CONSTRUCTION RISK MANAGEMENT AMONG CONSTRUCTION COMPANIES IN NIGERIA: MODERATED BY GOVERNMENT REGULATION

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ABSTRACT

Substantial empirical studies have established that certain organizational internal and external factors do influence construction risk management of companies. Conjugated with the recent substantial attention on risk management in Nigeria, and the demand for Nigerian construction companies to implement risk management in order to tackle the challenges they are facing, studies on risk management in Nigerian construction companies are few. The objectives of this study are to assess the extent of construction risk management among construction companies operating in Abuja and Lagos state in Nigeria, and to examine the organizational internal and external factors influencing their risk management, moderated by government regulation. A proportionate stratified random sampling was used to select 338 construction companies obtained from Nigeria Galleria and Lagos State Government Tender Board database. A total of 238 completed and valid questionnaires were returned, yielding a 72 percent response rate. Descriptive statistics, the 5-point Likert scale rendition and PMBOK's risk management category were used to achieve the first research objective. The extent of risk management among Nigerian construction companies was found to be at a moderate level. Drawing upon organisational control theory, this study also examined the role of government regulation on the relationship between organizational factors and construction risk management. Furthermore, the moderating effects of government regulation revealed a negative relationship between organizational internal factors and construction risk management, while government regulation moderated a positive relationship between organizational external factors and construction risk management. Likewise, all the hypotheses on the direct relationship between organizational factors and construction risk management were supported. In summary, the findings in this research demonstrate that government regulation can enhance risk management among construction companies operating in Nigeria. To enhance risk management among construction companies, project managers should give considerable attention to the organizational factors found to be influencing their risk management.

Keywords: Construction risk management, Organizational internal factors, Organizational external factors, Government regulation, Nigerian construction companies.

ABSTRAK

Banyak kajian empirikal mendapati bahawa faktor dalaman dan faktor luaran tertentu dalam organisasi mempengaruhi pengurusan risiko binaan sesebuah syarikat. Berkonjugat dengan banyaknya perhatian yang diberikan terhadap pengurusan risiko di Nigeria pada masa kini, dan permintaan syarikat-syarikat pembinaan di Nigeria untuk melaksanakan pengurusan risiko bagi menangani cabaran yang mereka hadapi, kajian mengenai pengurusan risiko dalam syarikat pembinaan di Nigeria didapati amat terhad. Objektif kajian ini adalah untuk menilai sejauh mana pengurusan risiko binaan dalam kalangan syarikat pembinaan yang beroperasi di Abuja dan negeri Lagos di Nigeria, dan mengkaji faktor dalaman dan faktor luaran organisasi yang mempengaruhi pengurusan risiko dengan pengantaraan pengawalseliaan kerajaan. Persampelan rawak berstrata berkadaran telah digunakan untuk memilih 338 buah syarikat pembinaan yang diambil dari Nigeria Galleria dan pangkalan data Lembaga Tender Kerajaan Negeri Lagos. Sebanyak 238 soal selidik yang dilengkapkan dan sah telah dikembalikan, menghasilkan kadar maklum balas sebanyak 72 peratus. Statistik deskriptif, tafsiran skala 5 mata Likert dan kategori pengurusan risiko PMBOK telah digunakan untuk mencapai objektif pertama kajian. Hasilnya, pengurusan risiko dalam syarikat-syarikat pembinaan di Nigeria didapati berada pada tahap sederhana. Berbekalkan teori kawalan organisasi, kajian ini juga mengkaji peranan pengawalseliaan kerajaan dalam hubungan antara faktor organisasi dan pengurusan risiko binaan. Tambahan pula, kesan pengantaraan pengawalseliaan kerajaan mendedahkan hubungan yang negatif antara faktor dalaman organisasi dan pengurusan risiko binaan, manakala pengawalseliaan kerajaan mengantarakan hubungan yang positif antara faktor luaran organisasi dan pengurusan risiko binaan. Kesemua hipotesis mengenai hubungan langsung antara faktor organisasi dan pengurusan risiko binaan juga disokong. Kesimpulannya, dapatan kajian ini menunjukkan bahawa pengawalseliaan kerajaan boleh meningkatkan pengurusan risiko dalam kalangan syarikat pembinaan yang beroperasi di Nigeria. Untuk meningkatkan pengurusan risiko, pengurus projek perlu memberikan perhatian terhadap faktor-faktor organisasi yang boleh mempengaruhi pengurusan risiko.

Kata kunci: Risiko binaan Pengurusan, faktor dalaman organisasi, faktor luaran organisasi, pengawalseliaan kerajaan, syarikat pembinaan di Nigeria.

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LIST OF ABBREVIATIONS

AMOS	Analysis of Moment Structures
AVOVA	Analysis of Variance
AVE	Average Variance Extracted
CB-SEM	Covariance Based-Structural Equation Modelling
CMV	Common Method Variance
DB	Design-build
f2	Effect Size
GDP	Gross domestic product
GoF	Goodness-of-fit
KSA	Kingdom of Saudi Arabia
MHSWR	Management of Health and Safety at Work Regulations
NIA	Nigeria Institute of Architecture
NIAs	Nigeria Institute of Engineers
NIBs	Nigeria Institute of Builders
NIQS	Nigeria Institute of Quantity Surveyors
OCT	Organizational Control Theory
PhD	Doctor of Philosophy
PLS	Partial Least Squares
PLS-SEM	Partial Least Square – Structural Equation Modelling
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
Q2	Construct Crossvalidated Redundancy

R2	R-squared values
RBS	Risk Breakdown Structures
RF	Risk Factors
RM	Risk Management
SAP	Structural Adjustment Programme
SEM	Structural Equation Modelling
SPSS	Statistical Package for the Social Science
SWT	Subhanahu Wa Ta’ala
UAE	United Arab Emirate
UK	United Kingdom
USA	United States of America
VIF	Variance Inflated Factor

CHAPTER ONE

INTRODUCTION

1.0. Introduction

This chapter begins with the background to the study from the global level, narrowed to the Nigerian perspective. The next part highlights the problems faced by Nigerian construction companies, followed by the explanation of the research gap to be filled in the present study and presentation of the research questions. Section three presents the research objectives. Section four presents the research scope, followed by the importance of the study. Thereafter, the organization of the thesis is presented, after which, to conclude the chapter, the summary of the chapter is presented.

1.1. Background of the Study

Risks during the construction process have received considerable attention among construction companies because of delay, cost overrun, time overrun and total abandonment that are connected with construction projects (Zou, Zhang & Wang, 2007). The term “risk” has been well-defined in several ways. While some scholars view risk from the perspective of gain and loss (Barrie & Paulson, 1992); others view risk in terms of loss only (Moavenzadeh & Rosow, 1999; Mason, 1973). Bufaied (1987) and Bothroyed & Emmett (1998) defined construction-related risk as a condition through which the process of project construction leads to uncertainty in the last cost, time and quality of the project. In this study, construction risk will be defined as “the probability of occurrence of any unexpected or ignored event that can hinder the achievement of project objectives, which may be in the form of management, materials, design, finance, labour and equipment risks," following (El-Sayegh, 2008; Thuyet, Ogunala & Dey, 2007).

According to Project Management Institute (2004), project risk was defined as an uncertain event that, if it occurs, will at least have a positive or negative outcome on project objectives like; scope, cost, time, and quality. Barber (2005) also viewed risk as threats to project success which are likely to occur when there is no proper management. In this research, risk management will be delimited as a process of identifying and analysing risk elements, which may occur as a result of management, material, design, finance, labour and equipment risk and solving them in order to attain the project aims.

Management of risk in the construction project has a broad perspective and is a systematic way of identifying, analyzing and responding to risk in achieving the project goals. The benefits of the risk management process include identifying and analyzing risk and improvement of construction project management processes with effective use of the resources (Zou, Zhang & Wang, 2007).

However, improper risk management has been found to be the cause of time and cost overrun in construction projects (Andi, 2006; Thompson & Perry, 1992). According to Wang, Dulaimi & Aguria (2004), it is not possible to remove all risks in construction projects. Thus, there is need for a proper risk management process to manage various types of risks.

Furthermore, immense attention has been focused on the issues of risk factors affecting construction companies such as material, management, design, equipment and labour risks, which in the long run lead to abandonment, delay, cost and time overruns which will definitely have substantial effect on the project (El-Sayegh, 2008). Thuyet, Ogunala & Dey (2007) also argued that in the construction company, improper risk management is usually the cause of cost and time overruns on projects because of lack of competency of the project managers to manage the risk effectively, thus delaying the estimated scheduled plan or exceeding the estimated budget of projects.

The noteworthy, state-of-the-art stadium in China is one of the globe's largest sophisticated stadiums. The stadium was constructed to host the 29th Olympic Games, held in 2008 in Beijing. The stadium construction was challenged with numerous unexpected events. Disputes ascended among the project companies' public and private partners, the financial feasibility of the stadium was destabilized, which brought re-negotiations in the contract designs, and eventually resulted to the termination of the stadium's retractable roof that was planned for. The risks as a results of cost overruns, managerial issues and delays in construction were mammoth and it was uncertain if the stadium construction would meet the objectives of the project. Finally, these risks were properly managed and the project was a massive success. The construction of the National Stadium of China was completed within the estimated time with good quality and within budgeted cost. This resulted in a remarkable infrastructure which was seen by the world during the 2008 Beijing Olympic Games. In spite of the uncertainties and various risks involved in the stadium construction, the management of these risks in the project enhanced its successful completion (Liu, Zhao & Wang, 2010).

Quite a number of researchers have discussed construction risk management in various countries such as; Indonesia (Andi, 2006), USA (Kangari, 1995), UK (Odeyinka, Lowe and Kaka (2008), Kuwait (Kartam & Kartam, 2001), Hong Kong (Ahmed *et al.*, 1999), China (Fang *et al.*, 2004), India (Ling & Hoi, 2006), Malaysia (Sambasivan and Soon, 2007), Taiwan (Wang & Chou, 2003), and in Nigeria (Aibinu & Jagboro; 2002). However, construction risk management is highly varied, and depends on each country's cultural, economic, and political conditions. The risk management is mainly influenced by the individuality of the construction company in a particular country (Andi, 2006).

Despite the importance and diversity of the construction companies with their underlying risks, risk management has only been useful and practiced for the past few years (Rounds & Segner, 2010), however its popularity when compared to other companies is pretty weak (Rostami, Sommerville, Wong & Lee, 2015).

This is due to the fact that risk from the construction companies emanate majorly from projects that are complex in nature, since it could lead to total abandonment, scope creep, cost and time overruns, all as a result of ineffective risk management (Chapman, 2001). Over a decade ago and presently, there have been serious focus over the globe on construction risk and its management (Santoso *et al.,* 2003; Zou *et al.,* 2007). Effective construction risk management is a serious issue because it involves many construction parties, which include risk from the management, shortage of materials, finance, poor design and lack of labour as the major risks to construction companies in Nigeria (Ogungbile and Oke, 2015). However, various parties with different skills and experience commonly have different interests and expectations, which naturally develop into confusion and problems for even the most experienced contractors and project managers (Dey & Ogunlana, 2004).

In the same vein, risk management is important from the early stage of a project, where effective decisions such as arrangement and selection of construction approaches might be influenced, if necessary. The advantages of the risk management process include identifying and analysing risks, and improvement of construction project management processes (Eskesen, Tengborg, Kampmann & Veicherts, 2004). Conversely, the purpose of the risk management process should not merely be the successful project completion but also to increase the expectations of project goals and objectives (Mills, 2001).

Therefore in the Nigerian context, there were various workshops and seminars that were organized, and the meetings took place differently among two agencies which are government and nongovernmental in 2014, like; the Nigeria Institute of Architecture (NIA), Nigeria Institute of Builders (NIBs), Nigeria Institute of Quantity Surveyors (NIQS), and Nigeria Society of Engineers (NSE). In those forums, majority of their debates was based on how to enhance risk management and reduce the degree of risk occurrence in Nigerian construction projects by the construction companies, and this have become major issues of discussion.

The key issues being deliberated on in workshops, conferences and meetings organized by Nigeria Institute of Architecture (NIA), Nigeria Institute of Builders (NIBs), Nigeria Institute of Quantity Surveyors (NIQS), or Nigeria Society of Engineers (NSE) revolve around the following issues concerning the Nigerian construction companies. Firstly, extent of risk management within the companies needs to be known in order to resolve the problem of construction risk management such as management, materials, finance and design with labour and equipment, which if not properly managed, may lead to total abandonment, cost and time overruns of construction projects (Aibinu & Odeyinka, 2006). Secondly, a study to show the extent of how risk management is effective within Nigerian construction companies needed to be carried out (Agbo, 2014).

According to Asgari, Awwad, Kandil & Odeh (2016), very little about the antecedent's factors of risk management is known, which operates under different conditions in an organization. Additionally, idiosyncratic properties are associated with RM, which make it unmovable from one organization to another (Leopoulos, Kirytopoulos & Malandrakis, 2006). Furthermore, due to the immense discussion of literatures on construction risk management, (Verbano & Venturini, 2013) suggested the assessment of the extent of construction risk management, which considerable attention is yet to be given to.

Given the aforementioned, the present study seeks to assess the extent of construction risk management and to examine the organizational factors influencing construction companies in Nigeria with the use of government regulation as a moderating variable.

1.2 Problem Statement

Construction projects remain the backbone of the whole nation. The population of the people that need basic amenities such as education, food and health care keeps increasing and without construction companies that can successfully manage the projects, these projects will never meet the requirements of the population.

Nigerian construction companies contribute about 70 percent of the country's fixed capital formation. However, the quality from the companies within the economy have been, and still remains poor as a result of certain construction risks such as management, materials, design, finance and labour and equipment risks, which make risk management ineffective. For example, the contribution of Nigerian construction companies to employment has persisted consistently at 1.0 percent for the last decade, compared to the World Bank's average observation with about 3.2 percent in other developing countries (FOS, 2015).

The long term performance of the construction companies partly depend on risk management of their projects (Elinwa and Uba, 2001). However, the need for the construction companies to reduce the risk during the construction process in Nigeria has become a general cause of fear to the main stakeholders (Aibinu& Jagboro, 2002; Aibinu & Odeyinka, 2006; Agbo, 2014).

For that reason, workshops, meetings, trainings, and seminars were held to discuss the issue of risks in the construction companies, mainly focused on the construction companies (Nigerian Institute of Builders Bulletin, 2014; Nigerian Institute of Quantity Surveyors Bulletin, 2014). For example, Nigerian Institute of Builders organized a workshop on 27 July, 2014, with the theme “Construction Risk and Its Management.” The workshop was held at the Sheraton Hotels, Abuja, Nigeria. Fifty one registered construction developers from Abuja and Lagos attended the workshop (NIOB, 2014).

However, local construction companies throughout the years have endured less patronage from clients. The main reason highlighted by the clients was that the Nigerian local construction companies are incompetent. Hardly could they satisfy their clients as a result of risk factors affecting their projects (outputs), which result to abandonment, cost and time overruns (Balogun & Oludare, 2006). This is consistent with the report made by Ayobami (2012) that about 12,000 federal projects were abandoned in Nigeria as a result of certain risk factors affecting the projects such as finance, lack of competent labour, and shortage of materials risk.

This allegation has created an atmosphere of uncertainty and fear among the local construction companies in Nigeria (Agbo, 2014). Thus, the governments, who constitute 80 percent of clients in Nigeria, and who are supposed to be the last hope for contractors within Nigeria, are not helpful and hardly award projects to the local companies (Agbo, 2014), in line with the report made by Ebhomele (2014) that the Lagos State House of Assembly summoned two of the state's major contractors because of time and cost overruns as a result of delay in payment and shortage of equipment risk factors.

The level at which the risk factors are affecting Nigerian construction companies has pushed the Federal Government of Nigeria to organize a Structural Adjustment

Programme (SAP) to revamp the sector. SAP precipitated concerted strength towards the reduction of risk factors affecting the construction companies. The main aim of establishing the development programme was to ensure sustainable development for the contractors, and to promote their effective participation in the construction companies, therefore promoting risk management, provision of loans and reliance on importation of construction materials with proper training has been the objective of the program (Adams, 1997; Watts, 2013).

A study conducted by Adams (1997) revealed that price of materials, procuring work and access to capital were the risk factors affecting Nigerian construction companies. Also, the study of (Wahab, 1977; Okpala & Aniekwu, 1988; Dlakwa & Culpin, 1990) revealed that corruption from duplicitous practices and bribes were the major risk factors that result to cost overrun in Nigerian construction projects, which make risk management less efficient. Thus, such preconception towards Nigerian contractors has divested them of the right to partake efficiently in the country's construction projects.

Similarly, it was perceived that the risk among construction companies in developing countries are only signs of the fundamental problems of frail enterprise management, which cannot be reduced by ordinary training (World Bank, 1984). Though training may be recommended as the remedy to all risk factors confronting contractors in developing countries (ILO, 1987), it was suggested by Andrews (1990) and Daramola & Ibem (2010) that a contractors' association should be actively involved in the design and implementation of contractor development programmes to lessen the risk factors affecting the construction projects.

Theoretically, the previous studies on risk management such as (Dikmen *et al.*, 2008) all studied the influence of risk factors on construction projects, which have been causing risk management to be less efficient in most of the country's construction projects. Hence, time overrun, cost overrun, poor quality and scope creep were revealed as the major risk factors behind the inefficient risk management and which on the long run, may hinder the achievement of project goals, but they all failed to investigate the inefficiency and extent of risk management from the perspectives of management, material, design, finance, labour and equipment risk factors (Walker, 2015; El-Sayegh, 2008).

Firstly, this study seeks to fill the first research gap created by previous studies on construction risk management in Nigerian construction companies, and from the above mentioned issues by investigating the extent of construction risk management among Nigerian construction companies, from management, design, finance, materials, with labour and equipment risk perspectives.

The study of Rostami *et al.,* (2015); Geraldi, Lee-Kelley & Kutsch, (2009); Hartono, (2014); Greenberg & Baron, (2008); Barber & Wan, (2005); Li *et al.,*(2011); Robertson & Robertson, (2006) and Odeyinka & Yusif, (1997), revealed that certain organizational resources (internal factors in this study) such as free flow of communication, competency and skills, active leadership, preferences and requirements have a positive relationship with construction risk management in construction projects. The study of Walker (2000) in Australia and Aibinu & Odeyinka (2006); Aibinu & Jagboro, (2002) in Nigeria revealed that certain organizational external factors such as; economic, technological, political, labour disputes and strikes have a positive relationship with construction risk management in the construction company. This is consistent with the issues revealed by Iroegbu (2005) that lack of management skill, accurate data, proper training, communication method, equipment, trust, technology, finance and change in government rules and regulations have an influence on Nigeria construction projects. Yet, it is rare to find studies relating organizational internal factors, organizational external factors and construction risk management together in this order. In contrary, Alinaitwe (2008); Macleod (1997); Assaf & Al-Hejji (2006); Jaafari (2001); Israelsson and Hansson (2009) and Kartam (2004) have found that conflict results with the organizational factors and construction risk management.

Therefore, this study will not be exhaustive enough without investigating the conflict findings with the prior literatures that organizational internal and external factors do influence construction risk management. More so, past literatures have payed less attention to Nigeria, which means previous findings have not been generalized to the Nigerian point of view due to contextual and culture differences. Hence, there is need to examine the organizational internal factors such as effective communication, team competency and skills and active leadership and organizational external factors like political, organizational culture, technology and economic factors that have been found to influence construction risk management with the moderating effect of government regulation, since very little attention has been given to the combination of organizational internal and external factors moderated with government regulation in a single study, as is proposed to be carried out in this study.

Alaghbari, Kadir & Salim (2007) examined the risk factors affecting Malaysia construction projects. In their study, the authors discovered that construction risks are significantly influenced by rules and regulations, in line with the study of Niu (2008) which discovered that the price of affordable houses in China are significantly influenced by rules and regulations of the government, that is, if companies comply with rules and regulations on the importation of construction materials and exchange rate, then probability to reduce the risks in construction companies is high. Thus, the moderating potentiality of government regulation on the relationship between organizational internal and external factors and construction risk management is possible in this study as also suggested by (Baron & Kenny, 1986).

In summary, the current study aims at assessing the extent of construction risk management in Nigerian construction companies operating in Abuja and Lagos. Also, the significance to the present study is to establish a relationship between organizational internal factors (intangible resources), organizational external factors, and construction risk management with potentiality of government regulation as a moderator, which previous studies have not considered. The diagram below depicts the gaps to be filled in this study, as the blue colour represents the previous studies relating to risk management, the grey colour stages the dependent variable to be studied in this research and lastly, the yellow colour represents the gaps to be filled in the current study.

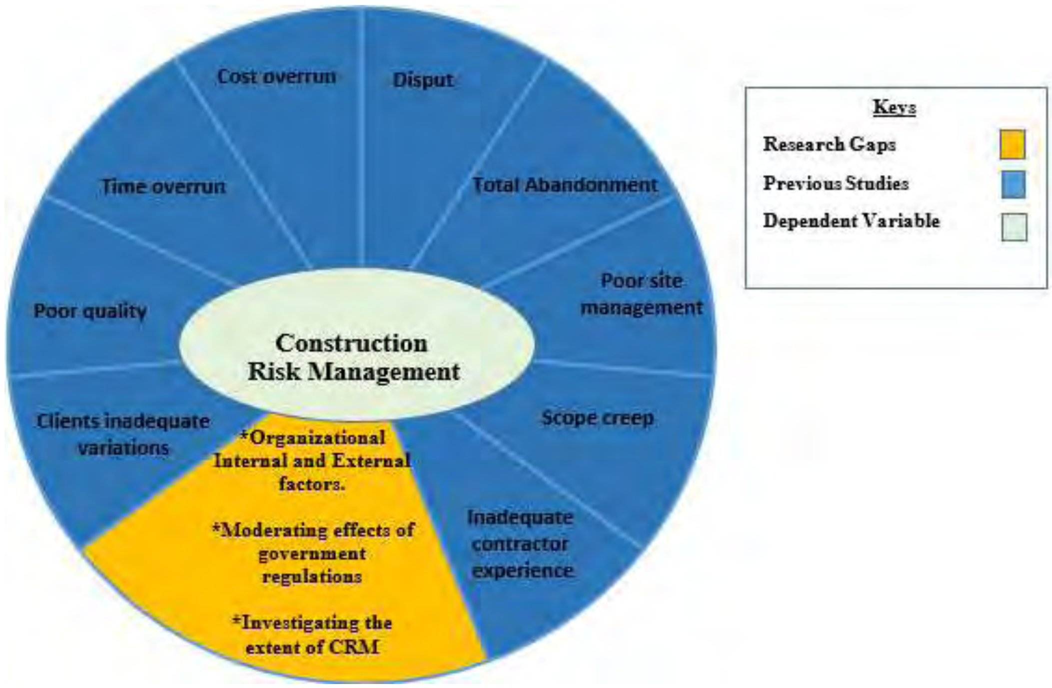


Figure 1.1: *Research Gaps Diagram*
Source: Author

This study seeks to provide answers to the following research questions listed below:

1.3. Research Questions

1. What is the extent of construction risk management among construction companies operating in Abuja and Lagos, Nigeria?

2. What is the influence of organizational internal factors on construction risk management among construction companies operating in Abuja and Lagos, Nigeria?

3. What is the influence of organizational external factors on construction risk management among construction companies operating in Abuja and Lagos, Nigeria?

4. What is the moderating effect of government regulation with the relationship between organizational internal and external factors and construction risk management?

1.4. Research Objectives

Therefore, the research objectives are stated as follows:

1. To determine the extent of construction risk management among construction companies operating in Abuja and Lagos, Nigeria.

2. To examine the significant relationship between organizational internal factors and construction risk management among construction companies operating in Abuja and Lagos, Nigeria.

3. To examine the significant relationship between organizational external factors and construction risk management among construction companies operating in Abuja and Lagos, Nigeria.

4. To examine the moderating effect of government regulation on the relationship between organizational internal and external factors on construction risk management among construction companies operating in Abuja and Lagos, Nigeria.

1.5. Scope of the Study

This study tends to assess the extent of construction risk management among Abuja and Lagos construction companies and to determine the influences between the organizational internal and external factors with their relationship to construction risk management, including the moderating effect of government regulation(rules and regulations) in Nigerian construction companies, and subsequently, this study will focus on construction companies. The construction companies have been chosen in this research because "virtually everyone can identify its outputs and its tenure" (Hällgren & Wilson, 2008). More so, this study focuses on the risk assessment stage only because it is based more on quantifying known risk with the use of statistical analysis (Lockyer & Gordon, 1996).

Local, national and multi-national construction companies are included in this study based on the classification Nigeria Ministry of Works assigned to them during the process of registration. For example; local contractors are allowed to handle projects that are within 50 million Naira while national contractors can contract projects from 50 million to 100 million Naira and multi-national contractors can handles above 100 million Naira (Adams, 1997; Ugochukwu, & Onyekwena, 2013). According to Somolu (2002) and Akintunde (2003), Nigerian local construction companies have enjoyed the patronage of the Federal Government in the early seventies, but presently, the government is migrating from the local to the foreign construction companies because of experience, equipment, skills and expertise which their local counterparts lack. Thus, the contractors operating in

Abuja and Lagos Nigerian construction companies are targeted in this study, following Karim *et al.*, (2012).

Abuja and Lagos State were used in this study because the two states are the heart of construction activities in Nigeria. Lagos was the federal capital territory before it was moved to Abuja on December 12, 1991. While Abuja is presently the federal capital territory of Nigeria, Lagos still remains the most populous city in West Africa, where most of the construction activities take place, following (Ukoha & Beamish, 1996; and Adams, 1997).

In relation to research in the field of construction risk management, Aibinu and Odeyinka, (2006) identified forty-three (43) construction risk factors and categorized them into nine (9) categories, of which five of them are adapted for this study; management, design, finance, materials and labour and equipment risk factors. These five risk factors are adapted because they are the major five global risk factors that are mostly mentioned in the reported literatures. Literatures have shown construction companies some significant influences on construction projects (Bramble & Callahan, 1992; Odeyinka & Yusif, 1997).

There are diverse types of construction projects, which Gloud (1997) described as cited by Ezeldin & Sharara (2006) and PMBOK (2004). The scope of this study comprises the following;

1. Residential construction;
2. Construction for businesses;
3. Infrastructure and heavy construction; and

4. Industrial construction projects.

This research focuses on construction projects, whether residential or infrastructure and heavy constructions. Residential construction projects comprise of condominium and apartment buildings, while infrastructure and heavy construction projects include roads, dams and airports. It needs to be mentioned that some construction projects are technically sophisticated compared to others, and what the client prefers will determine the duty of the field of construction management (Gloud, 1997) as cited by Ezeldin, & Sharara, (2006). In most cases, clients prefer to seek knowledge of a consultant firm or a contractor firm that is responsible for managing the construction project and the risks involved in it.

1.6. Significance of Study

The importance of risk management research has continuously been emphasised by both academics and practitioners, especially the need to have a better understanding of construction risk management from organisational and individual perspectives. This study makes contributions to the existing body of knowledge practically, theoretically and methodologically. For practice, this research might guide Nigerian construction company stakeholders on how to enhance risk management within the companies. More so, determining the degree of construction risk management in Nigerian construction companies might be the basis for the major performance benchmarking. Thus, the current framework may serve as the accurate motivation of change towards risks in Nigerian construction projects.

The significance of this study will further be grouped into three main parts: policy makers, company practice and academics. The contributions to the academics will further be separated into three: risk factors in the study to the perspective of construction companies, the model proposed in this study, and lengthening of the organizational control theory to suit the construction companies. Most risk managers and researchers have not given much attention to relating organizational resources based on the revealed literatures such as effective communication, team competency and skill and active leadership, and the external factors (political, organizational culture, technology and economic perspectives) with moderating effects of government regulation (rules and regulations), the gap between which this research tries to fill.

Furthermore, the research study might provide contractors; sub-contractors; project managers and policy makers with a tool to assess how construction organizational internal and external factors with government regulation as the moderator to construction risk management might enhance risk management within the construction companies.

Likewise, the proposed model in this study is to empirically investigate the relationship between organizational internal and external factors with government regulation as affirmed to influence construction risk management in construction projects. Also, all the factors are integrated together to develop the hypotheses built on theoretical and narrative reasoning.

Theoretically, the moderating effect of government regulation on the relationship between organizational internal and external factors on construction risk management could be explained from the theoretical perspective of organizational control theory (Flamholtz et al., 1985; Jaworski, 1988; Ouchi, 1979; Snell, 1992).

1.7. Organization of the Thesis

This thesis comprises of five chapters; Chapter 1 presents information about background of the study, including the problem statement, research questions, research objectives, scope of study and the significance of the study.

Chapter two presents the existing literatures and gives a context to this study. This chapter shows different ideas and opinions of some reviewed authors about the construction companies worldwide and Nigeria as the target of the study.

Chapter three reveals the methodology; quantitative (questionnaire) was used to acquire the data and PLS-SEM was used to analyze the feedback of the respondents based on the distributed questionnaires.

Chapter four features the analysis of the data, analyzing Nigerian construction companies and the extent of construction risk management with relationship between the exogenous, endogenous and the moderating variables.

In chapter five, the actual findings of the study were presented according to the research objectives. More so, in chapter five, the theoretical, methodological and practical implications of the findings are foregrounded. Lastly in chapter five, recommendations and suggestions for future research are offered.

1.8 Summary

This chapter reviews the background of the study from the global view. Furthermore, it provided the statement of the problem which warranted this study, and the problems that need to be solved. Also, research objectives are derived from the structured problem statement, which also leads to the research questions that were developed for this study. The scope that was covered throughout the cause of this study were also presented with the significance of this study. Lastly, the organization of the whole thesis is presented. The next chapter (2) will depict the relevant literature review relevant to this current study.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

The literature review chapter is divided into three parts. The first part is an overview of the construction companies in Nigeria. Furthermore, it presents an overview of the construction projects in Nigeria and their life cycle, in addition to the contribution of the construction activities growth rate to the Gross Domestic Product (GDP).

The second part shows an overview of risk management as a knowledge area of project management processes. It also depicts the construction projects lifecycles phases, types of construction projects, and construction parties. The third part is divided into two sections. The first section shows the relevant literature of effective construction risk management, related studies on identification and assessment of risk. The second section shows the relevant studies on causes of delays as a result of ineffective risk management on project completion in addition to risk allocation in developed and developing countries. Finally, the last section depicts the studies on the exogenous, endogenous and the moderating variables.

2.2 Nigerian Introductory Overview

The British influence and control over Nigeria becoming the most populous African country over the 19th century. World War II approved Nigeria's greater autonomy after a series of constitutions, when independence came on October 1st, 1960 (CIA, 2015).

A new constitution was adopted in 1999 after 16 years of military rule and completed peaceful transition to the civilian government. The government started to face the discouraging through fear of reforming a petroleum-based economy, which revenues have been consumed through as act of corruption, mismanagement and institutionalizing democracy (CIA, 2015).

Furthermore, Nigeria has started experiencing ethnic and religious tensions. In 2003 and 2007, violence and irregularities were brought to presidential elections. Nigeria is presently experiencing the longest period of civilian rule since October 1st 1960. The first transfer of power from civilian-to-civilian occurred in April 2007 general elections in Nigerian history and 2011 general elections were marked credible. Nigeria assumed a non-permanent seat on the UN Security Council for the 2014-15 regimes on January 2014 (CIA, 2015).

Nigeria is rated as the giant of Africa and is located on the western part of the Sub-Saharan region. Figure 2.1 shows the Nigerian map especially Abuja and Lagos stated as required in this study.

Figure 2.1: *Nigeria Map*
Source: (CIA, 2015).

Geographically, it is bordered by the Gulf of Guinea, between Benin and Cameroon. It's more than twice the size of California with total of 4,047 km land boundaries and its border countries include Benin 773 km, Cameroon 1,690 km, Chad 87 km and Niger 1,497 km, Table 2.1 depicts Nigeria's introductory overview (CIA, 2015).

Table 2.1: *Nigeria introductory overview*

Category	Nigeria	Year
Country's official name	Nigeria	-
Capital	FCT Abuja	-
Government type	Federal Republic	-
Area	923,768 square kilometers	2013
Independence	1 October 1960	-
National day	1 October 1960	-
Language	English(official), Hausa, Yoruba, Igbo (Ibo), Fulani, over 500 additional indigenous languages	-
Religions	Muslim50%,Christian 40%,indigenous beliefs 10%	-
Weather	Dry and Hot (summer), Raining season (Winter)	-
Population	177,155, 754	2014
Population growth rate	2.47 %	2014
Birth rate	38.03 births/1,000	2014
Death rate	13.16 deaths/1,000	2014
Unemployment rate	23.9 %	2011

Source: (CIA, 2015)

Table 2.1 (above) present's introductory information on Nigeria. The official name of the country is Nigeria and the capital is FCT Abuja located in the center of the Nigerian map. The official language is English and there are 250 ethnic groups with over 500 additional indigenous languages spoken (CIA, 2015). The country gained its independence from the British on 1st October 1960. In 2014, the estimated population was 177,155, 754 with a population growth rate of 2.47 % as of 2014. The birth rate in Nigeria is much higher than the death rate, at 38.03% births per 1000 of the population compared to 13.16% deaths per 1000. The unemployment rate is around 23.9%, that is, it is ranked 172nd in the world as of 2014 (CIA, 2015).

2.2.1 Overview of the Nigerian Economy

An overview of the Nigerian economy is presented in Table 2.2 (below), which demonstrates the key indicators of the Nigerian economy.

Table 2.2: *Nigeria economy overview*

Category	Nigeria	Year
Currency	Nigerian naira (#)	----
Exchange rate	#156.8 = USD 1	
Revenue budget	$23.85 billion	
Expenditure budget	$31.51 billion	2013
GDP Growth rate	6.2%	2013
GDP per capita (PPP)	$2,800	2013
Industrial production growth rate	0.9%	2013
Export	petroleum and petroleum products 95%, cocoa, rubber	___
Import	machinery, chemicals, transport equipment, manufactured goods, food and live animals	___
Inflation rate	8.7 %	2013
Health expenditure	5.3% of GDP	2011
Central bank discount rate	4.25%	2010
Tax and other revenues	4.8% of GDP	2013
Budget surplus (+) or deficit (-)	-1.5% of GDP	2013

Source: (CIA, 2015)

Table 2.2 illustrates the key indicators of the Nigerian economy. It shows that the industrial production growth rate is 0.9% in 2013, with a revenue budget of $23.85 billion and expenditure budget of $31.51 billion in 2013. This shows that the country's expenditure is much higher than its revenue budget though health services are provided (free services) as welfare. Nigeria spends 5.3% of its gross domestic product (GDP) on health.

The economy in Nigeria is very strong; one hundred and fifty six Nigeria naira (#156) is equivalent to one US Dollar ($1) and the gross domestic product (GDP) per capita is $2,800 with an inflation rate of 8.7% in 2013. Furthermore, the tax rate and other revenue are 4.8 of the GDP which is ranked 212 in the world for 2013 (CIA, 2015).

2.2.2 Overview of Nigerian Construction Companies

Nigerian construction companies are growing fast and are likely to grow enormously for the next decade, based on a forecast that was made in a June 2010 report by Global Construction Perspectives and Oxford Economics. It shows that current growth in the construction companies is greater than that of India. The report shows that the Nigerian population of approximately 154 million with impart of urban habitats has one of the fastest rates in the world, while the construction is now only 4.32 percent of the Gross Domestic Product as of 2011 (GCPOE, 2010).

According to Oladapo (2007), the Nigerian Statistical Fact Sheet on Economic and Social Development, 1999 to 2003 revealed that building and construction activities picked up largely in 2003, resulting in nearly 9% growth rate. The Nigerian National Bureau of Statistics further records that building and construction contributed 1.98% to the GDP in 2009. The GCPOE (2009) statistics reported that Nigeria has a nominal GDP of USD 183.1 billion, with construction being 3.2% of the GDP. Following this output, it shows that the construction industry is important to every economy for a better GDP.

The World Bank 2007 to 2011 reported the number of construction GDP to Nigeria economy growth in table 2.4 below.

Table 2.4: *Nigerian construction companies percentage contribution to GDP*

Year	2007	2008	2009	2010	2011
GDP	4.13%	5.21%	3.17%	3.85%	4.32%

Source: (World Bank, 2015)

The construction companies' contribution to the Nigerian economy inclined and declined from 2007 to 2011, however they improved in 2008 with 5.21%. Table 2.5 below shows the ongoing construction projects in Nigeria.

Table 2.5: *Nigeria's ongoing construction projects*

NO	**Project name**	**Description**	**State**
1	Dam	Lower Usuma Dam Water Treatment Plant	Abuja
2	Library	National library	Abuja
3	Road	Airport Expressway Expansion (Ten Lanes)	Abuja
4	Towers	Kanti Towers (Retails and Office)	Lagos
5	Bank	Central Bank of Nigeria, Branch Office	Lagos
6	Hotel	Oriental Hotel Extension	Lagos
7	Dome	The Dome, (Culture and Event Center)	Ondo
Total (#)		**#22 billion estimated for the overall project.**	

Source: (Nairaland, 2015)

It is also important to know that the Nigerian construction companies comprise of indigenous firms, private and a number of large firms owned by foreigners. The few large firms create about 5% of the total number of contractors in the formal sector, and control about 95% of the construction market, giving the indigenous and the small firms just about 5% share of the market (Oladapo 2007).

Following Oladipo, it is not surprising that most of the construction activities in Nigeria are controlled by the large firms, which are the multinational companies, because of the good output and performance they have been able to prove to their clients which the small firms have failed to do. Also, construction materials such as granite, gravel, stones, sand, steel, cement, wood, aluminum, and glass may possibly be obtained locally. But some of these do not come in adequate supply; therefore, materials importations are increased to meet demands, required standards and current technology, which show that insufficient availability has greatly affected the prices of building materials.

Inflation as an economic factor has affected many countries' construction sectors. Similarly, in a study of inflation dynamics in the construction sector of the Nigerian economy, using data on quarterly frequency from 1986 to 2003, it was found that comparatively, the construction company rate of growth in prices (of construction materials) was higher than the economy wide rate of growth of inflation (Oyediran, 2006). The quarterly growth rate showed by selected basic construction material prices fluctuated from 6% to about 17% with an average of 9%. The lack of material manufacturing factories poorly affects Nigerian construction companies.

