Risk Management In Nigerian Construction Industry

Aliyu Bashir Aminu

Submitted to the
Institute of Graduate Studies and Research
in fulfillment of the partial requirements of the Degree of

Master of Science
in
Civil Engineering

Eastern Mediterranean University
July, 2013
Gazimagusa, North Cyprus

Approval of the Institute of Graduate Studies and Research

Prof. Dr. Elvan Yılmaz
Director

I certify that this thesis satisfies the requirements as a thesis for the degree of Master of Science in Civil Engineering.

Asst. Prof. Dr. Murude Çelikağ
Chair, Department of Civil Engineering

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Master of Science in Civil Engineering.

Asst. Prof. Dr. Alireza Rezaei
Supervisor

Examining Committee

1. Assoc. Prof. Dr. Zalihe Nalbantoğlu Sezai
2. Asst. Prof. Dr. Mehmet Metin Kunt
3. Asst. Prof. Dr. Alireza Rezaei

ABSTRACT

The major requirement of every construction project is meeting client's need of cost, quality and time. However, the construction industry is overwhelmed with risks more than any other industry due to the fact that they are present in every activity from design to completion. These risks need to be controlled early or face the possibility of cost overruns, time delays and poor quality work leading to displeasure of client and public. This study assesses the ways of managing the most occurring risk factors and improving risk management practice in Nigerian construction industry. Questionnaire survey was used as the survey method due to distance and logistical reasons. The questionnaire was distributed via email and respondents returned it through the same channel.

The study identifies that the main problem of risk management application in Nigeria is knowledge. It was found that the best knowledge that will effectively manage project risks in the country is cost management and quality management. Materials price fluctuation has been identified as the most occurring risk in construction projects in Nigeria though increase in inflation rate has a higher possibility but its major effect is on the price of material which makes it the highest occurring risk factor in Nigeria. The attitude of construction participants is another problem to risk management practice.

Keywords: Construction Industry, Knowledge, Nigeria, Risk Management Practice, Risk.

ÖZ

Her inşaat projesinin en önemli gerekliliği maliyet kalite ve zaman ile birlikte müşterinin ihtiyacını karşılamaktur. Ancak, inşaat sektöründe de tasarımın tamamlanması için her türlü aktivitenin mevcut olması nedeniyle diğer sanayi kolları da daha fazla risk ile karşı karşıya kalmıştır. Bazı riskler kolayca tespit edilse de yine de beklenmedik durumlar sözkonusu olabilmektedir. Bu riskler erken kontrol edilmesi gereken veya maliyet aşımları, zaman gecikmeleri , istemci ve halkın hoşnutsuzluğunu yol açan kalitesiz işin olasılığıyla karşı karşıya bırakmaktadır. Bu çalışmada meydana gelen risk faktörlerini yönetme ve Nijerya inşaat sektöründe risk yönetimi uygulama geliştirme yollarını değerlenme amacı güder. Anket mesafe ve lojistik nedenlerden dolayı birtakım soruların yöneltilmesi esasıyla oluşturuldu. Anket e-posta yoluyla dağıtılan ve yine katılımcıların bu soruları yanıtlayıp yönlendirmesi ile tamamlandı.

Çalışma Nijerya'da risk yönetimi uygulamasının temel sorunun bilgi olduğunu ortaya koymuştur. Bu ülkede proje risklerini yönetecek en iyi bilginin maliyet yönetimi ve kalite yönetimi olduğu tespit edilmiştir. Enflasyon oranı artış daha yüksek bir olasılık olsa da onun en büyük etkisi Nijerya'da en yüksek risk faktörü yapar.Yapı ürünlerinin ücret dalgalanması Nijerya'da inşaat projelerinde en meydana gelen risk olarak tespit edilmiştir. Inşaat katılımcıların tutumu risk yönetim uygulamalarına için başka bir sorundur.

Anahtar kelimeler: Bilgi, İnşaat Sektörü, Nijerya, Risk, Risk Yönetimi Uygulama.

ACKNOWLEDGMENTS

All thanks and praise is to Allah (S.W.T) who gave us life, health and wisdom to be where we are today and successfully undertake this work. May He shower His blessings upon His beloved messenger Muhammad (S.A.W).

My sincere appreciation goes to Asst. Prof. Dr. Alireza Rezaei for his tireless support and guidance in the course of this study. Without his expert supervision this work would not have been completed.

I would like to thank Asst. Prof. Dr. Mehmet Metin Kunt, Assoc. Prof. Dr**.** Zalihe Nalbantoğlu Sezai and the departments chair Asst. Prof. Dr. Murude Çelikağ for their kind support throughout the time of preparing this report. I am obliged to the entire staffs and members of the construction management group for their constant help and encouragement in preparing this thesis.

Finally, I would like to express my special gratitude to my family for their moral support throughout my life. Their efforts, guidance and assistance towards my education will never be forgotten.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

N	Naira (Nigerian currency)
Trn	Trillion
GCP	Global Construction Perspective
GDP	Gross Domestic Product

Chapter 1

1 INTRODUCTION

1.1 Introduction

A better understanding of risk management process and practice within the construction industry is an important model for exploring the application and barriers of risk management in Nigeria. It will also help in identifying the ever-present risk factors and their probability of occurrence in Nigerian projects. This chapter summarizes the whole work carried out for this study.

Risk concept varies based on people's understanding, experience and attitude (Belel and Mahmood, 2012). Many people recognize events in a dissimilar way due to different attitude, emotions, judgments and beliefs. This means that the definition of risk will differ to different people. Risk in its simplest form means uncertainty with recognized probability distribution (Barkley, 2004). According to Holmes (2002), risk is not the actual being of a problem rather it is a possibility that a certain problem may arise in the future. Baloi and Price (2003) define risk as the likelihood of an unfavorable incident occurring to a project. It is widely accepted across the construction management society that a project risk is any event or series of events, whether motivated internally or externally, that when occurred will negatively affect the project objectives of functionality, performance, time and cost(Devripasadh, 2007). Risk within the construction industry is understood to be a mixture of

activities that can affect the project goals. Risks are major component of the overall cost of projects and their distribution has significant effect on project financial plan.

Project management is the scientific application of skills, tools and technique to fulfill project activities in order to meet the expectation and requirement of clients or stakeholders (Deviprasadh, 2007). A project is always trying to bring in some type of modifications or changes, a new invention, work or structure. This change involves uncertainty, which cause projects to have a possibility of being blown off by a possible future event. Risks and uncertainties are present in all activities of a construction project (Odeyinka, 2000). It is very important to know the distinction between risk and uncertainty (Carpenter and Frederickson, 2001). According to Hillson (2004) risk is measurable uncertainty while uncertainty is immeasurable risk.

Risk management is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives (Banaitiene and Banaitis, 2012). It is also defined as a planned form of identifying and evaluating risk and selecting, establishing and applying options for the handling of the risk (Kremljak, 2004). It is the recognition, prioritization and appraisal of risk followed by an organized resource application economically to reduce, monitor and manage the possibility of unfortunate events or to maximize production or outcome (Ehsan et al. 2010).

Development of infrastructure is one of the key drivers in business over the globe; it increases the GDP of a nation (Awodele et al. 2009). This encourage countries to prioritize infrastructural development and make provisions in their budgets for financing its infrastructure. This leads to new challenges considering the risks

involved in the design and production. Construction projects due to its nature allows a lot of possibilities for many environmental, socio-political and other problems during pre-contract, contract and post-contract stage leading to completion time problem, cost overruns or exceeding budget in projects and poor quality finish (Akintoye and Macloed, 1997). In order to avoid or reduce the losses, management of the risk involved in the construction project is required. Nevertheless, saying Nigerian construction industry is poor, is an understatement as the industry is characterized by frequent setbacks or interruptions, cost overruns and abandonment of projects (Awodele et al., 2009). These are caused by different kind of risks involved in construction projects. Risk factors are believed to be familiar to Nigerian construction professionals, yet the probability of occurrence and its impact at pre-contract and post-contract stage is yet to be investigated. However, there are few researches conducted on risk management within the construction industry in Nigeria. In Nigeria, the construction industry mainly depends on government's budget and the industry is performing very poor due to avoidable risk factors. The need for understanding how to manage project risks becomes a very important issue. Researches on risk management will be of great help to the construction industry in Nigeria but we presently have very few. Therefore, this study outlined the need for future studies especially on the impact of certain risk factors to construction projects in Nigeria.

Questionnaire was used as the survey method because it is believed to be the best method regarding the distance from Cyprus to Nigeria, and other logistical reasons. A questionnaire was developed for the purpose of this study based on the information gathered from literature review. The questionnaires were sent via e-mail

which is the best way to deliver it to respondents in Nigeria. A criterion was set for accepting the returned questionnaires in order to have reliable information.

This study found that risk management is poorly practiced in Nigeria. The study also identified knowledge as the key to risk management development within the construction industry in Nigeria and also the major barrier to risk management practice in the country. It also identified materials price fluctuation, delays in payments and insufficient skilled labor as the highest occurring risk factors in Nigerian projects.

1.2 Research Question

This research is performed to provide an appropriate answer to the question "How to improve Nigerian construction industry's risk management practice?" and also "How to identify the ever-present risk factors in Nigerian projects?" The whole of the study is trying to find the answers to this questions which will be beneficial for the construction industry in Nigeria.

1.3 Objectives of Study

Construction industry is overwhelmed with risks more than any other industry (Deviprasadh, 2007). The industry is prone to various types of risk which if care is not taken can destroy projects. When these risks are not managed or tackled adequately, the industry will suffer poor performance which is exactly the situation in Nigeria. In construction most or all decisions including the simplest ones involve risks (Pritchard, 2001). According to Akintoye and Macloed (1997), risk sources are identified in construction from pre-contract stage which includes design risk, tender

risk and estimating risk. Risk factors were identified at post contract stage which include; substantial risk, condition of site, unfavorable weather, authorized risk, ecological risk, logistic risk, political risk, fiscal risk and contract risk. The objectives of this study are:

1. To identify the areas or factors that will help to develop risk management practice in Nigeria,
2. To identify the factors responsible for poor risk management practice in Nigeria
3. To identify most important knowledge areas that will improve risk management in Nigeria, and
4. To identify and recognize those risk factors with high possibility of occurring during construction projects.

1.4 Work Done and Achievements

1. Some factors were listed for respondents to choose the ones they feel will help develop the practice of risk management in Nigeria. The factors are: attitude of contractors, project program scheduling; introduction of risk management model, cost of risk management and availability of knowledge and expertise. The study finds that availability of knowledge and expertise is the most important factor that will help the development of risk management practice in Nigeria.
2. The opinion of respondents was asked on the barriers to risk management i.e. the factors responsible for poor risk management practice in the country. The factors were: ineffective implementation of risk control strategies, absent of joint risk management mechanism by participants, lack of risk management

knowledge and dissimilar risk control strategies views. Based on the opinion of the respondents, the study finds that shortage of risk management knowledge is responsible for poor risk management practice in Nigeria.

3. The study explored the areas of knowledge or experience that will help in managing project risks effectively. Knowledge on cost management, resource management, quality management, time management and scope management were investigated. It was found that cost management knowledge or experience is the most important area that will help to manage project risks effectively.
4. The study tried to identify the risk factors that have a high probability of occurrence. Some risk factors are listed for respondents to choose a scale the likelihood of occurrence in projects. This will help to know the kind of risks participants are expecting when undertaking a construction project in Nigeria. It was found that materials price fluctuation is the highest occurring risk in Nigeria. Other risks factors with high possibility of occurring are insufficient skilled labor, inaccurate cost estimate and unfavorable weather condition.

1.5 Thesis Outline

A better understanding of risk management procedure and practice in the construction industry is an important model for exploring the application and barriers of risk management in Nigeria. It will also help in identifying the ever-present risk factors and their probability of occurrence in Nigerian projects. Chapter one summarizes the whole work carried out for this study

An extensive review of risk management in construction industry was conducted for this study. In chapter two past studies related to risk management in construction

industry will be reviewed in order to have an insight on what has been done regarding risk management especially in Nigeria. The aim is to find the research gap in the field of risk management and area that needs more attention or improvement for further studies.

The main problem with data collection is reliability of the information. The information given by respondents needs to be reliable in order to have a good and accurate result. Chapter three will give details of the type of survey method used for data collection stating the reasons why the method was chosen and why other methods were not used. It will give a report of the extent of reliability of the obtained data and how they were collected. This is important because the quality of any research depends on the accuracy and reliability of data.

