.	Safety posters and sign post of adequately place will reduce possibility of accidently risk				
14.	Adequate safety orientation at the beginning of construction project tend to reduce accidental risk				
15.	Evaluating the losses and cost of alternative way of handling risk				
16.	By identifying risk and handling the impact of risk				
17.	By estimating potential impact of risk and making decision				
18.	Competent supervisor encourage safety when in work				
19.	By carefully controlling operations that could cause accident				
20.	Mitigation the effect of risk and ascertaining some of the consequences				
21.	By consulting an advisory personnel on risk reduction				

SECTION C

What are operations that are involves in construction site that are likely to cause risk.

S/NO	ITEMS	SA	A	D	SD
22.	Timbering to trench operation				
23.	Scaffolding operation				
24.	Flooring operation				
25.	Excavation operation during building construction				
26.	Concrete mixing machine operation				
27.	Vibration machine operation				
28.	Erection of precast material operation				
29.	Forklift operation during building construction				
30.	Forming operation				
31.	Concreting operation				
32.	Crane operation				
33.	Welding operation				

APPENDIX C

FORMULAE

The mean response of each item was obtained using the formula:

$$\bar{X} = \frac{\Sigma FX}{N}$$

Where:

Σ = Summation of

X = Normal value of option

$\bar{X}$ = Grand mean response to all item

N = Total number of response of an items

F = Frequency of response to each option

Standard Deviation

$$S.D = \sqrt{\frac{\Sigma f (X - \bar{X})^2}{\Sigma N}}$$

Where:

Σ = Summation of

F = Frequency

X = Normal value of option

X = Mean response of all item

T – TEST

T – Test was used to compare the mean of the groups. For instance the mean response of laborers and professional builders was compared. Each T – Valve calculated that is less than the t – critical valve (1.98) at 0.5 level of significance was accepted while T - Valve that is equal or exceed 1.98 was rejected.

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{S_1^2 + S_2^2}{N_1 + N_2}}}$$

Where:

t = Test of significant

$\overline{X}_1$ = Grand mean of calculation building technician

$\overline{X}_2$ = Grand mean of professional builders

N_1 = Number of building technicians

N_2 = Number of professional builders

S^2_1 = Variance of building technicians

S^2_2 = Variance of professional builders

Df = $N_1 + N_2 - 2$

$60 + 40 - 2 = 98$