Moreover, construction projects in Nigeria are usually implemented through joint venture partnerships which involve multinational companies coming together with locally-based companies. The multinational partners supply advanced technologies and large capital needed for carrying out construction projects which the Nigerian partners are still lacking. The presence of the foreign partners expose the projects to risks like financial risks, political, policy and legal risks during the construction projects (Oladapo, 2007). In contrary to this, many studies affirmed the advantages of the foreign partners to reduce the chance of financial risk in a project such as (Bramble & Collahan, 2011; Sweis *et al.*, 2008).

Therefore, before construction activities commence, it must undergo certain stages of development to reduce or block every way for risk occurrence and ensure safety of workers on a project. The construction projects in Nigeria run through many stages of development, which are initiated by obtaining an inquiry information certificate from the Ministry of Works, a land survey from a private consultant and a final building permit from the Ministry of Works and Urban Planning. This is followed by submitting a form of compulsory supervision for the foundations and passing an inspection, then submitting a form of compulsory supervision for the second floor and passing an inspection. Later, it is necessary to request and receive a final inspection from the Civil Defence, then to obtain a certificate of completion from the Ministry of Works, get connected to the water supply, request an electrical inspection and get connected to the electricity supply, in addition to obtaining a sewage connection from the Ministry of Works before construction projects will commence and follow all the processes involved in project management (Naira land, 2014).

2.3. Project Management Process

Since this research is on risk management, giving the definition of a project will be most relevant to the study. Larson & Gray,(2011) defined a project as an irregular effort guaranteed to make a unique product service, or result which includes major characteristics such as an accomplished objective, time, cost and specific performance requirements, in addition to the affair of different professionals and sectors. Although, this definition is comprehensive, it failed to capture the start and end of a project (PMBOK, 2013).

Smith, (2008) and Kerzner (2001), provide a definition which says that a project is a sequence of activities which has start and end dates, with a specific goal to be achieved within confined time, cost, and resources.

After every plan for a project which has the start and the end date are known, the management of the project must be initiated with it. Though, project management has numerous definitions; however it hardly differs in meaning. PMBOK (2004) defined project management as an act of planning, organizing and managing the available resources to present the aims and objectives of the project successfully.

Similarly, PMI (2004) defined project management as "the act of directing and coordinating humans and resources through the life of the entire project by using the latest management techniques to reach pre-determined goals of scope, cost, time, quality and participants' satisfaction".

Following the PMBOK (2004) and the PMI (2004) project management definitions, although both of them are working towards the achievement of the project goals, they have failed to confine their definitions towards a "stipulated" time.

Therefore, the UK Association of Project Managers defined project management as "the planning, organizing, monitoring and controlling of all aspects of a project to achieve the project objectives safely and within agreed stipulated time, cost and performance standards" (Smith, 2008).

As every project is connected with time, cost and quality, there is need for the triple constraints of PM in the study, which are time, budget and the amount and quality of work (scope) to be completed for every project, as shown in Figure 2.1.

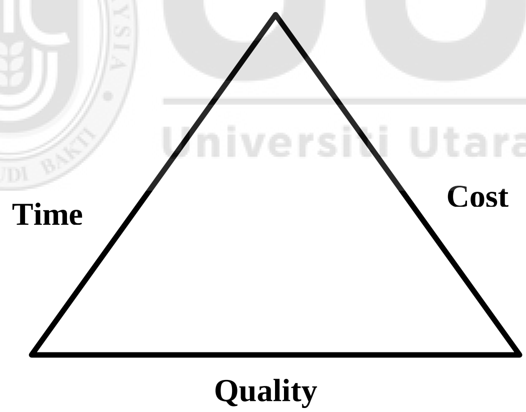


Figure 2.1: *Project management constraints*
Source: (Fewings, 2005) and (PMBOK, 2004)

Since the triple constraint has been affirmed to be the element that proves the success of every project, Fewings (2005) pointed out that both cost and time are positively connected, where the original cost is most likely to be overrun if the planned schedule is exceeded.

2. 3.1 Project Management Knowledge Areas

There are a lot of benefits when project management process and skills are applied to projects. (Kerzner, 2001), for example lists:

1. Identification of tools and techniques for analysis.
2. Early identification of problems.
3. Improve estimating skills for future projects.
4. Recognize whether the objectives cannot be met or will be exceeded.
5. Assess time and achievements against schedules and plans.

The project risk management as a scope in this study is one of the knowledge areas in project management process. There are nine knowledge areas in project management process such as; project integration management, project scope management, project time management, project cost management, project quality management, project human resources management, project communications management, project procurement management and project risk management (PMBOK, 2004).

This research proposed that the nine knowledge areas are not complete without project stakeholder's management which are also affirmed to be essential by PMBOK (2013) and make it to be ten knowledge areas all together.

Project integration management refers to a way of coordinating and bringing the project characteristic together. Project scope management shows what is to be included and excluded in a project in form of a written statement, in order to know what has been decided on a project. The actual scoping occurs in the second phase of the project lifecycle. Project time management comprises of identification of all the activities, put them in a sequence form, and then allocate time to each activity. In order to ensure the project finishes on time, time scheduling will come in, which would show when the projects starts and ends. Project cost management is related to the time management process, though each activity is connected with its cost, which form the project budget (Maylor, 2003), as cited by Kolltveit, Karlsen, and Gronhaug (2007). Project quality management is the planning of systematic action to monitor the outcome of the project if it's worth the specification for quality of finished works (Smith, 2008).

Likewise, project human resources management shows the planning of employees that will work on the project, classifying the skills required, emerging the team and documentation of their impacts. Project communications management comprises of four different areas, which are planning, sharing information, performance reporting and administrative closing communication. Project risk management refers to the method of identifying, quantifying and response accumulated from the team members and the projects (PMBOK, 2004) and (Maylor, 2003). Project stakeholders management comprises of the processes that need to identify all people or organizations joined together by the project, analysing stakeholders' expectations and impact on the project, and developing suitable managerial strategies for effectively involving stakeholders in project decisions and execution (PMBOK, 2013).

2.3.1.2 Project Lifecycle

It is important to study the project life cycle since this research is on risk management. Larson and Gray, (2011) clarified four stages of the project life cycle, which are:

1. Defining stage;
2. Planning stage;
3. Executing stage; and
4. Closing stage.

The author further combined the monitoring and controlling stages with the executing stage. However, PMBOK (2004) and OIT (2005) divided them and showed the project lifecycle with five major stages. Figure 2.2 illustrates the construction project lifecycle;

1. Initiation;
2. Planning and design;
3. Execution;
4. Monitoring and controlling; and
5. Closing

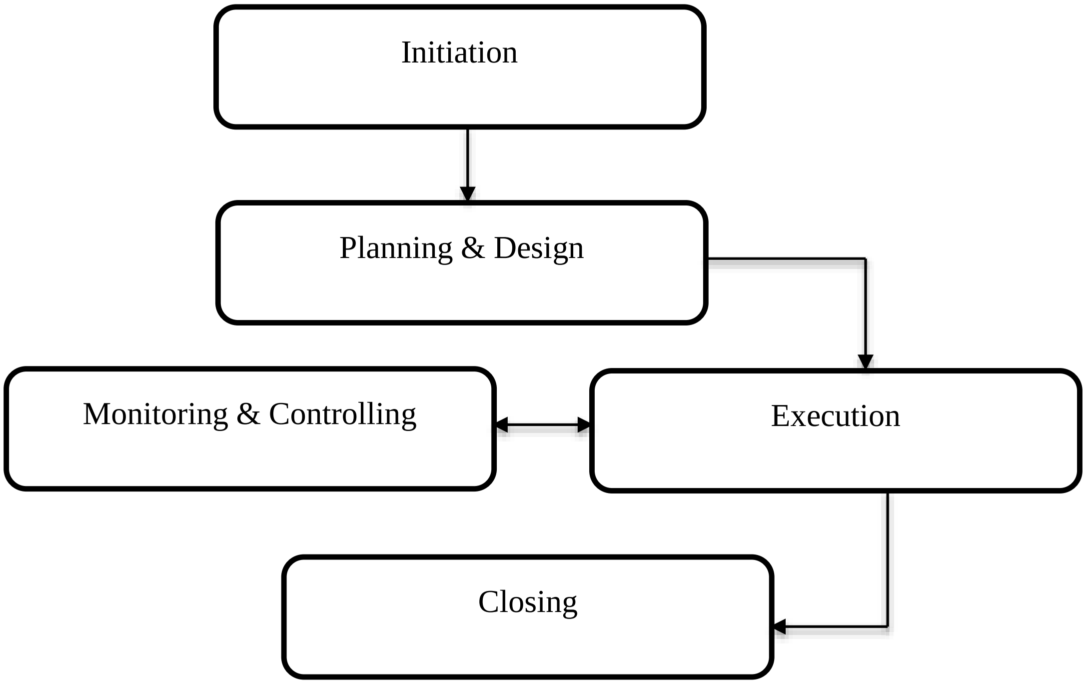


Figure 2.2: *Construction project lifecycle*

Source: (Larson and Gray, 2011) and (PMBOK, 2004)

1. Initiation:

Initiation stage creates the preliminary scope of the project, which helps to understand the project background and integrates all the necessary resources needed in developing the preliminary scope report of the project before the risk can be managed. Also, it has to include an organized plan which covers contracting, budget and equipment requirements. It also covers the costs, time schedule and the tasks (PMBOK, 2004).

2. <u>Planning and design</u>:

The main purpose of the planning and design stage is to explain how the project will be accomplished during the executing, monitoring and controlling processes. In planning and design stages, activities are bound together by outlining the project tasks and their sequences, also with their resources. Furthermore, it will help the end-user to be satisfied with the project and complete it within a stipulated budget and time (PMBOK, 2004).

3. <u>Execution:</u>

The execution stage is the phase that defines the activities in the project management plan (PMP), which must be carried out in order to achieve the projects' objectives. Also, it includes managing resources and people and integrating activities, in order to come out with the final result stated in the project management plan (PMBOK, 2004).

4. <u>Monitoring and controlling:</u>

The monitoring and controlling stage brings in observations of the project execution phase in order to identify problems and correct them. The monitoring and controlling stage comprises of the under way activities, also monitoring the cost, time and strength used against the project management plan. More so, it helps in monitoring baseline performance of the project which includes addressing risks and taking actions (PMBOK, 2004).

5. Closing:

The closing stage is the period in which the end-user accepts the construction project in a formal way. It consist of two phases: the project closure stage that shows all 48 activities which are to be finalized across the project, and the contract closure stage, where all projects related are to be completed and closed (PMBOK, 2004).

According to Levy (2000), some criteria are necessary for successful construction projects. They are:

1. Project completed on time: The project must be completed within the agreed time with the clients.
2. Final cost is within the project budget: The cost estimated for the project must not go beyond the budget.
3. No outstanding claims or disputes during or after the project completion: There must not any form of disputes among the team members and the project manager during and after the execution of the whole project.
4. Contractors hold a good relationship with the construction parties (client, consultant and sub-contractors): The contract within the parties such as the contractors, engineers, architects, surveyors, and clients must be plain without hiding any agenda.
5. Quality level achieved: The project must be of good quality as it must be worth the budgeted cost.

More so, there are various parties in construction companies they include; clients, contractors, sub-contractors, architects, quantity surveyors, structural engineers, services engineers and suppliers. However, the main construction parties are:

1. Clients – they fund and invest in construction projects, and the client may be a bank, user or developer and the main objective is to receive the project on time and within the estimated budget.
2. Consultants – they are professionals who protect the client's interest with skills and experience, and they are architects, project managers, designers and specialist engineers (civil, structural, mechanical, electrical, etcetera.). Their responsibilities are to give advice to the client on all aspects of the project before investing in it, and it maybe contracts, budgets or designs which at the same time they have to manage all the risk that is likely to occur and protect themselves from any potential lawsuits or disputes that may result to incorrect advice or any problems in executing the project.
3. Contractors – they embark on projects mainly to come out with any form of construction unit or a building. They may also be sub-contractors, suppliers, manufacturers, etcetera but their main aim of contracting is to make projects out of the projects.

2.4. Risk Management Overview

Risk is originated from France, and insurance transactions started to use it around 1830 in England. Risk are placed under three categories, namely; known risks, known unknown, and unknown unknown. Known risks are the slight changes on the project, known unknown risks are the predicted occurrence which may be either by their probability or by the likely effect, and unknown unknown risks are those events with unknown probability joined to it and unknown likely effect, which all need proper management in order to achieve the project objective (Smith, Merna, & Jobling, 2014).

Managing risk has been practiced since the beginning of civilization when farmers needed to store their harvest for future use, and when they started to build forts and fences to protect their villages and properties. Another related example is when a tradesman manages his risk during the process of moving goods from one place to another by asking the buyer to pay initial deposit to the seller which will be balanced up when the buyer receive the goods in good condition, so if any unforeseen circumstance arises during the movement of the goods, the tradesman will receive a compensation. Risk was not managed systematically from Babylonian days until the Age of Enlightenment, at the same time was based on 'gut feeling'. However, a more systematic methodology was discovered after theorists and statisticians developed measured techniques for assessing risk (Hubbard, 2009).

Risk management cannot be neglected during risk assessment because it is essential to construction management in the decision-making process (Tang *et al.*, 2007), mainly about the project's integration, scope, time, cost, quality, human resources, communications, procurement and stakeholders. It also increases the future predictions of a project as it points out probabilities and uncertainties (Borge, 2001).

Zou, Zhang, & Wangu (2007) defined risk management as 'a system whose purpose is to identify and quantify all risks that can affect the project and decide on how the risk can be managed'.

Lester (2007) viewed it as a process of making decisions within project management, and it is an essential part of the project management plan; it defines the sources, impacts and types of potential risks in the project, in which tools and techniques would be used in risk identification and assessment of the risk.

The two authors' assumptions failed to consider the origin of risk and it is essential to know the starting point of every risk before its management. Therefore, Dikmen *et al.* (2008) viewed RM as defining the origin of uncertainty (risk identification), estimating the effects of the uncertain condition/events (risk analysis), gathering of response strategies because of the expected outcomes and lastly, depending on the feedback obtained on literal outcomes and occurred risks, conducting identification, analysis and response steps respectively during the life cycle of a project to see the project objectives are achieved. RM in construction is a wearisome task as the purpose of the objective is likely to change during the project life cycle, and assumptions are legion due to the predisposition of projects to unmanageable risks hailing from the modifications of the macro-environment.

Although, there must be a comparison between potential risk and potential return or profit the project will generate in future with an effective risk management in the construction project (Flanagan & Norman, 1993). As this research is central to risk management in construction projects, giving the definition of construction project management will also be of relevance to the study. Walker, (2000) defined construction project management as:

> *" The planning , co-ordination and control of a project from conception to completion (including commissioning) on behalf of a client, requiring the identification of the clients' objectives in terms of utility, function, quality, time and cost, and the establishment of relationships between resources, integrating, monitoring and controlling the contributors to the project and their outputs, and evaluating and selecting alternatives in pursuit of the client's satisfaction with the project outcomes."*

Risk and uncertainty may lead to positive or negative outcomes in construction projects. Opportunities are results of positive risk and threats are the results of negative risks. Therefore, risk does not mean a bad thing. However, it implies things are uncertain (Cretu, Stewart, & Berends, 2011), while uncertainty is seen as opportunity of occurrence to which the event that is likely to occur (probability) is unknown (Smith, Merna, & Jobling, 2014). Uncertainty designates a situation being considered by decision makers that has no preceding data with which to ascertain the probability of its occurrence (Flanagan, 1993).

There appears to be division among experts on risk and uncertainty. While some viewed the two terms to mean the same, others distinguished between the two. However, all projects may lead to risk and uncertainty which may have either positive or negative effects on successful delivery of the projects. Risk factors can start internally or externally during a project lifecycle, and to achieve the projects aims and objectives, it is important to identify the possible risks and create a plan on how to manage them (Smith, 2002).

During the construction process, threat (negativity) may occur when risk and uncertainty change the real outcome of an activity from the planned outcome. It may be in two directions, positive or negative unconventionality, on the scheduled time frame or the estimated budget of the construction project.

RM is the process of thinking with the philosophy that pervades the complete range of all project activities (Jaafari, 2001). Despite the fact that the methodological views of RM are clearly defined, the philosophical background is quite unclear. Though, RM depends on different kinds of decision-making theories, Green (2001) criticizes the soft paradigm of RM, which is not clearly conceptualised.

However, Dikmen *et al.* (2007) argued that major disputes of RM are mostly due to the poor definition given to risk and why risks must be properly managed in project construction. The experts further mentioned that RM is seen as a task carried out to improve the measurement of risks. Thus, it must also support proper monitoring of risks, effective communication of risk information among project participants and construction of a collective risk memory to bring in experience-based resolutions on how risk can be properly managed.

This can be attributed to the fact that many experts have identified risk management as one of the most important procedures and competency areas in project management practice (Banaitiene *et al.*, 2010). As mentioned by Cao (2008); Hert's & Thomas (1983), project risk management consists of a logical sequence of steps comprising of risk identification, risk measurement, risk evaluation and re-evaluation. Also, the experts linked risk management with strategic planning and management. Bohem (1991), recommended a process consisting of two parts: risk assessment, which comprises identification, analysis and prioritization, and risk control, which includes risk management planning, risk resolution and risk monitoring planning, tracking and corrective action.

Therefore, small projects are liable to more risks as they experience more challenges compared to large projects because of their innate features such as tight project schedule, resource constraint, low profit margin and competition (Smith & Bohn, 1999). Also, small projects must be managed carefully to avoid cost and time overruns. However, RM is frequently overlooked because it is a costly and tedious strategy which needs thorough information analysis and gathering (Mubarak, 2010). In Hong Kong, Mok, Tummala & Leung (1997) discovered that only 35 percent of project parties implement RM in projects that cost less than HK$10 million, while more than 90 percent acknowledge the advantages of RM in projects that are worth more than HK$100 million.

Likewise, previous studies revealed that the small and medium contractors that focus on contracting small projects did not assign proper importance of RM in small projects because the contractors lacked adequate internal knowledge on RM (Ho & Pike, 1992; Smith and Bohn, 1999), particularly when it comes to application of risk analysis methods (Christopher Frey & Patil, 2002). Similarly, due to imbalance between the resources needed to conduct RM and the stumpy profit margin of small projects, a lot of SMCs were demoralized from investing in RM (Griffith & Headley, 1998). Besides, intense competition drives SMCs to beat down their price which restrict them from having excess budget for contingency (Smith & Bohn, 1999).

It was stated by the Institute of Risk Management (IRM) that risk management (RM) are developing rapidly with no viewpoints or agreement on what is involved in risk. Risk is identified by IRM in two dimensions: positive and negative. Positive risks are those that may have a positive contribution on successful delivery of a project while negative risks are related with the possible failures that may affect successful delivery of the project (IRM, 2002).

2.4.1 Risk Management Process

Most construction projects experience cost and/or time overrun as a result of risks. The concept of risk assessment is absolutely different from risk management, although some may use the risk management concept to designate a risk assessment process (Kaplan & Garrick, 1981). According to Westland (2007), risk management is 'the process by which risks attached to the project are properly identified, quantified and managed'. However, during the planning and construction stage, numerous types of risk may need to be identified, assessed and analyzed by using the relative importance index theory or probability theory for evaluation of the risk and regulate their effects on the construction project.

Risk management assists in reduction of delays, and also reduces predetermined disputes. One of the key discoveries of the existing methodologies used in analyzing delays in construction projects from the viewpoint of clients and consultants is to use simple methodologies instead of the complex one in analyzing delay, though it is recognized for less reliability (Yang & Kao, 2012).

Risk in construction projects is generally categorized into internal and external risks. Other categorizations are more in depth, which comprise of more specific categories, such as market, intellectual property, political, financial, safety and social risks (Songer, Diekmann, & Pecso, 1997; and El-Sayegh, 2008).

In general, identification of risks can be done at any stage in a project by recording relevant details of the risk in a register; nevertheless, risk can be identified in the construction company by the chance of occurrence of an event or the definite occurrence of an event during the construction process (Wang, Dulaimi, & Aguria, 2004).

According to Hertz and Thomas (1983), lack of predictability of structured outcomes in making decisions or planning situation can lead to risk. The outcome of an estimation which depends on the uncertainty related with various results might be better or worse than what is anticipated and later lead to cost overrun

(Lifson & Shaifer, 1982). This study will adopt the definitions of risk management as presented by Larson & Gray (2011) and Westland (2007) that state that risk management is the process by which risks associated with the project are identified, quantified (assess) and managed (responses).

Nevertheless, the major source of uncertainty in Nigerian projects is cost overrun, which is considered to be the main reason behind the claims and disputes between parties in the region, as cost overruns and delays are the effects of the risk factors (Elinwa and Uba, 2001; Aibinu and Jagboro, 2002). Companies in Nigeria have started to realize how essential risk management as a project management tool, and as a mixed process in any project, is. Figure 2.3 illustrates the process of risk management.

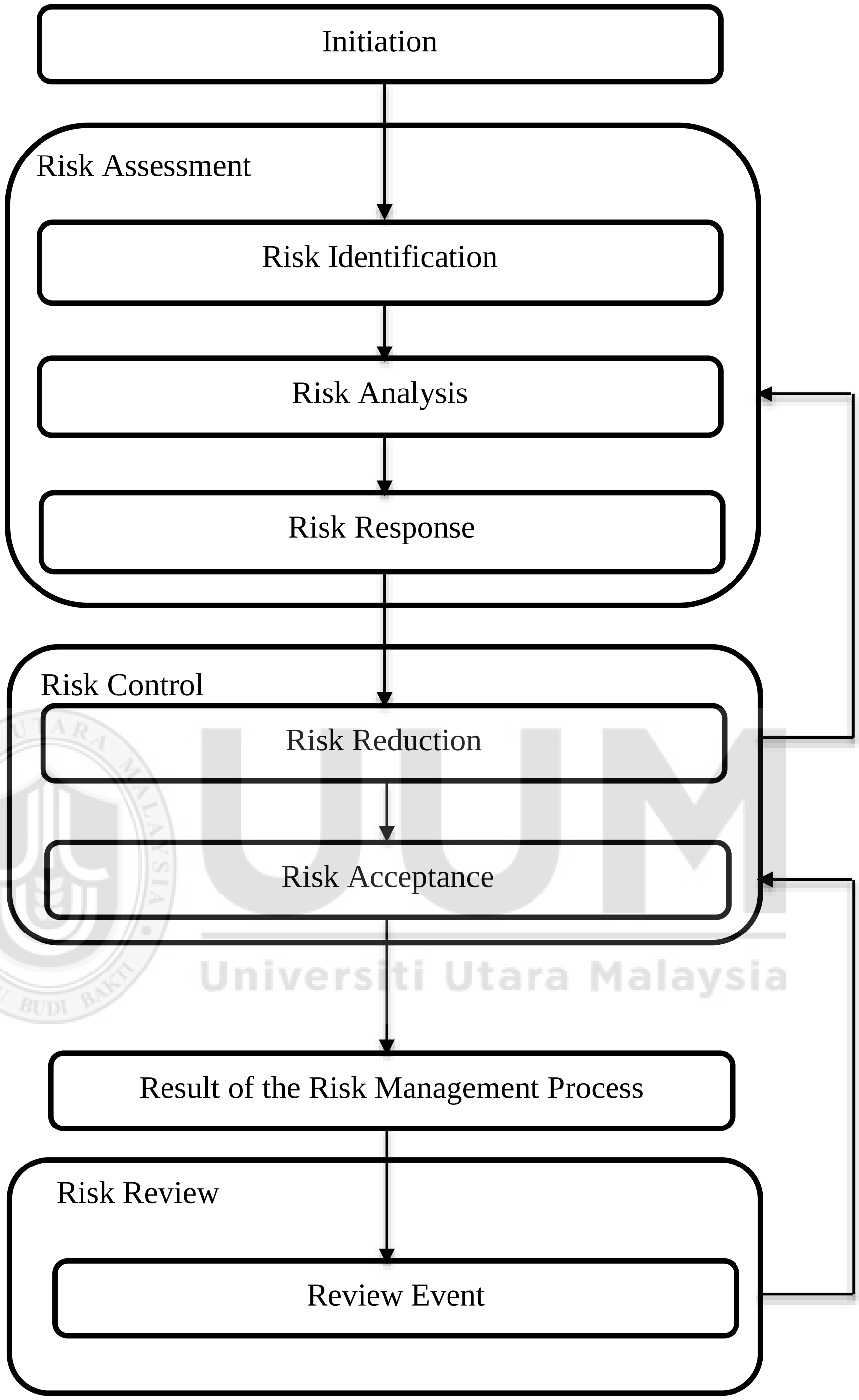


Figure 2.3: *Process of risk management.*
Source: (BurtonShAw-Gunn, 2009; Gray and Larson, 2003; and Murch, 2001).

Figure 2.3 illustrates the three stages in the initiation of the risk management process tool. The initiation process begins with the risk assessment phase, moves to risk control and ends with a risk review. More so, there are various types of risk, for example dependent and independent, controllable and uncontrollable risks. Therefore, this study focused on the first stage, which is the risk assessment stage, following (Lockyer & Gordon, 1996).

2.4.2 Risk Assessment

Introduction of techniques for risk assessment as a major part of the planning process is necessary because of the managing changes. Risk assessment focuses more on quantifying known risks with the use of statistical analysis, the known risk in most cases may be either quantitatively or subjectively assessed factors (Lockyer & Gordon, 1996) as cited by Malešević, Kekanović, & Čeh(2007).

According to (Smith, 2008; Maylor, 2003; Zayed, Amer & Pan, 2008), RM cycle (the risk assessment phase) has three stages which are, risk identification, risk analysis and risk response. Figure 2.4 depicts the risk assessment.

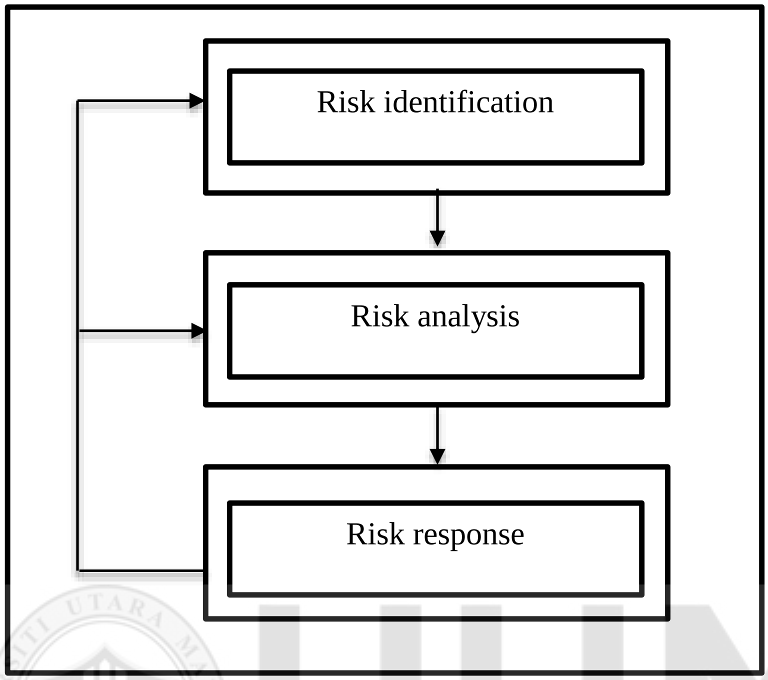


Figure 2.4: *Risk assessments*
Source: (Smith, 2008) and (Maylor, 2003)

1. Risk identification

The risk identification is the first step in the risk assessment process, whereby all the possible risk factors (RF) associated with construction projects are being identified and categorized (Zou, Zhang & Wang, 2007).

According to William (1995), the approach for identifying, controlling and allocating risks should be designed in the early stages of the construction project lifecycle. However, we should consider the possible internal and external risks to the client, contractor, and project team from the view of different contractors, architects, and predicting sources of claims or disputes. Also at the stage of risk identification, it is essential to identify the risk source and its likely effect (Chapman, 2001). Figure 2.5 illustrates the risk classification.

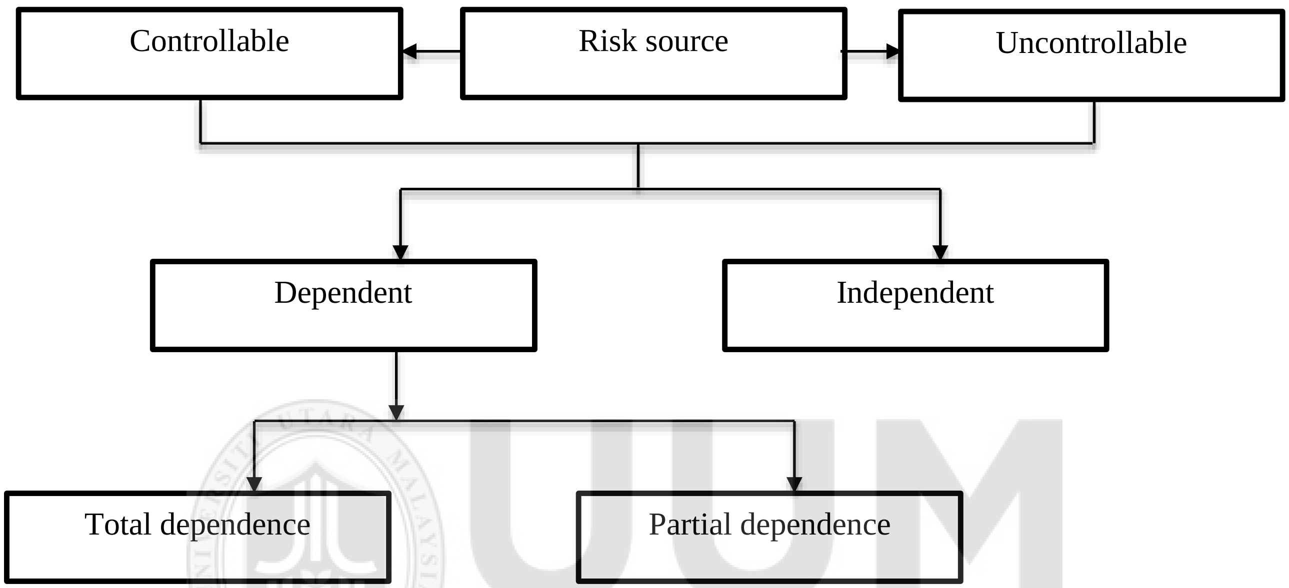


Figure 2.5: *Risk classifications*
Source: (Flanagan, 1993)

However, controllable risks are those which the results are within the power and control of the decision makers. While uncontrollable risks are those that the decision maker has no power or control upon, and they mostly stem from external sources in most cases, work breakdown structure are used to identify these risks (Flanagan, 1993; Chapman, 2001).

The work breakdown structure (WBS) is an effective tool used for identifying possible risks which lessen the chance of missing risk events (Gray & Larson, 2003).

Nevertheless, WBS can be seen as an act of identifying activities which are necessary to deliver the design required to construct the project and resources needed to execute the project (Maylor, 2003; and Smith, 2008). It is suitable to look for an answer to the three important questions in the risk identification phase which are: what may go wrong? How possible is it (probability)? And how it would it affect the project (impact)?. It is important for the project manager and the team members to make use of the lesson and experience learnt in the past by using a simulation model to show likely risks added to brainstorming for a way to identify the possible risk factors (Lockyer & Gordon, 1996).

2. Risk analysis

Risk analysis falls between risk identification and risk response. Techniques for risk analysis are grouped into quantitative and qualitative methods (Oztas and Okmen, 2004). The possible risks are analyzed using a quantitative or qualitative method to evaluate their possible impacts (Zou, Zhang & Wang, 2007). Estimation of what may happen if an alternative action or response was selected is another way of defining risk analysis (Aritua, Smith & Bower, 2009).

Furthermore, risk analysis can be qualitative or quantitative. Qualitative analysis shows the expert's opinion and it may lead to errors based on the feedback from respondents or decision maker's final say, while quantitative analysis is much more reliable and it needs thorough data collection and further specific analysis (Gray & Larson, 2003).

According to Tchankova (2002), identify the possible risk factors (RF) and study their effect on construction projects completion and provide a classification that shows all types of possible risk factors that are needed.

3. Risk response

The risk identification and analysis process bring in conclusion for the decision maker before any problems arise. Reaction of risks can be identified in many ways, such as risk avoidance, risk reduction or risk transfer (Raftery, 1999).

All projects are attached with risk, possible problems in the form of events or factors are known as risks, and they affect the time schedule, estimated cost and quality of projects (San Santoso, Ogunlana & Minato, 2003). Thus, all risks include both threats and opportunities (Ward & Chapman, 2008).

As stated earlier, experts have differentiated between uncertainty and risk. Uncertainty cannot be insured and it occurs in situations where possibility of attaching a probability to an event of occurrence exists (Raftery, 1999), or in a situation where the uncertainty might lead to risk events, threats and opportunities. (Ward & Chapman, 2008). Kartam & Kartam (2001) viewed risk as a way of predicting success of a project based on the possibility of uncertainties that are occurring. Level of uncertainty determines the increase of project risk; according to Kindrick (2003), any occurrence that is related with work can stand as risk. Risks may be positive, which indicate the result is better than what is expected or negative, which shows the result is worse (Raftery, 1999).

Also, uncertainty affects the risk and opportunity during evaluation, but it is important to know they both have different characteristics and different data (Smith, 2008). According to El-Sayegh (2008), managing construction risks needs risk management processes. Risk impact can be reduced in several ways such as gaining more information, communications improvement, running more tests, allocating more resources, and assigning risk to construction parties that can handle it (Smith, 2008).

There are several ways to respond to risks, depending on the level of severity. To avoid difficulties from achieving project objectives, alternative methods for managing the project risk can be used if the problem is severe, management strength can be increased, decreased dependence of one task to increase flexibility or increase resources (Lockyer & Gordon, 1996).

According to Larson & Gray (2011), making decisions are important after identifying and assessing risks by selecting the suitable solution to the risk occurrence. There are many ways to respond to risk, such as, insurance, deference, avoidance, sharing, mitigation, acceptance transfer and reduction (Staveren, 2006). Below are the major risk response classifications;

1. Mitigate;
2. Avoid;
3. Transfer;
4. Share; and
5. Retain.

1. Mitigating risk

The below are the two strategies for mitigating risk:

1.1 Reduce the probability occurrence of the event on the project.

1.2 Reduce the effect of the risk on the project.

Reducing the probability that risk will occur and it will have an impact on a project by reducing the impact of cost (Larson & Gray, 2011).

2. Avoiding risk

All the risk on project cannot be evaded, though some risk can be avoided before the project presentation while others can be eliminated by change of plan for the project (Larson & Gray, 2011).

A risk can be avoided completely by a continuous decision process (Jannadi, 2008). According to Nicholas (2004), stated that minimizing project complexity and also reducing requirements quality by eliminating risk activities can help to avoid risk.

3. Transferring risk

Transferring risk from one party to another does not change the risk; nevertheless risk can be transferred to the party who is capable of controlling it. Through insurance is a way of transferring risk but it will be costly for a large project to be insured. Also adding financial risk factors to the bid contract price is another way of transferring risk (Larson &Gray, 2011).

4. Sharing risk

Decision to divide risk may be made between the contractors and the clients by using a contractual agreement. For instance, they can pick the risk which they think they can manage best. Here are different types of contractual agreement for sharing responsibilities to risks (Nicholas, 2004), they are:

4.1 Fixed-price: The contractors are responsible for all risks.

4.2 Fixed-price with motivation fee: clients are responsible to 40% while the reaming 60% belong to the contractors.

4.3 Cost plus motivation fee: clients are responsible to 60% while 40% belong to the contractors.

4.4 Cost plus fixed fee: All risks are responsibilities of the clients.

5. Retaining risk

In cases where risk cannot be avoided or transferred then it can be retained, for instance, flood or earthquake. However, implementing contingency plan can be used to retain the risk. Contingency plan is defined as an extra plan that will be used in case if the risk come to reality. It is seen as an action to reduce the negative effect on the project if the risk occurs (Larson & Gray, 2011). This also called a legal task of cost of possible risk from one party to another in insurance (Jannadi, 2008).

2.4.3 Risk Control

According to Cretu, Stewart & Berends (2011), risk assessment is the first phase then followed by risk control phase. Risk control main function is to either reduce or accept risk. Below are the activities included in the risk control:

1. Track risk on the risk register
2. Identify the new risks
3. Adjust risk responses or develop new responses strategies on the risk
4. Monitor the implementation and effectiveness of the responses strategies.

For risk control, identifying the specific strategy response will help in controlling it. For instance, if the risk is negative (threats) it is better to avoid, accept, mitigate or transfer risk, Also, if there is positive risk (opportunity), it is better to exploit, improve or share risk. Risk response identification is the best solution to solve the problems (Cretu, Stewart & Berends, 2011).

According to Smith (2002), parties in construction project involve in risk to some extent, and all projects includes both risk and uncertainty, project contracts between parties must assign responsibilities for risks during the projects life.

However, risk management appears to be one of the ten focus areas in the Project Management Body of Knowledge (PMBOK). There are many advantages in it, such as reducing uncertainty, increasing confidence in achieving the projects aims and objectives, finding the best way for a situation and giving accurate estimates for successful delivery of the projects (KarimiAzari *et al.*, 2011).

Despite the aforementioned empirical studies on risks management, literatures indicate that less attention has been given to risk management especially in the developing countries.

2.5. Identification of Risk Factors in Construction Projects

The available resources, such as the conference papers and books, library subscribed database for journals and articles, with internet resources, were used to review all the information related to the research.

Experts have examined possible risks factors in construction projects both in developing and developed countries, from the level of small to large scale project. The three main parties in Construction Company are; clients, consultants and contractors, and a lot of studies have shown risks relating to them which sub-categories of related factors group risks based on their nature together. Table 2.1 shows recent important studies related to the identification of risk in construction projects.