Chapter four will outline the results of the returned questionnaires. Each question has different options for the respondent to choose. Any chosen option will be represented as a percentage of the total returned questionnaire in order to show the number of respondents that choose a particular answer. It would be followed with a pie chart to help in understanding the responses. Normally, it is difficult to get 100 percent of the questionnaires returned but according to Akintoye and Macleod (1997) a return rate above 40% is sufficient. In this research, it was believed that a return rate of above 50 percent would be satisfactory because of the distribution method and due to the distance between Cyprus and Nigeria as the respondents cannot be contacted in person.

Chapter five looks at the views of respondents and how they relate to the real situation in Nigeria and global construction. The questionnaire results would be

analyzed in order to see if they are in line with some construction professionals' views and how they differ with past researches.

Chapter six outlines the finding of this study i.e. stating the conclusions of the study based on the returned questionnaires and analysis.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

This research tries to find the extent of risk management application in Nigerian construction industry. There are certain factors that limit its application and there are areas that will influence the development of this process. It is believed that there are some risk factors or sources which have high probability of occurrence during construction projects in Nigeria. These factors will be investigated according to their likelihood of occurrence. According to Belel and Mahmood (2012) construction activities are susceptible to risk more than any other industry due to its complexity. There is absence of any literature that focus on these problems in the Nigerian construction industry.

An extensive review of risk management in construction industry was conducted for this study. This chapter will find past studies related to risk management in construction industry in order to have an insight on what has been done regarding risk management especially in Nigeria. The aim is to find out the research gap in the field of risk management and area that needs more attention or improvement for further studies. The study will be based on these past researches and they will serve as a reference point for present study.

2.2 Risk Management

Nothing is certain in this world, whenever we try to achieve an objective; there is always the possibility of deviation from the plan. Every step in achieving our objective has uncertainty; every step has an element of risk which needs to be addressed.

Therefore, risk means uncertainty with recognized probability distribution (Barkley, 2004). It is the probability of a future problem expected to arise, but does not give any assurance of existence of the problem (Holmes, 2002). It was also defined as the consequence of uncertainty on aims or objectives, either negative or positive (Augie and kreiner, 2000). It is very important to know the distinction between risk and uncertainty (Carpenter and Frederickson, 2001). Uncertainty is a state of being that involves a deficiency of information and leads to inadequate knowledge or understanding (Carpenter and Frederickson, 2001). But Perry and Hayes (1985), believed that while the distinction between risk and uncertainty is recognized, it is unhelpful to construction projects. Risk can be from financial market doubts or uncertainties, failures in projects, legal liabilities, loan risks, accidents, force majeure, events of uncertainties or unpredictable root-cause (Akintoye and Macloed, 1997).

Risk means the possibility of a problem in the future while management is the act of gathering people together in order to achieve set goals or objectives by the use of on hand resources efficiently. According to business dictionary, risk management is the identification, analysis, assessment, managing and avoidance, elimination or reduction of unacceptable risks. It is a process of taking actions or measures against uncertainties.

In risk management, we undergo a priority format in which the risk with higher loss and higher possibility of occurrence are managed first while the one with lower loss and less possibility of occurring is handled next in descending order. Evaluating total risks is difficult and balancing resources used in order to moderate between risk with more possibility of occurring and lower loss versus risk with greater loss and lower possibility of occurring can be misunderstood. In a risk management process, identification of risk is the first step in order to characterize the threat of the risk. The next step is to evaluate the weakness of significant assets to certain threats and also determine the risk, which means determining the expected possibility of risk occurrence of certain assets. Methods or ways of reducing those risks are identified and prioritize measures are taken for risk reduction. When risks are not properly prioritized and assessed, it amounts to waste of time trying to tackle risks that will not occur.

Risk management depends on organization or planning, early identification and risks evaluation, continuous tracking of risk and re-evaluation, actualization of remedy actions, communication and coordination (Kremljak, 2004). There are many ways to structure risk management, but according to Kremljak (2010) it is structured into four parts: Planning, evaluation or assessment, handling or control and monitoring. Risk management involves both positive and negative risk aspect (Augier and Kreiner, 2000). A successful risk management process should be able to identify advantageous alternative courses of action, improve chances of success and increase confidence in achieving project objectives (Perry and Hayes, 1985).

2.2.1 Risk Management Planning

Risk planning is a nonstop process of creating an organized detailed risk management approach. It includes procedures, practices, strategy development, setting of goals and objectives, planning assessment, control activities, resource identification, task and responsibilities etc. Planning describes how we intend to manage the risks and also describes the components management, the approach and resources to be used in managing the risk. The plan can be applied to products, processes and projects or to entire organization.

2.2.2 Risk Identification

Risks are events that cause problems when triggered and affect the achievement of objectives negatively (Moavenzadeh and Rossow, 1976). The first step after planning your risk management process is the identification of potential threats. This involves discovering, recognizing and outlining the risk that has effect on the achievement of organizational objectives. The source of the risk should be taken into account in addition to events or conditions that could affect organizational objectives. When the source of risk is identified or known, its easier to investigate the consequences of that source or the problems it caused e.g. withdrawal of stakeholders from a project.

2.2.3 Risk Assessment

Risk assessment evaluates the extent of risk effect i.e. damage or loss. This is an analysis of the risks in relation to the life cycle of the system. In this stage, making the best refined decisions is very important so as to be sure of implementation of the plan. The nature, source and causes of risks that have been identified should be

properly understood and the level of risk should be estimated. Risk assessment involves developing a probability consequences scale, performing supporting analysis, determining probability and significance levels or ratings, documentation of results and also to prioritize the risk. The risk analysis result is compared with the criteria for risk so as to decide if a certain risk level is tolerable or not. The primary objective for this assessment is to estimate risk by identifying undesired events; the likelihood of occurrence of these events and the result in case of occurrence or consequences. The main problem in risk assessment or evaluation is to determine the possibility of occurrence due to the fact that there is no available statistical information for some past incidents.

2.2.4 Risk Handling or Control

Risk control is the implemention of methods and techniques outlined in the risk management plan in order to deal with known risks. It includes planning and execution with the aim of tackling risk at reasonable levels. Individuals or parties are assigned to assume responsibility for risk response agreed. This technique helps to correctly manage identified risks and its effectiveness will determine if there is increase or decrease in project risks. The main purpose of risk control activities is to reduce the amount of risk. There are certain circumstances where the risk is wrongly identified or mistakes were made during analysis, therefore the risk management has to be very careful in this stage in order not to execute something that is wrongly identified or analyzed. According to Kremljak (2010), risks can be handled through the following methods:

1. *Risk Avoidance*

Risk avoidance means stopping any activity that could carry risk. It is the answer to all risk but might lose potential gain attached to a specific risk. It involves eliminating any process that may cause risk towards achieving our objective independent of the gain it may bring e.g. withdrawal from a business so as to avoid loss.

2. *Risk Reduction*

It means reducing the extent of the loss or possibility of loss. Here, we find a balance between negative effect of risk and the benefits attached to the process. Modern software have been developed which help with in this process.

3. *Risk Sharing*

In this process the risk is been shared with another party which means the loss burden or the benefit attached to it will be shared between the parties. In some cases, insurance is used so as to transfer the risk to a third party, but in case of default the original risk will likely revert to the first party.

4. *Risk Retention*

By default, all risks are retained if not avoided or transferred. This involves accepting the loss or benefit of gain from a specific risk. Mostly in this kind of situation the cost of managing the risk is far more than the negative effect of the risk. This include risks that are so large that cannot be insured against and premium would be infeasible e.g. war.

2.2.5 Risk Monitoring

Risks change with time as project progress, new risks emerge or expected risks vanish. This is a process whereby identified risks are checked, residual risks are monitored and new risks are identified. It also ensures implementation of risk plan and evaluating how it reduces risk. A special report should be prepared regularly on the possibility of new risk and how to tackle it. This process will be ongoing for the lifecycle of the system or project. Contingency plan is very important in this process depending on the nature of the system's objective.

According to Kremljak (2010), managers in industries, governmental and private organizations deal with great level of uncertainties in their decision. He argues that managers have incomplete data on future happenings or events; they lack knowledge of all possible alternative and consequences of all likely decisions. Finally he concluded that addressing uncertainty involves creating experimental tools which can bring acceptable solutions.

2.3 Risk Management in Construction Industry

The need for infrastructural development brings about the rapid growth in construction industries around the world. Development of infrastructure is one of the key drivers in business over the globe; it increases the GDP of a nation (Odeyinka et al., 2007). This made countries to prioritize infrastructural development and make provisions in their budgets for financing it. This leads to new challenges and considering the risks involved in the design and production. Construction projects by

its nature allows a lot of scope for many environmental and socio-political problems from pre-contract, contract up to post-contract stage leading to completion time problem, cost overruns and poor quality work (Okuwoga, 1998). Cost overruns will definitely affect project especially when involving a large amount of money (Odeyinka et al. 2007). In order to avoid or reduce the losses, management of the risk involved in the construction project is required.

Construction process or activity deals with materials and components which need to be assembled, designed and produced by different suppliers from diverse disciplines and with different technologies, so as to develop 'the built environment'. These activities include project planning, work regulation, design, construction, maintenance and final commissioning of the structure. The complexity and size of activities differs from one activity to the other based on the work undertaking by local builders or international construction firms engaging in complex or even high-risk projects e.g. civil construction or a simple building. A new construction is regarded as a means of providing a structure or building (e.g., a warehouse or bungalow), or infrastructure which will develop the economy (e.g., a railway), a societal improvement or service (e.g., a hospital) or provision for direct need. This means that construction can be a means of economical development for a nation and accounts for a certain percentage of a nation's annual fixed capital formation. It helps in the delivery of goods and services from other parts of the economy.

The construction industry on its part, provide many employment opportunities within the field of building, engineering, architectural and private industries. It requires the effort of different firms, experience contractors, architects and

engineers, professionals like structural engineers and quantity surveyors, suppliers and manufacturers of equipments.

Construction can be regarded as a basic economic multiplier because of its nature as a system integrator and incentive for many drivers of a nation's economy (Okuwoga, 1998). From macroeconomic point of view, government policy can affect the industry as it requires the three factors input which are land, labor and capital. In developed countries, the construction industry is not limited to their country only but may also be an international industry as many construction companies there are involved with a huge amount of work in other countries.

It is widely accepted across the construction management society that a project risk is any event or series of events, whether internally or externally motivated, that when occurred will negatively affect the project objectives of functionality, performance, time and cost. Risk within the construction industry is understood to be a mixture of activities that has an effect on project in relation to time of completion, project cost, scope and quality of works. Risks in the construction projects can be determinants of the total costs of the project and their distribution has significant effect on project financial plan. Construction projects are extremely complex in the sense that it involves different activities conducted by different people, thereby making it risky (Mills, 2001). Construction risks can be technical, management or socio political aspects or even natural disasters. The construction industry is inherent with risks and uncertainties more than any other industry due to the fact that they are present in every activity from design to completion (Deviprasad, 2007). Some risks are easily identified but still unforeseen (Odeyinka et al. 2007). These risks have to be addressed early or face a high possibility of cost

overruns, delays in completion time and poor quality work leading to dismay the of client and public. Project risks are tackled with past experience, assumption and human judgment (Zainab and Mahmood, 2012).

Risk management in construction industry deals mainly with construction projects. It aims at identifying project risks, finding ways to tackle them and minimizing their negative impact (Akindele and Macloed, 1997). Risk management process in construction projects is yet to be used in operative environment. Risk management within the construction industry relies on the nature of contract i.e. mainly on contract sum (Awodele et al. 2009). The application of risk management techniques within the industry is different from others. Team analysis and brainstorming for risks identification are the commonly applied techniques. Risk management is limited to identification phase, events can be known in advance or be expected but their extent not quantified. The main problem of risk management in construction projects is the cost effectiveness i.e. many construction participants believed that risk management only consume resources while the benefits are hard to measure in financial terms (Awodele et al. 2009). This means that there will be additional cost to the project for risk management process been adopted. But the result of not undertaking risk management with respect to the cost can be considered in a systematic and professional way. Mostly, there is lack of personnel to handle the risk management procedure as it is mastered by only few key people. It is necessary for every construction firm to form and test its own model for risk management as there is no any accepted model for the industry.

