AN APPRAISAL OF FACTORS MILITATING AGAINST THE EFFECTIVE IMPLEMENTATION OF FORMAL RISK MANAGEMENT TECHNIQUES IN PROJECT DELIVERY IN ABUJA, NIGERIA

By

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DECLARATION

I declare that the work in this thesis titled "An Appraisal of Factors Militating against the Effective Implementation of Formal Risk Management Techniques in Project Delivery in Abuja" has been carried out by me in the Department of Quantity Surveying, under the supervision of Dr. Y. G. Musa Haddary and Dr. A. D. Ibrahim.

The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this work has been presented for another degree or diploma at this or any other Institution.

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CERTIFICATION

This thesis titled AN APPRAISAL OF FACTORS MILITATING AGAINST THE EFFECTIVE IMPLEMENTATION OF FORMAL RISK MANAGEMENT TECHNIQUES IN PROJECT DELIVERY IN ABUJA meets the regulations governing the award of the degree of M.Sc. Quantity Surveying of the Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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ABSTRACT

Non utilization of Formal Risk Management Techniques in project delivery by the project team has been identified as one the causes of project failure This prompts the question 'what factors are responsible?' This study therefore first presents Risk management in project delivery as it relates to an integrated project team as well as internal issues. It then focuses on formal Risk management techniques and their processes of implementation with a view to revealing the internal and external barriers that inhibit their utilization in project delivery in Abuja Metropolis, Nigeria. A total of 391 questionnaires were distributed to construction firms and stakeholders in ABUJA metropolis but a total of 203 firms responded. Data retrieved were analyzed using descriptive statistics, ANOVA and spearman correlation coefficients. The internal barriers were found to be cost and time intensiveness, argumentative sessions that create riskier stance including subjective judgment that lacks accurate results while the external barriers were found to be lack of risk assessment training in place, lack of collaboration by parties on a project, low level of risk consciousness, ineffective monitoring by heads of firms and lack of historical data across the project team's spectrum. The study recommends strategies such as improving the grey areas in the implementation processes through research for internal barriers and conducting sensitization, legislation, business regulations and mandatory training to overcome the external barriers.

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GLOSSARY OF ABBREVIATIONS

FRMT	-	Formal Risk Management Techniques
RM	-	Risk Management
PRM		Project Risk Management
RP	-	Risk Platform
DF	-	Difference
RF	-	Relative Frequency
ANOVA	-	Analysis of Variance
RII	-	Relative Importance Index
LKS	-	Likert Scale
NR	-	Number
QS	-	Quantity Surveyors
BLD	-	Builders
ARCH	-	Architects
BLD/Civil	-	Building/ Civil Engineering Contractors
QSRBN	-	Quantity Surveyors Registration Board of Nigeria
ARCON	-	Architects Registration Council of Nigeria
BRBN	-	Builders Registration Board of Nigeria
FBCECN	-	Federation of Building and Civil Engineering Contractors in Nigeria.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Despite its numerous challenges, it is the Construction Industry that shapes the development parameters of any nation (Zeiss, 2007). So a firm grasp of the nature and effects of key issues affecting the Industry is always the beginning of developmental wisdom.

The construction industry is bedeviled with global climate change, aging infrastructure, shrinking workforce, declining productivity and information island (Akintoye and Macleod, 1997; El-sayeh, 2008; Smith, 1999 Zeiss, 2007; Hillson, 2002; Wang et al., 2004). Gandu and Musa-Haddary (2007) in their work mentioned high risks and uncertainties as additions to these problems.

In Nigeria, in particular, experts on management studies have lamented the complete neglect of formal risks management principles in the management of most construction projects (Akintoye and Macleod, 1997; Smith, 1999; Kartam and Kartam, 2001; Aina and wahab, 2011). Why most firms opt for the use of informal principle to the detriment of the formal and most beneficial ones is a puzzle that requires an organized study. In an assessment of some special challenges facing the Nigerian construction industry, Odonkor (2011) ranked poor risk understanding and management as the most unappreciated. The nature of this risk challenges as Odonkor (2011) partly observed lies in the failure to employ formal Risks Management Techniques available. Risk is inherent in construction projects whether in Nigeria or elsewhere. Risks are associated with fear of the unknown. Whether such fear is for positive or negative outcome, it matters little

than the realization that the likelihood exists for the outcome to deviate from the planned and expected objectives.