Table 2.1: *Related literatures on risk factors*

No	Author & Tittle	Case study	Risk factors
1.	Risk assessment and allocation in the UAE construction industry (El-Sayegh, 2008).	UAE	42
2.	Learning from risks: A tool for post-project risk assessment (Dikmen *et al.*, 2008).	Turkey	73

3.	Risk analysis in fixed-price design–build construction projects (Oztas & Okmen, 2004).	Turkey	14

Table 2.1 (Continued)

No	Author & Tittle	Case study	Risk factor
4.	Risks associated with trenching works in Saudi Arabia (Jannadi, 2008).	KSA	7
5.	An evaluation of risk factors impacting construction cash flow forecast (Odeyinka *et al.*, 2008).	UK	26
6.	Risk management in the Chinese construction industry (Tang *et al.*, 2007).	China	32
7.	Understanding the key risks in construction projects in China (Zou *et al.*, 2007).	China	85
8.	Assessment of risks in high rise building construction in Jakarta (Santoso *et al.*, 2003).	Jakarta	130
9.	The controlling influences on effective risk identification and assessment for construction design management (Chapman, 2001).	UK	85
10.	Risk and its management in the Kuwaiti construction industry: a contractors' perspective (Kartam *et al.*, 2001).	Kuwait	26
11.	A systematic approach to risk management for construction (Mills, 2001).	Australia	29
12.	Risk management trends in the Hong Kong construction industry: a comparison of contractors and owners perceptions (Ahmed *et al.*, 1999).	Hong Kong	25
13.	Project risk management in Hong Kong (Shen, 1997).	Hong Kong	8

2.5.1 Asia Related Studies

Tang *et al.,* 2007 studied the risk management system and the barriers causing the application of risk management techniques in China from the perception of different groups in six different cities from the construction company around China. Interviews and questionnaires were distributed as tools for survey to study the thirty-two risks that has been identified from the review literature. The findings of their studies revealed that there were no major differences in ranking of the thirty-two risk factors between the respondent groups. Though, there were different view on 6 factors which are poor coordination, safety; claims and disputes; insufficient technology; organizational interface; and premature failure of facility.

Furthermore, Zou *et al.,* 2007 ranked and identified major risks according to their impact, and a plan to manage those risks in Chinese construction projects was developed. Questionnaire was used to collect data on twenty-five risks which were grouped into 6 categories: clients; contractors; designers; subcontractors and suppliers; external issues and government agencies. The overall findings show that all parties that are involved in construction project should work together and take it as their responsibilities to manage risks from an early stage and in good time monitor the potential risks. Furthermore, contractors and subcontractors need to prepare a risk management plan to reduce or avoid risks and to make sure construction activities maintain good quality with a safe and efficient environment.

Ahmed *et al.* (1999) studied the importance of identifying and allocating risks to assist professionals in improving contractual documents was compared from view of contractors and clients on construction projects in Hong Kong. A questionnaire with twenty-six risks was used to collect data from clients and contractors. The results of the study showed that 66 contractors and clients has significance impart on the importance of the presented risk factors, although more responsibilities on risk was allocated to the contractors compare to the clients.

Using a questionnaire survey, Shen (1997) assess the view of the contractors from the 8 identified significance risk factors and how delays have contributed to the contribution project. These risk factors are as follows: poor precision of project programmed, insufficient design information, and poor coordination among subcontractors, Labour shortage of subcontractors, changes in weather and ground conditions, unsuccessful works as a result of poor workmanship, skills or techniques shortage, and lack of materials resources. Ranking of the greatest delay in construction project with the relative importance weighting approach that was adopted in the study specified the risk with the highest contribution to project. Also, ways of managing risk results showed the different effectiveness levels of different prevention approaches which were applied in the Construction Company, experience and judgment of the practitioners were found to be the most effective approach to manage risks.

More so, San Santoso, Ogunlana & Minato (2003) identified, ranked and categorized the potential risks that are essential to contractors in high-rise building projects in Jakarta. A quantitative survey method was used to evaluate 130 risks which they falls into 9 categories with twelve sub-categories depend on the rate of occurrence and their level of impact. The findings of the study ranked management and design related risk factors as the most important in Jakarta high-rise building construction projects.

2.5.2. United Kingdom (UK) Related Studies

Substantial literatures have affirmed various kind of risk in the UK construction industry. Therefore, the study by Odeyinka, Lowe & Kaka (2008) identified and assessed the influence and the degree of occurrence of twenty-six possible risk factors (RF) which result to variations between the estimate and actual cash flow. A structured questionnaire method was used to assess perceptions of UK contractors over the influence of these factors on cash flow estimate. The result of the findings shows that 11 out of twenty-six risk factors have an important impact, and they were further grouped into 3 categories which are: 'complexity of project, 'changes in the specification or design and 'natural inhibition'. Delphi technique as one of the best tools to collect data was suggested by the author, and Analysis of Variance (ANOVA) as the best technique to study the differences between the contract or group (small, medium and large firms) perception.

However, Chapman (2001) examined the necessary steps that are involved in the process of risk identification, overall management of the construction project affected by the effect of risk analysis and management process. The total numbers of eighty-five risks were identified and grouped into 4 categories with sub-groups. Semi-structured interview was used to collect data as a technique. In order to quantify the risk and its effect on project success, assessment process which begins with encoding was used to measure the impact and probability of risk occurrence.

2.5.3. The Australia Related Study

Mills (2001) developed a systematic risk management approach to identify and assign risks in a structural way. A small project that was affected by economic crisis was used by him as a case study to explain how effective the approach was. This case study stated twenty-nine risks which were grouped into 4 categories namely; planning risks, design risks, site-related risks, and market risks. As the findings show that risk management tools cannot eliminate all risk from projects but make sure risks will be managed. The researcher concluded that risk management process must be carried out with the party responsible for each risk.

2.5.4. Turkey Related Study

Dikmen *et al.* (2008) designed a tool that was able to store information related to risk and risk assessment information within the life cycle of a project (before-project, during project and after-project phases). A real construction project was used to test the tool in which the author figured out seventeen risk factors and were grouped into fifteen categories within 3 types of risk (external, project, and country).

Oztas & Okman (2004) examined the methods used to identify project risks, risk analysis and cost risk analysis in Turkey with the fixed-price design-build (DB) contract that was carried out. Effect of not applying risk identification and analysis on the fixed-price design-build (DB) projects during an economically difficult time in Turkey from the perception of designer-contractor firms was the main aim of the study. After all, fourteen risk factors (RF) were figured out from project documents, interviews and contract clauses. The persistent rise in general price level, exchange rate and bureaucratic problems were ranked as the major potential risk factors.

2.5.5 The Gulf Region - Related Studies

Kingdom of Saudi Arabia (KSA)

Jannadi (2008) stated that all risk should be considered by contractors to reduce and prevent delays .A mixed-method approach of questionnaire and interviews were used by the author to measure contractor's view of the seven risk factors related with trench construction project in Kingdom of Saudi Arabia (KSA), and potential risks from their responses were identified. Soil condition, equipment, material handling and site condition were ranked as the major risks in the study.

United Arab Emirates (UAE)

El-Sayegh (2008) identified forty-two important risks from the literature review that were assessed from United Arab Emirates Construction Company, both in local and international companies experts. Completed questionnaire by construction experts was used to assess the risk factors. The questionnaire comprises of two groups: the first group was respondents' personal information while the second group was to assess their views of the probability occurrence of events, and allocate each risk to the construction parties (clients, consultants, contractors). In order to categorize the risks, risk breakdown structure (RBS) was used to categorize them into internal and external groups where each group was attached with five categories and risk related factors. The internal group comprises of the clients, designers, contractors, sub-contractors and suppliers categories, while the external group were political, social and cultural, economic, natural and other categories.

The major important top ten risks were identified in the UAE construction company based on the risk assessment as a result of the study. In addition, 'inflation and unexpected changes in prices' created the most significant risk as an outcome of strong comparison between the view of International and local companies' experts in UAE.

State of Kuwait

According to Kartam & Kartam (2001), twenty-six risks were formulated and measured in the State of Kuwait. The authors targeted the assessment, allocation and impact of each risk to delays in construction projects from the perceptions of large Kuwaiti 65 contractors. Finding the best contractual arrangement to avoid or reduce construction risks was the main investigation in their study.

However, a questionnaire which consisted of three parts was used. The first part was designed to examine the behavior of large Kuwaiti contractors towards identification of risk. The second part was to measure the risk allocation, while the final part was to collect data on risk management of the contractors. Based on the result of risk identification, the relative important risk factor was financial failure as the highest, and then followed by delayed payment on completion of contract.

State of Qatar

The study of Jarkas, Haupt & Haupt (2015) revealed ten major construction risks factors to Qatar company from the contractors perspectives which are as follows: (1) slow decision making; (2) delay in payment; (3) frequent change orders; (4) omissions and errors in design drawings; (5) shortage or unavailability of specified materials;(6) financial difficulties; (7) technical specifications and clarity of drawings; (8) shortage in skilled labour and technical staff; (9) late supply of materials; and (10) late response of information from the consultants.

In sum, all the risk management studies across the globe revealed that most of the construction industries from all the countries are affected with financial risk, design risk, management risk, and material risk with labour and equipment risk, which shows that all these major risks are worthy to be studied deeply in this study.

2.6. Effects of Risks on Construction Projects

After relevant literatures on risk identification and assessment have been reviewed, the current study observed a repetitive statement: the effects of those risk on construction projects. In that case, this study needed to review related literature on effects of risk on construction projects and compare them to the literature review in Table 2.1. Below Table 2.2 shows a comprehensive summary review of the important literatures on delays which are the effects of risk on projects.

Table 2.2: *Related literatures on the effect of risk on projects*

No	Author Title	Case study	Risk effects
1	Causes and effects of delays in Malaysian construction industry (Sambasivan &Soon, 2007).	Malaysia	28
2	The significant factors causing delay of building construction projects in Malaysia (Alaghbari *et al.*, 2007).	Malaysia	31
3	Contractors' Perception of factors contributing to Project Delay: Case Studies of Commercial Projects in Klang Valley, Malaysia (Ali, Smith, & Pitt, 2012).	Malaysia	8
4	Construction delays in Hong Kong civil engineering projects (Lo *et al.*, 2006).	Hong Kong	30
5	Causes of construction delay: traditional contracts (Odeh & Battaineh, 2002).	Jordan	28
6	Delays in construction projects: The case of Jordan (Sweis et al., 2008).	Jordan	40
7	Causes of delay in large construction projects (Assaf & Al-hejji, 2006).	KSA	73
8	Delays and cost increases in the construction of private residential projects in Kuwait (Koushki *et al.*, 2005).	Kuwait	9
9	Construction Delays and Their Causative Factors in Nigeria (Aibinu & Odeyinka, 2006).	Nigeria	44
10	Identifying the Important Causes Of Delays In Building Construction Projects (Sugiharto & Keith, 2003).	Indonesia	31

Table 2.2 (Continued)

No	Author Tittle	Case study	Risk effects
11	Large construction projects in developing countries: a case study from Vietnam (Long *et al.*, 2004).	Vietnam	59
12	Causes of delay and cost overruns in construction of groundwater projects in a developing countries; Ghana as a case study (Frimpong et al., 2003).	Ghana	26
13	Construction delays in Florida: An empirical study (Ahmed et al., 2002).	Florida in Miami	17
14	Expert system for diagnosing delays problems in construction projects in Egypt (Amer, 2002).	Egypt	33

2.6.1 Asia Related Studies on Effects of Risk

Sambasivan & Soon (2007) identified twenty-eight major causes of delay as a results of the risk factors with their effects on the construction projects in Malaysia; the views of clients and consultants based on relative rank of the twenty-eight major reasons for delay were measured. The causes of delay were grouped into 8 different categories, and the major 10 causes of delay were listed below: inappropriate planning; poor management of site by the contractor; poor contractor experience; insufficient finance and payments for finished project; subcontractors problems; lack of materials; labour supply; failure and equipment availability; poor communication among the parties; and misapprehension during the stages of construction. More so, the main effects of delay were: arbitration, total abandonment, litigation, disputes, time and cost overruns.

Similarly, Alaghbari, Kadir & Salim (2007) studied the perceptions of different parties on thirty-one factors causing delays as a result of the risk factors which were grouped into 4 categories affecting construction projects in Malaysia, also allocating responsibilities and types of delay. A questionnaire was used and the results revealed that the major causes of delay in Malaysia were associated to 70 contractors, then followed by consultants, and lastly clients. Also, external factors were ranked as the least important in project delays.

Lo, Fung & Tung (2006) identified thirty mutual delay factors in Hong Kong construction projects which led to cost overruns and claims bind with legal agreement. The delay factors were grouped into 7 categories and show the perceptions of the clients, consultants and contractors from 6 projects to measure their point of view on the rank of these delay factors. The delay results show that there was strong agreement between clients and consultants, while consultants and contractors agree on different views of the causes of delays.

However, sixty-two factors causing delays in large construction projects in Vietnam were identified by Long *et al.* (2004), and were grouped into 7 categories. The view of the clients, designers/consultants and contractor/sub-contractors was used to rank the top twenty factors based on the frequency of their occurrence and the level of influence. Furthermore, contractor and consultant related causes were ranked as the highest in terms of frequency of their occurrence.

According to Alwi & Hampson (2003), thirty-one causes of delay were grouped into 6 different categories and contractor in large and small firms were asked to assess the most important causes of delays in Indonesian construction projects. Interviews and survey questionnaire were the tools used for data collection. The results revealed that there were discrepancies between large and small contractors for all categories. The highest ranked factor was management-related factors by the large contractors, while external factor were ranked as the lowest. More so, design-related factors were ranked as highest by the small contractors while execution-related factors were ranked as the lowest.

2.6.2 The Gulf Region Related Studies on Effects of Risk

Assaf & Al-Hejji (2006) studied seventy-three causes of delay due to the risk factors and they were ranked based on frequency of occurrence and their influence on construction projects in the eastern region of Kingdom of Saudi Arabia (KSA). The importance and level of impact of the causes of delay depend on the data collected from the clients, consultants and contractors of construction projects from the eastern region. The seventy-three identified causes of delay were further grouped in to 9 categories.

Koushki, Al-Rashid & Katman (2005) looked into causes of time delays and cost overruns in Kuwaiti private housing projects from the clients' view. It was proved by the clients that change the financial constraints during the design phase were the main causes of cost overruns and time delays. More so, to reduce time delays and cost overruns, sufficient funds and time at early stage of the design must be selected from a reliable consultants and contractors.

2.6.3 Africa Related on Effects of Risk

Aibinu & Odeyinka (2006) identified forty-four factors causing delay from the risk factors to Nigeria construction project and they were grouped into 9 categories. The questionnaire results from the perspective of the construction managers show that thirty-nine out of forty-four factors are responsible for almost ninety percent of project leading to delay in Nigeria such as management, material, finance and design factors.

Furthermore, Frimpong, Oluwoye & Crawford (2003) identified twenty-six factors that contributed to delay and ranked their importance with cost overruns in groundwater construction project in Ghana. The respondents that filled the questionnaire were from public and private clients, consultants and contractors. Payment difficulties, poor contract management and material procurement from the results of the study were the major causes of delay.

Amer (2002) researched on the construction project life cycle in Egypt and figured out thirty-three causes of delays before the construction stage and during the construction project stage. They were further grouped into 4 different categories and clients, consultants and contractors were appraised. Based on the result, a system was proposed by an expert to anticipate and avoid or minimize delays in construction projects.

2.6.4 Middle East-Related Studies on Effects of Risk

Sweis *et al.* (2008) researched on forty causes of delays as a results of the risk factors in Jordan construction residential projects and they were classified based on Drewin's Open Conversion System, which includes material, labour and equipment, client, consultant and contractors as cited by Hwang, Zhao & Ng (2013).

The data collection was done through clients, consultants, and contractors by use of questionnaires and interviews with the senior professionals in the construction area. The study led to general agreement that changing of order and financial difficulties by clients were the major causes of delays, while changes in government regulations and weather conditions were factors with less impact.

Odeh & Battaineh (2002) identified major delay factors on traditional contracts that were used in Jordanian construction projects which led to pricey disputes and claims from consultants and contractors. A questionnaire was used to identify the major factor that causes delay; financing, slow decision making, labor productivity and client interference were the top ten ranked factors causing delays.

2.6.5 United State of America-Related Studies on Effects of Risk

Ahmed *et al.*, (2002) studied and identified seventeen causes of delays from the risk factors, which were grouped into 6 categories, for both Florida and Miami Construction Company, which they were further ranked based on their frequency of occurrence. The scope of the research was based on construction projects in the state of Florida, and data was collected using questionnaire to identify the most important causes of 72 delay factors in construction projects, for responsibilities allocation and to identify different types of delays.

The major delay factors were: changes in specifications, changes to orders, decision made during the development stage, shop drawings approval, design development, changes to laws and regulations building permit approval, changes to drawings and incomplete document inspections. The responsibility share for each party was: client – 24%, contractor – 44%, government – 14%, shared – 12%, consultant – 6%.

In particular, the same risk factors identified earlier from various experts on risk identification were still the same effects the risk were having on the construction projects. The expert's major effects of risks are caused from design, finance, material, management, labor and equipment risks. This signifies that studying these risk elements in the study will be of great opportunities to the Nigerian construction companies.

2.7.Dependent Variable

Substantial experts such as Creswell, Fetters & Ivankova (2004); David & Sutton (2011); Hair, Ringle & Sarstedt (2011) viewed dependent variable as variable that depends on independent variable. These are the variables that the researchers want to understand and explore, and any changes in independent variable might also cause a change in dependent variable. The dependent variable can also be called effect variable and is being influenced by the independent variable. In most cases, dependent variable is on right side of the theoretical framework. In this study, construction risk management is the dependent variable which conceptualized into five (5) dimensions; management risk, material risk, design risk, finance risk, and labour and equipment risk.

2.7.1. Construction Risk Management

The classifications for construction risk factors can be done in several ways depending on the purpose. For example, some risks are classified into internal and external risks, while others are categorized as financial risk, client risk, design risk, material risk, and sub-contractor risk (Jarkas, Haupt & Haupt, 2015; Raftery, 1999; El-Sayegh, 2008). The categorizations of the risks factors in this study have been derived based on the previous risk relevant studies attended are presented in Table 2.3.

Table 2.3: *Categories and Classifications of Risk Factors from Previous Studies*

Categories	Rank
Management/administrative risk factors	1
Material risk factors	2
Design risk factors	3
Financial risk factors	4
Labor and equipment risk factors	5

After comparing the different categories included in the reviewed literatures on identification of risk factors, the results (Table 2.3) shows five leading categories which are management, materials, design, financial and labour and equipment.

However, in this research, the main categories was chosen after several revealed literatures from different countries, it was affirmed that these are the top five leading risk factors. In that case, this study seeks to investigate them thoroughly.

2.7.1.1 Management Related Risk Factor

There are two major aspects in project management, the science and the art of the project. The science aspect of it deal with defining and coordinating the work to be carried out, while the art aspect of it deal with people involved in the project; for an instance, it requires the understanding, knowledge, and the skillful application of a project management process (Heerkens, 2001).

Wahab (1990) established that there is poor management in Nigeria construction companies, which has led to higher importation of raw materials from foreign country with abundant of raw materials in Nigeria but they are yet to make use of them.

However, Zavadskas *et al.* (2010) claimed that the contractor's assessment and selection stages should be exposed to taking into consideration the factors that influence the process of construction efficiency.

Similarly, it was found by Johnston (2002) and Zakeri *et al.* (1996) that lack of proper caring from the management in Iran construction projects has led to identify the following factors influencing construction workers to be less productive while working in the construction site, which are; poor housekeeping, poor lighting in the work area, excessive moving of skillful people from one project to another, inadequate ventilation, uncontrolled breaks, inadequate tools and equipment, high employee turnover, shortage of rest rooms and drinking water and impromptu decisions making by the supervisors have found to be the leading factors caused by management during construction project in Iran as cited by Ghoddousi & Hosseini (2012). In line with the study of Jarkas, Haupt & Haupt (2015) which revealed lack of proper management in Qatar Construction Company as one of the major factors to construction risk management.

Faridi & El-Sayegh (2006) reported that shortage of skillful manpower, poor supervision, unsuitable leadership, poor site management, shortage and breakdown of equipment are factors caused by the management in United Arab Emirate construction projects.

Kaming *et al.* (1997) in their study revealed that skill workers in Indonesia spend almost 75% of their time working productively, but there are five major factors that make them to less productive which are; lack of equipment and tools, lack of materials, rework, absenteeism and gang interference during construction process.

More so, survey studies conducted in Uganda shows that workers are not satisfied with the financial situations. It was also shown that workers were not satisfied with the level of training and the state of participation in decision making process which has adversely affects productivity as a results of the poor management (Alinaitwe, 2008, 2009).

Olomolaiye *et al.* (1987) identified the management problems influencing skillful workers' productivity in Nigerian construction companies to be; lack of material, lack of tools, delays in passing instruction, repeated work or duplicated efforts, change of team members and incompetency of supervisors as cited by Ghoddousi & Hosseini (2012).

2.7.1.2 Material Related Risk Factor

Material related risk can directly affect project activities, and the effect on the cost of any project maybe important (Manavazhi & Adhikari, 2002). Risk factors that are associated to materials are selection time, type of materials, and availability of the material in the local market. The material category can have an understandable effect on increase in cost and delays.

Wahab (1990) perceived that Nigeria is blessed abundantly with raw materials, which may be converted to new building materials with reasonable price to the growing population, but till date no difference in the Nigeria construction industry. However, the current study framework maybe a base benchmark for the Nigeria construction industry to make sure that all materials are available at their disposal since it has been affirmed in this study and other experts as the major risk factor affecting the industry globally.

Experts have identified various inter-related challenges the construction industries in developing countries are facing as stated by the Department of Economic and Social Affairs (1962) Ofori (1993): (a) recurrent scarcity of construction materials resulting from the performance of users for conservative materials, of which most of them were brought from foreign countries; (b) lack of technological development in majority of the organization's, with lacks of equipment and plant, insufficient research and development programs and facilities, and poor relationship between practice and research; (c) inadequate skilled construction workers, and a poor reputations of construction companies; (d) an unfavorable working environment for construction companies, with difficult procedures and regulations, delays in payment to workers, and inappropriate contract documents; and (e) fluctuating and low level of construction activities.

The general concept that dominated both academia and company is that shortage of materials and equipment needed for construction is a grounded reality in developing countries construction projects. Ofori (1993) states that such shortages are significant and unfavourably affect construction projects.

Jarkas, Haupt & Haupt (2015) also affirmed late delivery of materials as the major construction risks to the Qatar construction companies, while the findings of Manavazhi & Adhikari, (2002) shows that delays in delivery of materials to the construction site, have a high impact on the overall schedule cost for the entire project. According to Mojahed & Aghazadeh (2008) availability of raw materials appears to be the only major productivity factors among the results of the research gathered by the experts in Iran, Nigeria, Thailand and USA (Ghoddousi & Hosseini, 2012).

2.7.1.3 Design Related Risk Factor

Allocation of sufficient time and money at the design phase is one of the most important requirements to reduce some of the risk factors like time delay and cost overrun in the project (Koushki, Al-Rashid & Kartam, 2005). Design is one of the most serious categories because the related factors associated to it were identified as the key risks in construction projects (Fereig & Kartam, 2006).

Furthermore, in the relationship study conducted between the contractors and subcontractors in Saudi Arabia construction companies, it was discovered that some factors significantly affected their relationship.

Based on the findings from the questionnaire survey of 16 contractors generally and 17 subcontractors, the factors were ranked as follows: poor design from the architecture as the leading factors which has led to scope creep by the clients, delay in payment of the workers, lack of quality in construction work, error and delay in drawing (Al-Hammad, 1993).

The results of Koushki, Al-Rashid & Kartam (2005) showed that a significant reduction between time delay and cost overrun was experienced by clients who spent more money and time on design phase of their residential project. Early design and money spent during the design phase of a construction project would ensure a better design quality and a more complete set of design drawings which would consequently reduce the possibility of change orders and mitigate costly delay during implementation phase of the project.

2.7.1.4 Finance Related Risk Factor

This category comprises of all factors that are associated to possible financial difficulties in the execution of the project, such as payments delayed and cash flow problems (Alaghbari, Kadir & Salim, 2007). Most of the reviewed studies showed that the major finance-related risk are payment delayed for completed work on Nigeria construction projects Sweis *et al.,*(2008); Aibinu & Odeyinka (2006). In line with the studies of Bramble & Collahan (2011) that show financial difficulties is one of the major risk factors to USA construction industries.

Finance has been seen as the most paramount resource during the construction process (Mawdesley, Askew & O'Reilly, 1997). More so, financial planning is fundamental for any construction company to survive. This is important because lack of fund has been branded to be the common causes of most business failure.

In construction, the major technique of financial planning is the cash flow estimating which allows the timing of financial requirements to be foreseen in advance and adequate arrangements are made to ensure funds are available to avoid the unsavoury consequences of indebtedness. However, the major challenges the construction managers find in making financial decisions comprises of both uncertainty and ambiguity bordering expected cash flows (Eldin, 1989). The issues of uncertainty and ambiguity are induced not only by project-related difficulties but also by technology and economic factors (Laufer & Coheca, 1990).

The study of Amer (1994) and Abd El-Razek, Bassioni & Mobarak (2008) examined the cause of delays to Egypt construction campanies, their findings showed that financial payment to completed work was the major risk factors affecting the completion of most of the construction project. Consistent with the studies of Memon *et al.,* (2013) as cited by Shehu, Endut & Akintoye (2014) checked the effect of cost overrun in Malaysia construction company project, their findings shows that approximately half of all Malaysian construction project experience between 0.03 and 72.88% of cost overruns with just slit difference from other countries.

Similarly, the study of Assaf, Al-Khalil & Al-Hazmi (1995) findings revealed that financial issues during construction were the major risk factors that caused delay to most of the Saudi Arabia construction project from the view of architects and engineers. Consistent with studies of Mezher & Tawil (1998) that studied causes of risk factors that result to delay in Lebanon construction company from the view point of owners, contractors and architecture and their findings showed that financial issues are the main risk factors leading to delay in Lebanon. Also in line with the study of Alaghbari, Kadir & Salim (2007) that looked into the causes of risk factors that result to delay in Malaysia building construction project and their findings showed that financial issue was the major risk factors to Malaysia building construction project from the viewpoint of the contractors.

2.7.1.5 Labour and Equipment Related Risk Factor

Labour risk are associated to problems of manpower such as lack of skilled labour and shortage of available workers, while factors associated to equipment are quality, availability and reliability of the equipment (Sweis *et al.*,2008). In line with the study of Manavazhi & Adhikari (2002) which stated that contractors hired unqualified workers to cut the cost being schedule for the project and at the end it affects the quality of the project.

Furthermore, Enshassi *et al.* (2007) conducted a survey of building projects in the Gaza strip. The results of the findings showed that there were ten (10) main factors that were negatively affecting workers' productivity which labour and equipment were ranked to be the major factor then followed by shortage of materials, low labour experience, low labour surveillance, disputes among labour and superintendents, drawings and specification alteration during execution, payment delay, labour disloyalty, inspection delay, working throughout the week without holiday, and shortage of equipment. Furthermore, forty five (45) factors deliberated in the study were distributed into 10 categories which are as follows: materials/ tools factors group, manpower factor group, project factor group, external factor group, safety factor group and motivation factors group.

More so, in a study conducted by Rivas *et al.* (2011), they focussed on identification and understanding the productivity factors influencing projects in Chilean construction companies, based on the questionnaire distributed for both direct workers and midlevel employees, the outcome revealed that the main factors influencing construction productivity were ranked as follows: labour and equipment as the leading factor, then followed by materials, tools, rework, the workers motivational dynamics and truck availability.

2.8. Independent Variable

According to Creswell, Fetters & Ivankova (2004); David & Sutton (2011); Hair *et al.*, (2007), Independent variable is a variable which affects and explains the dependent variable. Increase and decrease in independent variable affect level of dependent variable. Independent variable refers to influenced by dependent variable. By reading extensive literature, this study make used of two construct of independent variable and their dimensions which are organizational internal factors (effective communication, team leadership and skill and effective communication), these 3 Internal factors was chosen following Doloi, (2009) because these are the leading internal factors from the world view that has been affirmed to have an influence with constriction risk management. While organizational external factors (political, organizational culture, technology and economic) that were found to influence construction risk.

2.8.1. Organizational Internal Factors

In this study, organizational internal factors are conceptualized as effective communication, team leadership and skill and active leadership following (Kumaraswamy & Chan, 1998). Organization resources might be tangible or intangible and it can be combination of the two, or human resources. The tangible resources are organization assets like; equipment, land, capital and labour. The intangible resources are those that cannot be seen physically by the organizations, like the internal factors in this study. While the human resources comprises of the training and education of manager, team members and the owners (Inmyxai & Takahashi, 2009).

2.8.1.1. Effective Communication

In most cases, effective communication can be seen as hidden element for success. The disposition of the research warrant this variable and to check it influence with the dependent variable as stated in the research theoretical framework. Reliable and frequent communication is essential for successful project with less risk. This variable is vital for any project team or organization. It is necessary that authentic and clear information are disseminated at the appropriate time and place to the right person during the construction project. Also, the flow of information, either top down or bottom up communication is an essential characteristic of project to think about. It also lessens conflicts, and improve decision making and it influence on project team member performance to their project manager (Doloi, 2009). The critical issues is that, most of the time crucial information are not available to take right action, so it is required to make communication most vibrant tool for successful project (Moe & Pathranarakul, 2006).

Communication is a channel by which a sender transfer some information to the receiver. Both the sender and the receiver might be the project manager to the team members. Information can be transfer from various medium like; email, Facebook, Telephone and face to face. The face to face communication are deliberated to be more paramount which enhance sensitive issues in passing the information. Communication is useful for coordinating team member's efforts, directing their actions and build good working relationship with contractor or the project manager (Greenberg & Baron, 2008).

Furthermore, the advantages of flow of information and communication were harassed by most construction parties in some cases. This study needs to see the influence of effective communication on Nigeria construction companies as well. However, Loosemore (1998) affirmed that communication useful under uncertain conditions, while the reasons behind this information was used as a source of power, and when crises arose, information became more thoroughly guarded. Also during crises, there is a high possibility for information to be overload. This causes bottlenecks in dissemination of information where too much of it are disseminated within a short period of time, thereby unfavourably affecting communication. This advocates that even though communication is measured to be useful in dealing with uncertainty in construction projects, it may not be likely to occur (Geraldi, Lee-Kelley & Kutsch, 2010).

Lack of effective communication of project requirements between the contractors, project managers and team members has been reported to be the causes of most project failures (Li *et al.*, 2011; Robertson & Robertson, 2006; Karim Jallow *et al.*, 2014).

2.8.1.2. Team Competency and Skills

Team competency and skills are important variable to be considered, because these provide knowledgeable and technical human resource which are necessary for contractors, project managers and team members to achieve the project goals. Team competency and skills can be seen in terms of skills, knowledge and attitude. Team dynamics are also connected with team competency; that is what type of characteristic team have and what are the characteristics required for the project execution. These should be the first priority of every organization to educate/ train the project managers with the team members on how to deal with urgent action (Simpkins, 2009). Reduction of risks in construction project cannot be effective without participation of project team members. Team member's competencies and skills are important for a successful project delivery, which require an effective training to increase their competencies (Moe & Pathranarakul, 2006).

Furthermore, each and everyone have different abilities (capacity to handle different tasks) and skills (actions on specific task, which has been acquired through training). Skills and competencies are both important for contractors, project managers and team members in order to tackle uncertain event in the project (Greenberg & Baron, 2008).

A team can be defined as a group of people that are working together in order to accomplish a common goal which all team members are accountable for that. Project team are working temporarily on a project and once the project come to an end, they also end their contract for that particular project. To reach a closure in project based on the schedule time and budget, it is required to provide essential skills to team members, this would be helpful in performing their tasks efficiently in normal as well as in emergency condition (Greenberg & Baron, 2008).

2.8.1.3. Active Leadership

Most of the previous studies emphasis on strategies, leadership styles and behaviour. Successful project necessitates different kind of leadership from the normal routine project work. In construction project, there are needs for active leaders that can take serious actions on run time in order to avoid making situation worse. Active leader is one of the most important independent variable proposed in the theoretical framework. Project leader priority is to run project in emergency situation as it will be run in condition (Simpkins, 2009). For active leadership to respond to normal risk event, there are needs proactive leaders not reactive as proactive leaders give instructions in a project and reactive leaders try to bring a solution to the existing and foreseeable events in the projects. Proactive leaders are successful to finish the project based on the estimated budget and time. Proactive leadership is required when some uncertain event occurred in the project. The proactive leaders are the firelighters while the reactive leaders are the fire-fighters. Before a successful project can be attain, it is required to move from reactive to proactive leadership (Barber & Wan, 2005).

More so, a leader can be define as a person who possess an authority to influence others. Leadership is to influence others in order to achieve a certain objectives. Leadership includes followers; in construction project, leaders are usually the contractors/ project managers and followers are usually the project team members.

Leaders should be competent enough to lead in stressful conditions, guide and direct their followers. Flexibility is also vital, because they are various kind of risks and the ways to tackle each risk would be different based on state of projects. So leaders are expected to change their actions based on risk events (Greenberg & Baron, 2008).

2.8.2. Organizational External Factors

Complexity of construction process determines the type of environment which it subsists in (Walker, 2000; Walker, 2015). Construction process can be directly or indirectly based on the environmental (external) forces act of the project. The construction process can be related to the environmental influences acting directly or indirectly on the clients' activities. As a result of this, project managers have to get over these types of problems by process of conducting analyses on project environment, scanning for any potential problems and detecting the level of occurrence. Conversely, an action to predict and interpret changes in the environment by observing thorough information which can be used to create a set of developments can be seen as environmental scanning, (Robbins & Cenzo, 2007).

Furthermore, several issues are associated with the construction environment such as dust, noise, emissions, waste and health issues, more areas to be viewed which comprise of the project environment and government policy of the project team which are clients, contractors, sub-contractors, architect, quantity surveyor, structural engineer, services engineer and suppliers who are all bore on by economic, technology, cultural and political factors. Dust and noise are the persistent problems to construction sites neighbors (Fewings, 2005). Nevertheless, environmental forces can be grouped into four categories (Walker, 2000):

1. Political factor;
2. Organizational cultural factor;
3. Technology factor; and
4. Economic factor.

2.8.2.1 Political Factor

Jaafari (2001) stated that the influence of environmental variables such as safety, community perception, and legal acceptability, political and social impacts on project is mostly high. It was further explain by the author that political factors include discriminatory legislative, covering tax regimes, riots, strikes, civil unrest, wars, terrorism, invasions and religious turmoil.

Construction project encounter political forces which refer to the influence of the government policy on the projects. For example, reduction in the degree of investment and the provision of finance that may affect the labour market productivity. Furthermore, international projects are affected because of the political relationships between countries. Legal forces can be seen as legislation that might disturb accomplishments of the clients' activities. For example, regulation on safety and planning are affecting the construction projects directly through legislation or having an effect on enthusiasm to build (land controlling).

However, Institutional forces are the professional institutions such as stakeholders, head office and main organization regulating their members (Walker, 2015).

Political factors might also show how government intervenes in the economy. Precisely, political factors comprise of areas such as tax policy, labour law, environmental law, trade restrictions, tariffs, and political stability. Political factors may also comprise of goods and services which the government wants to provide or be provided (merit goods) and those that the government does not want to provided which are called (demerit goods). Furthermore, governments have significance influence on the health, education, and infrastructure of a nation (Walker, 2015).

2.8.2.2 Organizational Culture

Organizational culture is a mental concept that has been discussed for over thousands of years by experts, anthropologists, sociologists, historians and philosophers.

According to Walker (2015), cultural influences are denoted to the acceptability of the general public and the locals to particular activities.

Many authors have already attempted the importance of establishing a strong culture in the organizations (Hofstede *et al.,* 1990; Sackman, 1991; Kotter &Heskett, 1992; Schien, 1996) for successful project in the organization, the contractors, project manager and team members must have total commitment to the project.

Deal & Kennedy (1982) and Peters & Waterman (1982) suggested that successful project in an organization are considered by their strength to improve the organization cultural values that are well associated to their chosen strategies.

More so, Hofstede *et al.* (1990) and Schein (2004) perceived organizational culture as the elementary assumptions, values, beliefs and models of behaviour, practices, rituals, heroes, symbols, technology and artefacts. In addition, Hartog & Verburg (2004) indicated that organizational culture is a strong tool that is associated with "behaviour and attitude" of contractors, project managers and team members during execution of project which significantly influenced construction risks.

However, several researchers have attempted in classification of organisational culture and finally a single definition was given. It was further expanded by those who are the pioneers in the field of organizational culture such as (Hofstede, 1980; Deal & Kennedy, 1982; Schein, 1985). Firstly, Hofstede (1980) highlighted that there are regional and national cultural groupings that might have an influence on organization.

The author further declared that culture can be viewed from five dimensions with national influences, such as:(1) uncertainty avoidance; (2) power distance; (3) masculinity versus femininity; (4) collectivism versus individualism; and (5) short-term orientation versus long-term. Secondly, Deal & Kennedy (1982) viewed the measurement of companies based on feedback and risk, where fast feedback indicates an immediate reply and risk represents the level of uncertainty in the organizations performance. They grouped organization culture into four dimensions: (1) work hard/play hard culture; (2) tough-guy macho culture; (3) process culture; and (4) bet your organization culture. Finally, Schein (1985) classifies organization's culture into three dimensions: (1) assumptions at the first level; (2) values at the second level; and (3) artefacts at the third level.

Therefore, researchers have found out that it is important to understand organization culture in relations of dealing with people such as contractors, project managers and team members and their commitment towards the project they are handling, which are in line with Schraeder, Rachel, & Mark (2005); Barbosa & Carlos(2007). Schein (1985) stated that culture can be shown from three various levels: artefacts, shared values and underlying assumptions. Artefacts are the obvious components of the culture, for instance structural design, dressing code and physical layout. Shared value represents the standards organization set for their workers in judging people, object, situations and acts. Underlying assumptions are considered to be the essential culture for instance, sharing of things within people such as human nature, social relationships and relationships between social institutions and their surroundings.

To be specific, significant of studies globally have agreed that the greatest performing organizations invested in their organization culture and those that consciously implementing a strong culture in a systematic and consistent way for the past decades outperformed those that did not.

2.8.2.3 Technology Factor

According to Akanni, Oke & Akpomiemie (2014), technology is the views of an environment which must be considered in developing countries strategic plans. Oladapo & Olotuah, (2007) asserted that a suitable and proper construction technology can be measured by the presence of plant and equipment that are made locally, magnitude of local material resources and the level of utilization of the local construction resources, and the skilled manpower resources.

However, the construction companies in Nigeria according to the oil flourish in 1970/71 were qualified by the growth of projects which needed the construction technology and resources of developed nations. The shortage of managerial manpower and the absence of technological know-how were conceived to be one of major problems and limitations facing the nation. The condition as at 1980 was perceived as follows; “lack of basic knowledge of production methods and design techniques for machinery constitute a serious constraint to rapid industrialization of the country.