Risk management goal is to ensure correct risks identification within the project and set up an evaluation, planning and reporting process for identified risks. The reason

is to review key risks and necessary control measures so as to update the project manager or his representative.

As according to Ehsan et al. (2010) in order to undergo or perform a successful risk management within the construction industry, some factors have to be identified which are: the project risk i.e. in a risk management process, all the possible threats to the project must be identified; appropriate evaluation and analysis of risks can be decided early in order to help justify costly measures that will reduce risk level. It can also help decide if the risk can be avoided, shared or transferred. They argued that two methods exists for determining risks in a project, which include; qualitative and quantitative approach. Factors that expose projects to risks are;

a) History: New projects are always prone to risk because the process has not been experienced with over time. There is always uncertainty when something is been done for the first time. But if a similar project of that nature has been done before, then the prospect of a successful operation is enhanced.

b) Management Stability: When the entire management team share the same thoughts and ideas, the project objectives will be achieved successfully with little or no setback in terms of risk. But when the management team is unstable, they will make a mess of the whole project and lead to compromise in cost, quality and other objectives of the project.

c) Experience and expertise of staffs: Whenever the project team members are ill-informed about the project or lack working knowledge and past experience of that particular work, there is always a possibility of cost overruns, delays in completion time and poor quality standard.

d) Team Size: Too many cooks spoil the broth. Whenever there are too many people involved in the project execution and decision making, the possibility of problem occurrence will be high. The major problems will be difficulty in communication, sabotage, over confidence etc.

e) Resource availability: If resources are available, there will be immediate response to problems. Money or cash availability makes it easier to secure labor, material and equipment resources. But plenty of resources does not guarantee risk free project, rather it equip the project team with means of eliminating or minimizing the threat of risk.

f) Time Compression: There are projects where completion time is very small compared to the nature of the project; risks are expanded in this kind of situation. When we have more time, there will be more flexibility and opportunity to reduce the impact of occurring risk.

g) Complexity: In extremely complex projects, the likelihood of risk occurrence is always high. The possibility of making mistake is also high and a little mistake can cost you a great loss.

Risks can be related to business, operational or technical part of projects. Construction industry risks are best categorized into:

a) Technical risks: unfinished design, unsatisfactory site investigation, Suitability of specification, Uncertainty over the source and availability of materials

b) Financial risks: changes fluctuation in foreign exchange, Return of funds, delays in payment, local Taxes and Inflation.

c) Management related risks: industrial related problems, unsure productivity of resources, clash of interest and wrong decisions.

d) Logistical risks: availability of necessary facilities for transportation and construction equipment that will be needed for the progress of the work.

e) Socio-political risks involves: difficulties in disposing of plant and equipment; limitations on the availability and employment of emigrant staff; and persistence on use of local firms, methods and agents

f) Environmental risks: climate changes, weather implications, and natural disasters

Sources of risks include the following: Design problems, lack of knowledgeable staffs; changes in project scope and requirement, lack of experience from the contractor, new technology, unusualness with local conditions, inadequate defined roles and responsibilities, and size of workforce. Risk management involves four major processes as according to Ehsan et al. (2010) but Ahmed et al. (1999) believed that the application of this techniques depends on organizational plan, nature of the project, project management strategy, risk attitude of the project team members and availability of resources.

Some of the advantages of risk management include achievement of objectives, shareholders reliability, reduction of capital cost, less uncertainty and creation of value. Some of the limitations of risk management are, in case of wrong analysis or evaluation, time can be wasted trying to deal with risks that are not likely to occur; sometimes prioritizing risk management too highly could prevent from ever

completing a project, especially when other works are suspended until after risk management process.

Zou et al (2005) made a research trying to identify key risks in construction projects from stakeholders and life cycle perspective. They tried to identify certain project risks, their likelihood of occurrence and impact. Based on their assessment, twenty risks were identified with their likelihood of occurrence and impact on project goals. The risks were related to either clients, designers or contractors while only few were related to sub-contractors/suppliers, government bodies and other external issues. The twenty key risks are tight project schedules, design variations, delays in approval by administrative government bodies, high performance and quality expectations, low program scheduling, poor program planning, changes in construction programs, incompetency of sub-contractors, client change order, incomplete or delays in approval and other documents, inaccurate cost estimate, poor coordination among participants in a project, unavailability of sufficient professionals and managers, shortage of sufficient skilled labor, bureaucracy of government, occurrence of accident, poor soil test and site survey, dispute between participants, construction materials price inflation and noise pollution from construction

These risks are then examined based on stakeholder's perspectives and project life cycle perspective. The stakeholders include clients, contractors, designers, sub-contractors, government bodies and external bodies.

2.3.1 Risks Related to Client

Four key risks were identified as related to client including tight schedule in projects, client change order, high performance or quality expectation and incomplete or delays in approval and other documents.

2.3.2 Risks Related to Designers

Four risks were also identified as related to designers namely: variations in design, inaccurate cost estimate, poor program scheduling and poor soil test and site survey.

2.3.3 Risks Related to Contractors

Seven key risks were identified in relation to contractors which are: poor program planning, program change, poor coordination among participants, unavailability of sufficient professionals and managers, shortage of skilled labor, dispute between participants, noise pollution from construction and accident occurrence.

2.3.4 Risks Related to Sub-contractors

Incompetency of sub-contractors is the main and only key risk associated to sub-contractors. Normally sub-contractors allocate their resources and manpower to different projects at the same period in order to gain maximum possible profit. Without good management skills and experience they cannot meet different project's requirements simultaneously.

2.3.5 Risks Related to Government Bodies

Delays in approval procedures by departments and bureaucracy of government are the two risks associated with government. These are out of stakeholder's control.

Government need to create environmental friendly approval procedures to attract investment within their territory.

2.3.6 Risks Related to External Issues

Only construction materials price inflation is related to the external environment which is also not controlled by stakeholders. Materials prices are always changing with respect to change in inflation and the rate of demand and supply within the construction industry market.

Zou et al. (2005) recommended that the contractors and designers should be able to help the client in producing an appropriate schedule for the project, define or limit product quality expectation, prepare for price fluctuation of construction materials and get government approvals promptly. Designers should understand clients' need and get in-depth site information.

Odeh and Battaineh (2002) recommended incentives for early completion should be included into contracts in order to improve construction risk management and adopt new approach for awarding contracts based on experience rather than the lowest price. They suggested that experience should be given more recognition.

Tang et al. (2007) discussed risk management in Chinese construction industry. Their research outcome was based on an observed survey on the construction industry in China investigating the significance of project risk, risk management application techniques, status of risk management and barriers or setbacks to risk management application perceived by project members. The risk management strategies adopted by Three Gorges Project were also analyzed. The result of the study revealed that the current risk management system cannot or is not sufficient to

manage project risk, the construction industry in China have move from risk transfer control method to risk reduction, project risks are only a worry to the project members and lack of an industry accepted model for risk management is the main barrier to risk management application. They suggested that a future researches should be conducted in order to improve risk management within the construction industry using different methodologies that facilitate reasonable reward sharing by the use of effective risk management among participants.

Banaitiene and Banaitis (2012) discussed risk management in Lithuanian construction projects and stated that risk management practice encourages construction companies in identifying and quantifying risks, and that risk reduction and control policies should be considered. They found that Lithuanian construction firms significantly differ from foreign countries firms in that they adopt risk management process. Lithuanian contractors' attitude towards risk management will be difficult to change due to lack of experience. They suggested that construction companies should include risk as an important part of their construction management. In risk management framework, construction projects can be improved by using both qualitative and quantitative methodologies for risk analysis.

Ehsan et al. (2010) did a study identifying and evaluating current risks and uncertainties within the construction industry of Pakistan using questionnaire and literature survey. They found that proper risk management techniques and risk analysis are hardly used within the Pakistani construction industry as a result of lack of experience and awareness in the region. The commonly used risk measures are risk transfer and risk elimination. A result of the survey shows these practices are the causes of project complications, delays, below standard or poor quality and poor

project outcomes. They suggested that professionals within the construction must be enlightened on risk management, and formal and informal training for risk management should be developed. In the formal system, graduate level education should be in introduced in construction project management and the informal should be in form of training for construction teams within the industry.

2.4 Risk Management in Nigerian Construction Industry

Nigeria has the largest economy in West Africa and 3rd largest in Africa. It is ranked 30th in the world in terms of Gross Domestic Product (GDP). The country operates a mono-product economy which depends totally on the export of crude oil. In 2001, the export of crude oil was estimated to be 98.7% of foreign exchange earned (Oluwakiyesi, 2011). He further states that oil wealth is believed to be a key driver to construction industry across the major oil producing economies like United Arab Emirates, Saudi Arabia and Russia, for instance, the oil price boom of 1970s started the growth in UAE's construction sector. Nowadays, from the way oil price is booming, we hope that Nigeria's construction sector will achieve its full potential soon. According to a survey by GCP, construction growth in Nigeria would be the fastest of all markets. The survey stated construction is the best sector to be and that it is expected to grow at 128 percent from 2011 to 2020 (Oluwakiyesi, 2011).

The Nigerian construction industry is relatively small considering the size of the global construction industry, which is estimated at approximately $4trillion in 2008. The industry in Nigeria is valued at $3.2bn also in 2008 (Oluwakiyesi, 2011). Which means it forms only 0.01% of the worldwide total. The government's goal in Nigeria has been to increase the value of the industry.

Construction is among the smallest employers in the country, accounting for less than 1% of total labor force according to the NBS (2009). Nevertheless, it also accounts for some 69% of the fixed capital expenditure, which means that approximately 70% of capital expenditure in the country allocated to the construction industry (NBS, 2009).

In the 1980's, the construction industry in Nigeria contributed up to 7% of the GDP (NBS, 2009). As Walsh and Sawhney (2002) stated, construction activities contributes significantly to the GDP in industrialized countries and also has great effect on the global economic growth. This implies that construction is a key driver in the development or improvement of a country's economy. Unfortunately, Nigeria is yet to be an industrialized country though it is aspiring to be one. But the industry's contribution to the overall GDP from 2001 to 2009 averaged about 1.74% (NBS, 2009). This is as a result of political instability, high disintegration of the industry and poor performance (Awodele et al., 2009). This poor performance is the major cause of the industry's fragmentation which is as a result of a number of risks associated to the industry or construction in general. To say that Nigerian construction industry is poor is an understatement because the industry is characterized by cost overruns, subsequent delays and abandonment of projects (Odeyinka et al. 2007). A report by Capital Management Limited on Nigerian construction industry shows that there is insignificant participation from private sector which makes the construction industry highly correlated with the budget allocation (Oluwakiyesi, 2011). A regression of the construction sector GDP on government's total expenditure (federal and states) has a correlation coefficient of 0.92 from past data between 1982 and 2006 (Oluwakiyesi, 2011). This means that the federal, state and local governments are the major clients in the industry, but as

the country continues to deregulate the various parts of the economy, private sector clients have start accounting for larger share of contracts. The biggest private sector clients in Nigeria are mainly the large oil companies such as Shell, Chevron, Oando, Total, Exxon and Mobil, which need infrastructure, housing compounds and office space (Oluwakiyesi, 2011). There are also new generation banks and international clients such as non-governmental organization, the United Nation as well as large real estate developers especially in Lagos and Abuja.

Foreign companies control about 95% of the industry, while local companies have started to come into view over the years, but often partner with foreign firms because the quality of technology in Nigeria is low and high tech equipments have to be imported which is why partnering with foreign companies is of advantage (Oluwakiyesi, 2011). The country has good training in terms of manpower as well as competent engineers and planners but professionals have been sidelined because contracts are awarded to foreign companies (Oluwakiyesi, 2011). He argued that the country is not developing its own technology by awarding contracts to non-indigenous firms.

Belel and Mahmood (2012) assess the practice of risk management in Nigerian construction industry using questionnaire survey method. They found insufficient skilled staffs as the major source of risk in construction; shortage or lack of knowledge is recognized as the most intolerant issue that limits the practice of risk management. They identified contribution to project success as the main benefit of risk management. They stated that most of their respondents are familiar with risk management as related to safety hazard on site rather than recognize risk management associated with fulfilling project objectives of cost, quality and time.

They suggested that training of workforce to manage risks should be undertaken in Nigerian construction industry. Their study differs from the present one in that they took a case study of only Adamawa state which is not regarded among the leading states in terms of construction activities. Results from Adamawa state cannot be used to represent the views of construction participants in Nigeria.