Risk events, as most experts agree, are not just hazardous events with some degrees of uncertainties but events that "may be avoided through preemptive action" (Smith, 1999). This forms the working understanding of the type of challenges that are considered to be within what can be termed risk problems (David and Anthony, 2010).

The extent of application of risk management techniques by contractors especially, was found to differ in various construction industries across the globe. Laryea and Hughes (2009) found that most countries in the Middle East and some part of Africa do not utilize project risk management techniques in the delivery of construction projects. Akintoye and McLeod (1997) found that low usage of formal risk management techniques was essentially due to lack of knowledge and doubts on the suitability of the techniques to real life situations. This was supported by the findings of Shen et al., (2001). Kartam and Kartam (2001) however attributed the low usage of risk analysis techniques to subjective judgment and contractor's reliance on their experience and intuition. Laryea and Hughes (2009) attempted to find how contractors' in Ghana include risk in their bid prices. The research showed that besides having risk allowances as lump sums or percentage allowances, the method used is neither scientific nor informed by any empirical evidence.

In Nigeria, Ojo (2010) found that `design changes and inadequate specifications were the risk factors with most impacts on construction sites but the study did not highlight any Project risk management (PRM) technique used by Contractors to respond to such risks. Another research carried out in Nigeria on this subject was on the evaluation of key risk factors and the measures

to mitigate their effects on construction projects (Dada et al., 2007). Though the research found financial, political and physical risks as the most significant, the use of contingency sum and insurance cover were adjudged to be the most effective means of mitigating risk.

Bashir (2011) carried out an appraisal of risk management practices in a Redevelopment project in Yankari Games Resort in Bauchi state. Conducting the study from the perspectives of contracting organization using interview and content analysis he found a high utilization of informal risk management techniques even though the contracting organization that participated in the project were aware of formal risk management techniques. The **question then is what factors are** militating against the effective utilization of formal risk management techniques in project delivery?

1.2 Statement of the Problem

Previous research has found that jointly implementing formal risk management techniques (FRMT) is beneficial because it is associated with predicting a project success (Rejda, 2008). (Odonkor and Kwaku, 2011; Flyvberg et al., 2002). Unfortunately, most contracting organizations utilize informal techniques (Laryea and Hughes, 2009;Ojo, 2010; Dada, 2010; El sayegh, 2008).

Consequently, it has contributed to the prevalence of abandoned projects with Nigeria topping abandoned project chart in the world. This was a declaration during an interactive session on public procurement (PPA, 2007) in Abuja as reported in Blue print newspaper (2013).

Recent researches have shown that contracting organizations still employ informal risk management techniques in project delivery even though they are aware of formal risk management techniques (Kartam and kartam 2001; Allan et al , 2007). Informal techniques is

linked with the likelihood that a project prospector will use experience, intuition, rule of thumb or reacting to information in their projects as a means to mitigate risks. The existing evidence is in a redevelopment project where studies were conducted from the perspectives of contracting organizations (Bashir, 2011).

However, Wenzhe*et al*(2007) observed that many project risks cannot be controlled by one party on a project since risk appetites, perceptions and attitudes differ significantly among project teams. No study to date has been conducted from the perspectives of an integrated project team. This study has therefore exposed the project team to the conditions and questions of non utilization of formal risks management techniques and has directly predicted the outcome.

1.3 Significance of the Study

Risk in any construction project is a threat to project objectives and this makes its management necessary if projects are to be successful. Research has shown that neglecting formal risk management practice leads to project failures. Not finding out why it is not being implemented poses an obvious danger .This study helps to improve the practice of Formal Risk Management Techniques and enhance project success in Nigeria

1.4 Aim and Objectives

1.4.1 Aim

The aim of this research is to appraise factors militating against effective implementation of Formal Risk Management Techniques with a view of improving project success delivery in Nigeria.

1.4.2 Objectives

i. To evaluate the firms' perceptions on the severity of identified risks in their projects

ii. To determine the risk management techniques they use in their projects.

iii. To assess the internal barriers inhibiting the utilization of the formal techniques.

iv. To reveal the external barriers inhibiting the firms from utilizing formal risk management techniques in their projects

v. To recommend ways to overcome the barriers.

1.5 Delimitations and limitations

1.5.1 Delimitation

The study essentially deals with factors militating against the implementation of FRMT. It is therefore restricted to construction based organizations in the Federal Capital Territory, Abuja.

1.5.2 Limitation

The fact that the study use a sample of construction firms in Abuja, the FCT, barring other states capitals, the inference resulting from its findings should not be applied blindly without allowing this same shortcoming of not capturing other relevant areas.