The situation is aggravated by acute shortage of managerial manpower”. As at today, Nigeria still remains a net importer of technical manpower, almost all the spare parts are imported and nearly all investment in research and development (R&D) are built abroad, except those financed by the government in public companies .

Therefore, technology factors comprise the effect of the technologies on the development. It may include ecological and environmental aspects, such as research and development (R&D) activity, automation, technology incentives and the rate of technological change. They can determine barriers to entry, minimum efficient production level and influence outsourcing decisions. Furthermore, technological shifts can affect costs, quality, and lead to innovation in the construction companies (Walker, 2000).

Leavit & Whisler (1958); Sommerville & Craig (2006) proposes that information technology (IT) comprises of software and supportive hardware that are used to improve construction performance. It is also used to incorporate all sets of software and hardware that are used to improve project work practices through mechanization or integration, while Bharadwaj (2000) empirically examined the relationship between technology capabilities in Construction Company and other business performance, and a significant positive relationship between technology capabilities and construction risks were discovered.

2.8.2.4 Economic Factor

The economic and financial aspect of an organization depend on the level of universal economic activity, as well as the available resources to execute the work, which includes the economic competition of several level around the appointment of all parties involved in building projects. Financial shortage always seem to occur on building project, according to Obalola (2006) whose study depicted that financial environment drives are discerned from economic factor on the basis that economic is connected with deployment of resources, while, financial shortage are strictly linked with money. An inspiring task for any project manager is seen that a project is financially feasible within an inconsistent economic environment, Odeh & Battaineh (2002) revealed that occasional economic cycles significantly influence the construction company activities, and precise forecasting of economic veers between local and global are very important (Oladapo & Olotuah, 2007).

According to Walker, (2000) economic factors can be seen as the accessibility of materials, finance, equipment, labour and the degree of demands. It also includes economic growth, interest rates, exchange rates and the inflation rate. These factors have significance impacts on how businesses operate and make decisions in the construction risk. For example, interest rates affect a company cost of capital and therefore to what extent a business grows and expands. Exchange rates affect the costs of importing goods (construction materials) and the supply and price of imported goods in an economy.

2.9. Moderator

Baron & Kenny (1986) stated that a moderator is a quantitative (for example, level of reward) variable that affects the strength or direction of the relationship between an independent or predictor variable and a criterion or dependent variable.

The author stated that with a correlational analysis framework, a moderator is a third variable that affects the zero order correlation between two other variables as stated in the framework for this study. A moderator effect within a correlational framework may also occur where the direction of the correlation changes. However, before a moderator can be used, statistical analysis must be measured and test the influencing effects of both the independent and the dependent variable with the function of government regulation (rules and regulations) as a moderator in this study (Stern, McCants & Pettine, 1982; Baron & Kenny, 1986).

2.9.1. Government Regulation (Rules and Regulations)

Flanagan & Norman (1993) found out that rules and regulations play an important role of moderating the relationship between certain organizational internal and external factors to the construction risk management. Rules and regulations are used as moderators in this study because they have been used as independent variables in the study of Ismail (2001) in Malaysia context, Iroegbu (2005) in Nigeria, while these have been used as dependent variables by Aniekwu (1995); Gibb(2011); and Niu (2008) in Nigeria, Scotland and China respectively.

Ismail (2001) revealed that in Malaysia context, rules and regulations on housing with a positive relationship with construction risk management stated that, there must be a replacement for the traditional building practices by an industrialized building system (IBS), which on the long run might save labour, cost, confer quality and durability and time of construction in Malaysian construction companies as cited by (Alaghbari *et al.*, 2007). In line with the study of Iroegbu (2005) which also revealed that government rules and regulation positively influenced construction projects in Uganda, such as the importation of the construction materials and taxes.

Similarly, the housing rules and regulations policy in the UK comprise of whose salaries are low and the policy has reduced a fraction (65 per cent) of every pound household income which is higher than the household's threshold income. It was further discussed that the Scottish government is willing to increase the annual housing completions (market and affordable supply) from around 25,000 to 35,000 unit by 2015. Which they believe it will address housing market volatility and unmet needs.

The author further concluded that the predicament in the UK rules and regulations policy is to gain enough subsidy to make sure the required rent remains affordable. Government trial has been to secure ways to reduce grant but to keep rent affordable by reducing cost (for example; the purchases of sub-market price land or through scale economies) or looking for the means to cross-subsidies the development from the internal resources or through revenue gained from the market activities which this possesses a positive relationship with construction risk (Gibb, 2011).

Niu (2008) revealed that rules and regulations policy in China for over 13 years from 1994 to 2006 have been fluctuating due to the change in policy where the government take absolute controls of the land supply and plan for construction of affordable houses. Furthermore, based on the organizational control theory, the price control of affordable housing is somehow effective. But in general, home ownership affordability is still low in China cities, mainly because of the high price of commercial housing which brought in the government policy to support in reducing the price of the commercial houses to be more affordable.

Elinwa & Buba (1993) stated that insufficiency in government regulations, rules and specification on what qualification the contractors should possess from the aspect of technical and financial experience which have paved way and encouragement for small contracting firms that are not qualified to acquire a project in Nigeria which have added to the risk and low quality in construction projects.

Kartam, Flood & Koushki (2000) affirmed rules and regulations to be very important in safety management of workers in construction companies. More so, the European Agency for Safety and Health at Work (EASHW, 2003) revealed that most dangerous companies in terms of safety and health are the construction companies. From the worldwide views, the construction workers are three times more probably to die and two times more probably to experience injuries when compare to the average of workers in other companies activities. Workers are also prone to chemical substances, biological agents, noise vibration and temperature and ergonomic deficiencies (Sousa, Almeida & Dias, 2014).

However, Hastak & Shaked (2000) highlighted that rules and regulations significantly influence the agencies in the country, by introducing trade restriction, foreign currency exchange, or change of trade legislation with a positive relationship on construction risk management, organizational internal and external factors. For example, macroeconomic stabilities are associated with fiscal and monetary policy attitude, and with a country exposure to economic melt-down which may affect the prices of building materials. It is clear that government policy has a significant impact on the organization, although the extent of the impact is still immeasurable, especially on the moderating effect.

Manavazhi & Adhikari, (2002) supported rules and regulations from the government which have a positively significant influences on materials used in construction project in which suppliers monopolize their products, but if government rules and regulations are well established in the market, monopoly will not occur which would go to the extent of affecting construction projects.

Similarly, construction market level risks for a foreign company which includes technological advantage over local competitors, availability of construction resources, complexity of regulatory processes, and attitude of foreign and local government rules and regulations towards the construction company. While project level risks are specific to construction site and include logistics constraints, poor design, safety in site, poor quality and environmental protection (Thobani, 1999).

Government rules and regulations are directly linked to health and safety legislation which are frequently imposed by the Health and Safety Executive (HSE) or the local authorities (LAs). The Health and Safety Commission's (HSC) responsibilities are to monitor health and safety during the construction projects which this has a significant impact on company internal and external factors. For example, they are known for standard setting, policy enforcement and policy development (Gilbertson *et al.,* 2011).

Management of Health and Safety at Work Regulations (MHSWR, 1999) perceived risk as the hazard of probability of possible harm caused by something. The levels of the risk base on the probability of it occurrence, the possible severity of the risk such as the population that may be affected and the health effects. Procedures of the Management of Health and Safety at Work Regulations 1999 (MHSWR) need risk assessment by identifying the hazard and assessing the risk that may affect a project. For example, the assessment method figures out the probability of accidents that may occur, and the severity of the probability harm (Ahmed, 2008).

In particular, it is paramount to maintain a safe working environment in construction business. Human mistake plays a vital role in the causes of the accident. It constitutes up to 90% while the remaining 10% represents technical mistakes due to uncontrollable conditions. Most time in construction business, health and safety regulations are pressured to reduce accidents and large contractors need prove of minimum safety training for workers and managers (Hamid *et al.*, 2003).

2.10. Relationship between Organizational Internal Factors and Construction Risk Management

Previous researches have shown that dispersed and informal company resources facilitates construction risk management though they are intangible resources. On the other hand, effective communication, team competency and skill and active leadership are found to be the major barriers to the construction company during the execution of a project which if, it is taken with levity hands, it results to risk (Geraldi, Lee-Kelley & Kutsch, 2010; Karim Jallow *et al.*, 2014).

This present research seeks to assess the relationship between effective communication, team competency and skill and active leadership on effective construction risk management of Nigerian construction companies. In this research, effective communication refers to the life-blood of any company and the project team. It required that authenticity of information is passed at the right time, place and to the right person, it is also consistent with study of (Moe &Pathranarakul, 2006; Doloi, 2009) that effective communication minimizes conflicts, improve decision making and effect on project team member performance, which shows that most of the time vital information are not available to take proper action, that make communication more important in construction companies to reduce risk that occur during construction projects. The study of Bakar, Ali, Onyeizu & Yusof (2012) confirmed that communication has a significant relationship with construction risk management. Doloi, Sawhney, Lyer & Rentala (2012) also affirmed that lack of communication in Indian construction projects influenced construction risk management.

Likewise, the study of Bresnen and Marshall (2000) in the UK construction industry, affirmed no significant relationship between effective communication and construction risk management. In contrary, research conducted by Alinaitwe (2008) in Uganda construction companies demonstrated a negative relationship between effective communication and construction risk management.

However, team competency and skills refer to skills, knowledge and attitude. They also pronounce team competency, that is what type of characteristics the team has and what are the characteristics required for risk situation. These should be the highest priority of all company to make sure contractors, project manager and team members are educated especially in taking quick action to reduce risk during construction process. Risk response cannot be effective without the project team members participation. Team members competencies and skills are important for project success which produce positive relationship with construction risk (Simpkins, 2009).

Also in line with the study of Moe & Pathranarakul (2006) that different person possesses different abilities (ability to perform different task) and skills (command on actual tasks, which has been gained during the training) with influence to construction risk. Skills and competencies are both essential for contractors, project managers and team members, in order to respond to uncertain events and achieve project success (Greenberg & Baron, 2008). The study of Akintoye and Macleod (1997) revealed a non-significant relationship between the team competency and skills with construction risk management.

According to Simpkins (2009) active leadership must be the first priority of all project leaders to direct project in an emergency condition as it is expected to be directed in a normal condition. The author further classified leadership into two, which are proactive and reactive leadership. Reactive leadership solve the existing and foreseeable uncertainty in a project while proactive leadership are used to be successful in project completion within the stipulated time and budget. It is also in line with the study of Barber & Wan (2005) which stated that a leader is a person who has power to influence other team members in order to achieve a certain goals with a positive effect on construction project.

Active leadership has been found to be an important dimension affecting construction risk management. In a study that examined the relationship between active leadership and construction risk management, (Greenberg & Baron, 2008; Geraldi, Lee-Kelley & Kutsch, 2010) found out that active leadership positively influenced construction risk management such that in any organization where there are monitoring and control, there seems to reduce risk occurrence on construction projects. Contrary, the study of Ahmed, Ahmad, Saram and Darshi (1999) in Hong Kong affirmed a negative relationship between active leadership and construction risk management. Also in line with the study of Assaf & Al-Hejji (2006) affirmed a non-significant relationship between active leadership and risk management in Saudi Arabia construction industry.

2.11. Relationship between Organizational External Factors and Construction Risk Management

Quite an extensive number of researchers have studied the influence of organizational external factors to the company with the construction risk management. Ho & Pike (1992) advocated that external factors to a company would influence the company together with the application of information technology in construction projects. This is line with the findings of Kangari & Riggs (1989) whose study showed that external factor as one of the factors that influenced the practice of technology in construction projects. Results of researchers with the experts seem to be reliable with the influence of external factors.

Israelsson & Hansson (2009) discovered that Sweden property stock, mostly in design of building project are affected with political decision, which in the process of making decision and flexibility in buildings are affected. Political decision positively influences construction risk management within the organization, by which some companies are politically connected to one another. The author further discussed that those who are connected to the ruling party in the political affairs tend to receive more capital, support and huge projects with experts and vice versa to those that do not belong to the ruling political party. The study of Jaafari (2001) established a non-significant relationship between political factor and effective construction risk management.

Similarly, Scupola (2003) found that economic factors positively influence construction risk management. The author suggested that economy competition in the economy and the role of government would positively influence construction risk management, since the materials to be used for construction project are not available in the market. Economy competition would persuade construction companies to device a way to achieve a competitive advantage, which will make companies to be more creative in a new ways of doing things. Also, Israelsson and Hansson (2009) affirmed a negative relationship between economic factor and effective construction risk management.

Lewis *et al.* (2003) argued that culture is always being created within projects sometimes more towards integration and sometimes towards fragmentation. Jabnoun and Sedrani (2005) found out that culture positively and significantly influenced that project performance during construction. This is in line with the study of Dulaimi, Nepla & Park (2005) that suggested management should supply adequate support to create culture which would improve or nurture project manager's performance during construction project, which shows that culture positively influenced construction risk management.

Kuo & Kuo (2010) proposed five variables to measure project performance in construction company which are company attribute towards change, level of ability to handle multiple projects, strength of company culture, level of workers participation in making decision, and level of planning construction company. In addition, Ankrah & Langford (2005) found out that objectives and culture of company would influence project performance which may result to risk in the projects.

The study of Ankrah and Langford (2005) which was on comparative study on organizational culture and construction risk management established a non-significant relationship between these two variables. In line with Koushki and Kartam (2004) study in the Kuwait construction industry, they affirmed a negative relationship between organizational culture and construction risk management.

2.12. Relationship between Government Regulation (Rules and Regulations) with Construction Risk Management

In this study, government regulation (rules and regulations) refer to ways by which government regulates price of building materials, rules on qualification of the contractors, health and safety legislation of workers during construction process and approval of building documents. Niu (2008) examines the influence of government regulation on construction projects in China. The findings showed that government rules and regulations significantly influenced construction risks. Consistent with prior studies of Aibinu &Jagboro (2002) and Iroegbu (2005) that examined the effects of construction risks in Nigeria construction project, their studies showed that rules and regulations significantly influenced construction projects. Flanagan and Norman (1993) results advocated that environmental intricacy and uncertainty in project would influence construction risks. Similarly, rules and regulations from the government may encourage construction companies and also enhance risk management (Lai, Ngai & Cheng, 2005).

In examining the rules and regulations relationship with Construction Company's competency, Porter (1990) claimed that regulations that necessitate companies to meet specific performance standards for some products or health with safety surroundings for the workers are by forcing them to improve their product quality and rate of technology used in construction process. Consistent with opinions of scholars, Niu (2008) advocated that performance and standard government regulations would positively influence the conclusion of companies towards every actions to be taken in construction activities, for example, buying of construction materials.

Furthermore, Hartono, (2014) examined the relationship between rules and regulations and construction risk management, and indicated that rules and regulations with construction risk are theoretically and empirically related. Gann *et al.* (1998) and Gann (1996) studied the effect of construction government regulations on introducing energy effectiveness into United Kingdom construction projects. The results showed that government rules with regulations motivate company to follow normal protocols during construction process as cited by (Gann Salter, 2000).

Similarly, this is also in line with the study of Aniekwu (1995) who studied the business environment of the construction company in Nigeria. The author studied 47 variable which adversely affect the construction company. Thirty-seven (37) of the variables were classified under the business environment of which government policy (rules and regulations) were discovered to be positively influenced Nigeria construction companies.

In sum, the view of the experts has proven the moderating potentiality of government regulation (rules and regulations) as a significant variable to be further examined in this study. Table 2.4 depicts the summary of relevant studied literatures on construction risk management.

Table 2.4: *Summary of previous studies on construction risk management from the global view*

NO	Author (s)	Area / Country	Participant	Methodology	Data Analysis Method	Findings/ Variables
1	Tang *et al.,* (2007)	Constructions / China	Contractors and Clients	Interviews and questionnaires	Dilemmas analysis	The findings affirmed that delay in payment, equipment and shortage of materials were the risk factors affecting the China construction company
2	Koushki & Kartam (2004)	Construction / Kuwait	Contractor, engineer, and architecture	Interviews	Purposive sampling	The findings revealed that late delivery of construction materials to the site is the only risk factor affecting Kuwait construction company.
3	Ahmed *et al.,* (1999)	Constructions / Hong Kong	Contractors/ Clients	A questionnaire with twenty-six risks	t-test and factors analysis (mean)	Payment of completed work, poor supervision and shortage of labour and equipment were the risk factors revealed as the factors behind Hong Kong construction company.
4	Alaghbari *et al.,* (2007)	Construction / Malaysia	Contractors / Consultants and Owners	Questionnaire	Chi-Squared test and Relative Importance Index	The study affirmed that financial problem and poor coordination were the risks factors affecting Malaysian company.
5.	Assaf & Al-Hejji (2006)	Constructions / Saudi Arabia	Contractors, consultant and owners	One-shot questionnaire	Frequency index, Severity index and Importance index.	The overall findings revealed seventy- three risk factors causing delay to Saudi Arabia construction company. The causes from the contractors were 76 %, 56% from the consultant and 86% from the owners. Change order were ranked as the major factor to the company.

6.	Marzouk & El-Rasas (2014)	Constructions / Egypt	Contractors, owner, consultant and organization	Interview and questionnaire	Frequency index, Severity index and Importance index.	The research findings depicts that risk factor from material were very low, consultant related causes, and labour and equipment were low, external factors were having a medium effect, factors caused by contractors were high, while risk factors from the owners were very high.
7.	Santoso *et al.*, (2003)	Construction / Jakarta	contractors	One-shot questionnaire	Algorithms, mean end analysis, bayesian theory and decision trees.	The findings of the study ranked management and design related risk factors as the most important in Jakarta high-rise building construction projects.
8.	Odeyinka et al., (2008)	overseas construction projects / UK	contractors	Questionnaire	One sample t –test and frequency index	The result of the findings shows that 11 out of twenty-six risk factors have an important impact, and they were further grouped into 3 categories which are: complexity of project, changes in the specification or design and natural inhibition.
9.	Doloi (2012)	Construction / Indian	Contractors	Mixed-method	Factor analysis and regression modelling	Lack of commitment; inefficient site management; poor site coordination; improper planning; lack of clarity in project scope; lack of communication; and substandard contract. Regression model indicates slow decision from owner, poor labour productivity, architects' reluctance for change and rework due to mistakes in construction are the reasons that affect the overall delay of the

						project significantly were the results of the survey.
10.	Haseeb, Bibi & Rabbani (2011)	Constructions / Pakistan	clients, contractors and consultants	Mixed-method	Chi-Squared test and Relative Importance Index	Sixteen risk factors were revealed from the study, while finance, poor design, shortage of materials and poor coordination were the major factors affecting Pakistan construction company.
11.	Sambasivan & Soon (2007)	Constructions / Malaysia	Contractors, consultants and clients	Questionnaire	Relative Importance Index and correlation analysis.	The findings revealed 28 risk factors that are causing delays to Malaysian construction company. The top ten major factors identified were; (1) contractor's improper planning, (2) contractor's poor site management, (3) inadequate contractor experience, (4) inadequate client's finance and payments for completed work, (5) problems with subcontractors, (6) shortage in material, (7) labor supply, (8) equipment availability and failure, (9) lack of communication between parties, and (10) mistakes during the construction stage.
12.	Jannadi (2008).	road construction / Saudi Arabia (KSA),	contractors, consultants and clients	Structured interviews and questionnaires surveys, literature review and case studies of road construction projects in the country.	Frequency index and regression analysis	The findings show the following potential risks from their responses were identified. Soil condition, equipment, material handling and site condition was ranked as the major risks in the study.
13.	Sweis *et al.*, (2008)	Construction / Jordan	consultants, contractors,1 and owners	One-shot questionnaire	Relative importance index and one sample t-test	The findings revealed that material, labour and equipment, client, consultant and contractors were the

						risk factors in Jordan construction company.
14.	Odeh & Battaineh (2002)	Construction / Jordan	Contractors and consultant	One-shot questionnaire	Ranking (R) of the weighted average of the relative importance indices (RII)	Financing, slow decision making, labour productivity and client interference were the top ten ranked risk factors affecting Jordan construction company.
15.	Amer (2002)	Construction project in Egypt	consultants, contractors, and clients	A pilot questionnaire survey and Empirical questionnaire survey	one-way ANOVA test (F-test)	Based on the result, a system was proposed by an expert to anticipate and avoid or minimize delays in construction projects. While financial difficulties and shortage of materials were the major factors to Egypt construction company.
16.	Frimpong et al., (2003)	Construction project in Ghana	consultants, contractors, and clients	Questionnaire survey	Quantitative risk analysis techniques (in-depth analysis)	Payment difficulties, poor contract management and material procurement from the results of the study are the major causes of delay.
17.	Aibinu & Odeyinka (2006),	Construction project / Nigeria	Consultants and contractors	Questionnaire survey	Pareto analysis and one sample t test	The findings shows that thirty-nine out of forty-four risks factors are responsible for almost ninety per cent of project leading to delay in Nigeria construction company. While financial, poor management, shortage of labour and equipment, poor design, lack of communication between parties and improper planning were the leading risk factors in Nigeria construction company.
18.	Okpala & Aniekwu (1988)	Construction / Nigeria	Contractors, architects, quantity	Questionnaire survey	Ranking (R) of the weighted average of the	The revealed that shortage of materials, failure to pay for complete work and poor contract management were the risk factors

			surveyors and engineers		relative importance indices (RII)	causing delay to Nigeria construction company.
19.	Mansfield, Ugwu & Doran (1994)	Construction / Nigeria	Contractors, Engineers, consultant and clients	Questionnaire survey	Frequency index, Severity index and Importance index.	The research findings depicts that improper financial and payment management, poor contract management, shortage of materials, inaccurate cost estimations and fluctuations in cost were the risks factors affirmed to cause delay in Nigeria construction company.
20.	Semple, Hartman & Jergeas (1994)	Construction / Canada	Contractors and clients	Pilot study	Ranking (R) of the weighted average of the relative importance indices (RII)	The findings affirmed that increase in the scope of works, inclement weather and restricted access were the risks factors that causes delay in the Canada construction company.

2.13 Organizational Control Theory

Organisational control theory establishes some theoretical underpinnings to confirm the relationship between government regulation (rules and regulations), organizational internal factors, and organizational external factors with construction risk management. The organisational control theory (Flamholtz *et al.*, 1985; Jaworski, 1988; Ouchi, 1979; Snell, 1992) proposes that proper control established and implemented by an organization must theoretically be able to modulate risk occurrence on construction project within the organization with the aids of proper monitoring, control and compensation among the project managers, team members and the organizations themselves. Similarly, organisational control theory assumes that risk occurrence can be minimized through control introduced by an organisation through the government regulation (rules and regulations) which would certainly encourage compliance.

Considering the relationship between rules and regulations, organizational internal factors, organizational external factors with construction risk management, organizational control prior literatures suggested that common agreement exist among the researchers that organisational control procedures play a vital role in minimizing risk in the organization. More so, grounds for the organisational control theory were discovered across a diversity of some life situations, such as performance outcomes, social and communication (Miao & Evans, 2012; Miao, Evans, & Shaoming, 2007; Panagopoulos & Dimitriadis, 2009), construction risk management (Aibinu & Odeyinka, 2006), and irregular information issues in corporate governance (O'Sullivan, 2000).

In particular, Karim Jallow *et al.* (2014) discovered that organizational internal factors have a significant positive influence on construction risk. Similarly, Kangari & Riggs (1989) found that organizational external factors has a positive effects on construction risk management, such as overlooking specific job-related activities just because they are not properly controlled and monitored by the project managers. Lai, Ngai & Cheng (2005) empirical finding revealed that an increase in outcome control through rules and regulations reduces the likelihood of risk occurrence on construction projects.

Likewise, in explaining the moderating role of rules and regulations on the relationship among organisational internal factors, organizational external factors and construction risk management using the principle behind rules and regulations, the present study proposes that the extent to which organisational internal factors, organizational external factors are able to influence construction risk management, depends upon the level of the rules and regulation implemented within the organization together with proper control and monitoring.

However, the stronger the organizations implement government regulation (rules and regulations), the less likely would be risk occurrence on project. Given the empirical ground for organizational control theory all over various organizational settings, it is suggested that this theory would give an empirical support for government regulation (rules and regulations) as a moderator variable on the relations between organisational internal factors, organizational external factors and construction risk management.

2.14. Theoretical Framework

Organizational internal and external factors were used as variables in this study based on the previous empirical studies of (Barber & Wan, 2005; Greenberg & Baron, 2008; Geraldi, Lee-Kelley & Kutsch, 2010; Li *et al.,* 2011; Robertson & Robertson, 2006; Hartono, 2014). While Geraldi, Lee-Kelley & Kutsch, (2010) associate's internal factors (effective communication, team competency and skill and active leadership) with construction risk management. It was also discovered that (Walker, 2000; Hofstede *et al.*, 1990; Sackman, 1991; Kotter & Heskett, 1992; Schien, 1992) associated the external factors (political, organizational culture, technology and economic) with construction risk management.

Rules and regulations to play a moderating effects on organizational internal and external factors with construction risk management by strengthening their relationship. Bresnen & Marshall, (2000) stated that partnering together of companies working on a project might lessen the risks on project. It was further discussed by the authors that management of health and safety of workers with regulations of price for construction materials must be the priority of all construction companies to reduce the risk on projects (Okeola, 2009). Flanagan & Norman, (1993); Hastak & Shaked, (2000) advocated that if rules and regulations on construction materials and prices are regulated by government, it would favour construction companies with a significant relationship with construction risk management.

Therefore, this study considers the effective communication, team competency and skill and active leadership as internal factors; political, organizational culture, technology and economic as external factors with government regulation (rules and regulations) as the moderator to be examined, and that might influence construction risk management among construction developers in Abuja and Lagos Nigeria, as depicted in Figure 2.6.

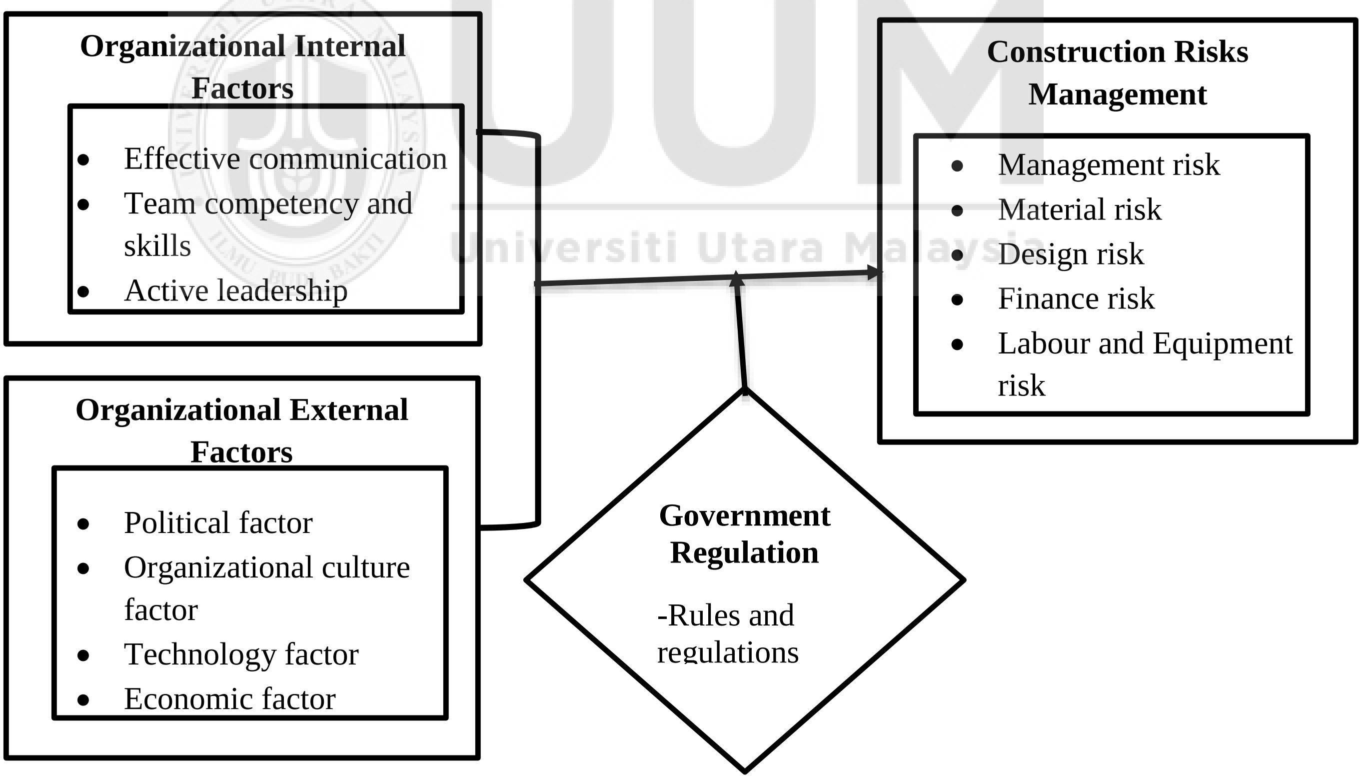


Figure 2.6: *Proposed Conceptual Framework for Factors Influencing Construction Risk Management among Nigerian Construction Companies.*

Furthermore, in the context of construction companies, Figure 2.6 represents the direct relationships between internal factors operationalized (effective communication, team competency and skills and active leadership), external factors construct comprising of political, organizational culture, technology and economic; moderator as rules and regulations with construction risks as construct consisting of management risk, material risk, design risk, finance risk, and labour and equipment risk.

Therefore, internal factors in the present research are the factors that are controllable within the company. External factors are more than what the company can control but it might be managed by responding tactically. For example, a construction developer can react to rules and regulations that encourage quality construction materials with irrespective of the price, by making judicious use of the opportunity since the government has regulated the price all because of the risk occurring to the project, in order to achieve quality project. The direction of arrow shows that both internal and external factors are hypothesized to influence construction risk management among the developers with government regulation (rules and regulations) as the moderator.

2.15. Hypothesis Development

Sekaran (2006) acknowledged two different relationships between variables within a hypothesis, which may be directional or non-directional. The directional hypothesis shows the direction effects of a variable on another variable (for example, the independent and dependent variables). While the non-directional relationship designates a relationship between two variables, but the directions of the relationship are not stated.

Directional hypothesis approach will be adopted in this research. To examine the influence of a construction company internal factors and external factors on construction risk factors, three (3) direct and two (2) indirect hypotheses are developed. Below are the hypotheses.

H1: There is a significant relationship between organizational internal factors and construction risk management among construction companies in Nigeria.

H2: There is a significant relationship between organizational external factors and construction risks management among construction companies in Nigeria.

H3: There is a significant relationship between rules and regulations and construction risks management among construction companies in Nigeria.

H4: Rules and regulations moderate the relationship between organizational internal factors and construction risks management among construction companies in Nigeria.

H5: Rules and regulations moderate the relationship between organizational external factors and construction risks management among construction companies in Nigeria.

2.16. Summary

This chapter reviews the concept and dimensions of risk management based on previous studies, as underpinned with organizational control theory with the dimensions of construction risks studied and deliberated. How construction risks were deliberated in previous studies are also presented in this chapter, and also how they are viewed in the current study. The factors discovered to influence construction risk management are generally separated into two groups such as; organizational internal and external factors. All of the factors with their relationships to construction risk management and government regulation (rules and regulations) being the moderator are explained vividly. The theoretical model and the developed hypotheses are also shown.

Furthermore, review of the related studies has contributed to an investigation of different areas such as worldwide risk identification, assessment and management. This may give encouragement to Nigeria in developing a standard risk management model in the construction companies.

Project management process concept has also been discussed in this chapter. Lastly, this chapter identified the major significant risk factors that may cause delays to projects and categorized them according to worldwide research construction project. The next chapter (3) will depict the methodologies that are used in the current study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the research methodology that is used to achieve the research objectives in the current study. The chapter begins with the nature and epistemology of the study research, methodology flow chart as depicted in Figure 3.1, research design, justification for adapting quantitative research, population and sampling with data collection procedures. Furthermore, the questionnaire designed for the data collection with the measurement and operationalization of all the variables including the pilot study are explained. Appropriate methods and techniques have been adapted and adopted in the current study to show clarifications of these tools. Lastly, this chapter shows the appropriate statistical techniques used to analyse the data in this study.

3.2 Epistemology and Nature of this Study

In general, researchers have their particular worldviews concerning the nature of specific social reality or knowledge based about their own philosophical paradigm. Therefore, linking the research and the philosophical orientation which help to elucidate researcher's theoretical frameworks (Cohen & Vigoda, 2000). Subjectivism, positivism and realism recommend that research is anticipated to uncover the current truth or reality within the social environment (Creswell, 1994). Positivist paradigm proposes that social phenomenon is required to be treated as an entity in as much as possible, the same ways that natural scientists are treating the physical phenomena (Creswell, 1994). However, it suggests that the researchers are required to be independent of the research and, moreover adopt techniques that increase objectivities and reduce the effects of the researchers in the research procedures.

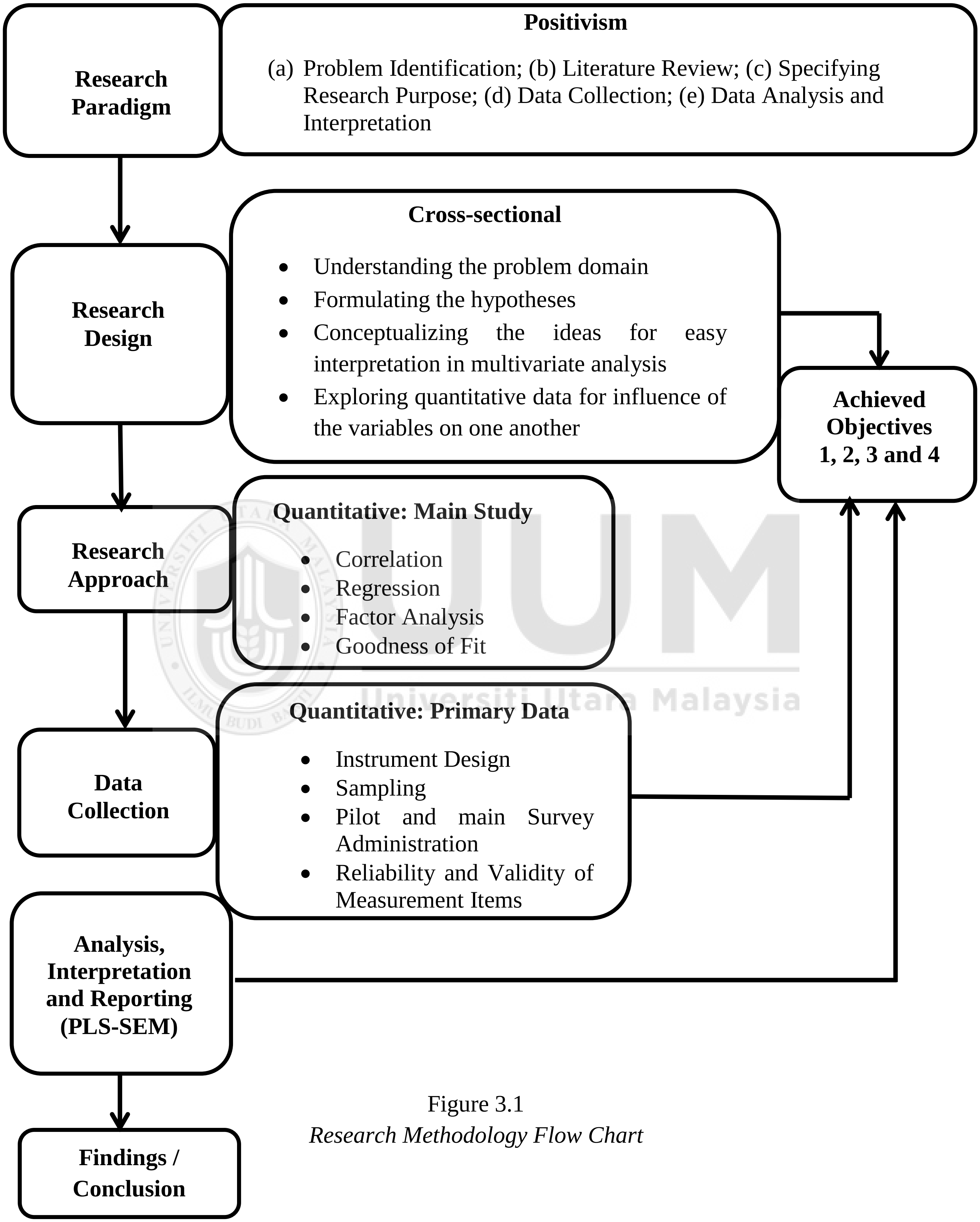


Figure 3.1
Research Methodology Flow Chart

As it was summarized by Creswell (1994) and being argued by various experts such as Crotty (1998); Neuman (2003); Marczyk, DeMatteo & Festinger (2005), the positivists views are: (1) empirical facts occur independently from individual views, emotions or ideas. The empirical evidences are gathered from a value free manner; (2) the investigations of social world are statistical in nature; (3) empirical evidences are governed by laws of effect and cause; (4) the assumed methodology is extremely structured and, moreover allows for repetition either by the same researcher or others; (5) the social certainty patterns are constant and, thus knowledge are additive. Consistent with this, positivism is the underpinning philosophy of this study.

Precisely, this study is quantitative in nature. Quantitative research can be defined as social survey which adopts the use of empirical approaches and empirical statements (Cohen & Manion, 1980). Furthermore, quantitative research is also defined as the type of research which the phenomena are explicated by gathering and analysing numerical data with the use of statistical based approaches (Creswell, 1994). Therefore, this study is quantitative in nature because the use of measurement is employed (i.e. making use of statistical tools) to understand the relationship between internal and external organizational factors to construction risks. Moreover, this study is in line with the requirements recommended for quantitative research, which means social reality is objectively influenced during the procedure of data collection and analysis (Creswell, 1994).

3.3 Research Design

Since the approaches for data collection in this study is quantitative in nature and the major objective in this research is to assess the extent of risk factors affecting Nigerian construction companies and as well examined the influence of organizational internal and external factors on construction risk management.

The combinations of a correlational and descriptive are used in this study, that is examining the influence between organizational internal, external factors; and construction risk management among construction companies in Nigeria is a correlational type of study. However, assessing the extent of construction risk management in Nigeria construction companies is a descriptive type of research. Thus, descriptive research attempts to examine what things are like and correlational or causal field study intends to create the relationships among predictor with the criterion variables (Cooper & Schindler 2001; De Vaus 2002).