Odeyinka et al. (2007) investigated the possibility of occurrence and impacts of certain risk factors at pre and post contract stages in the construction industry of Nigeria. They used questionnaire as a source of data collection. They found that at pre contract stage, the likelihood of occurrence of the identified risk factors are in order of design risk, estimating risk, competitive tendering risk and tender evaluation risk. Their impact when occurred is also in the same manner. At post contract stage, the likelihood of occurrence of those risk factors are in order of financial risk, political risk, contractual risk, logistic risk, legal risk and environmental risk. The impact in case of occurrence did not follow the same manner as the likelihood of occurrence. The present study tried to investigate more than just the likelihood of occurrence of some risk factors in Nigerian construction industry. But in their study they concentrated only on some certain risk factors while in the present study the applications and barriers of risk management were also investigated.

This chapter reviewed many researches on risk management in construction industries around the world but find only two relating to risk management in Nigerian construction industries and both are concentrating in some certain states of the country. This shows that there is need to investigate risk management process within the construction industry in Nigeria in order find ways of avoiding project

risks and maximizing production within the industry. This study identifies the most occurred project risks within the construction industry so that participants will take preventive measures before occurrence of any risk and also identifies ways of improving risk management in Nigeria.

Chapter 3

METHODOLOGY

3.1 Introduction

The main problem with data collection is reliability of the information. The obtained information need to be precise and accurate for the research to meet standard. This chapter will give details of the type of survey method used for data collection. It will also state the reasons why this method was chosen and why other methods are not used. It will give a report of the extent of reliability of the obtained data and how it was collected. This is important because the quality of any research depends on the accuracy and reliability of data.

The survey explore the opinions of Nigerian construction professionals on; application of risk management in Nigerian construction projects; barriers or factors that limit the application of risk management; the factors that can help in risk management development in Nigeria; and risk factors that are most likely to occur in Nigerian construction projects. The relevant information necessary for this study was collected through a detailed literature review from relevant works like journals, the internet, published books and lecture notes regarding risk management. The information gathered formed the basis for understanding risk management process.

3.2 Survey Method

Time limitations meant it was impossible to conduct a nationwide construction industries survey. Due to this reason, a random survey was employed across some of the states which could represent the views of construction participants in the whole nation. A specific focus was given to Abuja and Lagos which are the commercial as well as the political capitals of Nigeria. These states were given more attention because they are the hub of construction activities in Nigeria. Given the economic status of these two states with respect to number of project been undertaken annually and the number of firms there, data collected from these states can to a large extent represent the whole construction activities in Nigeria.

Questionnaire was chosen as the survey method due to distance and other logistical reasons. A questionnaire is a research tool made up of series of questions in order to gather information or find the opinions of respondents. A questionnaire was developed for the purpose of this study based on the information gathered from literature review. The questionnaires were sent via e-mails. Postal surveys avoid the problem of legwork and travelling, but obtaining a reasonable level of response can be another problem (Thomas, 1996). Akintoye and Macleod (1997) believed that if the return rate is lower than 30%-40%, postal surveys can be biased. In order to avoid the problem of response, reminder e-mails were sent to each respondent every week.

Respondents to the questionnaire belongs to different roles and professions within the construction industry, including clients, management organizations, contractors, designers and consultants from different disciplines of construction like architecture, civil engineering, quantity surveying, construction management, mechanical engineering etc.

The questionnaire is believed to be a better choice over other types of surveys in that it is not expensive, requires less much effort from the researcher, easy to analyze and often have straight forward answers with options which makes it simple for data compilation. Online interview was considered as an alternative method of data collection but number of respondents would be limited with this method. A method of case study was also considered but risk management is not well practiced in Nigeria to the point of getting a project with risk management considerations. Internet survey was also considered which is also cheap and easy but majority of the construction participants in Nigeria are not familiar with this type of survey. Other methods mentioned above were considered but questionnaire method was the better option for this study. The questionnaire consist of two parts; the background information of the respondents; and information about risk management in Nigeria.

3.3 Acceptance Criteria

Some criteria were set for accepting a questionnaire in order to have correct information from true participants in the construction industry. The first criterion was to have a professional that belongs to a company with an annual turnover of over N50 million. Any organization with a turnover of below N50 million means that they do not undertake sufficient projects to know the through picture of what is happening within the construction industry in the country. The second criterion was to have a construction participant with not less than 3 years experience in the system. This would help us to get reliable information.

3.4 Questionnaire Structure

The questionnaire structure is shown in Appendix A. It consists of two parts; the first part consist of the background information of the respondents and the organization they work including name of organization, his/her position, qualification, experience, number of employees in the organization, number projects undertaken annually, type of construction and type of company. This background information helped us in assessing the respondents and also determines if the response provided can be relied on. It will also help to set certain criterion or requirements for accepting the questionnaires. It has a total of thirty questions. The first nine questions aim to find out information about the respondents which helped in setting acceptance requirements for the questionnaires i.e. name of organization, position, qualification, experience, annual turnover of organization etc. The second fifteen questions were asking questions about risk management and the Nigerian construction industry i.e. risk management workshops, processes, most difficult part, stage that has most risks, development of risk management etc. The final fifteen questions were asking questions about the likelihood or possibility of occurrence of some risk factors in construction projects i.e. weather condition, design variations, contract dispute, skilled labor, cost estimate etc.

A Likert scale of 1-5 was used in eighteen questions in the questionnaire especially in the final fifteen questions. It is a response scale widely used in questionnaires around the world. This helps the respondents to specify the extent of their consent to a particular statement. This scale was named after Rensis Likert, the person who first published a report describing its use (Likert, 1932).

Chapter 4

DATA COLLECTION AND ANALYSIS

4.1 Introduction

In every research, data presentation is an important part of the study. It will help the reader to understand the results of the research. There is need to present the data collected from construction industry participants in order to analyze and interpret the result. In this study questionnaire was used as survey method which was discussed in the previous chapter.

This chapter will outline the results of the returned questionnaires. Each question has different options for the respondent to choose. Any chosen option will be represented as a percentage of the total returned questionnaire in order to show the number of respondents that choose a particular answer. It would be followed up with a pie chart to help in understanding the responses. Normally, it is difficult to get 100 percent of the questionnaires returned but past researches gave different benchmark for returned questionnaires. In this research, it was believe that a return rate of above 50 percent would be satisfactory because of the distribution method and distance.

4.2 Background Information

A total of 50 questionnaires were sent and 38 were returned which makes the response rate to 76 percent. Three questionnaires were rejected because they did not meet the acceptance requirement. Ninety-one percent of the respondents have an

experience of more than 5 years within the construction industry while only 8.6 percent have 3-5 years of experience as shown in a bar chart in Figure 1. Of the respondents, 85.7% have at least a diploma in one of the building profession mentioned earlier. Only 20 percent of the respondents undertake more than 5 projects annually, though in some cases one big project in a year can be more than 10 small ones in terms of size. Of the respondents, 77.1% engage only in industrial or residential buildings while the remaining 22.9 percent engage in both residential, industrial, heavy engineering and road construction. Of the respondents, 62.9% are working in public organizations while the remaining 37.1 percent belong to private companies. As stated earlier in the literature review, in Nigeria the federal, state and local governments are the major construction clients accounting for more than 90 percent of the projects. This means that automatically any building employer or professional from the public organization belongs to the client side while that of private companies belongs to the contractors or consultants. Nineteen of the respondents were clients, 10 contractors and 6 consultants. We do not have any response from sub-contractors.

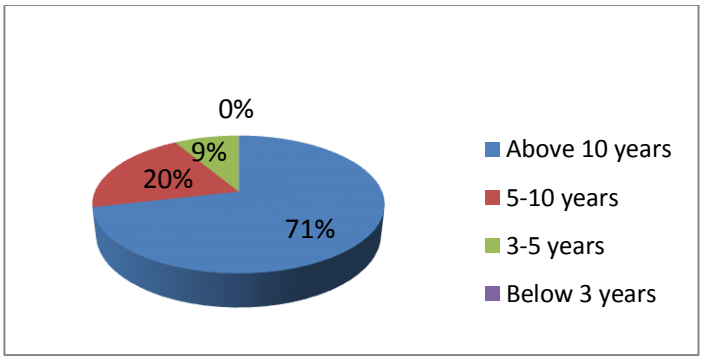

Figure 1: Year of Experience of Respondents

4.3 Analysis

The second part of the questionnaire consists of thirty questions which are subdivided into two: the first 15 were relating to risk management process from participants view in Nigeria, questions sixteen to thirty were questions regarding projects risk, the likelihood occurrence of certain risk factors in projects in Nigeria. Using a scaling of 1-5, respondents were requested to score the risk factors identified with the given scales (from least likely to most likely).

Respondents were asked on how they deal with project risk in their different organizations. Eighteen of the respondents (51.4%) use experience in dealing with project risks. Eleven respondents (29%) use judgment rather than experience in dealing with risks in construction while the remaining 6 (19.6%) used intuition to deal with project risks as shown in Figure 2. On whether respondents have ever attended a risk management workshop in Nigeria, 18 of the respondents (51.4%) stated that they attended while the other half said they have never attended. Respondents were asked whether their respective organizations have a risk management model. Twenty-one (60%) stated that they do not have any risk management model while only 14 (40%) believed to have a risk management model in their respective organizations. Respondents that have a risk management model were further asked which type of control method they adopt in their model. Seven of the respondents (50%) that had a risk management model use risk reduction as a control method while 4 of them (30%) use risk transfer as a control method.

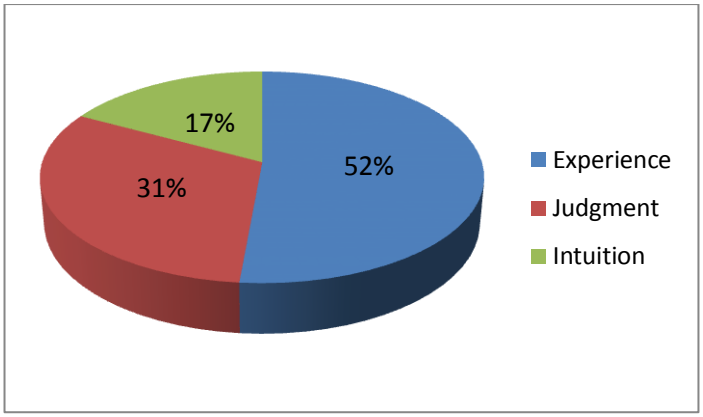

Figure 2: How to Deal With Project Risks

In response to the question, to what extent can some certain factors influence risk management process development in the Nigerian construction industry? This question is giving weights of 1-5 (from least important to most important). The first factor is the attitude of contractors in Nigeria. Sixteen of the respondents (45.7%) gave it a weight of five. Nine gave it a weight of four, 7 a weight of three while the remaining 3 gave it a weight of two. The second factor is project program scheduling which implies that to what extent can project program scheduling influence the development of risk management process in Nigeria. Nine of the respondents gave it a (25.7%) weight of five while 14 of them (40%) gave it a weight of four, 5 a weight of three and the remaining 7 did not fill this factor. The third factor is introduction of risk management model which means that to what extent introduction of risk management model will influence risk management development in Nigeria. Seven of the respondents (20%) gave it a weight of five, 21 gave it a weight of 4 and 3 and the other respondents did not fill for this factor. The fourth factor is the cost of risk management which is trying to explore the extent at which the low or high cost of risk management will affect the development of risk management in Nigeria. Twenty-one of the respondents (60%) gave it a weight of

one and two which are least important and less important respectively. Fourteen gave it a weight of three and four which is more important and important respectively. The fifth factor is the availability of knowledge and experience which is asking the extent at which availability of knowledge and experience in construction professions will persuade the development of risk management in Nigeria. Nine of the respondents (25.7%) gave it a weight of five while 25 gave it a weight of three and four.

When asked about how they bid for projects with high possibility of risk or risky projects. Twenty-four of the respondents (68.6%) stated that they bid risky projects with high price while 25.7% of the respondents stated that they bid it with normal price. The remaining stated that they withdraw their bids in risky projects as shown in Figure 3.