CHAPTER TWO

LITERATURE REVIEW

2.1 Construction Risks and Their Management

The purpose of this chapter is to review the literature on subject areas relevant to the research topic and questions of the study. The review is directed towards defining and identifying important themes, concepts, variables and significant findings and to facilitate the development of a theoretical framework for the study: The review is categorized under the following subheadings

2.2 Definition of Risk

Risk has been defined variously in relation to different exposures. For instance, Business Dictionary (2010) defines risk as a probability or threat of damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities and that may be avoided through preemptive action. Risk is viewed here in negative perspective only and this is not so as risk could also be positive.

The British Standards Institute, in BS4778 (1979), as cited by Odonkor (2012) provides the following definition: “The combined effect of the probability of occurrence of an undesirable event, and the magnitude of the event”. This definition comprises several aspects of importance; that risk is an undesirable event and that its magnitude and probability of occurrence should be taken into account. This quantitative approach of multiplying the effect by the magnitude is also suggested in definitions given by Green, (1982) and Riskman, (1994). These definitions place risk in a technical environment, allowing risk to be quantified. Another definition is that given

by Bannister and Bawcutt (1981) who define risk as "potential variability in the future outcome (of a stated situation) due to uncertainty". Bannister &Bawcutt (1981)'s one aspect of the above definition which is important is the potential for a desirable impact to be termed a risk. This concept that risk is the impact of uncertainty, whether beneficial or detrimental is also supported by Drucker (1974).

For formal risk management definition, according to David and Anthony (2010), there are a variety of definitions of formal risk management that have been developed by organizations. Formal risk management is the process of analyzing exposure to risk and determining how to best handle such exposure. According to Business Dictionary, formal risk management refers to policies, procedures, and practices involved in identification, analysis, assessment, control and avoidance, minimization, or elimination of risks.

2.3 Risks in projects delivery

Odonkor (2011) cite Flanagan & Norman (2003) stating that the typical formal risks on a construction project include:

a. Failure to achieve completion within the stipulated design construction time
b. Failure to obtain the expected outline planning, detailed planning or building code/regulation approvals within the time allowed in the design program.
c. Unforeseen adverse ground condition.
d. Exceptionally inclement weather.
e. Strike by the labour force.
f. Unexpected price rises for labour and materials.
g. Failure to complete the project within the client's budget allowance.

h. A claim from the contractor for loss and expense covered by the late production of design details by the design team.
i. Latent defects occurring in the structure through poor workmanship.
j. Natural disaster (flood, earthquake etc.)

2.4 Risk Management

Dionne (2013) points out that the study of risk management began after World War II. Risk management has long been associated with the use of market insurance to protect individuals and companies from various losses associated with accidents. Other forms of risk management, alternatives to market insurance, surface during the 1950s when market insurance was perceived as very costly and incomplete for protection against pure risk. Dionne (2013) further states that the use of derivatives as risk management instruments arose during the 1970s, as companies intensified their financial risk management. International risk regulation began in the 1990s, and financial firms developed internal risk management models and capital calculation formulas to hedge against unanticipated risk and reduce regulatory capital. These makes governance of risk management become essential; integrated risk management was introduced and corporate risk officer positions were created, but with the regulations, governance relying on risk management methods failed to prevent the financial crisis that began in 2007.

In other words, risk is when you take a chance at something which can either turnout better for you or could result in a negative outcome. The scientific approach to risk entered finance in the 1960s with the advent of the capital asset pricing model and become increasingly important in the 1980s when financial derivatives proliferated. It reached general professions in the 1990s

when the power of personal computing allowed for widespread data collection and numbers crunching.

2.5 Construction Risks

From Odonkor (2011)'s point of view, when citing Ahmed et al (2001) they state that "the construction industry has a poor reputation in coping with FRMT, many projects failing to meet deadlines and cost targets". Kangari (1989) said "the construction industry has a very poor reputation for coping with risk; FRM analysis is either ignored or done subjectively by simply adding a contingency. As a result many major projects fail to meet scheduled deadlines and cost targets with attendant loss to both contractors and owners.

Flanagan and Norman (2003) in their work noted that the relevance of risks in project delivery is in decision making and decision makers must rely on informal or formal means (tools) to ascertain the worthiness of alternatives. Since most decisions in project delivery are based on complex, unforeseen, non-routine and unpredicted problems they are full of risks, and the link between these risks and project delivery is that the poor performing companies are those that either do not have risk management system in place or do not implement decisions using the FRMT.