This study is cross-sectional, through which data is collected once to provide answer to the research questions. While a longitudinal design is much preferred to cross-sectional because it create higher quality of the data to be collected and the depth of analysis, although it is time consuming and expensive (Sekaran, 2006), as a result of that cross-sectional design is adapted for this research. Furthermore, this study depends on quantitative approaches. Survey will be employed to acquire personal and social evidences, attitudes and beliefs (Kerlinger, 1973). The unit of analysis for this study are construction companies in Abuja and Lagos State, Nigeria.

Zikmund (2000) revealed that the choice of the survey method were built on the following aims: 1) when the unit of analysis is company, 2) population size to investigate or interview is conceived huge, 3) when the items to be measured are based on views of construction developer, 4) obtainability of cost together with time, 5) to reduce researchers bias and, 6) testing of hypotheses.

Furthermore, Kerlinger's (1973) recommendation gives more understanding of phenomena in the real state. The author indicated that, not only the research problem, the research design, the method of data collection, measurement and types of analysis used need to equip together, but also they must to peer the researchers epistemological perspectives. In particular, the study objectives are to test the hypotheses and to investigate the relationships in between the independent and dependent variable.

3.3.1 Justification for Employing the Quantitative Approach

A quantitative survey, cross-sectional design is considered the best appropriate research design and approach to adopt in this study for a number of reasons. Firstly, the main objective of this study can be better accomplished by adopting the quantitative approach which includes collecting primary data and testing of a theoretical model to forecast future behaviours (Henn, Weinstein & Foard, 2006).

To better forecast the purpose of relationship among the variables, this study used the partial least squares grounded structural equation modelling (PLS-SEM) approach "to obtain values of the latent variables for predictive purpose" therefore necessitating to adopt only the quantitative research approach (Chin, 1998).

Therefore, this research preferred quantitative approach to a qualitative one as the quantitative approach alleviatesthe processing of large amount of data (Robson, 2002; Sekaran, 2009). Thus, this research adopted the quantitative approach by receiving primary data which was collected through the use of a structured questionnaire.

3.3.2 Population of the Study

The locations for the current research consist of two states which are Abuja and Lagos Nigeria. Abuja was selected in this study because it is currently the Federal capital Territory of Nigeria, and more so, Cooperate Affairs Commission is located in Abuja where all companies register for their operations (Ukoha & Beamish, 1996). Furthermore, Lagos was also selected in this study because it is the commercial heart of Nigeria where most of the business are carried out, which most of the company headquarters are also located in (Adams, 1997).Hence, Abuja and Lagos state represents an important Nigeria's zone for an effective operation of the three utility (Local, National and Multi-national construction industries) organizations under this study.

The three utility organizations are 331 in numbers, 234 organizations in Abuja and 88 organizations in Lagos state from Abujagalleria, published in (2005) and Lagos state Government, State Tender Board, published in (2009). The population consists of a contract manager, an executive director, a marketing manager, a project manager and an engineer in each organization were considered appropriate as the unit of analysis, following (Hilmi *et al*., 2010); and Jantan *et al*., 2003).

3.3.3 Sampling Techniques and Sample Size

The sampling in this study relies on two sources such as Krejcie & Morgan (1970) and G-power analysis. Sampling can be seen as a research procedure of choosing a suitable participant of the population in a certain study (Sekaran, 2006). The current study adopted the use of probability sampling techniques. The probability sampling techniques was chosen over the non-probability sampling because every group among the population possessed a known probability to be selected with the attributes of the sample selected can be extrapolated and the conclusion can be drawn based on the population. This shows that the results of this current study is the representation of all the attributes of the whole construction companies in Abuja and Lagos state Nigeria. Therefore, the findings of the research can be inferred on to the whole population of construction companies.

The method of sampling adopted in this research required the process that will be presented as follows. Grounded on the recommendation of proportionate stratified random sampling, it has a least bias and offers the greatest generalization, which the population of the research was separated into reciprocally exclusive cluster (Sekaran, 2006). The sample frame comprises of names and addresses of the construction companies acquired from the Abujagalleria, published in 2005 and Lagos state Government, State Tender Board, published in 2009.

A sample is a group of participants or individuals chosen from a higher population for the use of a survey (Salant & Dillman, 1994) .To make sure there are equal treatment and no biasness in survey between the two states, the proportionate stratified random sampling was chosen to the disproportionate sampling. Sekaran

(2006) revealed that the proportionate sampling can be seen as the same percentage of a set of levels at the process of conducting a survey. The below Table 3.1 and 3.2 further explain how the sample was chosen for the population of this study.

Table 3.1: *Distribution of Construction Companies in Abuja and Lagos Nigeria.*

Construction Companies State Branches	No. of Construction Companies
1.Abuja	243
2.Lagos	88
Total	331

Source: Nigeria Galleria, 2004; Lagos state government, state tender board, 2009.

Table 3.2: *Population and Recommended Sample Size for the Present Research.*

Companies	Population (*N*)	Required Sample (*n*)
Construction companies in Abuja and Lagos Nigeria.	331	181

Source: Krejcie & Morgan (1970); Sekaran (2006) sample guide.

3.3.3.1: Power Analysis

Furthermore, an optimal sample is important for decreasing the cost of sampling error, hence, one need to specify the advantages of choosing an appropriate sample size. Precisely, Salkind (2003) highlighted that a suitable sample size is essential for any research because choosing too small sample size is not an ideal representation of the population. In spite of that, the results of too small sample size will leads to Type I error, which is the likelihood of mistakenly rejecting a particular result when it supposed to be accepted (Sekaran, 2003). More so, it was also argued by Sekaran (2003) that too enormous sample size is not suitable because of likely problem of type II error, which means, accepting a specific result when it is supposed to be rejected.

Ticehurst and Veal (1999) have indicated the significance of deciding an accurate sample size which is independent of the research population, hence signifying the need for method of deciding a sample size like statistical power test. Precisely, Cohen (1998) emphasised that sample size should be influenced by using an appropriate power of statistical test. So in deciding an appropriate sample size for this study, power of a test turns to be a viable option. According to the author, the power of a statistical test was defined as the likelihood of rejecting a null hypothesis or rejecting a precise effect size of a certain sample size at a particular alpha level. The test has the ability to discover a difference if it truly exists in the broader population. In addition, even though the sample size to be used in a specific study has been shaped through other methods, it is still worthy and appropriate to use power analysis so that the chance of discovering the effects of different sample sizes is plainly known (Ramalu, 2010).

However, With the use of G*Power 3.1.9.2 software, sample size is calculated as a function of user-assigned values for the to-be discovered population effect size ($f2$), necessary significance level (α), the anticipated statistical power ($1 - \beta$), with total number of predictors in the research model (Faul, Erdfelder, Lang, & Buchner, 2007). Therefore, for the sample size of this study to be ascertain, a priori power analysis was carried out using the software package G*Power 3.1.9.2 (Faul *et al.*, 2007). Three (3) predictor variable equations were used in this study for determining the sample size. Moreover, going by the Cohen's (1998) recommendations, the subsequent standards were used in computing the sample size being used for this study: effect size (*f2*= 0.15); significance alpha level (α= 0.05); chosen statistical power (1-β = 0.95); with the total number of three (3) predictors (IF, EF and RG).

As depicted in Figures 3.2 and 3.3, results of the statistical test disclosed that for a multiple regression based statistical analysis, a sample size of 119 is suitable for this study. The results also disclosed the statistical power for discovering the effect sizes for this study was determined at a suggested value of 0 .95 (Cohen, 1977).

The determined sample size of 119 for a broader population of three-thirty one (331) appears to be insufficient. Therefore, the need to explore a different technique for the sample size determination becomes essential. Subsequently, Krejcie and Morgan's (1970) scientific approach guideline was employed to determine the sample size for this study. As a result, the total of 181 organizations were figured-out to be adequate for the population of 331 subjects.

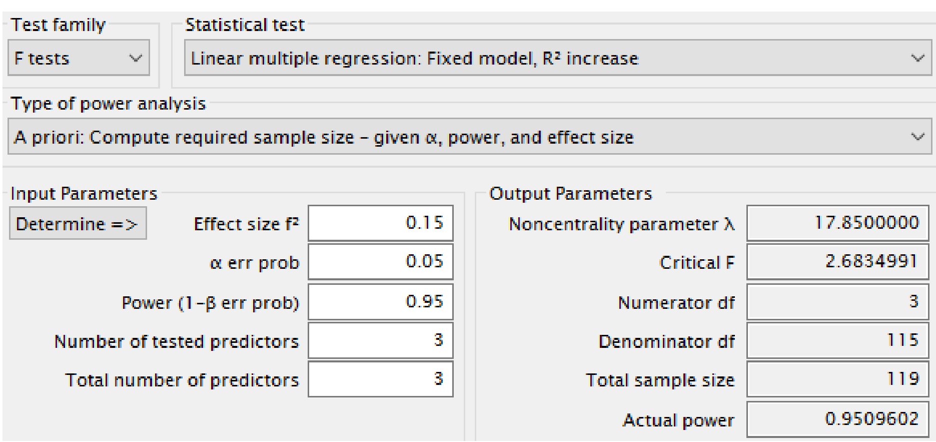


Figure 3.2
Power Analysis for Medium Effect

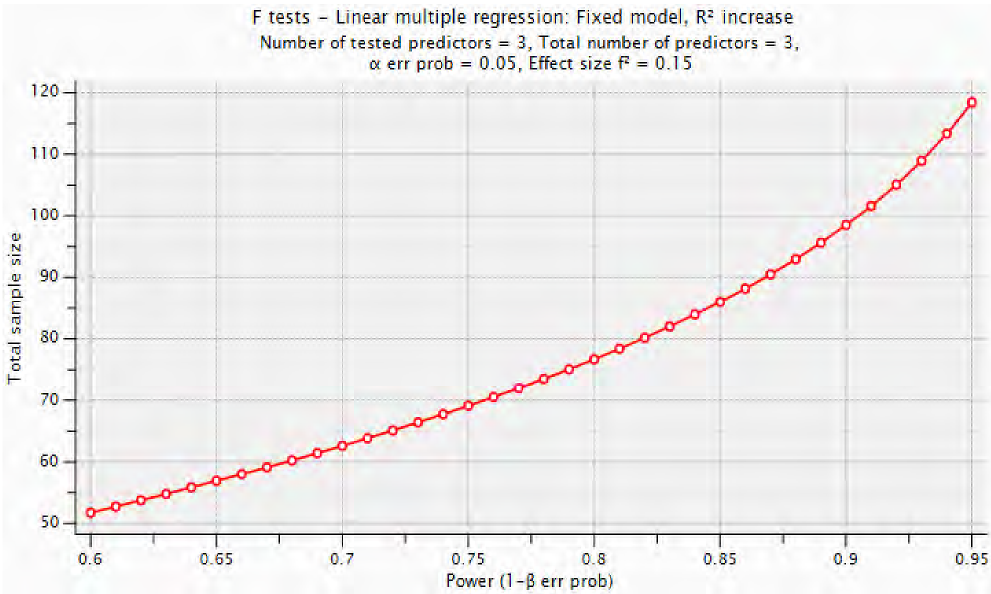


Figure 3.3
X-Y Plot for Medium Effect Power Analysis

The sample size determined for this study was also appropriate following Roscoe's (1975) rule of thumb. Roscoe states that, for most of the research with sample more than 30 and less than 500 is appropriate. More so, Hair *et al*. (2010) stated that, for all multivariate research, the sample size must be several times (preferably 10 or more times) greater than number of variable in the research. In the current study, there were four variables which the expected sample must be 40 or more.

In order to avoid inappropriate sample size and to ensure accuracy in determining a sample size representative for this study, a more thorough method proposed by Dillman (2000) was employed. Hence, with the population size of 331, the below formula was employed to calculate the sample size:

$$n = \frac{(N)(p)(1-p)}{(N-1)(\frac{B}{C})^2 + (P)(1-P)}$$

Where n represent the calculated sample size required for the preferred level of precision; N represent the population size; p represent the ratio of population required to choose; B represent the precision or acceptable amount of sampling error; and lastly C is Z statistic connected with the confidence level of 1.96 which corresponds to the 95% level. B may be set at .1, .05, or .03, which are + 10, 5, or 3% of the accurate population value, respectively. In the current study, the agreed amount of sampling precision or error is set at .05 or 5%. Confidence level of 1.96 in line with the 95% level.

Before data collection for this study, percentage of the respondents whose answer would be "favourable" or unfavourable was unknown, therefore, in line with Dillman (2000), the ratio of .05 was used to .03 for an additional homogenous sample. Using .05 will result to a larger sample size compare to .03; nevertheless, it always renders a sufficient sample size for a greater or smaller population (Biemer & Lyberg, 2003).

Where N = 331, p = 0.5, B = 0.05, C = 1.96

$$n = \frac{(331)(0.5)(1-0.5)}{(331-1)(\frac{0.05}{1.96})^2 + (0.5)(1-0.5)}$$

$$n = \frac{(331)(0.5)(0.5)}{330 * 0.000651 + (0.5)(0.5)}$$

$$n = \frac{82.75}{0.21483 + (0.5)}$$

$$n = \frac{82.75}{0.46483}$$

$$n = 178.02 \approx 178$$

Going by the computational results of the sample size, this current study needed 178 respondents to roundup the survey. As stated in the formula, the sample was within the sample frame of +5% margin errors. It was discovered that there were no significant difference between the determined sample size of 181 in line with the Krejcie and Morgan's scientific rules and 178resulted from the method suggested by Dillman (2000). Because the purpose is to have a greater sample size that would serve as a better representative of the study population, the determined sample size of 181 achieved using the Krejcie and Morgan's scientific rules has been adopted.

3.3.4 Procedure of Data Collection

Quantitative data was collected to organize and describe the attributes, behaviours and activities of populations (Parahoo, 2014). Data collection should be objective, systematic and repeatable (Gerrish & Lacey, 2010). Robson (2007) maintains that a researcher should use the simplest manner of collecting the data to get answers to the research question and should not collect any more data than necessary. Mindful of these conditions, the data collection instrument selected for this study is a questionnaire. In the current study, the researcher is the appropriate person to administer the questionnaire to the targeted respondents.

According to suggestion made by Krejcei & Morgan (1970), a 5% margin of errors was given, the appropriate sample size (181) would be needed in to show the population of (331) for the respondents. In addition to that, questionnaires will be distributed physically to the selected companies in the two states. There are some rationale behind physical distribution of questionnaire. Firstly, to use the opportunity to exchange contacts with the respondents. Secondly, to get immediate response to any question or inquiry from the respondents regarding the survey. Lastly, is to possess a good response rate and not to waste time to get back the questionnaires. Also, for the respondents to reveal a reliable response rate, a souvenir was distributed to reciprocate their caring gesture to complete the survey (Dillman, 1978).

A survey method was used in this study to acquire the respondent's perceptions towards the relationship between organizational internal, external factors and construction risk management among construction companies in Nigeria. Following Kamaruddeen *et al.* (2013); Hilmi *et al.*(2010); and Jantan *et al*. (2003), a single person from each company for this research is enough as a respondent, for example, a contract manager, an executive director, a marketing manager, a project manager or an engineer would serve the purpose. The data acquired from these stated personnel are considered enough in clarifying the relationship between the organization's internal and external factors that influence construction risk management within the company.

Following Kamaruddeen *et al*. (2012), the questionnaire is design inform of booklet sheet with the logo of Universiti Utara Malaysia and English language is the medium of communication in it, because it is the only official language in Nigerian. Therefore, (331) questionnaire was administered for this study from April to June, 2015.

3.3.5 Expected Response Rate

For the purpose of this study, 331 questionnaires instead of 181 were distributed among the construction industries operating in Abuja and Lagos Nigeria as stated in Table 3.2. The oversampling helps to take care of the possible loss as a result of damages and non-cooperative subjects (Salkind, 1997). Specifically, the oversampling was used so that the non-response bias and non-response rate will not have an impact on the results, following (Phokhwang, 2008; Sindhu & Pookboonmee, 2001; Ringim, Razalli, & Hasnan, 2012). In line with Babbie's (1973) controversy that 50% (166) response rate is considered as an acceptable rate in any social research study; however, this current study is set out to attain just that.

3.4 Questionnaire Design

The main aim of this study was to measure the extent of construction risk affecting construction companies and to investigate the relationship between company internal, external factors; with construction risk among construction companies in Abuja and Lagos Nigeria. Therefore, the designed questionnaire booklet contained the below items;

1. The cover letter are displayed in the front page.
2. Subdivision1: Overall information about the respondent and the company.
3. Subdivision 2: Information about internal factors.
4. Subdivision 3: Information concerning the external factors.
5. Subdivision 4: Information concerning the construction risk management.
6. Subdivision 5: Information concerning the rules and regulations.

In the process of providing a simple and clear questionnaire that is to avoid ambiguous questions, Subdivision 1 in the questionnaire contains the respondents with the company's information, Subdivision 2 depicts about the internal factors, Subdivision 3 depicts about the external factors, and Subdivision 4 is regarding construction risks, Subdivision 5 pertaining to the rules and regulations.

Dillman's (1978) proffer on development of questionnaire design, wordings and scale-indicators development, the questionnaire designed was inform of a booklet with a dainty cover showing the Universiti Utara Malaysia logo. An appeal letter composed for the respondents asking for their general assistance in completion of the survey questionnaire is next to the cover page.

Sekaran (2006) suggested the approach in designing a questionnaire which the attention must be on wording, planning on how the variables will be grouped, coded, and scaled, with the general look of the questionnaire. While developing the questionnaire, jargon, technical terms, vague wording, ambiguous questions, and double-negative words with double-barrelled questions must be averted.

Furthermore, the close-ended questions were chosen over the open-ended questions, in order to help the respondents to understand the aim of the questions, to improve the data accuracy and for the analysis (Sekaran, 2006). In the current study, there were two constructs for independent variables, with one construct for the dependent variable and one dimension for the moderator.

3.4.1 Measurement and Operationalization of Variables

Sekaran (2006) advocated that the relationship between independent and dependent variables may be negative or positive. The current study has organizational internal and external factors as the two (2) main constructs for the independent variables, while the dependent and the moderator in this study has a single construct which are construction risk management and government regulation respectively. This study adapt PMBOK (2000) 5-point Likert scale and the value range were used in this study questionnaire in ascending order as follows presented in Table 3.3 to represent the extent of risks occurrence.

Table 3.3: *Scale and range*

Scale	Range
1	= *very low* (1.0-1.49)
2	= *low* (1.5-2.49)
3	= *medium* (2.5-3.49)
4	= high (3.5-4.49)
5	= *very high* (4.5-5.00)

It was supported by previous literatures such as Krosnick & Fabrigar (1991) that a scale between1-5 is enough to points out reliably and validly measure of an item, than a longer or shorter scale point. Also, Dawis (1987) and Garland (1991) advocated that the decision of the measurement scale is mainly depends on the researcher preference, since there is no best or single method for constructing a scale. Similarly, the Table 3.3 below depicted the summary and indicator that was measured.

Table 3.3 *Summary of Variables and Measurement of Indicators*

Constructs	**Variable & Dimensions**	**Scale**	**No. of indicators**
Internal factors	Effective communication	5 points	5
	Team competency and skills	5 points	5
	Active leadership	5 points	4
External factors	Political factor	5 points	5
	Organizational culture	5 points	6
	Technology factor	5 points	4
	Economic factor	5 points	4
Construction risk management	Management risk	5 points	13
	Material risk	5 points	4
	Design risk	5 points	6
	Financial risk	5 points	4
	Labour and Equipment risk	5 points	7
Government regulation	Rules and regulations	5 points	5
Total number of questions		**72**	

3.4.2 Organizational Internal Factors

The organizational internal factors in this study are also known as company intangible resources. There are three dimensions of internal factors in this current study namely; effective communication, team competency and skills and active leadership. To ensure the dimensions are applied to construction companies, which means, the construction companies, comments, and advices were gathered through the expert during the process of pilot survey. The following items used to measure effective communication, team competency and skills and active leadership were adapted from (Kumaraswamy & Chan, 1998).

(a) Effective communication

According to Doloi (2009) and Kumaraswamy & Chan, (1998), effective communication is defined as an act of reducing conflicts; improving decision making with good outcome on team member performance. In this study, effective communication means how free flow of communication can influence construction risk management. Below are the indicators used to measured effective communication. It was measured with five indicators.

1. In our company, there is effective communication.
2. In our company, there is reliable and frequent communication.
3. In our company, effective communication prevent the occurrence of conflicts.
4. In our company, effective communication reduce likelihood of disputes erupting.

5. In our company, there is free flow of communication.

(b) Team competency and skills

Simpkins (2009) and Kumaraswamy & Chan, (1998), viewed team competency and skills as the way by which organization educate the project team members and managers about the urgency of handling fast action on project risks, which requires the organization to provide effective training to the managers and as well as to the team members in order to increase their competencies. In this study, team competency and skills means how the manager's competency and skills can influence construction risk management. Below are the indicators used to measured team competency and skills.

Team competency and skills was measured using five questions

1. In our company, there is adequate managerial skill.
2. In our company, there is adequate organizational experience.
3. In our company, there is proper planning and scheduling at preconstruction stage.
4. In our company, there are less mistakes during construction.
5. There is adequate skill among employers in our company.

(c) Active leadership

According to Simpkins (2009), active leadership is seen as a leader who is proactive and reactive to tackle the foreseeable and existing risks in a project. Thus successful leaders are the active ones that finish the project within the planned time and budget. In this study, active leadership means how the contractor actively control the entire project and how it influence construction risk management. Below are the indicators used to measured active leadership. Active leadership was measured using four questions

1. In our company, there is adequate managerial and supervisory personnel.
2. In our company, there is fast decision- making.
3. In our company, there is proper control over site resource allocation.
4. In our company, there are stable leadership styles.

3.4.3 Organizational External Factors

Organizational external factors are mostly beyond the control of project team members nor the organization herself (Sun & Meng, 2009; Jaafari, 2001). The organizational external factors construct in this research is conceptualized with four dimensions viz. political, organizational culture, technology and economic. The items used to measure political, economic and technology factor are adapted from Sun & Meng (2009); Jaafari, (2001) and organizational culture were adapted from (Kamaruddeen *et al.,* 2012).

(a)Political factors

According to Jaafari (2001) political factors is seen as losses due to political disruptions such as; riots, coups, civil wars, international wars and political elections. In this study, political factors means factors which may influence construction risk management from political aspects. Below are the indicators used to measured political factors.

Political factors were operationalized into five question

1. Our construction projects are not affected by government instability.
2. Our construction projects are not affected by political violence.
3. Our construction projects are not affected by government tax policy
4. Our construction projects are not affected by government tariffs.
5. Government subsidy on construction materials are beneficial to our company.

(b)Organizational Culture factors

Mobley, Slaney & Rice (2005), defines organizational culture as a set of beliefs, values, common understanding, thinking and rules for behaviour that are being shared by all members in an organizations. It is defined in this study as the way in which behaviour, common understanding and beliefs of the organization influence construction risk management. Below are the indicators used to measured cultural factors.

Organizational culture factors were operationalized into six questions

1. Our company is very dynamic place.
2. The leadership in our company generally exemplifies risk-taking.
3. Our company is an entrepreneurial place.
4. In our company, there is commitment to development.
5. In our company, the management style are characterized by uniqueness.
6. In our company, the management style are characterized by freedom.

(c) Technology factors

Leavit & Whisler (1958); Sommerville & Craig (2006) viewed technology factors as combination of both software and hardware (machinery and equipment) that can improve construction performance. While in this study, it refer the factors that can influence construction risk management from technology perspective. Below are the indicators used to measured technology factors.

Technology factor were operationalized into four questions

1. Our company make use of new construction materials.
2. In our company, we use new construction method.
3. In our company, there is technology simplicity.
4. In our company, we use new technology.

(d) Economic factors

According to Sun & Meng (2009), economic factors can be seen as market or personal losses due to economy disruptions such as currency valuation, trade tariffs or barriers, tax and wage level. While in this study, it refers to the factors that may influence construction risk management from economic perspective. Below are the indicators used to measured economic factors.

Economic factor were operationalized into four questions

1. In our company, inflation have no impact on construction materials.
2. In our company, equipment and labour price do not fluctuate.
3. In our company, exchange rates do not affect construction materials.

4. In our company, interest rates do not affect construction materials.

3.4.4 Construction Risk Management

The construction risk management construct is operationalized into five dimensions: management risk, material risk, design risk, finance risk and labour and equipment risk. The following items used to measure construction risk management were adapted from (Ahmed *et al.,* 1999; Abd El-Razek, Bassioni & Mobarak, 2008).

(a)Management risk

Management risks in this study refers to some risks which may influence construction risk management from the management aspects. Below are the indicator used to measured management risk.

Management risk were operationalized with thirteen indicators.

1. There is no postponement in resolving contractual issues in our company.
2. There is no postponement in resolving litigation and arbitration disputes in our company.
3. There is good organizational management in our company.
4. In our company, we control the activities of sub-contractor during execution of projects.
5. In our company, we conduct inspection and testing during construction.
6. There is no mistakes during soil investigation in our company.
7. In our company, there is safety during construction.
8. In our company, there is database in estimating activities.

9. In our company, there is proper site management and supervision.
10. In our company, there are no deficiencies in planning and scheduling during preconstruction stage.
11. In our company, we do not experience change in order from our clients.
12. In our company, there is contract negotiation.
13. In our company, there are normal judgment in estimating time and resources.

(b) Material risk

Material risk in this study refer to risk which may occur as a result of unavailability of material on the construction site. Material risk were operationalized with four indicators.

1. In our company, we experience adequate of materials in the markets.
2. In our company, there are fast delivery of materials.
3. Defective materials are not allowed in our company.
4. In our company, there are no changes in materials types and specifications during construction.

(c) Design risk

Design risks in this study refer to risks which may influence construction risk from design perspective. Below are the indicators used to measured design risks.

Design risk were operationalized into six questions.

1. In our company, we prevent design error and incomplete drawings.
2. In our company, there are no changes in design during construction.

3. In our company, there are no deficiencies in specifications and drawings.
4. Complete design are used in our company.
5. In our company, there are no delays in design information.
6. In our company, there are adequate design team experience.

(d) Finance risk

Financial risks in this study refer to the likely risks which may influence construction risk management as a result financial difficulties such as unpaid work within the project manager and the team members which will restrict them from proceeding with the project. Below are the indicators used to operationalize financial risks.

Finance risk were operationalized into four questions.

1. In our company, there are no delays in payment.
2. In our company, there is no financial failure.
3. In our company, there are no change order negotiations.
4. In our company, there is no price escalation.

(e) Labour and equipment risk

Labour and equipment risks in this study refer to the likely risks that may occur from the team members and the risks which may occur due to shortage or unavailability of equipment. Below are the items used to operationalize labour and equipment risks.

Labour and equipment risk were operationalized into seven questions

1. In our company there is adequate of labour.
2. In our company, there is adequate equipment productivity.

3. There is adequate of equipment in our company.
4. In our company, there is motivation of labour force.
5. In our company, there are skilled operators.
6. In our company, there is fast maintenance of equipment.
7. There are new equipment in our company.

3.4.5 Government Regulation (Rules and regulations)

Government regulation (rules and regulations) in this study playing a moderating effects means how government with his rules and regulations will strengthen the relationship in this study. Below are the indicators used to measured government rules and regulations. The items used to measure the moderating effect of government regulation (rules and regulations) on construction risk management were adapted from (Mezher & Tawil, 1998).

(a) Rules and regulations

Rules and regulations were operationalized into five questions

1. Government introduce regulation that promote construction risk in our company.
2. In our company, we obtain permission from municipality.
3. In our company, we wait for approval of drawings and materials samples.
4. In our company, we obtain permit from urban planning bureau.
5. Government rules and regulations reduce the price of construction materials in our company.

3.5. Source of Measurement Instrument

The Table 3.4 below depicts the source of each measurement instrument that was used in the questionnaire survey.

Table 3.4: *Sources of Measurement Instrument*

S/N	Variables	Sources	Remarks
1.	Effective communication	Kumaraswamy & Chan (1998)	Adapted
2.	Team competency and skills	Kumaraswamy & Chan (1998)	Adapted
3.	Active leadership	Kumaraswamy & Chan (1998)	Adapted
4.	Political	Jaafari (2001)	Adapted
5.	Organizational cultural	Kamaruddeen *et al.*, (2012)	Adapted
6.	Technology	Sun & Meng (2009)	Adapted
7.	Economic	Sun & Meng (2009)	Adapted
8.	Management risk	Aibinu & Odeyinka (2006)	Adapted
9.	Material risk	Aibinu & Odeyinka (2006)	Adapted
10.	Design risk	Aibinu & Odeyinka (2006)	Adapted
11.	Finance risk	Aibinu & Odeyinka (2006)	Adapted
12.	Labour and equipment risk	Aibinu & Odeyinka (2006)	Adapted
13.	Rules and regulations	Mezher & Tawil (1998)	Adapted

Source: Author

3.6. Pilot Study

According to Hulley (2007), a pilot study is a small scale initial investigation carried out in order to assess cost, time and feasibility for the purpose of predicting an accurate sample size and meliorate upon the study instrument earlier to the actual conduct of a full-scale study. A pilot study is essential because it may reveal deficiencies in the design of a proposed study which can be treated before the commitment of resources and time on huge scale study (Doug *et al*. 2006).

Precisely, the purpose of this pilot study comprise: (1) to ascertain validity and reliability of items in the questionnaire; (2) to determine the adequacy of item-wording and phrasing's for proper results; (3) to determine if questions are framed in such a way that would produce a better response; and (4) to determine if respondents can supply the accurate data needed. The validity of research instrument is the magnitude to which it measure what it is supposed to measure and not something else, while reliability of instrument is the magnitude to which the instrument is free from errors and results are reliable and stable across time and contexts (Sekaran & Bougie, 2010).

3.6.1 Validity of Research Instruments

The face or content validity of the research instrument was carried out before the pilot study. According to Babbie (2004), content validity is defined as the degree to which an instrument shows its meaning imbedded in specific concepts. More so, content validity include meeting with a small number experts or potential panels for their view over the wordings, and phrases of items in the research process (Hair *et al*. 2007; Sekaran & Bougie, 2010). Below Table 3.5 depicts the feedback received from the experts.

Table 3.5: *Expert's Comment during Content Validity*

Items in questionnaire	Comment by Expert
Section 1	
Q2: How many years have you been working with your company?	Remove the "numbers suggestions and leave it blank."
Q4: Which of the following describes the type of project your company specialize on?	Remove "residential, infrastructure and heavy" and replace with "apartment buildings, roads and bridges?"
Q7: How old is your company?	Change the sentence to "for how long has your company been in existence" and also remove the number suggestions and leave it blank
Q8: What is the number of full time employee in your company?	Remove the "number suggestions and leave it blank."
Section 2	
All questions are in negative statements.	Change all questions back to positive statements.
Section 3	
All questions are in negative statements.	Change all questions back to positive statements.
Q4: In our company, there are war during construction process.	Change back to positive and replace "war" to "violence."
Section 4	
All questions are in negative statements.	Change all questions back to positive statements.
Section 5	
All questions are in negative statements	Change all questions back to positive statements. More so, questions was reduced from "7 to 5".

Table 3.5 depicts the feedback comments received from the experts on developed initial questionnaire. This was done to make sure all items in the instrument represent the idea in each variable, while Table 3.6 below shows the profile of expert validators in this current study.

Table 3.6: *Validator's profile*

S/N	Names	Locations
1	Dr Wan Nasidi Osman	Snr Lecturer in Universiti Utara Malaysia, Malaysia.
2	Mr Okunola .O. Akere	Site accountant in Raymond construction company (RCC Nig Ltd).
3	Prof Dr Yemi .O. Alabi	Lecturer and a contractor in University of Lagos, Nigeria.
4	Dr Wasiu S.A.	Lecturer and an Engineer in University of Lagos, Nigeria.
5	Prof Dr Saminu Tunji .O.	Lecturer and Architecture in University of Lagos, Nigeria.

Source: Author

The content validity was carried out by requesting five (5) experts in the field of research and construction to validate and assert the questionnaire before the main pilot test. The questionnaire was sent as a hard copy to the experts of which four out of the five experts are academicians and at the same time practicing in Univerisit Utara Malayia and University of Lagos Nigeria respectively. While the fifth validator is a practitioner and an accountant in Raymond construction company Nigeria with many years' experience with the company. Using their comments to restructure the questionnaire, there were changes made to Section 1 to 5 of the questionnaire with removal and addition of words as presented in Table 3.5 above. Their comments and suggestions were integrated in the restructuring of the contents with the wordings of the questions and were all refined as suggested. The next section depicts the reliability of the pilot study questionnaire.

Following Malhotra (1999), a sample size for a pilot study is usually smaller comprising of 15 to 30 components, though it can increase considerably depending of individualities. Fifty questionnaires was distributed among the construction companies located in Lagos state Nigeria. Lagos was chosen because of one major reason: Lagos is where most construction activities are taken place in Nigeria and the close proximity from the place where the researcher resides. The number of the questionnaires was enhanced to 50 above based on the suggestion made by Malhotra's (1999) for low response rate not to occur. However, 45 questionnaires were completed and returned, but only 40 were retained as usable after five of the questionnaires were removed as a result of different errors, signifying a response rate of 80 percent.

The pilot study commenced on June 25 to July 20, 2015 and the process last for about four weeks. There were various kind of reliability test, however, the mostly used method by the researchers is "internal consistency reliability test" (Litwin, 1995). It is the magnitude to which items of a specific construct congregate together and are autonomously capable of measuring the actual construct; and at the same time the items are correlated with each other. The internal consistency reliability test of Cronbach's alpha coefficient (Sekaran & Bougie, 2010) was adopted. As presented in Table 3.7, the results revealed that all measures achieved a high reliability coefficient, ranging from 0.840 to 0.868. Research pundits regard a reliability coefficient of .60 as average reliability, and a coefficient of .70 and above as high reliability (Hair *et al.*, 2006; Nunnally, 1967; Sekaran & Bougie, 2010).

Table 3.7: *Summary of Pilot Test Reliability Results*

Constructs	Dimensions	No of items	Cronbach's Alpha
Internal factors	Effective communication	5	0.868
	Team competency and skills	5	0.850
	Active leadership	4	0.864
External factors	Political factors	5	0.862
	Organizational culture	6	0.863
	Technology factors	4	0.851
	Economic factors	4	0.862
Construction risk management	Management risks	13	0.840
	Material risks	4	0.857
	Design risks	6	0.861
	Financial risks	4	0.865
	Labour and equipment risks	7	0.842
Government regulation	Rules and regulations	5	0.858

Source: Author

3.7. Statistical Analysis

The Partial Least Square – Structural Equation Modelling (PLS-SEM) was used to analyse the data collected for this study. Precisely, two main PLS-SEM software applications which comprises SmartPLS by Ringle *et al.*, (2005) and PLS-Graph by Chin (2003) were used in the presentation of the analysis results.

3.7.1 Justification for using PLS-SEM in this study

According to Hair, Sarstedt, Pieper & Ringle (2012), the variance based PLS-SEM were chosen as the best over others. The authors further explain that if the aim of a study lies in the confirmation of a relationship instead of prediction. However, the PLS approach seemed to be the appropriate data analysis technique for this study because the aim of the study is to investigate the extent of construction risk management in Nigerian construction companies, and also to investigate certain internal and external organization factors that were confirmed to have a positive relationship with construction risk management in this study with the moderating effects of rules and regulations.

Furthermore, the methodologists argue that PLS-SEM analysis provides a robust statistically solutions where the basic expectations of CB-SEM, such as multivariate normality, less complex model, large sample size, and factor indeterminacy are hard to satisfy (Fornell & Bookstein, 1982; Chin, 1998; Hair, Ringle, &Sarstedt, 2011). However, in the context of this study, the data do not fulfil the assumption of multivariate normality, the theoretical model is reasonably complex. Therefore, the PLS-SEM approach was adopted for this study.

3.7.2 Descriptive Analysis

According to Sekaran & Bougie (2010), descriptive analysis is mostly used to depict phenomenon interest. Descriptive analysis like the mean score, percentage, and standard deviation, minimum and maximum was used. There were two functions of descriptive analysis such as; one, is to find out the profile of the respondents with the companies that participated in the survey. Two, is to investigate the extent of risk management in the construction companies using the mean scores acquired from the SPSS outputs. Lastly, this study investigates the extent of risk management by checking which of the range above are consistence the mean score in the SPSS output.

3.7.3 Partial Least Square Technique

The PLS-SEM techniques is termed as the second generation structural equation modelling (Wold, 1982). The comparatively new techniques works very well with structural equation models which comprises latent variables and a sequences of cause-and effect relationship (Gustafsson & Johnson, 2004). PLS-SEM method is flexible and a good tools for statistical model building and also prediction (Ringle, Wende, & Will, 2005).

Firstly, the use of PLS-SEM has been established by past researchers as having the power to test for moderating effect (Kadir, Said & Singh, 2012; Henseler & Fassott, 2010; Goodhue *et al.*, 2007; Chin *et al.*, 2003). It was depicted by Bolen (1989) that PLS are more significant and effective while other analytical method conclusion results are less clearer, which involves various other separate methods of analysis.

In order to comprehend the complex relationship related with the social science research, the use of PL-SEM is important in the use of more advanced multivariate data analysis method (Hair *et al.*, 2013). More so, it is viewed as a powerful tool with the power to test several relationships simultaneously.

Secondly, the PLS path modelling has become more suitable in the real world applications and more beneficial to use when there is a complex models (Fornell & Bookstein, 1982; Hulland, 1999). The soft modelling premises of PLS technique (i.e. aptitude to develop flexibly and to validate complex models) provides benefit of estimating prominent complex models (Akter, Ambra & Ray, 2011). The current study examined the relationships between internal and external organizational factors and construction risk management as well as the moderating effects of rules and regulations within the structural model and further adopting the use of PLS-SEM techniques which more suitable for better prediction.

Thirdly, in most of the social science studies, data incline to have problem of normality (Osborne, 2010) and it is not necessary for data to be normal in PLS path modelling (Chin, 1998a). In spite of that, PLS handles non-normal data comparatively well. By and Large, PLS path modelling was chosen for this study in order to avoid any normality problem which may come up during the data analysis for the current study. Fourthly, PLS-SEM provides more significant and valid results, compare to other methods of analysis such as statistical package for social science (SPSS) used for statistical analysis, mostly effect in less clear conclusions and would need various separate analysis (Bollen, 1998). Furthermore, it was stated by Tabachnick & Fidel (2007) that SEM is one of the greatest statistical tools in social science and even behavioural sciences which have the ability to test various relationships simultaneously.