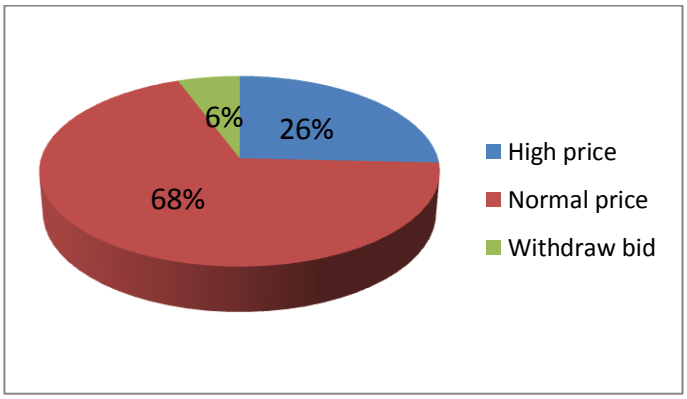

Figure 3: How to Bid Projects With High Risk Possibility

Respondents were asked the most difficult part of risk management process in Nigerian projects. Fifteen of the respondents (42.9%) stated that risk monitoring is the most difficult part of risk management process. Twenty-nine percent believed that risk control is the most difficult part of risk management process. Of the respondents, 14.3% stated risk identification is the most difficult part while the

remaining 14.3% believed that risk analysis is the most difficult part of risk management process in Nigeria which is shown in Figure 4.

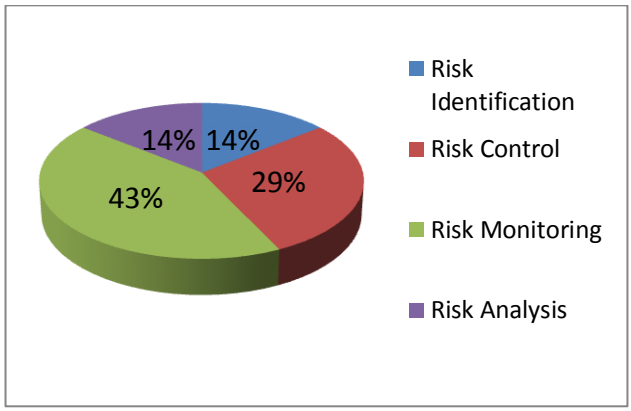

Figure 4: The Most Difficult Part of Risk Management Process in Nigeria

Responding to whether respondents have a program or process in their organizations for determining project performance. Of the respondents 8.6% stated that they do not have any program or process for determining project performance. Of the respondents, 91.4% stated that they have a process of determining project performance. A further question was asked to those respondents that have a means of determining project performance. Among those respondents that have a means of determining project performance 90.6% use resource and quality management as a means of determining the project performance while 9.4% of them use time and cost management to determine project performance.

In order to explore how knowledge or experience can effectively help to manage project risks in Nigeria five factors were listed with weights of 1-5 (from least important to most important). The respondents were required to give weights to these factors based on its importance to managing project risks. Six of the respondents (17.1%) believed experience in time management to be the most important factor giving it a weight of five. Fifteen and Twenty-five percent believed

that knowledge or experience in time management is an important factor but not the most important factor which will help in managing project risks in Nigeria giving it a weight of three and four respectively. The second factor was cost management, 51.4% of the respondents believed that knowledge or experience in cost management is the most important factor that will help to manage project risks effectively giving it a weight of five, 28.6% and 20% stated that experience or knowledge in cost management is an important factor but not the most important factor which will help to manage project risks effectively giving a weight of three and four respectively. Of the respondents 31.4% stated that experience and knowledge in resource management is the most important factor that will help in managing project risks effectively, 28.6% and 40% stated that experience or knowledge in resource management is an important but not most important factor in managing project risks giving it a weight of three and four respectively. Fourty percent of the respondents believed knowledge or experience in quality management is an important factor that will help manage project risk, 11.4% and 48.6% gave quality management a weight of three and four. Experience or knowledge in scope management was believed to be less important in which it will help to manage project risks as majority of the respondents gave it a weight of 1 and 2.

Respondents were asked about the general attitude of project participants toward risks in Nigeria. Of the respondents, 71.4% stated that contractors carry certain risks and its price in their tender while 28.6% of the respondents believed that the client should carry as many risks as possible in the project which is shown in Figure 5.

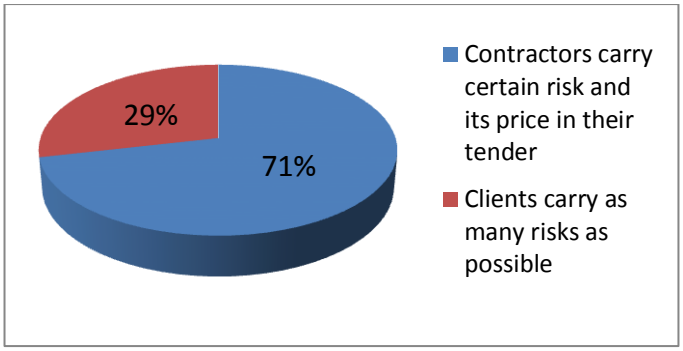

Figure 5: General Attitude of Parties Towards Construction Risks

Responding to the stage when most risks are encountered in projects, 42.9% of the respondents believed that it is design construction stage that most risks are encountered while 57.1% of the respondents believed that during the construction stage is where most project risks are encountered as shown in Figure 6.

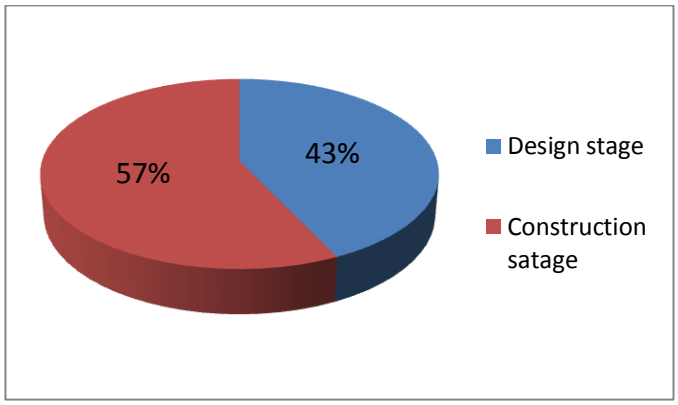

Figure 6: Stage Where Most Risks are Encountered

On the most suitable stage to start risk management process, 80% of the respondents believed that briefing stage is the best stage to start risk management process while 14.3% of them believed that during the design stage is the best to start risk management process with only 5.7% stating that construction stage is the best as shown in Figure 7.

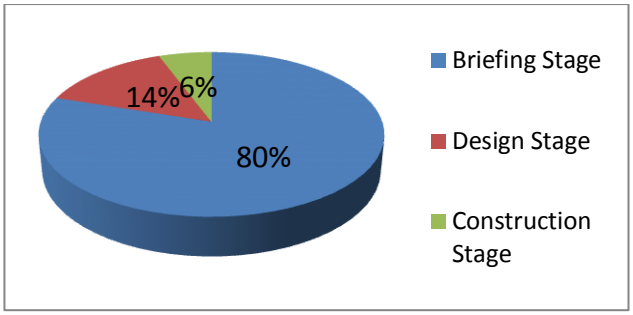

Figure 7: Most Suitable Stage to Start Risk Management

In Nigeria, a 5% contingency sum is included in contract or project sum. Respondents were asked whether it is enough to cover construction risks. Fourty percent of the respondents believed that the contingency sum is enough to handle project risks while sixty percent stated that the contingency sum is not enough to handle project risks.

In order to have an insight on the factors that limits the application of risk management or barriers to risk management, some factors were listed for respondents to choose the ones that are barriers to risk management in Nigerian construction industry. Fourteen of the respondents (40%) stated that ineffective implementation of risk management is responsible for poor risk management practice in Nigerian construction industry. Of the respondents, 34.3% believed that absent of joint a risk management mechanism by parties is the barrier or limitation to risk management practice in Nigeria, 51.4% identified shortage or lack of knowledge on risk management is responsible for poor risk management practice in Nigeria and 5.7% believed that different recognition of risk control strategies is responsible for lack of risk management practice in Nigerian construction industry.

Responding to who contributes most risks in projects in Nigeria, 60% of the respondents believed that contractors contribute the most risks while 31.4% believed that designers are responsible for contribution with the most risks. Only

8.6% agreed that clients contribute with the most risks in projects as shown in Figure 8.

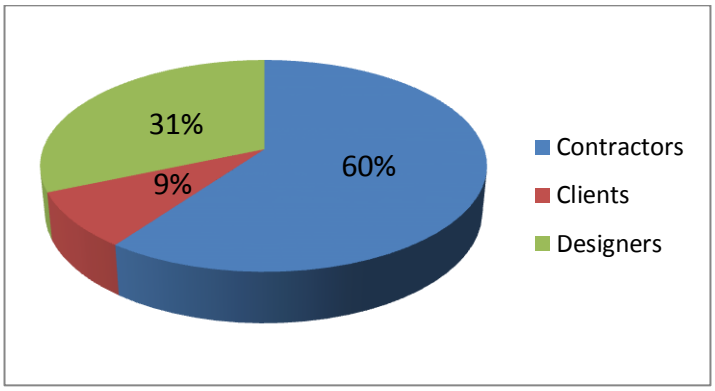

Figure 8: Those That Contribute With Most Risks

Some risk factors or sources were identified in order to explore their likelihood of occurrence. Respondents were asked on a scale of 1-5 the likelihood of occurrence of each risk factors (1 is not likely, 1 is less likely, 3 is likely, 4 is more likely and 5 is most likely). The first was design variations, 14.3% of the respondents gave it a scale of five which is most likely, 20% and 15.7% gave it a scale of four and three which are more likely and likely while the remaining 40% gave it a scale of two which is less likely.

Delays in payment by clients were identified as a source of risk and respondents gave scale based on its likelihood of occurrence, 25.7% of the respondents chose a scale of five which is most likely while 40% and 25.7% chose a scale of four and three which are more likely and likely. The remaining 8.6% chose a scale of 2 which is less likely.

On the likelihood of occurrence of materials price fluctuation, 40% of the respondents chose a scale of five which is most likely while 20% and 40% chose a scale of four and three which are more likely and likely.

Contract dispute between client and contractors or with sub-contractors was identified as a source of risk in construction projects. 31.4% and 40% of the respondents believed that this factor is more likely or likely to occur giving it a scale of four and three. The other 28.6% gave it a scale of two and one which are less and least likely.

Client change order was also identified as a risk factor, 60% and 28.6% of the respondents believed that this factor is likely to occur giving it a scale of four and three and the other 11.4% believed that this factor is less likely to occur giving it a scale of two.

Inaccurate cost estimate was recognized as a source of risk. Of the respondents, 31.4% gave it a scale of five which is most likely to occur, 60% gave it a scale of three and four which are likely and more likely while the remaining 8.4% of them gave it a scale of one which is least likely.

The likelihood of occurrence of inadequate program scheduling as a source of risk factor was investigated. Of the respondents, 40% choose a scale of five which is most likely, 28.6% and 11.4% chose a scale of four and three which are more likely and likely respectively. The other 20% of the respondents did not choose any scale for this factor.

Unsatisfactory site investigation was also recognized as a source of risk. Of the respondents, 28.6% chose a scale of five which is most likely while 20% and 40%

gave it a scale of four and three which are more likely and likely respectively. The remaining 11.4% of the respondents did not choose any scale.

The likelihood of occurrence of an increase in inflation rate is a source of risk. Of the respondents, 71.4% believed that it is most likely to occur giving it a scale of five. 17.1% and 8.6% chose a scale of four and three which are more likely and likely while only 2.9% chose a scale of two which is less likely.

The likelihood of occurrence of insufficient skilled labor is identified as a source of risk. Of the respondents, 22.9% gave it a scale of five which is most likely, 28.6% and 40% gave it a scale of four and three which are more likely and likely while 8.6% of the respondents chose a scale of two which is less likely.

Plant and equipment problem is also identified as a source of risk in Nigerian construction projects. Of the respondents, 5.7% choose a scale of five for this factor which is most likely, 31.4% and 40% choose a scale of three and four which are likely and more likely while 5.7% chose a scale of two which is less likely. The other 17.2% of the respondents did not fill any scale for this factor.

Bureaucracy of government is recognized as a risk factor. Twenty percent of the respondents gave it a scale of five meaning most likely, 21.4% and 18.6% chose a scale of three and four which are likely and more likely while only 11.4% gave it a scale of two meaning less likely.