Risk management improves an organization's strategic decision- making by addressing threats and opportunities in a way that integrates risk management with the strategic planning process as stressed by Doehring (2011). Also risk management as stated by Doehring (2011) is a systematic approach to managing all of an organization's uncertainty in order to maximize shareholder value by optimizing risk taking.

Mendel (2006) states that risk is inherent in construction and must be properly analyzed and mitigated to ensure the success of any project. Risk is in short, anything that can go wrong and this can include:

(a) Development risk – funding, entitlement, approvals to actually perform the project.

(b) Financial risks – cost overruns due to uncontrolled change orders or unstable market pricing.

(c) Unforeseen conditions – unidentified subsurface conditions, hazardous materials or unknown conditions discovered during renovations or excavations.

(d) Disputes, deriving from misunderstandings, for scope or contractual documentations or unrealistic expectations.

(e) Schedule – if it's over scheduled, it usually means it's over budgeted.

(f) Quality – potential for design or construction defects.

(g) Accidents or mistakes, responsibility for corrections, insurance disputes.

Mendel (2006) further points out that: project delivery model is based on assessment of the risks for a particular project and allocating the risks to that party best able to evaluate, control, manage and assume the risk. Proper allocation of risk will yield a project that is less adversarial, with fewer surprises, cost impacts and completion in a timely manner.

2.5.1 Risks Related to Client

According to Zou et al (2006), four key risks are related to clients. They include:

i. Tight project schedule – it infers that formulating an appropriate schedule in the conceptual/feasibility phase is never more constructive to the project delivery. The clients should prepare a practical schedule allowing sufficient but not redundant time to

accommodate all design and construction activities. As time and cost are always closely correlated, a lengthy schedule will undoubtedly wreck the project cost benefit.

ii. Variations by the client – this can directly result in changes in the planning, design and construction; variations possibly result from two reasons, the change of mind by the clients or the misunderstanding/misinterpretation of the clients' needs in the project brief. For the former cause, the clients will bear the responsibility, for the later one, a knowledgeable initial project team should be established as early as possible to define the project scope and functions precisely.

iii. High performance/quality expectations – this is borne in most clients' mind, which however may mean the sacrifice of project cost, time and even safety. The outcome of the project may also oustrip the market or the clients' needs. Hence, clients should define the performance/quality of the proposed projects based on rational research of their own and/or the market needs.

iv. Incomplete approval and other documents usually occur due to management weakness of the project routines or the bureaucracy of government. Clients need to establish a competent team to obtain the approval from government agencies and prepare project documents effectively and efficiently.

2.5.2 Risks Related to Designers.

Zou et al. (2006) stated that four key risks are related to these designers which are:

1) Design variations – which popularly arise in the design phase of a project and may result from issues such as variations by the client and defective designs. To avoid defective design, the design team needs not only to fully understand what the clients want as

defined in the project brief, but also to establish an efficient communication scheme among the designers.

2) Inadequate program scheduling – often appears in projects with a tight schedule when some programs need to be reduced to meet the project timeline. Moreover, uncertainty surrounds most facets of construction projects, which makes it possible to accurately predict the time required for various programs. Choosing experienced designers can help to minimize the difference between the proposed and practical program schedules.

3) Incomplete or inaccurate cost estimate is directly related to the designer/consultants' knowledge and attitude towards work. As previously mentioned, many unforeseen factors compass construction activities, which often deviates the estimated cost from the real cost. Choosing responsible and experienced designers and if possible getting the contractor/subcontractors involved early can help to illuminate the black box and minimize the inaccuracy.

4) Inadequate or insufficient site information (soil test and survey report) can affect the progress of excavation, foundation and footing constructions. Prior to any design scheme, borehole, soil test and survey with the government agencies and nearby building should be conducted to ascertain the site conditions and reduce unexpected risks.

2.5.3 Risk Related to Contractors

Eight key risks related to contractor were highlighted by. Zou et al (2006)

1) Unsuitable construction program planning may result from inadequate program scheduling, innovative design or contractors' lack of knowledge in planning construction program, so can affect the project.

2) Variation of construction program – to reduce the negative influence of the two risks, an informative program scheduling should be worked out in the design phase, and the constructability of innovative design should be examined, more importantly, the abilities to manage construction programs and implement innovative design should be used as key criteria in appointing contractors.