Concerning this study, SmartPLS path modelling was used to create measurement and structural models. In order to explain or assess constructs' reliability and validity of the current study, measurement model was used. More so, in conducting bivariate correlation analysis and simulations regressions analysis to create correlations and relationship effects within constructs in this study, structural model will be used. Lastly, using the PLS software of algorism and bootstrapping, the moderating effects of rules and regulations on the relationship between organizational internal and external factors and construction risk management were analysed and Table 3.8 depicts the summary of the objectives and analytical technics.

Table 3.8: *Summary of objectives and analytical technics*

Objectives	**Analytical Technics**
Objective 1	SPSS
Objective 2	PLS-SEM
Objective 3	PLS-SEM
Objective 4	PLS-SEM

3.8. Summary

This chapter has discussed the epistemology and nature of the current research. It also discussed the research design and the research method that was employed for data collection in this study. Further discussed how the questionnaire was developed and the sources of measurement for all the variables that was used in this research. Hence, it also discussed the pilot study procedures and how 40 questionnaires was returned from the filed with 331 questionnaires distributed for the main survey among the construction companies in Abuja and Lagos state Nigeria, because this research is mainly based on quantitative approaches. Which they were subsequently used for validating and testing necessary hypotheses on the relationships between organizational internal and external factors, construction risk management and rules and regulations. This chapter also depicts the statistical analysis to be used in achieving the objectives of the research which was SPSS and PLS-SEM with it advantages over other techniques. The next section in this study discussed the analysis of the whole research.

CHAPTER FOUR

ANALYSIS

4.1 Introduction

This chapter presented the results of data that were analysed with the use of SPSS and Partial Least Square (PLS) path modelling. Furthermore, the initial data screening and preliminary analysis were discussed. The descriptive statistics results for all the latent variables were also reported. Next, the actual results of the current study were depicted in three main sections. For section one; the descriptive statistics was analysed with the use of SPSS to achieve the first objective of this research. Section two, the measurement model was measured to determine the individual indicator reliability, internal consistency reliability, convergent validity and discriminant validity. Section three presented the results of the structural model (for example, how significance is the path coefficients, level of the R-squared values, effect size, and predictive relevance of the model). Lastly, the results of complementary PLS-SEM analysis, meant to examine the moderating effects of rules and regulations on the structural model, were all presented.

4.2 Response Rate

The word response rate refers to the total number of completed and returned survey questionnaires, classified by the number of sample respondents which are qualified for the survey (Frohlich, 2002). Prior managerial studies depicted that 32% were the average response rate for survey studies (Fohlich, 2002). Thus, the author suggested some approaches to improve response rate in survey studies such as:

1) The respondents must be aware before the survey
2) Give a sincere appeal on the cover letter
3) Conduct a pilot study, and use the existing scale for survey
4) Be sure the items are well formatted and managed
5) Mailed the questionnaire more than once
6) Provide a prepaid postage
7) Make non-stop follow up
8) Send the questionnaire to the appropriate respondent
9) Provide the third party logo (such as construction company logo) on the survey questionnaire
10) Add more effort to get accurate result at the end of the research.

This research adopted the strategy listed above but with the exceptions of number 5 and 6 because the questionnaires were delivered by hand to all respondents to get more response.

In this study, a total of 331 questionnaires were distributed to the Local, National and Multi-national construction companies in Abuja and Lagos state of Nigeria. In an effort to attain high response rates, a lot of SMS (Salim Silva, Smith, & Bammer, 2002; Traina, MacLean, Park, & Kahn, 2005) and phone call reminders (Sekaran, 2003) were sent from time-to-time to all the respondents who were yet to complete their given questionnaires after four weeks (Dillman, 2000; Porter, 2004).

Consequently, the outcomes of these survey yielded 248 returned questionnaires, out of 331 questionnaires that were distributed to the target respondents. This gives a response rate of 75% following Jobber's (1989) response rate definition. Out of the 248 returned questionnaires, 10 were void because a substantial part of those questionnaires were not filled by the respondents; and the remaining 238 useable questionnaires were used for this study analysis. This there indicated 72% useable response rate. Therefore, a response rate of 72% is regarded appropriate for this study analysis because Sekaran (2003) proposed that 30% response rate is abundant for surveys (see Table 4.1), as this study followed Sekaran.

Table 4.1: *Questionnaire Distributed and Decisions*

Response	**Frequency/Rate**
No. of distributed questionnaires	331
Returned questionnaires	248
Return and usable questionnaires	238
Return and excluded questionnaires	10
Response rate	75%
Valid response rate	72%

Source: Author

4.3 Data Screening and Preliminary Analysis

Data screening at the initial stage is very paramount in any multivariate analysis because it helps researchers discover any likely desecrations of the main assumptions concerning the implementations of multivariate methods of data analysis (Hair *et al.*, 2007). In addition, data screening at the initial stage helps the researchers to better comprehend the collected data for further analysis.

Before the initial data screening, all the 238 returned and usable questionnaires were all entered and coded into the SPSS (version 21). After the data entry and coding, the following preliminary data analyses were conducted: (1) Normality test, (2) Multicollinearity test, (3) Non-response bias test and common method variance test (Hair, Black, Babin, & Anderson, 2010; Tabachnick & Fidell, 2007). According to Hossain (2013), PLS accommodate non-normal or extremely non-normal data without conducting the above test. However, the current study still conducted the test but test for missing values was not conducted in the present research because all the data from respondents contains no missing values but instead void data which have been removed from the data set.

4.3.1 Normality Test

Previous studies (for example, Cassel, Hackl, & Westlund, 1999; Reinartz, Haenlein, & Henseler, 2009;Wetzels, Odekerken-Schroder, & Van Oppen, 2009) have conventionally presumed that PLS-SEM offers accurate model estimations in circumstances with enormously non-normal data. Nevertheless, these presumptions may change to be false. Lately, Hair, Sarstedt, Ringle and Mena (2012) proposed that researchers should carry out a normality test on the data. Extremely kurtotic or skewed data can amplify the bootstrapped normal error estimates (Chernick, 2008), which in turn undervalue the statistical significance of the path coefficients (Dijkstra, 1983; Ringle, Sarstedt, & Straub, 2012a).

Contrary to this background, graphical method was employed to check for the normality of the data collected in the present study (Tabachnick & Fidell, 2007). Field (2009) proposed that in a large sample of more than 200, it is paramount to check at the shape of the distribution graphically rather than observing the value of the kurtosis and skewness statistics. Field (2009) added that a large sample reduces the standard errors which amplify the value of the kurtosis and skewness statistics. Therefore, this warranted the reason for using a graphical representation method of normality test compare to the statistical methods.

Going by Field's (2009) proposition, in the current study, a histogram and normal probability plots were carried out to ensure that normality presumptions were not breached. Figure 4.1 shows that collected data for this study follow normal rule since all the bars on the histogram were shut to a normal curve. Therefore, Figure 4.1 shows that normality presumptions were not breached in the present study.

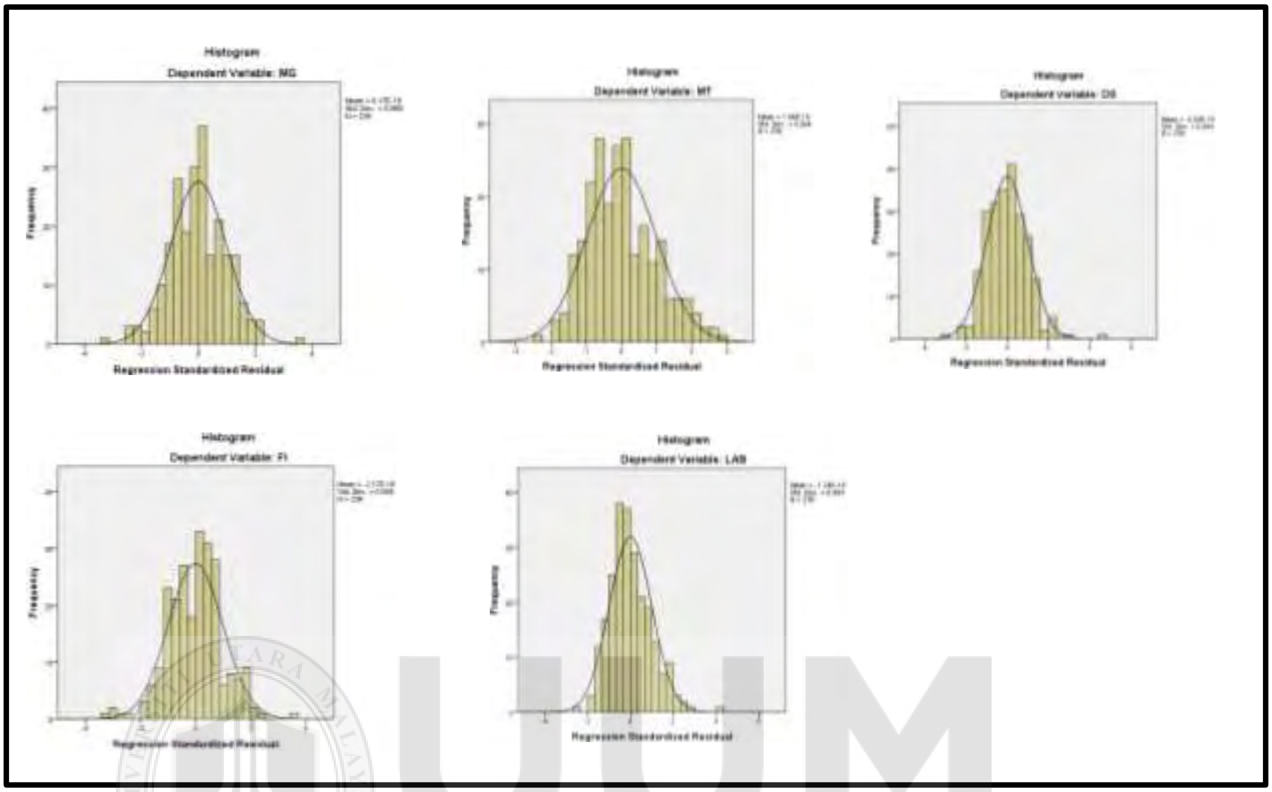


Figure 4.1
Histogram and Normal Probability Plot
Source: Author

4.3.2 Multicollinearity Test

Multicollinearity is a state where more exogenous latent constructs are highly correlated. The existence of multicollinearity between the exogenous latent constructs can considerably change the estimates of regression coefficients with the tests for their statistical significance (Chatterjee & Yilmaz, 1992; Hair *et al.*,2006). Specifically, multicollinearity increases the standard errors of the coefficients, which later makes the coefficients statistically nonsignificant (Tabachnick & Fidell, 2007).

To detect multicollinearity, variance inflated factor (VIF) with its tolerance value were examined to detect multicollinearity problem. Hair, Ringle and Sarstedt (2011) proposed that multicollinearity is a concern if VIF value is more than 5 and the tolerance value is less than .20, Table 4.2 depicts the VIF values and the tolerance values for the exogenous latent constructs. Thus, Multicollinearity has no effects on the data collected for the present study.

Table 4.2: *Multicollinearity Test for Exogenous Latent Constructs*

Coefficients		
Latent Constructs	**Collinearity Statistics**	
	Tolerance	**VIF**
Team competency and skills	.530	1.886
Active leadership	.540	1.852
Political factor	.696	1.437
Organizational culture	.551	1.814
Technology factor	.428	2.338
Economic factor	.779	1.284
Management risk	.287	3.484
Material risk	.479	2.090
Design risk	.430	2.328
Finance risk	.585	1.709
Labour and equipment	.339	2.953
Rules and regulations	.500	1.998

Dependent Variable: Effective communication		
Active leadership	.518	1.932
Political factor	.687	1.455
Organizational culture	.529	1.889
Technology factor	.428	2.338
Economic factor	.779	1.284
Management risk	.295	3.395
Material risk	.478	2.091
Design risk	.428	2.334
Finance risk	.585	1.708
Labour and equipment	.344	2.910
Rules and regulations	.492	2.032
Effective communication	.554	1.807
Dependent variable: Team competency and skills		
Political factor	.683	1.465
Organizational culture	.532	1.880
Technology factor	.444	2.251

Table 4.2 (Continued)

Economic factor	.790	1.266
Management risk	.286	3.494
Material risk	.481	2.081
Design risk	.431	2.318
Finance risk	.585	1.709
Labour and equipment	.340	2.945
Rules and regulations	.494	2.025

Effective communication	.547	1.828
Team competency and skills	.502	1.990
Dependent variable: Active leadership		
Organizational culture	.537	1.861
Technology factor	.432	2.312
Economic factor	.824	1.213
Management risk	.290	3.444
Material risk	.479	2.089
Design risk	.429	2.333
Finance risk	.585	1.710
Labour and equipment	.339	2.948
Rules and regulations	.492	2.031
Effective communication	.534	1.874
Team competency and skills	.505	.1980
Active leadership	.517	1.980
Dependent variable: Political factor		
Management risk	.285	3.508
Material risk	.484	2.068
Design risk	.435	2.301
Finance risk	.599	1.670
Labour and equipment	.350	2.857
Rules and regulations	.498	2.008
Effective communication	.524	1.907
Team competency and skills	.503	1.989
Active leadership	.543	1.842

Political factor	.728	1.374
Organizational culture	.538	1.858
Dependent variable: Economic factor		
Material risk	.507	1.973
Design risk	.486	2.057
Finance risk	.596	1.678
Labour and equipment	.348	2.876
Rules and regulations	.512	1.954
Effective communication	.529	1.889
Team competency and skills	.521	1.920
Active leadership	.542	1.844
Political factor	.707	1.414
Organizational culture	.539	1.854
Economic factor	.788	1.269
Dependent variable: Management risk		
Design risk	.435	2.299
Finance risk	.607	1.647
Labour and equipment	.368	2.716
Rules and regulations	.500	2.000
Effective communication	.525	1.905
Team competency and skills	.503	1.988
Active leadership	.542	1.845
Political factor	.693	1.443
Organizational culture	.535	1.868
Economic factor	.795	1.259

Management risk	.301	3.320
Dependent variable: Material risk		
Finance risk	.607	1.649
Labour and equipment	.366	2.734
Rules and regulations	.507	1.972
Effective communication	.525	1.903
Team competency and skills	.502	1.991
Active leadership	.539	1.854
Political factor	.691	1.447
Organizational culture	.533	1.876
Economic factor	.788	1.269
Management risk	.319	3.136
Material risk	.480	2.083
Dependent variable: Design risk		
Labour and equipment	.346	2.890
Rules and regulations	.506	1.976
Effective communication	.524	1.907
Team competency and skills	.503	1.988
Active leadership	.537	1.861
Political factor	.691	1.446
Organizational culture	.534	1.873
Economic factor	.795	1.258
Management risk	.286	3.494
Material risk	.490	2.039
Design risk	.444	2.252

Dependent variable: Finance risk		
Rules and regulations	.526	1.903
Effective communication	.525	1.904
Team competency and skills	.512	1.955
Active leadership	.542	1.844
Political factor	.692	1.445
Organizational culture	.536	1.864
Economic factor	.799	1.252
Management risk	.287	3.483
Material risk	.512	1.955
Design risk	.460	2.172
Finance risk	.595	1.681
Dependent variable: Labour and equipment		
Effective communication	.534	1.873
Team competency and skills	.502	1.991
Active leadership	.541	1.847
Political factor	.692	1.445
Organizational culture	.535	1.868
Economic factor	.788	1.269
Management risk	.293	3.415
Material risk	.481	2.077
Design risk	.442	2.261
Finance risk	.603	1.658
Labour and equipment	.364	2.745
Dependent variable: Rules and regulations		

4.3.3 Test for Non-response Bias

Non-response bias was defined by Lambert and Harrington (1990) as “the dissimilarities in the answers provided by the non-respondents and respondents”. Hence, in order to eradicate the likelihood of non- response bias, Armstrong and Overton (1977) proposed a time-trend extrapolation method, that involves relating the early and late respondents (i.e., non-respondents). It was further disclosed from the author’s argument that late respondents share akin features with non-respondents.

Furthermore, to reduce the issue of non-response bias, Lindner and Wingenbach (2002) proposed that a 50% minimum response rate must be accomplished. Following Armstrong and Overton’s (1977) method, the current study separated the respondents into two main clusters: those who responded to the questionnaires from July 26, 2015 (i.e., early respondents) and those who responded after July 26, 2015 (i.e., late respondents) (Vink & Boomsma, 2008). Vast number of the respondents in the sample; that is 25 (15%) replied to the questionnaire within 30 days, while the other 213, signifying 85% replied after 30 days (Table 4.3).

To be specific, an independent samples t-test was carried out to discover any likely non-response bias on the actual study variables comprising management risks, material risks, design risks, finance risks, labour and equipment, effective communication, team competency and skills, active leadership, political factor, organizational culture, technology factor, economic factor and rules and regulations. Table 4.3 depicts the results of independent-samples t-test attained.

Table 4.3: *Results of Independent-Sample T-test for Non-Response Bias*

					Levene's Test for Equality of Variances	
Variable	**GROUP**	**N**	**Mean**	**Std. Deviation**	**F**	**Sig.**
EC	Early response	25	2.8640	.72277	1.182	.278
	Late response	213	2.7174	.76598		
TC	Early response	25	2.6240	.80482	.046	.831
	Late response	213	2.7362	.80941		
AL	Early response	25	2.5600	.70814	2.529	.113
	Late response	213	2.7817	.85877		
PL	Early response	25	2.3520	.66151	.123	.726
	Late response	213	2.4122	.68131		
OC	Early response	25	2.5600	.68866	.440	.508
	Late response	213	2.5282	.63340		
TG	Early response	25	2.4400	.82689	.543	.462
	Late response	213	2.4988	.87365		
EN	Early response	25	2.3000	.69970	.186	.667
	Late response	213	2.4460	.66279		
MG	Early response	25	2.6862	.60239	.219	.640
	Late response	213	2.6941	.61336		
MT	Early response	25	2.8100	.95274	1.632	.203
	Late response	213	2.7171	.79620		
DS	Early response	25	2.6200	.81155	.257	.613

	Late response	213	2.6886	.70732		
FI	Early response	25	2.1700	.75939	.044	.834
	Late response	213	2.3439	.73570		
LAB	Early response	25	2.5657	.75534	.008	.931
	Late response	213	2.7103	.76239		
RG	Early response	25	2.2800	.73711	.264	.608
	Late response	213	2.4404	.69802		

Source: Author

The results of independent-samples t-test as depicted in Table 4.2 shows that equal variance significance values for the thirteen main research variables were higher than the 0.05 significance level of Levene's test for equality of variances as proposed by Pallant (2010) and Field (2009). Therefore, this proposes that the premiss of equal variances among early and late respondents has not been desecrated. Hence, it can be sealed that non-response bias was not main issue in the current study. Similarly, following the recommendation made by Lindner and Wingenbach’s (2002), since this study attained 72% response rate, it can be drawn that the problem of non-response bias does not seem to be a major concern. Hence the data collected was used for the analysis.

4.3.4 Common Method Variance Test

Common method variance can be viewed as a potential problem in behavioural research, CMV is defined as the variance which is constantly attributable to the measurement process relatively than the main constructs the measures characterize (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). There has been a serious issue on how to eliminate method biases because it is one of the primary sources of measurement error detected in behavioural research.

This research has used self-reported data acquired from Local, National and Multi-national construction companies in Abuja and Lagos state Nigeria, which generate potential for common method variance (CMV). The implication of this is that the predictors (i.e effective communication, team competency and skills and active leadership), and criterion variables (i.e., management risks, material risks, design risks, finance risks, labour and equipment) are gathered from a single rater or source (employee). Some statistical and procedural measures were therefore taken in the research process to solve the issue of CMV (Podsakoff *et al.* 2003). Some of these statistical and procedural measures comprise of elimination of item ambiguity, allowing the respondents' anonymity, Harman's single-factor test and reverse worded questions as suggested by Podsakoff *et al*. (2003).

One of the most widely techniques used by researchers to solve the problem of common method variance is Harman's single-factor test. However, the technique allows loading simultaneously of all research variables into an exploratory factor analysis and studying the un-rotated factor solution to create the number of factors that are essential to account for the variance in the variables. The rule states that if a significant number of common method variance is present, the results of the factor analysis may be a single factor, or that a single factor will cause for most of the covariance between the measures (Podsakoff *et al*., 2003). The results of the un-rotated exploratory factor analysis signify 13 factor variables, signifying a cumulative of 48.7% of the variance; with the first (largest) factors explaining 20.2% of the total variance, which is below 50% (Kumar, 2012). Furthermore, the results signify that no single factor accounted for the majority of covariance in the predictor and the criterion variables (Podsakoff *et al.*2012). Thus, this proposes that common method bias is not an issue and is unlikely to amplify the relationships among variables measured in the current study.

4.4 Demographic Profile of the Respondents

This part depicts the demographic profile of the respondents in the sample. The demographic features observed in this study contain positions in the company, years of experience and gender, (see Table 4.4).

Table 4.4: *Demographic Profile of the Respondents*

Respondents	Frequency	Percentage (%)
Position in the company		
Contract manager	26	10.9
Executive director	8	3.4
Marketing manager	12	5.0
Project manager	75	31.5

Engineer	72	30.3
Other employees	45	18.9
Working experience (Years)		
Lowest working experience	1	0.4
Highest working experience	47	5.9
Gender		
Male	182	76.5
Female	56	23.5

Source: Author

Out of 238 company representatives who participated in the instrument survey, 10.9% were contract manager, 3.4% executive director, 5.0% marketing managers, 31.5% project manager, 30.3% engineer and 18.9% other employees. Their years of working experience were rated from 1 to 47. The highest (5.9%) percentage of working experience was 14 years, followed by 12 years and 13 years respectively. Concerning the gender of respondents, the percentage of male respondents was 76.5% compared with 23.5% female. Table 4.3 shows the features of the respondents that took part in the current study.

4.5 Demographic Profile of the Companies

Table 4.4 shows the features of the companies that took part in the current study. A total of 36.6% of the companies specialized in building apartment. The next 54.7% of the companies specialized in roads construction, 6.7% of the companies specialized in bridges constructions, while 2.1% of them are other specializations.

The company's ownership rated from local, national and multi-national companies. The highest, 63.0% were local companies; followed by national, 6.3%,multi-national, 30.3% and others with 0.4%.

The company's operational business location rated from local markets to international markets. Local company operations have the highest percentage with 60.1%, followed by companies that work within few states 3.8%, companies working within a region 2.5%, followed by companies that work across Nigeria 16.8%. Companies that work within the international market are just 18.4%. Concerning the year of company's existence, which rated from 3 to 65 years of experience with 0.4% as the lowest and 12.2% as the highest respectively. The size of the company mostly determines the numbers of the employee company will have. The employee ranged from 5 to 87156 employees with the lowest of 0.4% and 5.9% as the highest.

Table 4.5: *Demographic Profile of the Companies*

Parameters	**Frequency**	**Percentage (%)**
Company specialization		
Apartment buildings	87	36.6
Roads	130	54.7
Bridges	16	6.7
Others	5	2.1
Company ownership type		
Local	150	63.0
National	15	6.3
Multi-national	72	30.3
Others	1	0.4
Company business location		

Local market areas	143	60.1
Within few states	9	3.8
Regional	6	2.5
Across Nigeria	40	16.8
International markets	39	18.4
Company existence (years)		
Lowest	1	0.4
Highest	29	12.2
Company employee		
Lowest	1	0.4
Highest	14	5.9

Source: Author

4.6 Descriptive Analysis of the Latent Constructs

This part is directly linked with the descriptive statistics for the latent variables used in the current study. Descriptive statistics in the terms of means and standard deviations for the latent variables were calculated. All the latent variables used in the current study were measured using a five-point likert scale anchored with 1 = *very low* (1.0-1.49); 2 = *low* (1.5-2.49); 3 = *medium* (2.5-3.49); 4 = high = (3.5-4.49); 5 = *very high* (4.5-5.00). following PMBOK (2000).

The results of descriptive statistics depicted in Table 4.5 show that all latent variables with their dimensions have a mean rating from 2.3256 and 2.7584.While the standard deviation of all latent variables rated from 0.61097 and 0.86736 which are also regarded acceptable. Thus, it can be drawn that on the basis of responses i.e. the views of respondents gathered in this study clearly show to a satisfactory and acceptable level of application with regard to all latent variables viz. effective communication, team competency and skills, active leadership, political factors, organizational factors, technology factors, economic factors, management risk, material risks, design risks, finance risks, labour and equipment and rules and regulations. Table 4.6 shows the descriptive statistics for the latent variables.

Table 4.6: *Descriptive Statistics for Latent Variables*

Latent Constructs	Number of Items	Mean	Standard Deviation
Effective communication	5	2.7328	.76142
Team competency and skills	5	2.7244	.80797
Active leadership	4	2.7584	.84565
Political factor	5	2.4059	.67815
Organizational culture	6	2.5315	.63796
Technology factor	4	2.4926	.86736
Economic factor	4	2.4307	.66674
Management risk	13	2.6933	.61097
Material risk	4	2.7269	.81228
Design risk	6	2.6814	.71740
Finance risk	4	2.3256	.73852
Labour and equipment	7	2.6951	.76136
Rules and regulations	5	2.4235	.70234

Source: Author

4.7 Extent of construction risk management among Abuja and Lagos State Nigeria Construction Companies

This part depicts the analysis performed in other to accomplish the first research objective in this study.

As mentioned earlier in Chapter 1, the first objective of this research is to determine the extent of construction risk management among Abuja and Lagos state Nigeria construction companies. PBOK (2000) categorize risk management into five different levels such as, *very low, low, medium, high and very high*. PMBOK defines risk management as the process of identifying, analysing and responding to risk events throughout the stages of a project in order to obtain the acceptable or optimum degree of risk control or elimination. Furthermore, as it was stated earlier that the major five risk factors affecting most of the construction companies from the world view were management, material, finance, design with labour and equipment risks, as it was also affirmed by Aibinu and Odeyinka, (2006) that these five risk factors affected Nigerian construction companies, which prompted this research to investigate to what degree and from which angles are these risk factors affecting Nigerian construction companies from attaining effective construction risk management. Following PMBOK (2000) and Ahmed *et al.*(1999) interpretation of the Likert scale, the subsequent values range was used to interpret the 5-point Likert scale in ascending order (in the questionnaire) as follows: 1 = *very low* (1.0-1.49); 2 = *low* (1.5-2.49); 3 = *medium* (2.5-3.49); 4 = high = (3.5-4.49); 5 = *very high* (4.5-5.00). Finally, the extent of construction risk management among Abuja and Lagos state Nigeria construction companies was ascertained by examining which of the range observed matched the mean score of construction company risk in the SPSS descriptive statistics result. For example, a mean score of 1.0 to 1.49 signifies that extent of risk management within the construction company is very low. Table 4.7 shows the extent of construction risk management in Nigerian construction companies.

Table 4.7: *Extent of Construction Risk Management among Abuja and Lagos state Nigeria Construction Companies*

Construction risk management extent	Frequency	Percentage	Mean	Median	Mode	SD
Very low	-	-				
Low	116	48.4				
Medium	95	39.9	2.652	2.500	2.26	0.590
High	26	10.6				
Very high	1	0.4				

Table 4.7 shows the frequency and percentage scores for the extent of construction risk management among Abuja and Lagos state Nigeria construction companies. The group *low* scored the highest frequency (116) with 48.4%. However, the mean score (2.652) signifies that the extent of construction risk management among Abuja and Lagos state Nigeria construction companies is at the *medium* category, that is risk management is not implemented within the companies at degree of very high nor very low but less effective. This is also in line with the study of Bramble & Collahan (2011) which affirmed that, there is very limited application of risk

management in Nigeria construction project. Table 4.8 shows the extent of management risk among Nigerian construction companies.

Table 4.8: *Extent of management risk among Abuja and Lagos state Nigeria construction companies*

Management risk	**Frequency**	**Percentage**	**Mean**
Very low	-	-	
Low	106	44.4	
Medium	107	44.9	2.693
High	24	10	
Very high	1	0.4	

Table 4.8 depicts the frequency and percentage score for management risk of Abuja and Lagos state Nigerian construction companies. The score with highest frequency (107) and percentage (44.9 %) is medium. The mean score (2.693) indicates that most of risk causes by the management is at medium level, which makes Abuja and Lagos state Nigeria construction companies risk management to be less effective. Table 4.9 shows the extent of material risk among Nigeria construction companies.

Table 4.9: *Extent of material risk among Abuja and Lagos State Nigeria construction companies*

Material risk	**Frequency**	**Percentage**	**Mean**
Very low	1	0.4	
Low	94	39.4	
Medium	90	37.8	2.726
High	46	19.4	
Very high	7	2.9	

Table 4.9 presents the frequency and percentage score for material risk of Abuja and Lagos State Nigeria construction companies. The score with highest frequency (94) and percentage (39.9 %) is medium. The mean score (2.726) indicates that most of risk that occurs as a result of material is at medium level, which makes Abuja and Lagos State Nigeria construction companies risk management to be less effective. Table 4.10 shows the extent of design risk among Nigerian construction companies.

Table 4.10: *Extent of design risk among Abuja and Lagos State Nigeria construction companies*

Design risk	Frequency	Percentage	Mean
Very low	-	-	
Low	95	39.9	
Medium	102	42.9	2.681
High	36	15.1	
Very high	5	2.1	

Table 4.10 presents the frequency and percentage score for design risk of Abuja and Lagos State Nigeria construction companies. The score with highest frequency (102) and percentage (42.9 %) is medium. The mean score (2.681) signifies that most of risk that occurs as a result of design is at medium level, which makes Abuja and Lagos state Nigeria construction companies risk management to be less effective. Table 4.11 shows the extent of finance risk among Nigerian construction companies.

Table 4.11: *Extent of finance risk among Abuja and Lagos State Nigeria construction companies*

Finance risk	**Frequency**	**Percentage**	**Mean**
Very low	8	3.4	
Low	146	61.3	2.325
Medium	58	24.4	
High	24	10	
Very high	2	0.8	

Table 4.11 presents the frequency and percentage score for finance risk of Abuja and Lagos State Nigeria construction companies. The score with highest frequency (146) and percentage (61.3 %) is medium. The mean score (2.325) signifies that most of risk that occurs as a result of finance is at low level, which makes Abuja and Lagos state Nigeria construction companies risk management to be less effective. Table 4.12 shows the extent of labour and equipment risk among Nigerian construction companies.

Table 4.12: *Extent of labour and equipment risk among Abuja and Lagos State Nigeria construction companies*

Labour and equipment risk	**Frequency**	**Percentage**	**Mean**
Very low	-	-	
Low	114	48	
Medium	83	34.8	2.695
High	34	14.2	
Very high	7	2.9	

Table 4.11 presents the frequency and percentage score for labour and equipment risk of Abuja and Lagos State Nigeria construction companies. The score with highest frequency (114) and percentage (34.8 %) is medium. The mean score (2.695) signifies that most of risk that occurs as a result of labour and equipment is at medium level, which makes Abuja and Lagos State Nigeria construction companies risk management to be less effective.

4.8Assessment of PLS-SEM Path Model Results

It is paramount to state that a study conducted by Henseler and Sarstedt (2013) proposes that goodness-of-fit (GoF) index is not appropriate for model validation (see also Hair et al., 2014). For example, using PLS path models with induced data, the authors revealed that goodness-of-fit index is not appropriate for model validation because it cannot distinguish invalid models from valid ones (Hair, Ringle, & Sarstedt, 2013).

In the light of the latest development about the precarious of PLS path modelling in validating the model, the current study adopted a two-step process to measure and report the results of PLS-SEM path, as proposed by Henseler, Ringle and Sinkovics (2009). The adopted two-step process in the current study includes (1) the assessment of a measurement model, and (2) the assessment of a structural model, as shown in Figure 4.2 (Hair *et al.* 2014; Hair *et al.* 2012; Henseler *et al.* 2009).

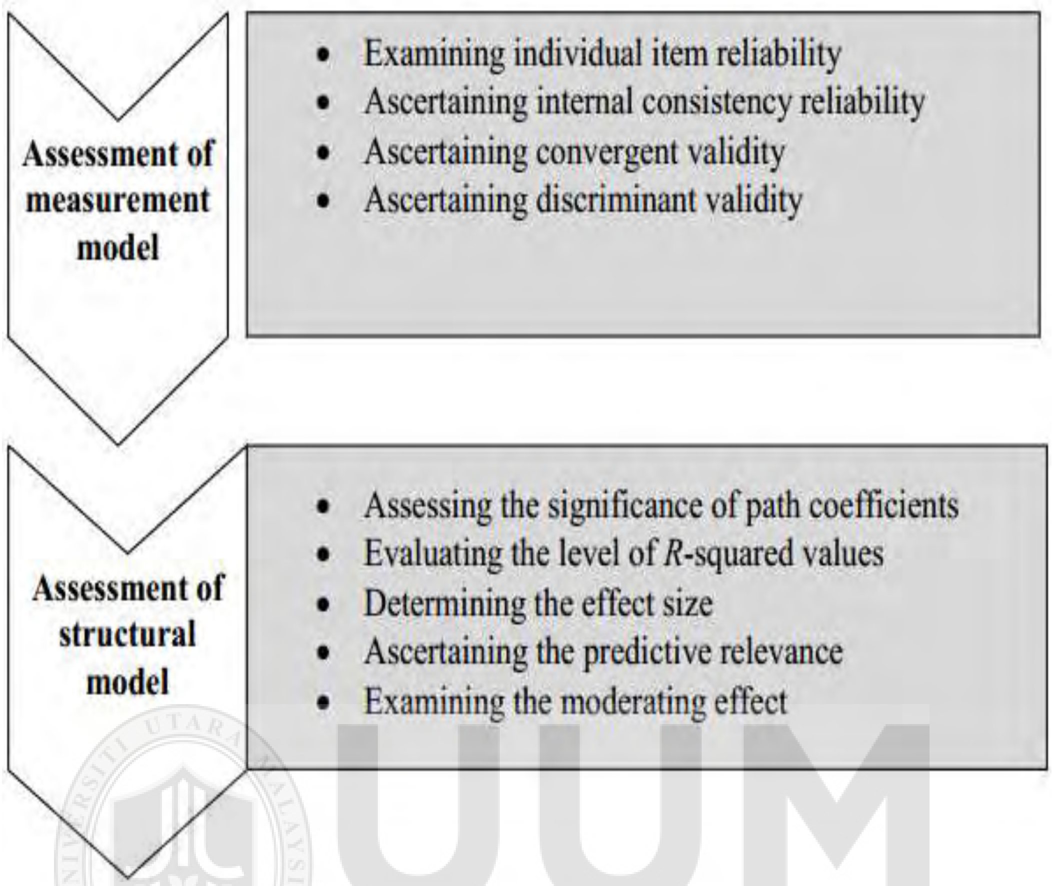


Figure 4.2
A Two-Step Process of PLS Path Model Assessment
Source: (Henseler *et al.* 2009)

4.9 Assessment of Measurement Model

An assessment of a measurement model requires the definitions of individual item reliability, internal consistency reliability, content validity, convergent validity with discriminant validity (Hair *et al.*2014; Hair *et al.* 2011; Henseler *et al.* 2009).

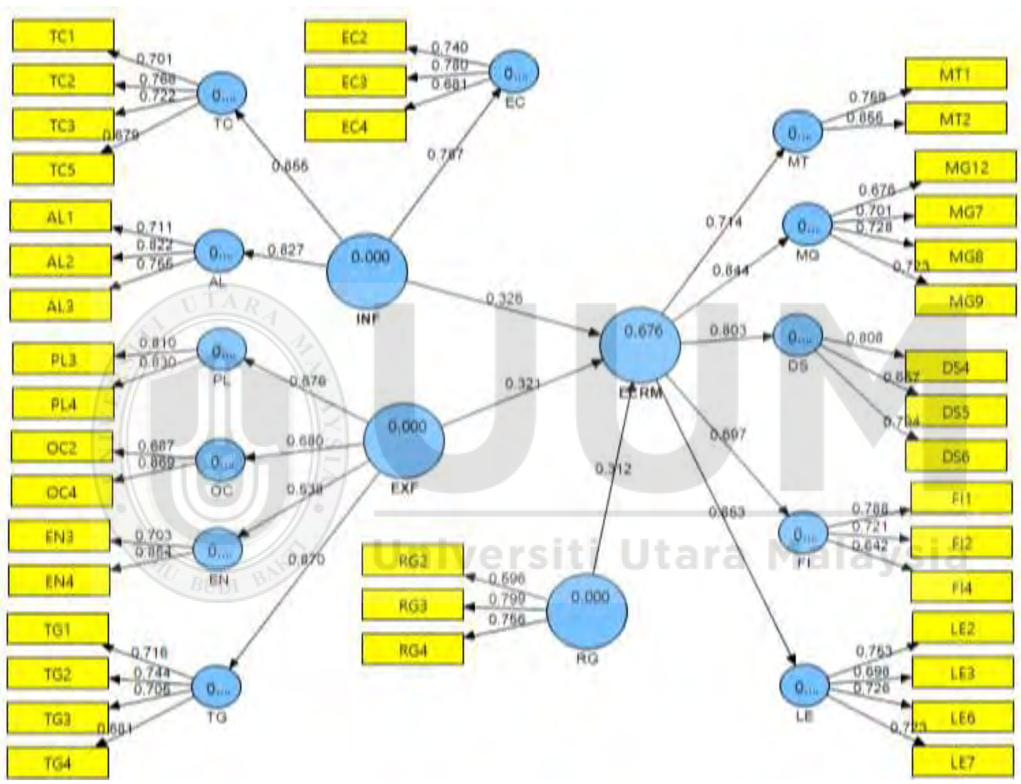


Figure 4.3: *Measurement Model*

4.9.1 Individual Item Reliability

Individual item reliability was measured by studying the outer loadings of each construct's measure (Duarte & Raposo, 2010; Hair *et al.* 2014; Hair *et al.* 2012; Hulland, 1999). Going by the rule of thumb for holding items with loadings between .40 and .70 (Hair et al., 2014), it came upon that out of 72 items, 33 were deleted because they demonstrated loadings lower than the threshold of 0.40. Therefore, in the whole model, only 39 items were reserved as they had loadings between 0.596 and 0.869, Following Hayduk, & Littvay (2012), the authors suggested that fewer items are required to run a standard PLS analysis.