Unfavorable weather condition is identified as a risk factor. Twenty percent of the respondents gave it a scale of five meaning most likely, 31.4% and 40% chose a scale of three and four which are likely and more likely. Only 8.6% gave it a scale of two which is less likely.

Incompetent sub-contractors is been recognized as a source of risk. Of the respondents, 31.4% chose a scale of five which is most likely, 17.1% and 40% gave it a scale of three and four meaning likely and more likely while the remaining 15% gave it a scale of two meaning less likely.

Political risk is believed to be a major source of risk in Nigerian construction industry. Of the respondents, 28.6% gave it scale of five meaning most likely while 40% and 31.4% of the respondents gave it scale of three and for which are likely and most likely.

In this chapter the views of respondents who were able to return the questionnaires were summarized; but the most important thing for the research is the discussion of respondent's views. This means that the result retrieved from the survey need to be analyzed.

Chapter 5

RESULTS AND DISCUSSION

5.1 Introduction

More than thirty respondents from different disciplines of building construction filled the questionnaire and returned it with their views on certain questions regarding risk management in Nigerian construction industry. It was strongly believed that the data given by these respondents can be relied on because they have sufficient experience within the construction industry.

In this chapter views of respondents and their relations with the real situation in Nigeria and Global construction will be discussed. The questionnaire results would be analyzed in order to see if it's in line with some construction professionals' views and how it differ with past researches.

5.2 Risk Management Practice

Due to high risk involved in many practices today, it becomes necessary to have prevention plan against the effect of risk. There is no other process of preventing or eliminating risk other than risk management. It is believed to affect many aspects of a project. Normally all risks cannot be controlled or addressed but ignoring risk handling techniques will surely lead to severe consequence to the project. Construction practitioners are faced with great level of uncertainties in their decision as little mistake can affect the project objectives.

Of the respondents, 51.4% deal with project risks using experience which is a better way, given the complexity of construction project, 29% use judgment while only 20% use intuition in dealing with project risks which is not good for projects. This implies that in Nigeria majority of organizations use experience in dealing with project risks which is the right approach. Using this approach will help tackle many risks involved today in construction projects unless it's a new type of risk not known to all which is hardly. Past researches show that majority of construction companies around the world deals with project risks based on judgment, experience and intuition. It is believed that majority of the risks are biased and are related to either contracts or construction processes which is why it is better to be dealt with base on experience. Of the respondents, 51.4% have attended a risk management workshop which will help building participants to understand more on risk management process, while 48.6% have not attended any workshop relating to risk management, showing that a lot has to be done in Nigeria regarding risk management. This shows that risk management workshops are organized but not regularly or with less awareness.

Sixty percent of the respondents do not have any risk management model in their organizations which would help in managing project risk. The rest acknowledged the existence of a risk management model in their organizations. This implies that in Nigeria majority of construction organizations do not have any risk management model; they tackle project risks without any accepted procedure. Fifty percent of those that have a risk management policy or procedure confirmed that they use risk reduction method for controlling risks while 30% use risk transfer. Although, majority of organizations do not have a procedure for risk management, the ones

that have use risk transfer and risk reduction as controlling methods. With the help of organized risk management workshops this problem will be addressed.

Of the respondents, 42.9% believe that risk monitoring is the most difficult aspect of risk management process in Nigeria, 28.6% believe risk control is the most difficult part while 14.3% believed it is risk identification. The remaining 14.3% believed it is risk analysis. The opinions of the respondents here is a little confusing but it can be seen that the most difficult part is risk monitoring followed by risk control. This shows that in Nigeria the most difficult part of risk management has to do with implementation of identified ways. Implementation has always been a problem in Nigeria but with good and competent management in place risk management process will be so easy to undertake.

Of the respondents, 68.6% bid projects with high possibility of risk or risky projects with normal price. In other words, they do not include the cost of risk management in their bids. 25.7% bid risky projects with high price meaning they include the cost risk management in their bids while the remaining 5% withdraw their bids for fear of been priced out. Normally there is the attitude of selecting the lowest bid in Nigeria and when involved with project of high probability of risks, organizations are left with difficult choices of either bidding with normal price and face the possibility of losing at the end of the project or with little profit. But from the survey, majority of organizations take the risk of losing or getting negligible profit by bidding with normal price. The attitude of accepting the lowest bid should be reviewed especially in risky projects. According to Nadeem et al. (2010), majority of Pakistan construction companies bid projects with high price or withdraw their bids in trying to eliminate risk which is totally opposite with what was observed in

Nigeria based on our survey. Of the respondents, 40% believe the 5% contingency sum included in project cost will be enough to cover risk management while the other 60% believed that the contingency sum is not enough to cover project risks.

Of the respondents, 91.4% have a program or process in their organizations to determine project performance while the other 8.6% do not have. Determining project performance is the best way to improve against future projects. In Nigeria majority of the organizations have a way for determining project performance, 90.6% of those that have process of determining projects performance use resource and quality management to measure the performance while 9.4% use time and cost management to assess project performance. This shows that in Nigeria they care more about the quality of projects to their costs when assessing the performance. Cost and time can always be adjusted but whenever the quality is compromised the whole project can be affected. It is not surprising to see how quality is been considered more in Nigeria.

Of the respondents, 71.4% believe that contractors carry certain risks and include it in their tender while the other 28.6% believe the clients carry so many risks in the course of the project. It seems in Nigeria the contractors suffer consequences of project risks.

The hardest part of risk management is not finding the techniques or tools to analyze risk and uncertainty, but accepting that life is uncertain and that it is better to grasp it rather than ignoring it. Knowledge and techniques can be learnt easily but the awareness and attitude to construction projects are very difficult to change in Nigeria. Risk management is not giving any priority as practitioners feel it is not a

fundamental aspect of the construction, an awareness campaign will help make participants understand its important and how it will improve the industry.

5.3 Risk Management Development

The aim of risk management is to identify advantageous alternative courses of action, improve chances of success and increase chances of achieving project objectives. Risk management development will help Nigerian construction industry. There are many ways to develop the process looking at how the industry was developed in countries like China.

Of the respondents, 45.7% believe that the attitude of contractors is the most important factor which can influence risk management development in Nigeria's construction industry. On the other hand, 45.7% believe that it is important but not the most important. Culture can be influential to risk management development in Nigeria. Cultural change can be very important for implementing risk management philosophies for most Nigerian contractors. Cultural aspects will not only affect motivation and commitment of project members, but will also influence relationship between parties involved in projects. Many practitioners within the industry sees risk management as a western culture in building especially the aspects that violates their traditional systems. Normally contractors have I don't care attitude towards risk. Of the respondents, 25.7% believed project program scheduling to be most important factor that will influence risk management development in Nigeria, with 54.3% stating that project program scheduling is important but not the most important factor. Completing projects on time is an important issue in the construction industry but in Nigeria it is a big problem due to lack of proper program scheduling. Only

20% of the respondents agree that introduction of risk management model will influence the development of risk management in Nigeria, with 60% agreeing its importance but not the most important factor. This means that majority of construction participants in Nigeria are of the opinion that risk management model will help risk management. With more risk management awareness this problem can be addressed.

Of the respondents, 60% believe that the risk management cost will not influence the development of risk management in Nigeria. They believed that risk management cost can affect the project's cost. The other 40% believed it is important but not the most important. The cost of risk management can be negligible in small scale projects at the same time effective in large scale projects. The cost can influence risk management development but can be problematic when the cost of damage caused by a certain risk is less than the cost of managing the risk. Of the respondents, 25.7% believe that availability of knowledge and expertise is the most important factor to influence the development of risk management in Nigeria, while 71.4% agree it is important but not the most important factor. This shows that knowledge and expertise of participants will really help in risk management development in Nigeria. Majority of participants in the construction industry of Nigeria are ignorant about risk management process. Whenever they heard about risk management they think about safety.

The construction practitioners in Nigeria lack the basic understanding of risk management process. They view it as a technique that will not make a significant impact on projects which makes it an optional process in the industry. This is as a

result shortage of knowledge and expertise and also their general attitude towards risks i.e. thinking that risk has to do with safety risk only.

5.4 Knowledge

Within the construction industry, there is always the possibility of the presence of some factors that can hinder the progress of the project. These factors can affect the project negatively due to lack of knowledge, unrealistic attitude towards risk, cultural and political ideologies and negligence within the construction industry. The best way to tackle this kind of situations, against factors that can harm the project is through risk management.

Risk management has a strong correlation with knowledge. Only 17.1% of the respondents agree that knowledge or experience in time management to be the most important factor that to help in managing project risks effectively while 40% argued though it is important but it is not the most important factor. Delays in projects have been a regular act in Nigeria usually caused by both clients and contractors which eventually affect the project objective of completion time. With adequate knowledge and experience on time management this effect can be reduced or eliminated. Of the respondents, 51.4% believe that knowledge or experience in cost management is the most important factor that will help in managing project risks while the other 48.6% agree that it is important but not the most important factor. In construction a little change or modification can affect the total cost. Cost overruns are results of poor quality of work done at pre-feasibility, feasibility and design stages. Generally surprises are costly in projects meaning that unexpected situations which can affect the project objectives are costly. There is need for complete information and

understanding of client's requirement. Of the respondents, 31.4% believed that knowledge or experience in resource management is the most important factor that will help in managing project risks while the other 68.6% believed its importance but not the most important. Wasting of resources is common practice in Nigeria due to improper supervision. Laborers waste blocks, cement, paint etc. because their superiors are not always present on site. At the end of the project this waste will affect the project negatively. Resource management knowledge will surely help in managing project risks. Fourty percent of the respondents, believe that knowledge in quality management is the most important factor to help in managing project risks while 60% argued that it is important and not the most important factor. This shows that majority of the respondents are of the opinion that knowledge on how to maintain quality will definitely help projects. Most respondents agreed that knowledge in scope management is less important in managing project risks.

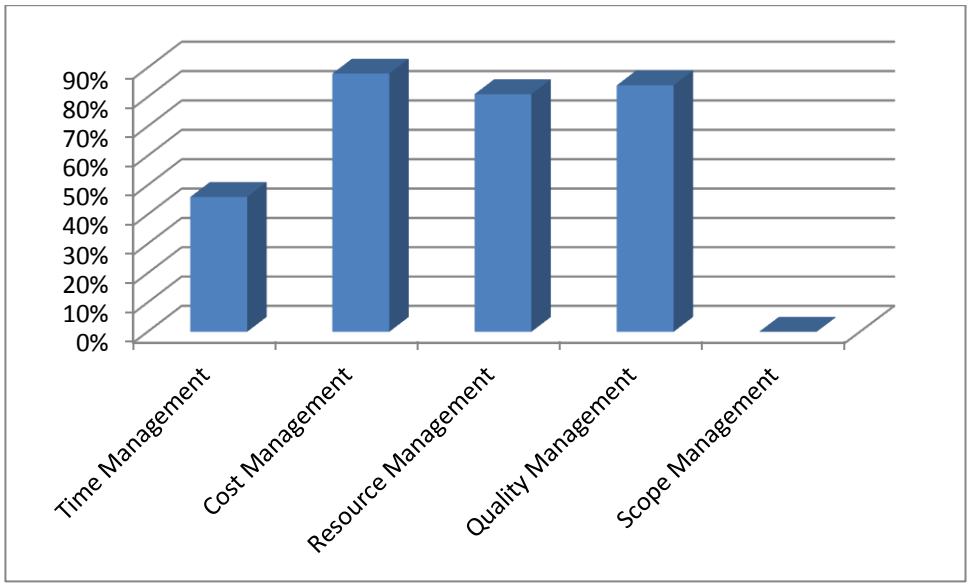

Figure 9: The Most Important Knowledge Area to Help in Managing Project Risks

Of the respondents, 42.9% believe that most project risks are encountered during the design stage while the other 57.1% believed that during construction stage is where

most risks are encountered. Generally most risks are encountered during construction stage but design risks are more severe because any deviation in design will affect the project at a later stage. Eighty percent of the respondents believed that briefing stage is the most suitable stage to start risk management while 14.3% believed during design stage is the best.

This research also identified that cost management knowledge is the main area that will help to effectively manage construction risks. It could be observed in the results that materials price fluctuation is the most likely occurring risk in the industry which shows why experience on how manage costs is the most important. The study revealed risk monitoring as the most difficult part of risk management yet past research across the world shows that risk analysis is the most difficult part. This implies that in Nigeria risk management is not been practiced well enough to even know the better part.