3) Lack of coordination between project participants – may lead to chaos in the management of construction team and programs. A general contractor or project manager who is skipped in team and program coordination should be engaged. On the other hand, strengthening the participant's perception of cooperation and communication is also important for improving construction quality and efficiency.

4) Unavailability of sufficient professionals and managers and (5) unavailability of sufficient amount of skilled labour may result in delays in the construction phase. The contractors should be mapping the construction progress all the time and coordinating different project stakeholders in order to secure sufficient professionals, managers and skilled labour ready to work.

5) Occurrence of dispute exists in most construction projects, on account of the discrepancy and variations in the design and construction. In announcing any design variation or difficulty in construction, contractors should always discuss with the team and negotiate with the project manager (particularly the representative of clients) about potential changes in the documentation and record the resulted delay of progress in construction rather than surprise them.

6) Serious noise pollution caused by construction – contractors should arrange a suitable time for the construction work with serious noise and if necessary make sound installation on site.

7) General safety accident occurrence is usually due to lack of project management negligence of construction safety policy and confliction of unparallel construction programs once happening; it will bring on personnel change and further impede the construction progress. Therefore, contractors should establish a systematic construction program scheduling and provide safety training on-site staff to improve their awareness of safety.

2.5.4 Risks Related to Subcontractors

Subcontractors' low management competency as stated by Zou et al. (2006) is recognized key risk in addition to the eight risks applicable to the general contractor which applies to him also as he continuously manages a construction site for a long period, alongside the general contractor. Subcontractors normally allocate their manpower and other resources to different projects in order to achieve maximum profit of their own business. Without competent management of skills, subcontractors cannot successfully manage their resources to meet the needs from several concurrent construction sites. Accordingly, in additional to specialist abilities, the management competency should be regarded as one of the key criteria for appointing subcontractors.

2.5.5 Risks Related to Government Bodies

Zou et al. (2006) noted that excessive approval procedures in administrative government department and bureaucracy of government are seldom complained by clients and contractors. These risks are normally out of the control of the project stakeholders, to attract investment within their administrative territory, the government agencies should always make great efforts to create a friendly environment in which the approval procedures are reduced or at least the approval time is shortened and the bureaucracy is minimized from project team perspective, they should always adopt the strategies of maintaining close relationship with local government officers and communicating with them as much as possible and at the same time recording everything in black and white, as suggested by He, (1995).

2.5.6 Risks Related to External Issues

In addition to the above key risks related to project stakeholders, Zou et al. (2006) point out that one risk, price inflation of construction materials is identified to be related to external environment. The price of construction materials is always changing in response to the inflation and the relation between supply and demand in the construction material market. As this risk is usually unavoidable, clients should choose an appropriate type of contract such as lump sum to transfer the risk to other parties, while contractor should always avoid using fixed price contracts to bear the risk, one fair way to deal with the potential price fluctuation is to add the contingency premium.

2.6 Risk Awareness in Project Delivery

According to Simms (2007), there are a series of 8 systemic or common risks to the successful delivery of any project that should be formally considered, evaluated and, where necessary, action taken.

1. Business requirement: How well are the business requirements known and stable?
2. Design skills: Do we have the requisite skills to design the solution?
3. Development skills: Do we have the requisite skills to develop and implement the solution?
4. Technical risk: Are we dealing with known or new technologies?
5. Business knowledge: How well does the project team understand the business and its issues?
6. Client risk: Has this project team worked with this Sponsor/business before?
7. Timescale risk: How long is the project's duration (allowing, therefore, the time for requirements to change)?
8. Failure risk: What is the business consequence if this project failed?

When project teams objectively evaluate these systemic risks it causes them to consider a set of potential risks that seem to be too often forgotten. The risks' standard categories also allow each project's overall risk profile/status to be defined in an easily comparable form.

The whole project leadership team should be involved in determining the current and future risk states so that there is broad ownership of the outcomes; while the governance team should validate that the thinking has been rigorous enough and no level of 'glossing over issues' has taken place.

2.7 Formal and Informal Risks

Smith et al (2006) provided two basic types of approaches to the management of risk in construction projects. These are the informal and the formal approaches. The procedures and processes used in each of the approaches differ.