4.9.2 Internal Consistency Reliability

Internal consistency reliability relates to the degree of which all items on a specific (sub) scale are measuring the same concept (Bijttebier *et al.* 2000; Sun *et al.*,2007). Cronbach's alpha coefficient and composite reliability coefficient are the major commonly used estimators of the internal consistency reliability of an instrument in organizational research (for example, Bacon, Sauer, & Young, 1995; McCrae, Kurtz, Yamagata, & Terracciano, 2011; Peterson & Kim, 2013). In the present study, composite reliability coefficient was selected to determine the internal consistency reliability of measures adapted.

Composite reliability coefficient was used in this study based on two grounds. Firstly, from composite reliability coefficient, less biased estimate of reliability are provided compare to Cronbach's alpha coefficient because the later presumes that all items add the same to its construct without looking at the literal contribution of individual loadings (Barclay, Higgins, & Thompson, 1995; Gotz, Liehr-Gobbers, & Krafft, 2010).

Table 4.13: *Loadings, Composite Reliability and Average Variance Extracted*

Constructs Dimensions	Items	Loadings	Composite Reliability	AVE
Effective communication	EC2	0.7396	0.778	0.5395
	EC3	0.7797		
	EC4	0.6808		
Team competency and skills	TC1	0.7007	0.8092	0.5152
	TC2	0.7665		
	TC3	0.722		
	TC5	0.6789		
Active leadership	AL1	0.711	0.8073	0.5836
	AL2	0.8219		
	AL3	0.7547		
Political factor	PL3	0.8104	0.8045	0.673
	PL4	0.8301		
Organizational culture	OC2	0.6868	0.7578	0.6133
	OC4	0.8689		
Technology factor	TG1	0.716	0.804	0.5066
	TG2	0.744		
	TG3	0.705		
	TG4	0.681		
Economic factor	EN3	0.7026	0.7571	0.6113
	EN4	0.8538		
Management risk	MG12	0.6756	0.7999	0.5001
	MG7	0.7008		
	MG8	0.728		
	MG9	0.7231		
Material risk	MT1	0.759	0.901	0.6539
	MT2	0.8554		
Design risk	DS4	0.8083	0.7992	0.5721

	DS5	0.6574		
	DS6	0.7942		
Finance risk	FI1	0.7881	0.7619	0.5178
	FI2	0.7212		
	FI4	0.642		
Labour and equipment risk	LE2	0.7529	0.816	0.5259
	LE3	0.6978		
	LE6	0.7258		
	LE7	0.7235		
Rules and regulations	RG2	0.5962	0.7633	0.5217
	RG3	0.7986		
	RG4	0.7563		

Source: Author

Secondly, it is possible for Cronbach's alpha to under-estimate or overestimate the scale reliability. The composite reliability assumes that indicators have dissimilar loadings which can be translated or serves as the same meaning as Cronbach's α (thus, it does not matter which specific reliability coefficient is used, because an internal consistency reliability value that is above .70 is regarded as adequate for an acceptable model, while a value below .60 shows absence of reliability).

All the same, the rendition of internal consistency reliability with the use of composite reliability coefficient was grounded on the rule of thumb proposed by Bagozzi and Yi (1988) and also Hair *et al.* (2011), who recommended that the composite reliability coefficient must be at least .70 or more than. Table 4.12 depicts the composite reliability coefficients of the latent constructs. As depicted in Table 4.12, the composite reliability coefficient of each of the latent constructs rated from .7578 to .901, with each of them exceeded the acceptable benchmark value of .70, signifying satisfactory internal consistency reliability of the indicator used in this present study (Bagozzi & Yi, 1988; Hair *et al.* 2011).

4.9.3 Convergent Validity

The magnitude to which items truly constitute the aimed latent construct and really correlate with other measures of the same latent construct is referred to as convergent validity (Hair *et al.* 2006). As proposed by Fornell and Larcker (1981), convergent validity was measured by studying the Average Variance Extracted (AVE) of each of the latent construct. To attain enough convergent validity, Chin (1998) proposed that the AVE of each of the latent construct must be above .50. Going by Chin (1998), the AVE values for the present study (see Table 4.12) presented high loadings (> .50) on individual construct respectively which signify acceptable convergent validity.

4.9.4 Discriminant Validity

According to Duarte and Raposo (2010), the magnitude to which a particular latent construct is different from other latent constructs is regarded as discriminant validity in the current study. The discriminant validity was determined using the AVE, as proposed by Fornell and Larcker (1981). This was attained by equating the correlations between the latent constructs with the square roots of average variance extracted (Fornell & Larcker, 1981). Furthermore, discriminant validity was ascertained following Chin's (1998b) criterion by equating the indicator loadings with other reflective indicators from the cross loadings table. To evaluate discriminant validity with the rule of thumb, Fornell and Larcker (1981) propose the use of AVE with a score of .50 and above. In the process of achieving satisfactory discriminant validity, Fornell and Larcker (1981) further propose that the square root of the AVE must be higher than the correlations between latent constructs.

As presented in Table 4.12, the measures of the average variances extracted rate between .5001 and .673, proposing satisfactory values. In Table 4.14, the correlations between the latent constructs were equated with the square root of the average variances extracted (measures in bold face). Table 4.14 also depicts that the square root of the average variances extracted were all higher than the correlations between the latent constructs, proposing sufficient discriminant validity (Fornell & Larcker, 1981).

Table 4.14: *Latent Variable Correlations and Square Roots of Average Variance Extracted*

	AL	DS	EC	EN	FI	LE	MG	MT	OC	PL	RG	TC	TG
AL	**0.76**												
DS	0.45	**0.76**											
EC	0.52	0.4	**0.73**										
EN	0.33	0.24	0.14	**0.78**									
FI	0.37	0.48	0.34	0.26	**0.72**								
LE	0.55	0.58	0.45	0.28	0.5	**0.73**							
MG	0.49	0.61	0.41	0.3	0.48	0.61	**0.71**						
MT	0.5	0.47	0.42	0.21	0.39	0.56	0.53	**0.81**					
OC	0.42	0.3	0.37	0.21	0.37	0.38	0.4	0.41	**0.78**				
PL	0.31	0.27	0.22	0.31	0.21	0.26	0.31	0.32	0.33	**0.82**			
RG	0.47	0.56	0.44	0.26	0.46	0.62	0.54	0.44	0.34	0.28	**0.72**		
TC	0.54	0.46	0.5	0.24	0.43	0.55	0.58	0.48	0.45	0.32	0.46	**0.72**	
TG	0.57	0.58	0.51	0.29	0.51	0.65	0.61	0.51	0.45	0.39	0.6	0.55	**0.71**

Note: Values displayed in bold face denote the square root of the average variance extracted.

Likewise, as mentioned earlier that discriminant validity can be determined by equating the indicator loadings with cross-loadings (Chin, 1998a). To attain satisfactory discriminant validity, Chin (1998a) proposes that all the indicator loadings must be greater than the cross-loadings. Table 4.15 equates the indicator loadings with other reflective indicators. All the indicator loadings were higher than the cross loadings, proposing satisfactory discriminant validity for further analysis.

Table 4.15: *Cross Loadings*

	AL	DS	EC	EN	FI	LE	MG	MT	OC	PL	RG	TC	TG
AL1	.711	.364	.342	.169	.272	.351	.282	.331	.313	.145	.255	.345	.328
AL2	.822	.352	.416	.243	.267	.456	.425	.398	.315	.301	.411	.471	.513
AL3	.755	.315	.433	.333	.310	.451	.404	.406	.327	.253	.400	.405	.447
DS4	.401	.808	.411	.200	.400	.496	.492	.417	.278	.238	.471	.379	.525
DS5	.234	.657	.185	.155	.382	.351	.372	.234	.118	.131	.341	.321	.317
DS6	.363	.794	.288	.195	.306	.464	.503	.396	.253	.225	.446	.350	.456
EC2	.425	.329	.740	.183	.255	.383	.365	.389	.331	.205	.319	.413	.429
EC3	.368	.258	.780	.117	.319	.319	.304	.295	.203	.158	.362	.347	.375
EC4	.353	.292	.681	.005	.172	.280	.229	.239	.268	.112	.285	.341	.303
EN3	.268	.174	.082	.703	.172	.158	.198	.074	.144	.236	.186	.155	.148
EN4	.253	.206	.138	.854	.230	.261	.265	.239	.189	.257	.215	.211	.286
FI1	.242	.374	.284	.188	.788	.351	.370	.337	.291	.104	.321	.320	.323
FI2	.309	.331	.233	.262	.721	.352	.309	.223	.293	.167	.418	.304	.387
FI4	.249	.318	.216	.113	.642	.383	.364	.265	.222	.182	.257	.294	.390
LE2	.417	.433	.361	.192	.458	.753	.440	.417	.252	.208	.486	.401	.483
LE3	.383	.383	.291	.268	.308	.698	.391	.420	.265	.134	.407	.398	.422
LE6	.384	.450	.364	.138	.369	.726	.439	.357	.329	.162	.529	.414	.531
LE7	.418	.425	.283	.206	.315	.724	.486	.419	.268	.244	.369	.380	.459
MG12	.332	.441	.215	.222	.330	.403	.676	.379	.289	.217	.416	.409	.408
MG7	.277	.426	.333	.154	.346	.390	.701	.372	.214	.212	.345	.405	.399
MG8	.365	.418	.277	.258	.402	.461	.728	.353	.332	.251	.354	.429	.478
MG9	.409	.435	.339	.212	.291	.458	.723	.407	.296	.207	.426	.402	.429
MT1	.359	.341	.371	.098	.302	.384	.337	.759	.324	.251	.303	.378	.381
MT2	.439	.416	.323	.234	.322	.506	.511	.855	.343	.262	.405	.396	.439
OC2	.275	.174	.221	.132	.195	.210	.231	.323	.687	.242	.192	.216	.227
OC4	.368	.276	.339	.197	.368	.370	.379	.330	.869	.271	.329	.448	.450
PL3	.260	.202	.194	.216	.190	.189	.243	.277	.286	.810	.218	.235	.308
PL4	.251	.236	.165	.297	.152	.236	.272	.243	.250	.830	.236	.293	.333
RG2	.229	.279	.264	.027	.251	.391	.315	.271	.228	.168	.596	.227	.269
RG3	.418	.521	.359	.278	.396	.496	.451	.335	.255	.253	.799	.389	.535
RG4	.349	.380	.321	.211	.332	.447	.400	.350	.265	.171	.756	.367	.459
TC1	.370	.306	.327	.137	.221	.342	.382	.304	.270	.206	.263	.701	.327
TC2	.399	.298	.355	.207	.314	.362	.427	.266	.324	.244	.345	.767	.364
TC3	.384	.356	.366	.171	.368	.491	.430	.347	.344	.223	.345	.722	.427
TC5	.387	.371	.392	.162	.315	.378	.428	.456	.339	.251	.372	.679	.447
TG1	.421	.501	.423	.283	.452	.513	.443	.466	.376	.340	.421	.457	.716
TG2	.376	.403	.361	.133	.333	.456	.438	.340	.271	.240	.458	.402	.744
TG3	.407	.425	.357	.252	.345	.419	.402	.336	.323	.329	.474	.357	.705
TG4	.413	.307	.287	.134	.300	.474	.447	.290	.312	.188	.347	.326	.681

4.10 Assessment of Significance of the Structural Model

Having determined the measurement model, the current study measured the structural model. The current study also used the standard bootstrapping process with a number of 500bootstrap samples and 238 cases to measure the path coefficients significance, following (Hair *et al.* 2014; Hair *et al.*, 2011; Hair *et al.* 2012; Henseler *et al.* 2009). Figure 4.4 and Table 4.15 consequently depict the approximations of the full structural model, which comprises the moderating variable (for example, rules and regulations).

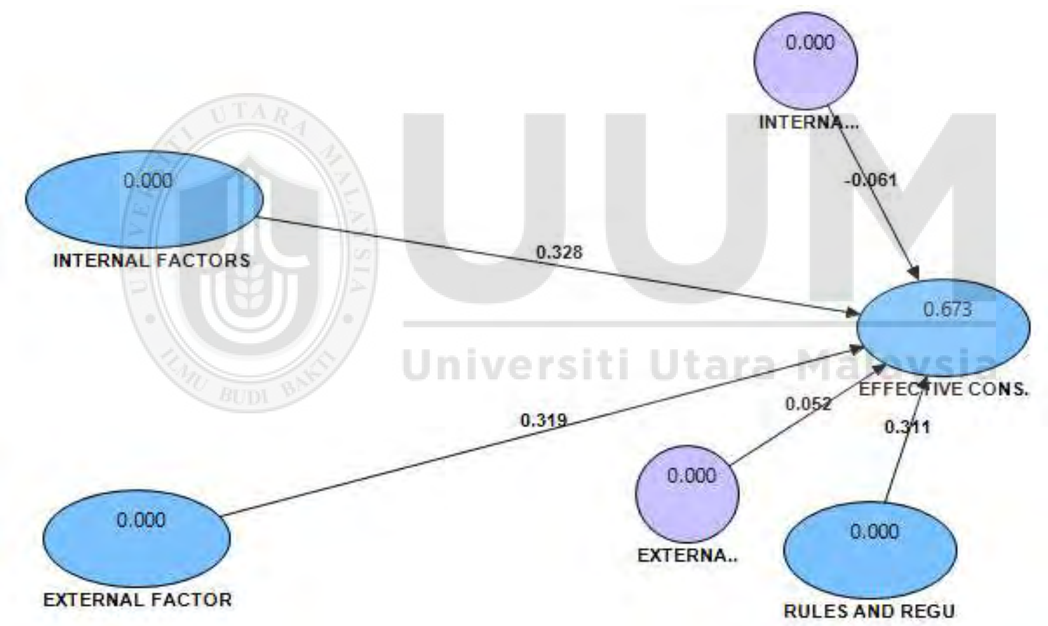


Figure 4.4
Structural Model with Moderator (Full Model)

At the beginning, Hypothesis 1 predicted that organizational internal factors have a significant relationship with construction risk management. Result (Table 4.16 and Figure 4.4) revealed a significant positive relationship between organizational internal factors and construction risk management (β = -0.328, t = 8.66, p<.01), supporting Hypothesis 1.

Table 4.16: *Structural Model Assessment with Moderator (Full Model)*

Hypothesis	Relation	Beta	SE	T-Value	Findings
H1	Organizational internal factors ->Construction risk management.	.328	.038	8.66***	Supported
H2	Organizational external factors ->Construction risk management.	.319	0.37	8.55***	Supported
H3	Rules and regulations ->Construction risk management.	.311	.029	10.56***	Supported
H4	Organizational internal factors * Rules and regulations ->Construction risk management.	-.061	0.34	1.77**	Not supported
H5	Organizational external factors * Rules and regulations ->Construction risk management.	.052	.033	1.59*	Supported

Note:***Significant at 0.01 (1 -tailed), **significant at 0.05 (1 -tailed), *significant at 0.1 (1 -tailed).

Hypothesis 2 predicted that organizational external factors have a significant relationship with construction risk management. Result (Table 4.15 and Figure 4.4) revealed that external factors have a positive relationship with construction risk management (β = .319, t = 8.55, p < .01).

Similarly, hypothesis 3 predicted that rules and regulations have a significant relationship with construction risk management. Result (Table 4.15 and Figure 4.4) indicated that rules and regulations possess a positive relationship with construction risk management ($\beta = .311$, $t = 10.56$, $p < .01$).

Hypothesis 4 predicted that rules and regulations moderate the relationship between organizational internal factors and construction risks management. Result (Table 4.15 and Figure 4.4) pointed that rules and regulations possess a negative relationship with organizational internal factors and construction risk management ($\beta = -.061$, $t = 1.77$, $p <.05$).

Lastly, hypothesis 5 predicted that rules and regulations moderate the relationship between organizational external factors and construction risks management. Result (Table 4.15 and Figure 4.4) revealed that rules and regulations possess a positive relationship with organizational external factors and construction risk management ($\beta = .052$, $t = 1.59$, $p < .1$).

4.10.1 Assessment of Variance Explained in the Endogenous Latent Variables

Another essential criterion for measuring structural model in the PLS-SEM is the use of *R*-squared values or the coefficient of determination (Hair et al., 2011; Hair et al., 2012; Henseler et al., 2009). The values of the *R*-squared stands for the ratio of variation in the criterion variable(s) which can be explicated with one or more predictor variable (Elliott & Woodward, 2007; Hair *et al.* 2010; Hair *et al.* 2006). Though the tolerable level of *R2* value depends on circumstances of the research

(Hair *et al*. 2010), Falk and Miller (1992) suggest an R-squared value of 0.10 as the minimum level of acceptance. While, Chin (1998b) proposes that value of *R*-squared with 0.67, 0.33, and 0.19 in PLS-SEM can be regarded as substantial, moderate, and weak, respectively. Table 4.17 depicts the *R*-squared values of the endogenous (construction risk management) latent variable.

Table 4.17: *Variance Explained in the Endogenous Latent Variable*

Latent Variable	**Variance Explained (R2)**
Construction risk management	67%

As shown in Table 4.16, the research model explicates 67% of the total variance in construction risk management. This proposes that the three sets of exogenous latent variables (i.e., internal factors, external factors and rules and regulations) jointly explain 67% for the variance of the construction risk management. Therefore, following Falk and Miller's (1992) and Chin's (1998) standard, the endogenous latent variable presented acceptable levels of *R*-squared values, which were regarded as substantial.

4.10.2 Assessment of the Effect Size (f2)

Effect size shows the relative effect of a specific exogenous latent variable on the endogenous latent variable(s) through the means of changes in the *R*-squared (Chin, 1998). It is computed as the increase in *R*-squared of the latent variable of which is connected with the path, proportional to the latent variable's ratio of unexplained variance (Chin, 1998). Therefore, the effect size can be calculated with the following formula (Cohen, 1988; Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012; Wilson, Callaghan, Ringle, & Henseler, 2007):

$$\text{Effect size: } \mathrm{f}^2 = \frac{R^{2Included-}R^{2Exlcuded}}{1 - R^{2Included}} \quad (4.1)$$

Cohen (1988) draws *f2* values of 0.35, 0.15 and 0.02 as having strong, moderate and weak effects respectively. Table 4.1 8 depicts the respective effect sizes of the latent variables of the structural model.

Table 4.18: *Effect Sizes of the Latent Variables on Cohen's (1988) Recommendation*

R-squared	**Included**	**Excluded**	**f-squared**	**Effect Size**
Internal factors	0.614	0.518	0.25	Moderate
External factors	0.614	0.514	0.26	Moderate

As depicted in Table 4.17, the effect sizes for the internal factors and external organizational factors, were 0.25 and 0.26, respectively. Therefore, following Cohen's (1988) recommendation, the effects sizes of these two exogenous latent variables on construction risk management can both be considered moderate effects.

4.10.3 Assessment of the Predictive Relevance (Q^2)

The current study also employed the Stone-Geisser test of predictive relevance for the research model using blindfolding processes (Geisser, 1974; Stone, 1974). The Stone-Geisser test of predictive relevance is commonly used as an additional measurement of goodness-of-fit in PLS-SEM (Duarte & Raposo, 2010). Although this study makes use of the blindfolding to determine the predictive relevance of the research model, according to Sattler, Völckner, Riediger and Ringle (2010) "blindfolding processes is only employed to endogenous latent variables that possess a reflective measurement model operationalization" (p. 320). However, following McMillan and Conner (2003), reflective measurement model "defines that a latent or unperceivable concept causes difference in a set of observable indicators". Therefore, since all the endogenous latent variables in current study were all reflective in nature, a blindfolding processes was employed mainly to the endogenous latent variables.

To be specific, a cross-validated redundancy measure (Q^2) was employed to determine the predictive relevance of the research model (Chin, 2010; Geisser, 1974; Hair *et al.* 2013; Ringle, Sarstedt, & Straub, 2012b; Stone, 1974). The Q^2 is a standard to evaluate how good a model predicts the data of excluded cases (Chin, 1998; Hair *et al.*2014). A research model with *Q2*statistic (s) that is larger than zero is regarded to have predictive relevance (Henseler *et al.*2009). In addition, a research model with larger positive *Q2* values proposes more predictive relevance. Table 4.19 depicts the outcomes of the cross-validated redundancy Q^2 test for the present study.

Table 4.19: *Construct Cross Validity Redundancy*

Total	**SSO**	**SSE**	**1-SSE/SSO**
Construction risk management	1190	710.01	0.4034

As depicted in Table 4.18, the cross-validation redundancy measure Q^2 for the endogenous latent variables are above zero, proposing the present research model predictive relevance (Chin, 1998; Henseler et al., 2009).

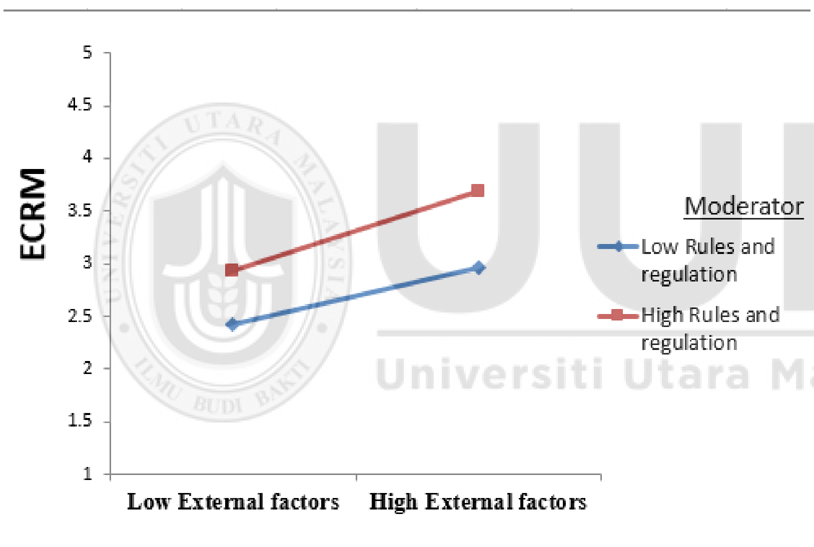
4.10.4 Testing Moderating Effect

The current study employed a product indicator approach with the use of PLS-SEM to discover the strength of the moderating effect of rules and regulations on the relationship between organizational internal and external factors, with construction risk management in Nigerian construction industries (Chin *et al.* 2003; Helm, Eggert, & Garnefeld, 2010; Henseler & Chin, 2010a; Henseler & Fassott, 2010b). The product term method is regarded appropriate in present study because the moderating variables are continuous (Rigdon, Schumacker, & Wothke, 1998). Henseler and Fassott (Henseler & Fassott, 2010a) "stated that the results of the product term method are normally superior or equal to the group comparison method, the authors always recommend the use of product term method" (p. 721). To employ the product indicator method in trying out the moderating effects of rules and regulations on the relationship between organizational internal and external factors, with construction risk management, the product terms between the indicators of the latent predictor variable and the indicators of the latent moderator variable need to be established, thus, the product terms would serve as the indicators of the interaction term for the structural model (Kenny & Judd, 1984). Likewise, to determine the strength for the moderating effects, the current study employed Cohen's (1988) recommendation in ascertaining the effect size. Figure 4.4 and Table 4.15 therefore depict the approximations after the application of the product indicator method to ascertain the moderating effect of rules and regulations on the relationship between the exogenous and endogenous latent variables.

It could be recalled that Hypothesis 4 stated that rules and regulations significantly moderate the relationship between organizational internal factors and construction risk management. Although, the relationship is negative but instead of the rules and regulations to strengthen the relationship between the organizational internal factors and construction risk management; it dampens the relationship. The result is however statically significant for individuals with high obedience to rules and regulations than for individuals with low obedience to rules and regulations.

As anticipated, the results shown in Table 4.15, showed that the interaction terms playing the internal factors x rules and regulations (β = -.061) was negatively significant. Therefore, Hypothesis 4 was not supported, that is for individuals with high obedience to rules and regulations than it is for individuals with low obedience to the rules and regulations.

Similarly, the results depicted in Table 4.15 and Figure 4.4 confirmed the Hypothesis 5, which stated that rules and regulations significantly moderate the relationship between external organizational factors and construction risk management, such that the relationship is stronger (i.e. more positive) for individuals with high obedience to rules and regulations than it is for individuals with low obedience to the rules and regulations ($\beta = .052$, $t = 1.59$, $p < .1$). The moderating effect of rules and regulations on the relationship between organizational external factors and construction risk management is shown in Figure 4.5, which depicts a stronger positive relationship between organizational external factors and construction risk management.



Rules and regulation strengthens the positive relationship between External factors and ECRM.

Figure 4.5
Interaction Effect of External Factors and Rules and Regulation on Construction Risk Management.

4.10.5 Determining the Strength of the Moderating Effects

To ascertain the strength of the moderating effects of rules and regulations on the relationship between organizational internal and external factors, with construction risk management, Cohen's (1988) effect sizes were computed. Likewise, the moderating effects strength can be measured by equating the coefficient of determination (*R*-squared value) of the actual effect model together with the *R*-squared value of the full model that comprises both the exogenous latent variables with the moderating variable (Henseler & Fassott, 2010a; Wilden, Gudergan, Nielsen, & Lings, 2013). Hence, the moderating effects strength could be determined with the use of the following formula (Cohen, 1988; Henseler & Fassott, 2010a):

$$\text{Effect size: } \mathrm{f}^2 = \frac{R^{2 model\ with\ moderator} - R^{2 model\ without\ moderator}}{1 - R^{2 model\ with\ moderator}} \quad (4.2)$$

According to (Cohen, 1988; Henseler & Fassott, 2010a), moderating effect sizes (*f2*) values of 0.35, 0.15 and 0.02 can be considered as strong, moderate and weak respectively. Nevertheless, according to Chin *et al.* (2003), effect sizes with low values does not essentially mean that the moderating effect is insignificant. "Even a small interaction effect can be significant under utmost moderating conditions, if the resulting beta changes are significant, then it is paramount to take these conditions into consideration" (Chin et al., 2003). Output of the strength for the moderating effects of rules and regulations is depicted in Table 4.19.

Following Henseler and Fassott's (2010b) and Cohen's (1988) rule of thumb used in determining the strength of the moderating effects, Table 4.20 depicts that the effect size for construction risk management was .18, proposing that the moderating effect was moderate(Henseler, Wilson, Götz, & Hautvast, 2007; Wilden et al., 2013).

Table 4.20: *Strength of the Moderating Effects Following Cohen's (1988) and Henseler and Fassott's (2010) Guidelines*

Endogenous Latent Variable	**R-squared**		**f-squared**	**Effect Size**
	Included	**Excluded**		
Construction risk management	0.673	0.614	0.18	Moderate

4.11 Summary of Findings

Having displayed all the results comprising the moderating and the main effects in preceding sections, the results of the hypotheses tested are summarized in Table 4.21.

Table 4.21: *Summary of Hypotheses Testing*

Hypothesis	**Statements**	**Findings**
HI:	There is a significant relationship between internal organizational factors and construction risk	Supported

	management among construction companies in Nigeria.	
H2:	There is a significant relationship between external organizational factors and construction risk management among construction companies Nigeria.	Supported
H3	There is a significant relationship between rules and regulations and construction risk management among construction companies in Nigeria.	Supported
H4	Rules and regulations significantly moderates the relationship between internal organizational factors and construction risk management among construction companies in Nigeria.	Not supported
H5	Rules and regulations significantly moderates the relationship between external organizational factors and construction risk management among construction companies in Nigeria.	Supported

4.12 Summary

In this chapter, the descriptive analysis was carried out and also the interpretations of the PMBOK (2000) and Ahmed *et al.* (1999) Likert scale risk management categories which suggest that the extent of construction risk management among Abuja and Lagos state Nigeria construction companies is at medium level.

Likewise, the bases for employing PLS path modelling which is to examine the theoretical model was demonstrated in the study. However, going by measuring the significance of the path coefficients, the main findings of the research were demonstrated. In general, self-report methods have rendered substantial support for the moderating effects of rules and regulations on the relationship between organizational internal and external factors on construction risk management. To be specific, the path coefficients shown a significant positive relationship between hypothesis (1,2,3 and 5) while a negative relationship exist in hypothesis (4), such that: (1) organizational internal factors and construction risk management, (2) organizational external factors and construction risk management, (3) rules and regulations and construction risk management, (4) rules and regulations and organizational internal factors on construction risk management, and (5) rules and regulations and organizational external factors on construction risk management.

Lastly, regarding the moderating effects of rules and regulations on the relationship between the two predictor variables and the criterion variable, PLS path coefficients showed that one (1) of the two (2) formulated hypotheses was significant. The following chapter (Chapter 5) further discussed the findings, the implications, the limitations, hypnotism for future research directions and lastly, the conclusion of the whole research.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The research findings presented in the preceding chapters are discussed in this chapter by connecting them to the theoretical views and the previous researches associated to construction risk management. Precisely, the other parts of the chapter are arranged as follows: Section 2 presented the summaries of the research study findings. In section 3, the research findings in relation to the underpinning theory and previous researches are discussed. Section 4 depicted the theoretical, methodological and practical implications of the study. In Section 5, the limitations to the study are discussed and base on the discussed limitations, the suggestions for future research are recommended. In the last section, the conclusions are drawn.

5.2 Summary of the Research Findings

The main objective of the study is to assess the extent of construction risk management among Nigerian construction companies and to determine the influences between the organizational internal and external factors with their relationship to construction risk management, including the moderating effect of rules and regulations in Nigeria construction companies. In general, this study has succeeded in determining the extent of construction risk management among Nigeria construction companies by rendering answers to the following research objectives:

1. To determine the extent of construction risk management among construction companies operating in Abuja and Lagos State of Nigeria.

2. To examine the significant relationship between organizational internal factors and construction risk management among construction companies operating in Abuja and Lagos State of Nigeria.

3. To examine the significant relationship between organizational external factors and construction risk management among construction companies operating in Abuja and Lagos State of Nigeria.

4. To examine the moderating effect of government regulations on the relationship between organizational internal and external factors on construction risk management among construction companies operating in Abuja and Lagos State of Nigeria.

Considering the direct relationship among the exogenous latent variables and the endogenous latent variables, this research findings showed that out of all the 3 hypotheses proposed for this study, all are supported. The results for the PLS path model indicated that internal factors is significantly and positively related to construction risk management. Findings further disclosed that external factors is also found to be significantly and positively related to construction risk management.

With respect to rules and regulations as a moderator on the relationship between the exogenous latent variable and the endogenous latent variables, results affirmed the empirical support for the 2 indirect hypotheses drawn from rules and regulations. Specifically, rules and regulations as moderators contributed a negative relationship between organizational internal factors and construction risk management. While rules and regulations as moderators contributed a positive relationships between organizational external factors and construction risk management. Therefore, out of 5 Hypothesized proposition 4 are supported in the current study.

5.3 Discussions

This section talks about the study findings based on applicable theory and previous research findings. The subheadings for the discussion part are framed following the research objectives.

5.3.1 Extent of construction risk management

In the present study, the extent of construction risk management among Nigerian construction companies is assessed by conducting descriptive analysis to achieve the mean score of how construction risk management is effective within the companies. The result shows that the mean score of extent of construction risk management is 2.652 with a standard deviation of 0.590. PBOOK (2000) Likert scale interpretation is used to interpret the 5-point Likert scale in the questionnaire with the categories of risk management such as: very low, low, medium, high and very high (in ascending order and medium being the level) are used to distinguish the level which the mean scores belong. The reason for using these categories is because the criterion for the categorization is risk management (PMBOK, 2000).

Extent of construction risk management mean score (2.652) is within the "medium" category. Likewise, the findings of the current study proposed that the extent of construction risk management among Nigerian construction companies falls under the category of "medium." Medium category signifies that risk management is not highly implemented within Nigerian construction companies, which is possible to affect most of their projects since there is less effective risk management within the companies.

Methodologically, the extent of construction risk management among construction companies determined in the current study is in line with previous risk management studies in Nigeria and other Western countries (Aibinu and Odeyinka, 2006). Assessed the level of risk management within Nigerian construction companies which the authors regarded it to be moderate.

Theoretically, the extent of construction risk management among Nigerian construction companies found in this study is consistent with Ibrahim, Price and Dainty (2006) that examined the ability of construction companies to implement construction risk management. Their study proposed that construction companies are ready to implement risk management by exhibiting a slightly high level of "*control"* within the organization. This is also grounded on organizational control theory (Flamholtz et al., 1985; Jaworski, 1988; Ouchi, 1979; Snell, 1992).

In summary, this study proposed that the construction risk management among Nigerian construction companies is at medium level. This construction risk management is explained by five dimensions: management risk, material risk, design risk, finance risk, labour risk and equipment risk. This result however does not agree with the assertions that construction companies in the developing countries generally lag behind in terms of risk management because this study proved Nigerian construction companies within the two states (Abuja and Lagos) to be in medium level in term of risk management effectiveness (Wang *et al.*, 2004).

5.3.2 The Influence of Dimensions in Organizational Internal Factors on Construction Risk Management

Organizational internal factors refer to intangible resources because they cannot be seen physically by any organizations. Thus, for every successful organization there must be a resources behind it. However, these intangible resources as they are used in this study (i.e., effective communication, team competency and skills and active leadership) while tangible resource which are organization assets (i.e., land, equipment, capital and labour) which on the long run, it would help in detecting, monitoring and minimizing the occurrence of risk during the construction process within the company (Kumaraswamy & Chan 1998; Inmyxai & Takahashi, 2009).

Kumaraswamy & Chan (1998) identified three dimensions of organizational internal factors (i.e., effective communication, team leadership and skill and active leadership) that can influence employees output within the construction project. As proposed by Moe & Pathranarakul (2006) as well as Doloi (2009), smooth organisational internal factors reduce the chance of employees to involve in dysfunctional conduct once there is proper monitoring and control by the organization itself. Therefore, this study hypothesized that organisational internal factors are significantly related to construction risk management. To achieve this end, one research hypothesis is developed and tested with the use of PLS path modelling.

Firstly, in line with Hypothesis 1, result disclosed a significant positive relationship between organizational internal factors and construction risk management with moderate effect size of ($f2$ = 0.25), proposing that when employees observe that management practices strong internal control over project monitoring, they are more likely to be proper project management and less likelihood of risk occurrence during construction activities, defined as construction risk management aimed at an individual. This finding is congruous with organizational control theory (Ouchi, 1979; Snell, 1992; Flamholtz *et al.* 1985; Jaworski, 1988) that conventional control practiced by an organization would theoretically able to cut down the likelihood of risk occurrence on construction project through monitoring, discipline and punishment. Going by the research findings with limited literatures to the organizational internal factors, it has been revealed theoretically that this study has built a ground by proving that organizational internal factors possess a positive relationship to construction risk management.

Furthermore, positive relationship between organizational internal factors and construction risk management is consistent with the findings from Greenberg & Baron (2008); Geraldi, Lee-Kelley & Kutsch (2010) who proved that when employees perceive that an organization efficaciously enforced monitoring and control through effective communication, team competency with skills and active leadership during construction project, they are less likely risk recorded during the construction process which are likely to occur from the management, material, design, finance and labour and equipment aspects. Thus, on the long run it will improve construction risk management within the organization.

5.3.3 The Influence of Dimensions in Organizational External Factors on Construction Risk Management

The third research objective for this study is to check whether the dimensions of organization external factors explain construction risk management. Going by the research question, the third objective of this study is to examine the relationship between organization external factors and construction risk management.

5.3.3.1 Organizational External Factors and Construction Risk Management

Organizational external factors refer to factors which are mostly beyond the control of the organization or the project team members (Sun & Meng, 2009; Jaafari, 2001). Organizational external factors are those of the important factors which have been supported empirically by several studies to have positive relationship on construction risk management in general. For example, the four dimensions of organizational external factors (i.e., political, organizational culture, technology and economic factors) have been conceptualized following (Jaafari, 2001; Kamaruddeen *et al.,* 2012; Sun & Meng, 2009). Following the findings of Israelsson & Hansson, 2009; Kangari & Riggs, 1989;Scupola, 2003; Lewis *et al.,* 2003, organisational external factors are tend to reduce the effectiveness of construction risk management within the organization if it is not monitored at the appropriate time by the organization.

Consistent with Hypothesis 2, result revealed a significant positive relationship between organizational external factors and construction risk management with moderate effect size of ($f2$ = 0.26), this result proposed that an individual's conduct (i.e., government itself, culture of an organization which must be dynamic in nature) significantly influenced by perceptions and observations of what most organizations actually do in a specific situation, for example when there are inflation or deflation in a country economy, definitely it would affect construction materials in one way or the other.

The positive relationship between organizational external factors and construction risk management is also consistent with previous findings of Jabnoun & Sedrani (2005) and Dulaimi, Nepla & Park (2005) who established that when an organization is able to monitor all the external factors which may occur as a result of political affairs of the country, cultural system of an organization (which must be dynamic in nature), technological involvement of an organization and the economic system of the country, there are tendency for an organization construction risk management to be more effective.

5.3.4 Moderating Effect of Rules and Regulations

Rules and regulations are defined as the statement and standard or procedure of a general pertinence adopted by an organization board which address certain issues related to types of construction materials to be used, process and steps involve before project execution and safety of employee (Manavazhi & Adhikari, 2002). This study also suggests rules and regulations as a moderator on the relationship between organizational internal and external factors, and construction risk management because Aniekwu (1995) and Niu, (2008) have found that those organizations that follow government rules and regulations effectively are less likely to be affected with construction risk. Additionally, Porter (1990) noted that rules and regulations are important issues to be considered in understanding the accomplishment of an organization because they tend to reduce the levels of risk occurrence on construction project and make risk management more effective. Also in line with the study of Bakar *et al.* (2012) which stated that government regulations or policies are parts of key factors contributing to the growth of Malaysian construction companies.

Following what has been affirmed by the authors, the fourth research question is to check whether rules and regulations moderate the relationship between organizational internal factors, organizational external factors and construction risk management.

5.3.4.1 Moderating Effects of Rules and Regulations on the Relationship between Organizational Internal Factors, Organizational External Factors and Construction Risk Management

To answer the forth research objective, three research hypotheses are developed and tested with use of the PLS path modelling (i.e. H3, H4, and H5). It could be remember that hypothesis H3 stated that, rules and regulation moderate construction risk management as the endogenous variable. Precisely, this relationship is stronger (i.e. more positive) for individuals with high obedience to rules and regulations than it is for individuals with low obedience to rules and regulation. However, the findings pertaining moderating effects constitute the primary contributions of this research, potential justifications of the moderating effect of rules and regulations can be clarified from theoretical viewpoints rather than previous empirical studies.