Generally, contractors care more about their profit and regard quality less in the process. With little understanding of how compromise in quality will affect the project objectives, the consequence is left to the client at the long run. This makes it very important for participants in the industry to know more about cost management and quality management, how they correlate. Nigerian contractors need risk management knowledge and expertise in order to manage project risks successfully. Risk management courses need to be introduced in institutions within the country for diplomas and degree studies. Students of Architecture, Quantity surveying, and Engineering should undertake this course before graduating. This will increase the knowledge of building participants in the country.

5.5 Limitations or Barriers

There are certain factors or processes which are responsible for poor risk management practice in Nigeria. These factors are not unknown to the practitioners but due to negligence and misconception of the parties, they are not addressed. Identifying these factors and finding ways of tackling them will improve the practice of risk management Nigerian construction industry.

Fourty percent of the respondents believe that ineffective implementation of risk management is responsible for poor practice of risk management in Nigerian construction industry, 34.3% believed that absent of an industry accepted joint risk management mechanism by parties is the cause of inefficient risk management practice and 51.4% identified shortage of knowledge on risk management as responsible for poor risk management practice. Only 5.7% agreed that different recognition of risk control strategies is the cause of poor practice of risk management.

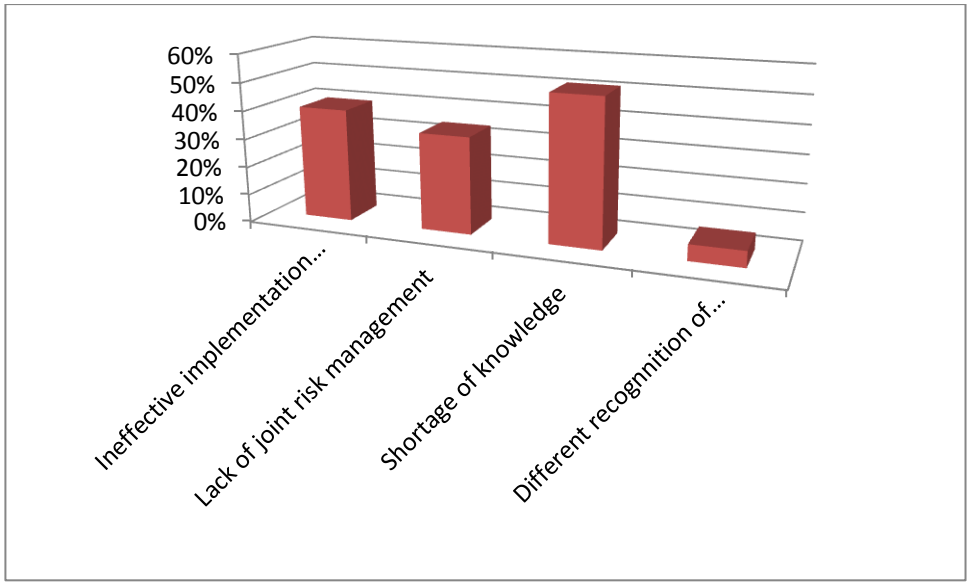

Figure 10: Barriers to Risk Management Practice

This shows that lack of knowledge is the biggest barrier to risk management practice in Nigeria followed by ineffective implementation of risk control strategies. Many of the laborers in the country are not knowledgeable meaning they work based on instructions only. Without proper supervision they will fail. Majority of the supervisors which are professionals do not have risk management knowledge which is a problem to risk management application. Without risk management knowledge there is no way they can identify the control method to use. This implies that all the factors that limit risk management application start with knowledge problem.

Of the respondents, 60% believe that contractors contribute the most risks in Nigeria while 31.4% agreed that clients are responsible for contribution with most risks. The remaining believes the consultants contribute more. In a case where the contractors contribute with more risks, public private partnership would be the best way to tackle this problem because the contractors will have interest in successful operation of the project.

5.6 Risk Factors

In this section, the possible occurrence of certain project risks in Nigeria will be identified and explored. This is to have knowledge of the most commonly expected risks when undertaking a project. Lists of fifteen possible risks were investigated based on their likelihood of occurrence. These risks were ranked based on the possibility of occurrence in projects and the first ten were focused on. Risks are present in every aspect of life and more in construction projects. Risk management is believed to be best or only way of reducing or eliminating risks in projects. This study tries to identify the likelihood of occurrence of certain risk factors. These

factors were ranked based on their likelihood of occurrence which will help construction participants to know the kind of risks they are expecting when undertaking a project. It also identified the areas that will encourage risk management development in the country and the factors that limits the practice of risk management. It is believed that knowing this will help participants to point out the problem attached to risk management in the country and how to improve it.

5.7 Likelihood Estimation

In order to rank the risks based on their likelihood or possibility of occurrence, the scales were used for the respondents in the survey which is more like the risk significance index score. A weight of 5 which is most likely will be given three points, weight of 4 would be given two points and weight of 3 would be given one point. A weight of 2 and 1 which are less likely and not likely would be given zero points. The points were reduced from five to three in order to have lower figures and make it easier to understand. less likely and least likely are zero because there is a very probability of occurrence. This method is used in order to rank the factors based on respondent's opinion.

Table 1: Ranking of Risk Factors Based on Likelihood of Occurrence

	Risk Factors	Likelihood of Occurrence (%)	Ranking
1	Increase in inflation rate	93	1
2	Material price fluctuation	84	2
3	Clash of interest	80	3
4	Inaccurate cost estimate	75	4
5	Delays in payment	73	5
6	Incompetent sub-contractor	73	6
7	Unsatisfactory site investigation	72	7
8	Insufficient skilled labor	72	8
9	Unfavorable weather condition	71	9
10	Inaccurate program scheduling	70	10
11	Client change order	62	11
12	Plant & equipment problem	56	12
13	Contract dispute	50	13
14	Bureaucracy of government	49	14
15	Design variation	47	15

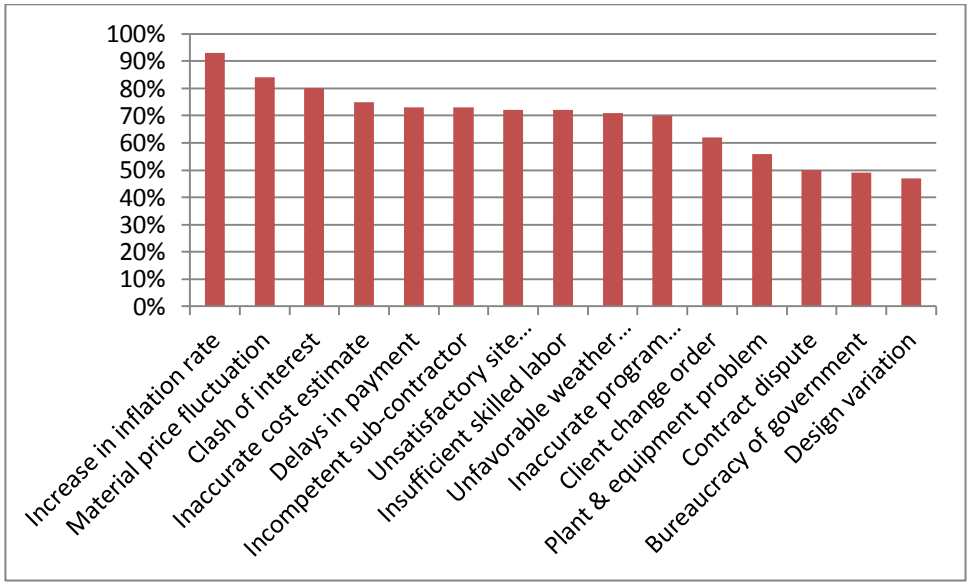

Figure 11: The Likelihood of Occurrence of Some Risk Factors

Table 1 shows the possibility of certain risks occurring. It was found that increase in inflation rate has the highest possibility of occurring with a 93%. This shows that in every project in Nigeria there is a high probability of experiencing cost overrun due

to an increase in inflation rate. Inflation rate is highly correlated with material price because any deviation on the rate of inflation will affect the price of materials. Though the respondents gave it a high weight but the inflation rate is not supposed to be an issue anymore because there were reports that Nigeria's economy is been stabilized but the price of construction materials is always fluctuating. Most of the construction materials are been imported which can be affected by many things like the exchange rate. One of the most consumed material in construction projects is cement, in 2010 the local production increased to 70% from 45% in 2009 and there are some plants under construction which will positively affect the price of cement. The risk of material price fluctuation is always there especially in projects that have duration of one year or more. With little fluctuations, the contingency sum should be able to cover the fluctuation. A stable economy and use of local materials in projects will reduce the fluctuation of material price.

Political risk has high possibility of occurring from the viewpoint of the respondents. Political risk covers a range of issues from clash of interests, changes in tax and other laws, currency inconvertibility and many more. Political risk can be described as any politically motivated event or action that affects the achievement of project objectives. In Nigeria, these kinds of events occurs frequently due to change of governments, pressures from opposition parties, religious and ethnic differences e.g. the fuel subsidy removal in 2012 which affected many contractors that had projects then. The best way to tackle this problem is through flexible contracts that will make the clients pay for cost of political risk.

Cost estimation is a fundamental part of any construction contract normally in the form of bill of quantities. It gives the client a summary of the contract cost from

inception to completion. This helps the client to know the cost and compare it with his budget in order to know if the project is feasible. Whenever this estimate is inaccurate, the project might not be completed at the end which is a major risk. The respondents gave it a high possibility of occurring in Nigeria. A double check should be done before approving the estimate in order to be sure of the final sum.

Delays in payments have been a long time issue in Nigeria. Normally, contractors are supposed to be paid not more than two weeks after valuation but due to some factors, it usually takes more than two months which can affect the project completion. The respondents believed this is always occurring in the country. The best way to tackle this problem is to have competent contractor with financial muscles of completing project without any problem.

In Nigeria, sub-contractors are selected based on mutual understanding or loyalty, not based on track record or competency. This eventually affects project objectives at the long run. At times projects have to be delayed because suppliers did not bring certain materials to site or did not meet the required quality. The respondents noticed this problem and gave it a high possibility of occurrence which means that in undertaking a project in Nigeria, participants have to take note of the sub-contractors they employ. In order to manage this risk, competent sub-contractors should be employed and agree on supply contract.

The soil in some areas is very bad which will need additional attention in the foundation and mostly the contractors in the country are used to traditional approaches to soil problems. Traditionally, builders just assume that the soil is fine and start the project without any due investigation. The respondents noticed this problem and identified it as a possible threat to construction projects. Proper site

investigation should be undertaken right from inception and past projects in the area should be investigated before commencing project.

Lack of skills has always been an African problem, not only Nigeria. This problem has led to low production in the country despite having a cheap labor and high population. The root of the problem is lack of basic vocational education in the country which would have helped the labor. In construction projects skillful individuals are highly needed especially in large scale construction projects. The respondents have identified lack of skills as a possible risk in Nigerian projects. Generally the country needs to vocational education centers across the country though one of the key government official in an interview recently has assured of introduction of more training. In case of construction projects, clients should make sure that they employ the right workers.

The respondents recognized unfavorable weather condition as a possible occurring risk. In Nigeria, construction activities are stalled during the rainy season which is usually within the second and third quarter. During these periods construction materials suppliers record low earnings or lost. Some parts of the country witness heavy rainfall leading to flood which is risky for construction activities. The best way to tackle this risk is to have labor force as much as possible to make great progress towards completion whenever there is no rain.

Inaccurate program scheduling is also a risk factor with high possibility of occurrence according to the survey results. Normally in Nigeria, program scheduling is not given priority in projects which lead to poor or inaccurate program scheduling.

The respondents' views concerning risk management in Nigeria with respect to the current and past situations in the country were discussed. Risk management practice

has been very poor in the country due to some reasons which were discussed in the analysis. Since the factors affecting risk management process in the country were deeply analyzed, ways of neutralizing these factors were also suggested.

Chapter 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The complexity and risk of building projects is increasing by the day as more ideas are emerging. The primary aim of every construction project is to achieve project goals within available cost, with best possible quality and within a specified period of time. This means meeting client's requirement with minimum possible cost, with required quality and within the specified time. Any action or event that may affect the achievement of these goals or objectives is a project risk. Majority of building participants are familiar with risk management in relation to safety measures against hazards.