Furthermore, results concerning the rules and regulations moderate the construction risk management which seem to be consistent with organizational control theory (Ouchi, 1979). Congruent with the perspective that organizational control is an essential cognitive resource that would limit occurrence of risk on construction project once all protocols are followed as they supposed to be before project executions (Snell, 1992; Flamholtz *et al.*, 1985). This study proposed that organizations that duly follow high rules and regulations are less likely to experience high risk during construction process, that is, there would be effective risk management within the organization.

5.3.4.2 Moderating Effects of Rules and Regulations on the Relationship between Organizational Internal Factors and Construction Risk Management

The forth research objective also answers the hypothesis (H4), which stated that, rules and regulations moderate the relationship between organizational internal factors and construction risk management. Specifically, there is negative relationship among these variables.

In the same vein, the results regarding the moderating effect of rules and regulations moderate the relationship between organizational internal factors and constructions risk management which appear to follow the organizational control theory. Going by the view of rules and regulations, it helps the organization employee to duly follow all the lay downed rules and regulations the organization adopted from the government and implemented in various organisations, which govern how the employee will communicate, their activeness and their competency that needs to follow what exactly the organization required from them. These would lessen risk occurrence on construction project and make risk management to be more effective (Ahmed *et al.* 1999). However, rules and regulations play a negative relationship between organizational internal factors and construction risk management that is for individual with high obedience to rules and regulations as opposed to individuals with low obedience to rules and regulations. This suggests that organization employees that duly imbibe rules and regulation in all their activities are likely to make risk management in the organization to be more effective. According to organizational control theory, organizations who adopt advancement focus have a tendency to regulate their employees conduct by involving in positive manners when it comes to project execution which requires all the three dimensions of the organizational internal factors (i.e., effective communication, team competency and skills, and active leadership) which bring up a good output when it comes to the project closure (Abd El-Razek, 2008). This study suggests that rules and regulations operated as a buffer between organizational control theory and construction risk management, such that individuals with high obedience to rules and regulations are less likely to reduce risk on construction projects than individuals with low obedience to rules and regulations implementation.

5.3.4.3 Moderating Effects of Rules and Regulations on the Relationship between Organizational External Factors and Construction Risk Management

In the same vein, from organizational control view, high level of rules and regulations enables organizations to predict event within the organization and to develop ways to control those events (Snell, 1992). Hence, it is expected that high levels of rules and regulations could positively energize employees coping activity during construction project execution (Walker, 2000). Furthermore, organizational control theory suggests that organizations with high obedience to rules and regulations do not tolerate indiscipline acts even though they faced certain external factors and situation forces in the organization, for example (organizational culture which is meant to be flexible, country economy which is meant to be favourable, high technology practices with training and stability within the political state of the country).

To further answer the fourth research objective, another hypothesis is developed and tested (i.e. H5), which predicted whether rules and regulations moderate the relationship between organizational external factors and construction risk management. Firstly, the findings provide support for the hypothesis 5 in this study. It affirms the view that the rules and regulations moderate the relationship between organizational external factors and construction risk management. Similarly, the results support the view that the rules and regulations moderate the relationship between organizational external factors and construction risk management. These findings are not surprising because they are in line with the organizational control theory by Flamholtz *et al.*1985, which suggest that rules and regulations moderated the relationship between organizational external factors and construction risk management, in such a way that organizations with higher obedience to rules and regulations are likely to experience low risk during construction process regardless of pressure they undergone during the implementation. More importantly, these results affirmed that when employees find it difficult to follow all protocols involve during project execution, rules and regulations help them to achieve their milestones with significant and effective risk management within the organization. Moreover, the results proposed that rules and regulations play a positive and significant (strengthening the positive relationships) role in moderating the relationship between organizational external factors and construction risk management (Flanagan & Norman, 1993; Ismail, 2001; Iroegbu, 2005).

Again the results affirmed that compared with those organizations with low obedience to rules and regulations, organizations who duly practice or implement rules and regulations have ability to overpower the influence of employee workgroup, because they would be able to influence things in spite of circumstances constraints (Hartono, 2014).

5.3.5 Unique Contributions to Knowledge

Since 1990s, the drive towards risk management in construction companies has assembled various strength and has started to reveal itself globally. This research has made several contributions to theory, practical and methodological to this field. This research for the first time to assess the extent of risk management among construction companies in Nigeria, thereby rebutting the impression that the construction companies mostly lagging when it comes to risk management (Odeyinka *et al.*, 2008; Tang *et al.*, 2007). This research has succeeded in placing the construction companies in Nigeria to their level of risk management. However, following Table 4.6, it is shown that Nigerian construction companies fall within "medium" level of risk management with the mean score of 2.652 as also presented in Table 5.1 below.

Table 5.1: *Extent of risk management among Abuja and Lagos State construction companies as a unique contribution*

Construction risk management extent	Frequency	Percentage	Mean	Median	Mode	SD
Very low	-	-				
Low	116	48.4				
Medium	95	39.9	2.652	2.500	2.26	0.590
High	26	10.6				
Very high	1	0.4				

Secondly, the present research focuses on factors influencing construction risk management. While majority of studies in construction company either focused on the roadblocks towards implementing risk management (El-Sayegh, 2008); delays to construction projects (Sambasivan & Soon, 2007; Ali *et al.*, 2012); organizational internal factors (Kumaraswamy & Chan,1998); organizational external factors (Sun & Meng, 2009), the present research examined and combined both organizational internal and external factors that can influence construction risk management among Nigerian construction companies, as presented in Figure 5.1, 5.2, and 5.4.

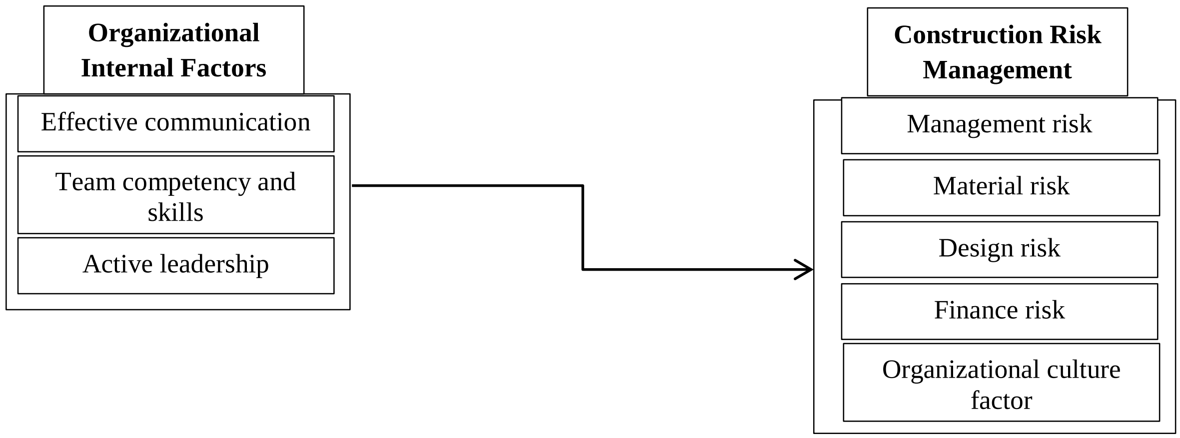


Figure 5.1 *Organizational Internal Factors on Construction Risk Management as a unique contribution.*

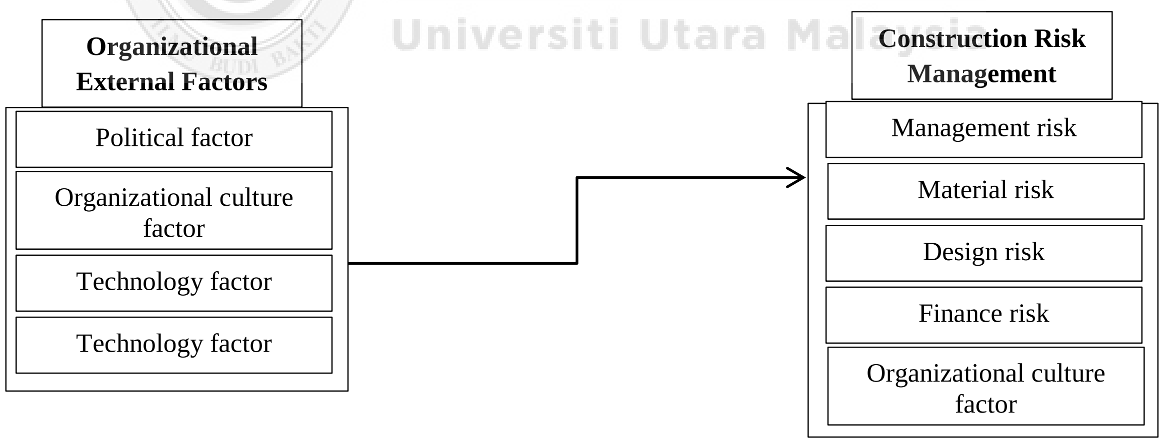


Figure 5.2 *Organizational External Factors on Construction Risk Management as a unique contribution.*

Lastly, the present research also introduced rules and regulations as a moderator with both organizational internal and external factors on construction risk management to buffer or strengthen the relationship which has been affirmed by the previous studies, which all forms a solid framework that might serve as the accurate motivation of change towards risk in Nigerian construction projects, as presented in Figure 5.3.

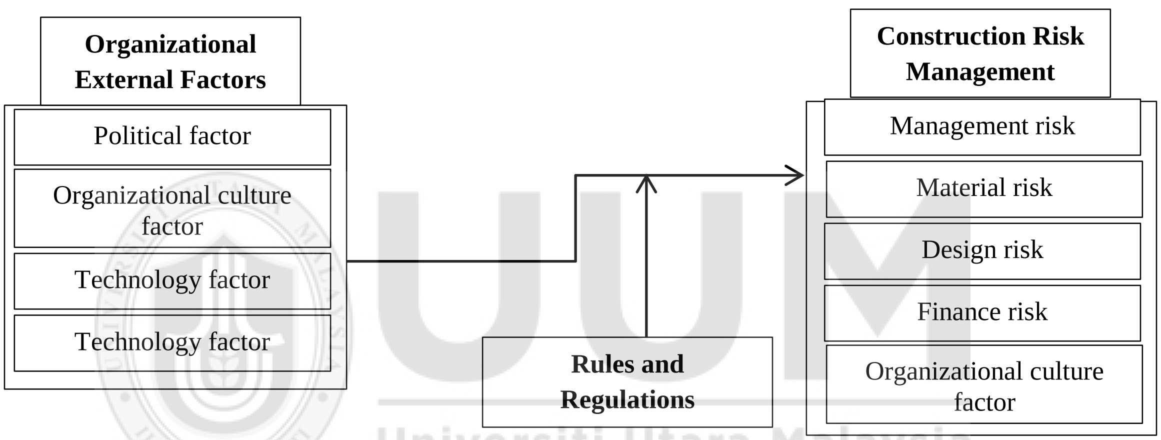


Figure 5.3 *Organizational Internal and External Factors on Construction Risk Management with Rules and Regulations as a unique contribution.*

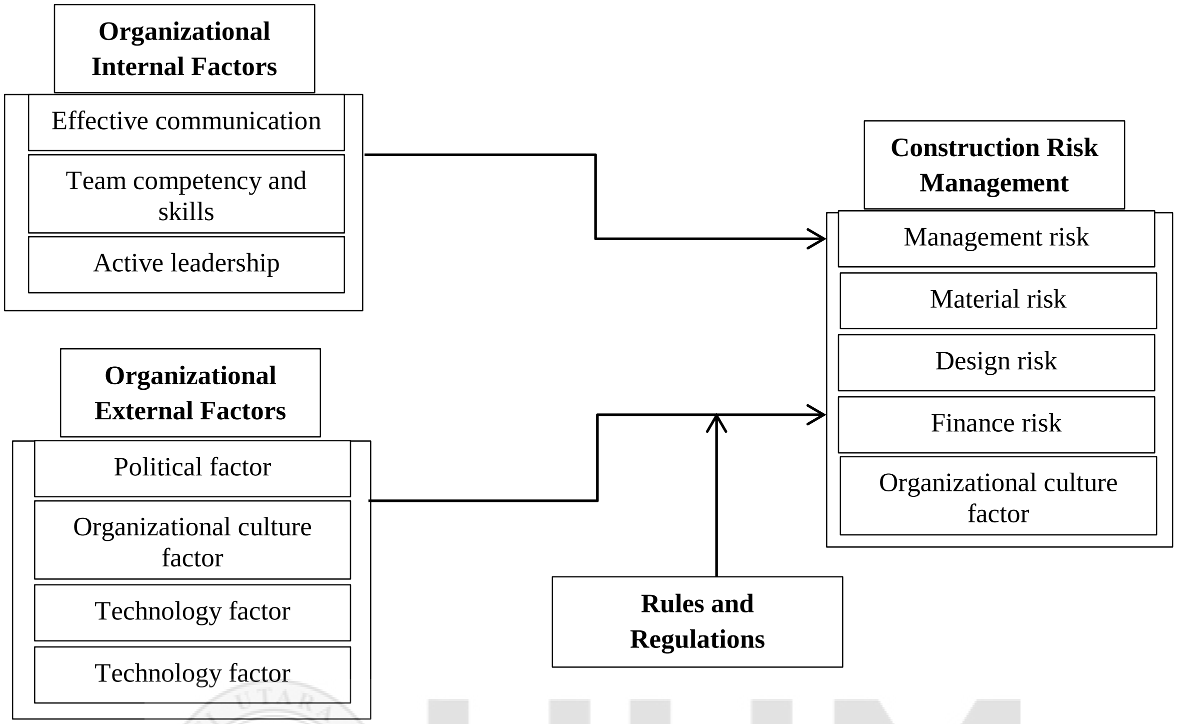


Figure 5.4: *The Research Empirical Model linking Supported Organizational Internal Factors and Organizational External Factors Dimensions, with Construction Risk Management and Moderating effect of Rules and Regulations as a unique contribution.*

5.3.6 Theoretical Implications

The conceptual framework for this research is established on the previous empirical findings and theoretical gaps discovered from the previous literatures. It is also affirmed and enlightened from the theoretical grounds of organizational control theory (Flamholtz *et al.* 1985; Jaworski, 1988; Ouchi, 1979; Snell, 1992). The current research incorporated rules and regulation as a moderating variable to better understand the relationship between organisational internal factors, organizational external factors and construction risk management. Going by the findings and discussions of the research, the current research has made various theoretical contributions in the research on organisational internal factors, organization external factors, rules and regulations, and construction risk management.

5.3.6.1 An Extra Empirical Grounds in the Field of Organizational Control Theory

This research has rendered a theoretical significance by providing an extra empirical ground in the field of organizational control theory. The theory stated that courtly control introduced by an organization must theoretically shape employees conduct in the organization through rules and regulations, rewarding system, directing and monitoring during construction process. Instead of concentrating on the relationship between organisational internal factors and organizational external factors such as, the free flow of communications among the team members, team competency and skills, active leadership, political factor, organizational culture, technology factor and economy of a country which all must support or ready to lessen risk occurrence on construction projects. This research has lengthen the theory by investigating an extensive range of risks on construction project such as the management risk, material risk, finance risk, design risk and labour and equipment risk; which all organization expect to be more effective.

This research has also established the moderating role of rules and regulations on the organizational internal factors, organizational external factors and construction risk management. Substantial empirical studies has reported a positive relationship between the variables (e.g., Kumaraswamy & Chan, 1998; Doloi, Sawhney, Lyer & Rentala, 2012; Greenberg & Baron, 2008; Geraldi, Lee-Kelley & Kutsch, 2010) as well negative relationship (e.g., Alinaitwe, 2008; Akintoye and Macleod,1997), which tends to be inconsistent findings. Therefore, this research strongly proposed the need for integrating a moderating variable between these relationships. Following Baron and Kenny (1986), “a moderator variables are mainly brought in when there are inconsistent relation or unexpectedly weak relationship between the predictor and the criterion variable”.

This research has appeared to the gap by integrating rules and regulations as the moderating variable to better improve the understanding on the effect of organizational internal factors and organizational external factors on construction risk management among construction companies operating in Abuja and Lagos State, Nigeria. To test the organizational control theory, the study results described that all the dimensions for the four variables; organizational internal factors, organizational external factors, rules and regulations and construction risk management (i.e. effective communication, team competency and skills, active leadership, political factor, technology factor, organizational culture, economic factor, rules and regulations, management, material, design, finance and labour and equipment risks) all had a significant influence, adding empirical prove in affirm of the aforementioned theory. Going by the results, it can be drawn that curtly control introduced by the organisation played an important role in explicating effective construction risk management, particularly among construction companies in Nigeria.

Lastly, the present research represents an extra contribution to literature and theory of risk management domain. Precisely, the research has demonstrated a positive directional relationship of rules and regulations on organizational external factors but negative relationship with organizational internal factors on construction risk management, which follows Alinaitwe (2008) negative results.

5.3.6.2 Significant Moderating Role of Rules and Regulations

Rules and regulations as moderators on the relationship between organisational internal factors, organizational external factors and construction risk management. Whereas most of the previous studies such as (Kumaraswamy & Chan, 1998; Sun & Meng, 2009; Jaafari, 2001 and Kamaruddeen *et al.* 2012) have only concentrated on examining the direct relationship between organisational internal factors, organizational external factors and construction risk management, while this study integrated rules and regulation as a moderator on these relationships based on the following reasons. Firstly, difficult control power such as rules and regulations may be able to supersede both the employees and the organizations itself towards risk occurrence on construction projects (Niu, (2008).

Secondly, rules and regulations are required to moderate the relationship between organisational internal factors, organizational external factors and construction risk management. Because organizations with low obedience to rules and regulations incline to experience more risk occurrence on construction projects, and they find it difficult to deliver a good output to the clients (Mills, 2001; Dikmen *et al.* 2008). In that case, their disregard of rules and regulations, make risk management to be less effective within the organization. To be precise, this research has added empirical prove to the body of knowledge in the domain of risk management and this study results may be a strong foundation for future researches on risk management within the construction industries.

5.3.7 Practical Implications

Following the research findings, the present research has added various practical implications in terms of project management practices in the setting of Nigerian construction company's practices. Firstly, it is proposed by the results that sensing of thorough control and monitoring within the organization are paramount in managing construction risk management. Construction companies can make substantial efforts in reducing risk occurrence on construction project by enhancing employee's perceptions towards proper monitoring during project execution. For example, by compensating and motivating those employees in every milestone of construction projects, it would enhance proper control within the organization and once there is proper control, then, there would be less likely of risk to occur on the project within Nigerian construction companies.

Secondly, the research findings examined that organization internal and external factors variables are related to risk occurrence on construction project. In particular, the seven dimensions of the variables (i.e., effective communication, team competency with skills, active leadership, political factor, organizational culture, technology factor and economic factor) were found to be positively related to construction risk management in the whole sample. Consequently, management of the construction companies could reduce the likelihood of risk occurrence on project by improving conditions that contribute to positive group interactions among the employees (Heerkens, 2001). For example, management of the companies may establish training, workshop and symposium which will handle or discuss more on construction risk management among Nigerian construction companies.

Finally, as stated earlier in this report, organizational internal and external factors are dominant and costly development for all organizations (Hartono, 2014). Therefore, the current study results proposed that apart from organizational factors, individual factors should also be place a considerable attention among the construction companies operating in Nigeria. In particular, the moderating effect of rules and regulations proposes that effective obedience to rules and regulations within the organization can reduce the chance of risk occurrence on construction project. Thus, project managers in the Nigerian construction companies could consider rules and regulations as a selection standard when hiring employees in the organization. This can be attained by carrying out selection process test, so that the results of such test can help project managers and the contractors in the Nigerian construction companies to choose those employees whose measures are simpatico with the organization and screen out those whose measures are not compatible with the organization standard. More so, this research model has also measured and provided a ground on how effective is risk management within Nigerian construction companies for future risk management, specifically on project.

5.3.8 Methodological Implications

Preceding risk management studies have applied the use of analytical tools including the SPSS and SEM AMOS to produce results (Aibinu & Jagboro, 2002; Aibinu & Odeyinka, 2006). This research has explored a relatively new tool of analysis (i.e. PLS) to explicate the structural relationship among the constructs of this study. The PLS tool is a general model that constitutes canonical correlation, multiple regression, principal components techniques, multivariate analysis of variance between others. Therefore, the current study makes use of this comparatively new tool of analysis which has some significant methodological implications.

Another methodological contribution from this research is related with the use of PLS path modeling to measure the properties of each latent variable. Precisely, the present research has come through in measuring the properties of the latent variables such as the convergent validity and discriminant validity. The properties studied are the individual item reliability, average variance explained (AVE) and composite reliability for each latent variable. Convergent validity was measured by checking the value of AVE for the latent variables. Likewise, the discriminant validity was assessed by making comparison to the correlations between the latent variables and the square roots of AVE. The outputs for the cross loadings matrix were also assessed to support the discriminant validity in the conceptual model. Therefore, this research has proven to use the best vigorous approaches (PLS path modeling) to determine the properties of the latent variables demonstrated in the conceptual model of this research.

5.3.9 Limitations and Future Research Directions

Despite this research has affirmed support for some number of hypothesized relationships among the exogenous and endogenous variables, the findings need to be interpreted with condition to the study limitations. Firstly, the current study employ a cross-sectional design that does not give room for causal illations to be made from the study population. Hence, a longitudinal design needs to be considered in the future for assessing the theoretical constructs at a dissimilar points in time to ascertain the findings of the current study.

Secondly, the present research employs proportionate stratified random sampling ,(i.e. selected from each cluster) that is all the population elements were picked randomly within two states in Nigeria, as such, the degree to which sample size represents the whole population were selected randomly (Sekaran, 2006). The use of random sampling has reduced the level of which the findings of the research can be vulgarized to the population. Hence, future study needs to go further than covering two states within Nigeria. Therefore, two sample frame were found which can be vulgarized to the whole construction companies operating in Nigeria.

Thirdly, it is also essential to understand that the construction risk management data stated in this research was subjective. Research establishes that subjective data is reliable and valid for measuring construction risk management (see, for example, Zwikael, & Ahn, 2011). However, subjective assess is vulnerable to various types of judgmental biases (Dunlop & Lee, 2004). Though it was not easy to acquire objective data (Detert *et al.* 2007), using objective measure would have apparently fortified the results. Hence, the future research is required to repeat the findings of the present study with the use of objective measure of construction risk management.

Fourthly, the research model revealed 67% of the total variance in construction risk management, which indicates that there are other latent variables that can importantly explain the variance in construction risk management. Therefore, the remaining 33% of the total variance for construction risk management can be explained by other factors. Hence, future research is required to consider other likely factors that can make risk management to be more effective within Nigerian construction companies.

Finally, the future research can examine while rules and regulations dampens the relationship between organizational internal factors on construction risk management because rules and regulations are expected to strengthen the positive relationship but it is negative, which future study can explore more for rules and regulations to moderate organizational internal factors on construction risk management. Similarly, the relationship between organizational internal factors and organizational external factors on construction risk management may also be mediated by rules and regulations. Examining rules and regulations as mediators on these relationships can be boulevard for future research because it was indicated from the literature that less attention has been given to the primal reason why organizational internal and organizational external factors predict construction risk management. So, more research is required to look into such mediating effects.

Also, population of this study is limited to two states within Nigeria. Therefore, future study should follow homogenous sample for the quantitative study because it produces more accurate reflection on the population.

5.4 CONCLUSIONS

First, little attention has been given to study the extent of construction risk management among Abuja and Lagos State of Nigeria construction companies, which the present study has determined the level of risk management practices within Nigerian construction companies as the first research gap.

In general view, the present research has provided an extra prove to the developing body of knowledge regarding the moderating role of rules and regulations on the relationship between organizational internal factors, organizational external factors and construction risk management. Findings from this study contributed more support to the main theoretical proposals. To be specific, the present study has successfully provided answers to all the research questions and objectives in spite of some of its limitations. Likewise, there have been many research investigating the underlying causes of construction risk management, however, the current study covered the theoretical gap by integrating rules and regulations as an important moderating variable.

This study also contributed empirical and theoretical grounds for the moderating effects of rules and regulations on the relationship between organizational internal factors, organizational external factors and construction risk management. It is also evaluated in this study how rules and regulations theoretically moderate the relationships among the exogenous and endogenous variables. This study theoretical framework has also contributed to the field of risk management with organizational control theory by investigating the influence of organizational internal factors and organizational external factors on construction risk management.

Likewise, to the theoretical contributions, the findings from present study offer some essential practical implications to the contractors and the construction companies. Also, on the limitations of the present study, various future research directions are described. In conclusion, the current study has contributed valuable practical, methodological and theoretical ramifications to the developing body of knowledge in the domain of industry, particularly project management.

In summary, the present study meets all the following applicable quality requirements of a thesis (Hart 1998, p. 24). Firstly, this research is an empirically based which has not been done before. Second, this research makes use of already known practice and idea but with a new rendition. Thirdly, this research proofs new evidence to bear on the view about risk management in the Abuja and Lagos State of Nigeria construction companies with different tools (PLS-SEM) of analysis compared to what has been used in the previous literatures like SPSS and Excel. Fourthly, this research appears at areas that previous experts in construction companies have not looked at before.

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APPENDIX A

RESEARCH QUESTIONNAIRES

UUM
Universiti Utara Malaysia

CONSTRUCTION RISKS IN NIGERIAN CONSTRUCTION COMPANIES

School of Technology Management and Logistics
Universiti Utara Malaysia
06010, Kedah Sintok
Malaysia.

Dear Sir/Madam,

You are receiving this survey as part of a PhD research on construction risks affecting Nigeria construction companies. The aim of this study is to determine the factors influencing construction risks among construction companies operating in Abuja and Lagos.

However, the information you provide will lead to achieving the aim of this study.

I would appreciate if you could kindly respond to all the questions and return it to the sender. Your responses will be collated and analysed together.

The answers you provide will strictly remain confidential. Special precautions have been taken to protect the confidentiality of your responses. The successful completion of this study will largely depend on your valuable, immeasurable contributions and kind gesture.

Your contribution to this effort is very much appreciated. If you have any questions about the questionnaire, please contact the researcher through the email address or phone number provided below.

Thanks you for your anticipated cooperation.

Adeleke A.Q
+6016 6936794
adeleke_qudus@stml.uum.edu.my or aadekunle0@gmail.com

SECTION1: General Information about respondent and the company

Please tick ☑ the one that best describe your company.

Q1. Which of the following describes your position in your company?

☐ Contract manager ☐ Executivedirector ☐Marketing manager

☐ Project manager ☐ Engineer ☐ Others, please describe ………………..

Q2. How many years have you been working with your company? …………….

Q3. What is your gender?

☐ Male ☐ Female

Q4. Which of the following describes the type of project your company specialize on?

☐ Apartment buildings ☐ Roads ☐Bridges ☐ Other, please describe…………

Q5. Which of the following describes the type of your company ownership?

☐Local ☐ National ☐Multi-national ☐Other, please describe…………..

Q6. Which of the following describe your company prime location?

☐ Local market areas ☐ Within few States ☐ Regional

☐Across Nigeria ☐International markets

Q7. For how long has your company been in existence? …………….

Q8. What is the number of fulltime employee in your company? ……………

SECTION 2: INFORMATION ABOUT INTERNAL FACTORS: Effective communication, Team competency and skilss, Active leadership

Please tick ☑ the one that best describe your company.

‘1= very low, 2 = low, 3 = medium, 4 = high, 5 = very high,

No.	EFFECTIVE COMMUNICATION					
1.	In our company, there is effective communication.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
2.	In our company, there is reliable and frequent communication.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
3.	In our company, effective communication prevent the occurrence of conflicts.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
4.	In our company, effective communication reduce likelihood of disputes erupting.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
5.	In our company, there is free flow of communication.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
	TEAM COMPETENCY AND SKILLS					
6.	In our company, there is adequate managerial skill.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
7.	In our company, there is adequate organizational experience.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
8.	In our company, there is proper planning and scheduling at preconstruction stage.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
9.	In our company, there are less mistakes during construction.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
10.	There is adequate skill among employers in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
	ACTIVE LEADERSHIP					
11.	In our company, there is adequate managerial and supervisory personnel.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
12.	In our company, there is fast decision- making.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
13.	In our company, there is proper control over site resource allocation.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
14.	In our company, there are stable leadership styles.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

SECTION 3: INFORMATION ABOUT EXTERNAL FACTORS: Political, Organizational culture, Technology, and Economic.

Please tick ☑ the one that best describe your company.

'1= very low, 2 = low, 3 = medium, 4 = high, 5 = very high,

No.	POLITICAL					
15.	Our construction projects are not affected by government instability.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
16.	Our construction projects are not affected by political violence.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
17.	Our construction projects are not affected by government tax policy	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
18.	Our construction projects are not affected by government tariffs.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
19.	Government subsidy on construction materials are beneficial to our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
	ORGANIZATIONAL CULTURE					
20.	Our company is very dynamic place.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
21.	The leadership in our company generally exemplifies risk-taking.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
22.	Our company is an entrepreneurial place.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
23.	In our company, there is commitment to development.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
24.	In our company, the management style are characterized by uniqueness.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
25.	In our company, the management styles are characterized by freedom.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
	TECHNOLOGY					
26.	Our company make use of new construction materials.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
27.	In our company, we use new construction method.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
28.	In our company, there is technology simplicity.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
29.	In our company, we use new technology	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

	ECONOMIC					
30.	In our company, inflation have no impact on construction materials.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
31.	In our company, equipment and labour price do not fluctuate.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
32.	In our company, exchange rates do not affect construction materials.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
33.	In our company, interest rates do not affect construction materials.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

SECTION 4: INFORMATION ABOUT CONSTRUCTION RISKS: Management, Material, Design, Finance, Labour & Equipment.

Please tick ☑ the one that best describe your company.

'1= very low, 2 = low, 3 = medium, 4 = high, 5 = very high,

No.	MANAGEMENT					
34.	There is no postponement in resolving contractual issues in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
35.	There is no postponement in resolving litigation and arbitration disputes in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
36.	There is good organizational management in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
37.	In our company, we control the activities of sub-contractor during execution of projects.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
38.	In our company, we conduct inspection and testing during construction.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
39.	There is no mistakes during soil investigation in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
40.	In our company, there is safety during construction.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
41.	In our company, there is database in estimating activities.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
42.	In our company, there is proper site management and supervision.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
43.	In our company, there are no deficiencies in planning and scheduling during preconstruction stage.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

44.	In our company, we do not experience change in order from our clients.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
45.	In our company, there is contract negotiation.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
46.	In our company, there are normal judgment in estimating time and resources.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
MATERIAL						
47.	In our company, we experience adequate of materials in the markets.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
48.	In our company, there are fast delivery of materials.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
49.	Defective materials are not allowed in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
50.	In our company, there are no changes in materials types and specifications during construction.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
DESIGN						
51.	In our company, we prevent design error and incomplete drawings.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
52.	In our company, there are no changes in design during construction.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
53.	In our company, there are no deficiencies in specifications and drawings.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
54.	Complete design are used in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
55.	In our company, there are no delays in design information.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
56.	In our company, there are adequate design team experience.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
FINANCE						
57.	In our company, there are no delays in payment.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
58.	In our company, there is no financial failure.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
59.	In our company, there are no change order negotiations.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
60.	In our company, there is no price escalation.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

LABOUR AND EQUIPMENTS						
61.	In our company there is adequate of labour.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
62.	In our company, there is adequate equipment productivity.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
63.	There is adequate of equipment in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
64.	In our company, there is motivation of labour force.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
65.	In our company, there are skilled operators.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
66.	In our company, there is fast maintenance of equipment.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
67.	There are new equipment in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
SECTION 5: GOVERNMENT POLICY: Rule and regulations						
RULES AND REGULATIONS						
68.	Government introduce regulation that promote construction risk in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
69.	In our company, we obtain permission from municipality.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
70.	In our company, we wait for approval of drawings and materials samples.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
71.	In our company, we obtain permit from urban planning bureau.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
72.	Government rules and regulations reduce the price of construction materials in our company.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Please give your feedback or comments, it will be used to improve this questionnaire.

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Appendix B

SMARTPLS Output Measurement Model

	AVE	Composite Reliability	R Square	Cronbachs Alpha	Communality	Redundancy
ECRM			0.676274		0.583562	0.042297
AL	0.583562	0.807283		0.642214	0.572143	
DS	0.572143	0.799165		0.623755	0.539522	
EC	0.539522	0.777986		0.572101	0.342395	
EN	0.611338	0.757071		0.573309	0.611338	
FI	0.517806	0.761869		0.528691	0.517806	
LE	0.525948	0.815997		0.699443	0.525948	
MG	0.500120	0.799939		0.666427	0.500120	
MT	0.653863	0.790120		0.575545	0.653863	
OC	0.613295	0.757812		0.583029	0.613295	
PL	0.672954	0.804488		0.514242	0.672954	
RG	0.521703	0.763290		0.538151	0.521703	
TC	0.515153	0.809210		0.685115	0.515153	
TG	0.506591	0.804026		0.675784	0.506591	

Appendix C

Blindfolding Procedure Output

CV Red.

	1-SSE/SSO
EFFECTIVE CONSTRUCTION RISK MANAGEMENT	0.399386
EXTERNAL FACTORS	0.491558
EXTERNAL FACTORS * RULES AND REGULATIONS	0.548327
INTERNAL FACTORS	0.679003
INTERNAL FACTORS * RULES AND REGULATIONS	0.774022
RULES AND REGULATIONS	0.623012

Indicator Cross validated Redundancy

Total	SSO	SSE	1-SSE/SSO
AL	238.000000	71.085510	0.701321
AL* RG	238.000000	56.823582	0.761245
DS	238.000000	146.415511	0.384809
EC	238.000000	88.104587	0.629813
EC* RG	238.000000	58.797100	0.752953
EN	238.000000	167.489073	0.296264
EN* RG	238.000000	136.561722	0.426211
FI	238.000000	165.996064	0.302538
LE	238.000000	117.679965	0.505546
MG	238.000000	129.854877	0.454391
MT	238.000000	154.783707	0.349648
OC	238.000000	114.940694	0.517056
OC* RG	238.000000	102.506523	0.569300
PL	238.000000	137.915063	0.420525
PL* RG	238.000000	109.611000	0.539450
RG	238.000000	0.000000	1.000000
TC	238.000000	70.002035	0.705874

TC* RG	238.000000	45.727305	0.807868
TG	238.000000	63.691943	0.732387
TG* RG	238.000000	81.313671	0.658346

CV Com.

	1-SSE/SSO
EFFECTIVE CONSTRUCTION RISK MANAGEMENT	-0.000000
EXTERNAL FACTORS	0.491558
EXTERNAL FACTORS * RULES AND REGULATIONS	0.548327
INTERNAL FACTORS	0.679003
INTERNAL FACTORS * RULES AND REGULATIONS	0.774022
RULES AND REGULATIONS	1.000000

Construct Crossvalidated Communality

Total	SSO	SSE	1-SSE/SSO
EFFECTIVE CONSTRUCTION RISK MANAGEMENT	1190.000000	1190.000000	-0.000000
EXTERNAL FACTORS	952.000000	484.036773	0.491558
EXTERNAL FACTORS * RULES AND REGULATIONS	952.000000	429.992916	0.548327
INTERNAL FACTORS	714.000000	229.192132	0.679003
INTERNAL FACTORS * RULES AND REGULATIONS	714.000000	161.347987	0.774022
RULES AND REGULATIONS	238.000000	0.000000	1.000000

Indicator Crossvalidated Communality

Total	SSO	SSE	1-SSE/SSO
AL	238.000000	71.085510	0.701321
AL* RG	238.000000	56.823582	0.761245
EC	238.000000	88.104587	0.629813
EC* RG	238.000000	58.797100	0.752953
EN	238.000000	167.489073	0.296264
EN* RG	238.000000	136.561722	0.426211
FI	238.000000	238.000000	-0.000000
OC	238.000000	114.940694	0.517056
OC* RG	238.000000	102.506523	0.569300
PL	238.000000	137.915063	0.420525
PL* RG	238.000000	109.611000	0.539450
RG	238.000000	0.000000	1.000000
TC	238.000000	70.002035	0.705874
TC* RG	238.000000	45.727305	0.807868
TG	238.000000	63.691943	0.732387
TG* RG	238.000000	81.313671	0.658346

Appendix D

Decision on PhD Proposal Defense by the Panel Reviewers' Committee

PUSAT PENGAJIAN PENGURUSAN TEKNOLOGI DAN LOGISTIK
SCHOOL OF TECHNOLOGY MANAGEMENT AND LOGISTICS (STML)
Kolej Perniagaan
UUM College of Business
Universiti Utara Malaysia
06010 UUM SINTOK
KEDAH DARUL AMAN
MALAYSIA

UUM Universiti Utara Malaysia

Tel: 604-928 7001/7002
Faks (Fax): 604-928 7070
Laman Web (Web): www.stmlportal.uum.edu.my

KEDAH AMAN MAKMUR•BERSAMA MEMACU TRANSFORMASI

Ref.No :UUM/COB/STML/A-3
Date :29 April 2015

Adeleke Adekunle Qudus (96139)
Bakoja Compoumd P.O Box 193
Saugo Saki Oyo State 193
Saki,Nigeria

Dear Sir,

RESULT FOR PHD PROPOSAL DEFENCE

With reference to the PhD proposal defence held on **28 April 2015 (Tuesday)**,the members of the Proposal Defence Board have agreed to award you the following status :

"PASS WITH MINOR REVISION – Pass with minor revision,and re-submit the amended proposal within One (1) Month".

In accordance with this :

1. You are given a maximum period of **One (1) Month** beginning from **29 April until 28 May 2015** to make correction and resubmit you proposal.
2. Correction should be done based on comments and suggestion made by reviewers
3. **Dr. Ahmad Yusni Bahaudin and Dr. Ahmed Mohammed Kamaruddeen,**will be responsible for supervising you in making the necessary correction.
4. For the purpose of making the required changes,the reports of the reviewers will be made available to your supervisor,i.e. **Dr. Ahmad Yusni Bahaudin** and **Dr. Ahmed Mohammed Kamaruddeen**
5. Supervisors are required to submit a written report on the corrections undertaken to Dean,School of Technology Management and Logistics (STML) within the stipulated period.
6. The amended proposal will be re-examined **Dr. Ahmad Yusni Bahaudin**,who will then submit a written report to the Dean.You will be awarded a pass if the reviewers is fully satisfied with the amendments undertaken by you.
7. You are required to submit a copy of amended pproposal using the latest stardards format of writing to the Dean by **28 May 2015 (Thursday).**

Universiti Pengurusan Terkemuka
The Eminent Management University