This research have explored the application of risk management in Nigeria, the barriers of risk management or factors that limit its application and also the factors that will influence risk management development. It identifies that the main problem of risk management application in Nigeria is knowledge. All the factors that limit the application are caused by lack of knowledge. It was found that the best knowledge that will effectively manage project risks in the country is cost management and quality management. Materials price fluctuation has been identified as the most certain risk which occur in every construction project in Nigeria. Although increase in inflation rate has a higher possibility but its major effect is on the price of material which makes it the highest occurring risk factor in

Nigeria. The attitude of construction participants is another problem to risk management. It was seen that contractors bid for risk prone projects with normal price which in turn affect their profit margin.

6.2 Recommendations

According to findings in this research, knowledge has been the major problem of risk management in Nigeria and improvement in risk management knowledge is the driver of its development. So the best way to improve risk management in Nigerian construction industry is; to include a risk management course in high institution across the country; introduce vocational training on risk management; and risk management workshops should be organized regularly. A risk management course will help upcoming building professionals to have knowledge of risk management. They will find easier to participate and practice when they have the background idea of risk management than to be introduced during projects. Vocational training will help the workforce that may perform majority of the works on site which are the laborers, bricklayers, painters, steel workers etc. They will have insight about risk management before been involved in any project. Many of the construction participants in the country are not familiar with risk management in relation to project objectives rather they thought it has to do with safety hazard. Risk management workshops will help many of the project participants to understand what risk management is all about and how to apply it in construction projects. The attitude of accepting the lowest bid should be reviewed in order to facilitate quality works. Some criteria should be used to select because most of the times the lowest bids are not the best especially in relation to risk management.

Further studies need to be undertaking in order to explore the extent of impact of certain risk factors or sources like materials price fluctuation, unfavorable weather condition, political risks etc. A research on the benefits of risk management to the construction industry will be of great importance.

REFERENCES

Ahmad, S. M., Ahmad, R., and Saram, D. D. (1999). Risk management trends in the Hong Kong construction industry: A Comparison of Contractors and Owners Perceptions. Construction and Architectural Management, 6(3), pp. 225-234.

Akintoye, A. and MacLeod, M. (1997). Risk Analysis and Management in Construction. International Journal of Project Management, 15(1), pp. 31-38.

Augie, M. and Kreiner, K. (2000). Rationality, Imagination and Intelligence: Some Boundaries in Human Decision-making. Industrial and Corporate Change, 9(4), pp. 659-679.

Aibinu, A. A. and Odeyinka, A. (2006). Construction Delays and Their Tausative Factors in Nigeria. Journal of Construction Engineering Management, 132(7), pp. 667-677.

Al-Moumani, A. (2000). Construction Delay: A Quantitative Analysis. International Journal of Project Management, 20, pp. 51-59.

Awodele, O. A., Ogunlana, S. O. and Motawa, I. (2009). Understanding and Managing Risks Necessary Condition for Success and Sustainability of Privately Finance Market Projects in Nigeria. Proceedings of the Fourth

International Conference for Post-graduate Researchers of the Built and Natural Environment at Glasgow Caledonian University, Scotland.

Baloi, D. and Price, A. D. (2003). Modelling Global Risk Factors Affecting Construction Cost Performance. International Journal of Project Management, 21, pp. 261-269.

Banaitiene, N. And Banaitis, A. (2012). Risk management in Construction Projects. Current Issues and Challenges, pp. 429-448.

Barkley, B. T. (2004). Project risk management. McGraw-Hill, New York.

Belel, Z. and Mahmood, H. (2012). Risk Management Practices in the Nigerian Construction Industry- A Case Study of Yola. Journal of Engineering Sciences, 7(3), pp. 1-6.

Carpenter, M. A. and Frederickson, J. W. (2001). Top Management Teams, Global Strategic Posture and the Moderating Role of Uncertainty. Academy of Management Journal, 44(1), pp. 533-545.

Chapman, C. and Ward, S. (2003). Project Risk Management: Techniques, and Insights. 2nd Ed, Wiley, New York, NY.

Deviprasadh, A. (2007). "Risk Assessment and Management in Construction Projects. College of Engineering, Guindy, Anna University, Chennai-600025.

Ehsan, N., Mirza, E., Alam, M. and Ishague, A. (2010). Risk Management in Pakistani Construction Projects. 3rd IEEE Conference on Computer Science and Information Technology, pp. 16-21.

Hillson, D. and Hullet, D. (2004). Assessing Risk Probability: Alternative Approach. PMI Global Congress Proceedings - Prague, Czech Republic.

Holmes, A. (2002). Risk management. Capstone Publishing, Oxford.

Kremljak, Z. (2010). Risk Management. Proceedings of the 21st International DAAAM Symposium, 21(1), pp. 253-254.

Kremljak, Z. (2004). Decision Making Under Risk. DAAAM International, Vienna.

Liu, J., Li, B. and Nguyen, V. (2007). Key Issues and Challenges of Risk Management and Insurance in China's Construction Industry. Industrial Management and Data Systems, 107(3) pp. 382-396.

Lin, C. H. and Tseng, S. M. (2005). The Implementation Gaps for the Knowledge Management System. Industrial Management and Data Systems, 105(2), pp. 208-222.

Mills, A. (2001), A Systematic Approach to Risk Management in Construction. St. Survey, 19(5), pp. 245-252.

National Bureau of Statistics. (2008). Facts and Figures About Nigeria, Available on http://www.nigerianstat.govt.ng.

Odeh, A. M. And Battaineh, H.T. (2002). Causes of Construction Delays: Traditional Contracts. International Journal of Project Mnagement, 20, pp. 67-73.

Odeyinka, H. A. (2000). An Evaluation of the Use of Insurance in the Managing Construction Risks". Construction Management and Economics, 18, pp. 519-524.

Odeyinka, H. A., Oladapo, A. A. & Dada, J. O. (2007). An Assessment of Risk in Construction in the Nigerian Construction Industry. International Symposium on Globalisation and Construction, Construction in Developing Economies, 107, pp. 359-368.

Okuwoga, A. A. (1998). Cost-time Performance of Public Sector Housing Projects in Nigeria. Habitat International, 22(4), pp. 389-395.

Oyewobi, L. O., Ganiyu, B. O., Oke, A. A., Ola-Awo, A. W. and Shittu, A. A. (2011). Determinants of Unethical Performance in Nigerian Construction industry. Journal of Sustainable Development, 4(4), pp. 175-182.

Oluwakiyesi. T, (2011). Nigerian Construction Industry: A Haven of Opportunities. A Report on Construction Industry, www.proshare.com, pp. 2-31.

Perry, J. G. and Hayes, R. W. (1985). Risk and Its Management in Construction Projects. Proceedings of Institute of Civil Engineers, 1(78), pp. 499-521.

Pritchard, S. (2001). Peg Helps Pull SAR Down in Global Rank. South China Morning Post, October, 2001.

Tang, W., Qiang, M., Duffield, C. F., Young, D. M., and Lu, Y. (2007). Risk Management in Chinese Construction Industry. Journal of Construction Engineering and Management, 133(12), pp. 944-956.

Thomas, R. (1996). Surveys. Research Methods: Guidance for Postgraduates, Edward Arnold, London, pp. 115-124.

Walsh, K. and Sawhney, A. (2002). International Comparison of Costs for the Construction Sector Towards a Conceptual Model for Purchasing Power Parity. Report Submitted to the World Bank Group.

Zou, P. X.Y., Zhang, G. and Wang, J.Y. (2006). Identifying Key Risks in Construction Projects: Lifecycle and Stakeholder Perspectives. Proceedings of 12th Rim Real Estate Society Conference, Auckland, New zealand.

APPENDIX

Appendix A: Risk Management in Nigerian Construction Industry

Questionnaire Survey

QUESTIONNAIRE

You are invited to participate in this survey of the construction industry in Nigeria. It will provide a picture of the application, barriers, advantages and disadvantages of risk management process in Nigerian construction industry. The research is seeking the opinions of clients, contractors, sub-contractors, researchers and other building professionals. The survey will investigate the causes of project risks, the application and barriers to risk management in the Nigerian construction industry.

PART 1

Name of company/organization:

Position:

Qualification:

Company's turnover

□ Less than N50million □ N50 – N100million □ Above N100million

Your experience related to construction industry?

□ 0 - 5 years □ 6 - 10 years □ 11 - 20 years □ Above 20 years

What is the current number of employees in your organization?

□ Below 10 □ 10 -20 □ 20 - 30 □ 30 - 40 □ Above 40

Average number of projects undertaken annually

□ Below 3 □ 3 - 5 □ 5 - 10 □ Above 10

Type of construction

□ Industrial/residential buildings

□ Heavy engineering and road construction

□ Both

Type of company

□ Private □ Foreign □ State-owned

PART 2

1. How do you deal with project risks in your organization?

   □ Experience □ Judgment □ Intuition

   □ Other, please specify…..

2. Have you attended any risk management workshop in Nigeria?

   □ Yes □ No

3. Do you have any risk management model for your projects?

   □ Yes □ No

4. If the answer to question 3 is Yes, what control method do you apply?

   □ Risk transfer □ Risk elimination □ Risk sharing □ Risk reduction

   □ Other, please specify….

5. To what extent can the following influence the development of risk management in Nigerian construction industry? (Please give weights with 1-5 from least important to most important)

   a) The attitude of contractors □ 1 □ 2 □3 □ 4 □ 5

   b) Project program scheduling □ 1 □ 2 □3 □ 4 □ 5

   c) Introduction of risk management model □ 1 □ 2 □3 □ 4 □ 5

   d) Cost of risk management □ 1 □ 2 □3 □ 4 □ 5

   e) Availability of knowledge and expertise □ 1 □ 2 □3 □ 4 □ 5

   □ Other, please specify….

6. How do you bid for a project with high possibility of risk?

   □ High price □ Normal price □ No bid

□ Other, please specify….

7. What is the most difficult part in risk management process in Nigerian construction industry?

   □ Risk identification □ Risk analysis □ Risk control □ Risk monitoring

   □ Other, please specify….

8. Does your organization have any program or process to determine project performance?

   □ Yes □ No

   If yes how?

   □ Time and cost management □ Resource and quality management

   □ Other, please specify….

9. To what extent can the following knowledge areas or experience help to manage construction risks effectively? (Please give weights with 1-5 from least important to most important)

   a) Time management □1 □ 2 □ 3 □ 4 □ 5

   b) Cost management □ 1 □ 2 □ 3 □ 4 □ 5

   c) Resource management □ 1 □ 2 □ 3 □ 4 □ 5

   d) Quality management □ 1 □ 2 □ 3 □ 4 □ 5

   e) Scope management □ 1 □ 2 □ 3 □ 4 □ 5

   □ Other, please specify….

10. What is the general attitude toward construction risks in Nigeria?

    □ Contractors carry a certain risk and include its price in their tender

    □ Clients carry as many risks as possible

    □ Other, please specify….

11. When are the most frequent risks encountered in your projects?

□ Briefing stage □ Designing stage

□ Tendering stage □ Construction stage

□ Other, please specify….

12. Which stage is the most suitable to start risk management process?

□ Briefing stage

□ Designing stage

□ Construction stage

□ Other, please specify….

13. Do you think the 5% contingency included in contract sum enough to handle construction risk?

□ Yes □ No

14. What are the barriers to risk management practice in Nigerian construction industry?

□ Ineffective implementation of risk control strategies

□ Lack of joint risk management mechanism by parties

□ Shortage of knowledge on risk management

□ Different recognition of risk control strategies

□ Other, please specify….

15. Among the construction participants in Nigeria, who do you think contribute with the most risks?

□ Clients □ Contractors □ Designers □ Consultants

□ Other, please specify….

For questions 16 -30, tick appropriately inside the table.

On a scale of 1-5, what is the likelihood of occurrence of each risk factor below? (1 is not likely, 2 least likely, 3 less likely, 4 likely and 5 most likely).

	RISK FACTORS	1	2	3	4	5
16	Design Variations					
17	Delays in payment					
18	Material's Price Fluctuation					
19	Contract Dispute					
20	Client change Order					
21	Inaccurate Cost Estimate					
22	Inadequate Program Scheduling					
23	Unsatisfactory Site Investigation					
24	Increase in inflation rate					
25	Insufficient of skilled labor					
26	Plant and equipment problem					
27	Bureaucracy of government					
28	Unfavorable weather condition					
29	Incompetent sub-contractor					
30	Clash of interest (political risk)					