This approach views risk in a highly subjective manner and largely utilizes experience, intuition, judgement and use of contingency sums in the management of project risks (Akintoye and MacLeod, 1997; Shen, et al., 2001; Smith et al, 2006; Dada et al., 2007). Contingency sum is a sum made available to absorb extra cost or to assist in overcoming delay (Dada et al., 2007). Lump sum or percentage contingency is often provided in the project budget to take care of identified risk that could occur during the project. The major shortcoming however, is that the sum usually allowed is not a true financial representation of all the identified risk. This is because of the unlikelihood of all identified risks occurring during the project life cycle (Smith et al, 2006). For a high risk project, management contingency and technical contingency are combined together in order to achieve the project objective (Akintoye and MacLeod, 1997).

Another drawback to the inadequacy of contingency sum as a risk premium strategy is that even though sums are included, this has to be guided by concerns about competitors and wining the job rather than prioritising on the level of project risk (Laree and Hughes, 2009).

The use of intuition, experience or discussion with professionals experienced in analogous types of projects is often utilised in the identification of likely project risks and projects are reviewed in the light of these risks (Smith et al, 2006; Akintoye and MacLeod, 1997). Unfortunately to practitioners of the informal approach, the methods in this approach are usually found to be inadequate and fall short of dealing with risks that occur during the project. This adversely

affects the attainment of the objectives either in terms of minimising threats or maximising opportunities that availed the projects (Kartam and Kartam, 2001).

As a panacea to the inadequacy of this approach, it was suggested that there is the need to develop proven techniques of risk analysis assessment and management for construction project and risk managers, and also provide formal and/or informal education and training through academic institutions and continuing professional development (CPD) programme by professional bodies (Akintoye and Macleod, 1997).

Research conducted in so many countries has shown that contractors rarely utilised formal risk management approach in the management of construction projects (Akintoye and Macleod, 1999; Shen et al., 2001; Kartam and Kartam, 2001; El- Sayegh, 2008; Laryea and Hughes, 2009).

The management of risk in a formal approach has a set of procedures that must be followed in order to achieve objectivity as an essential attribute of the overall process (Smith et al, 2006). There is no singular methodology for risk management in construction projects but a number of professional and academic writers have provided frameworks for formalised risk management procedures. These frameworks range between three to five stages.

Wang et al (2004) classified the first stage of the process to be risk identification which starts with identifying all the potential risks that could be faced by the project. The identification process could involve getting the key project stakeholders together to identify the project risks and prioritise them in order of importance to the project principally in terms of probability of occurrence and the level of impact they are likely to have on the project. Risk identification techniques such as brainstorming, use of checklist, risk registers of past projects, etc are used by

key stakeholders for this purpose. Key stakeholders are usually a mix of senior management and experienced staff on similar projects. The use of checklist also helps in directing attention to various risk categories and identification of those relevant and specific to the project (Ashworth and Hogg, 2007)

2.8 Formal Risk Management Techniques

Odonkor (2011) state that the process of risk identification relies on the knowledge, judgment, and experience of the people involved in the project. In order to assist these participants and to add a scientific base to the process, techniques have been developed. These techniques also help to control the bias arising from the subjective nature of the exercise and personal objectives.

The techniques can be divided into two categories: those designed to assist in the identification of risks and opportunities, and those designed to assist in determining the initial significance of those sources. The following list, although not exhaustive, shows examples of the techniques available to assist in the identification stage.

1) Checklists
2) Brainstorming
3) Cause-event-effect
4) Prototype activities

The techniques applied to the pre-analysis stage include the following.

1. Qualification
2. Quantification
3. Risk Mapping
4. Classification

Also the Institute of Management Accountants (2007) explores the following formal risk management technique in their paper "enterprise risk management: tools and techniques for effective implementation" as:

1) Brainstorming
2) Event inventories and loss event data
3) Interviews and self-assessment
4) Facilitated workshops
5) SWOT analysis
6) Risk questionnaires and risk surveys
7) Scenario analysis
8) Using technology
9) Fuzzy set techniques

2.8.1 Checklists

Checklists are a popular method of identifying risks and opportunities. They are an effective method of relating past experience to present situations. The checklist will usually contain a list of the risks which commonly occur on projects or ventures of a similar type. Although this technique will not identify the risks specific to the project under consideration, they do ensure that risks identified on other projects, usually through experience, are considered (Al-Bahar and Crandall, 1987;Odonkor, 2011).

2.8.2 Brainstorming

The objective of this technique according to Odonkor (2011) is to elicit information specific to the project under consideration. The process requires a group of people involved in the project, preferably with different expertise and perspectives, in order that the list of risk and opportunities reflects all aspects of the project. The inclusion of a number of people in the exercise helps to control personal bias although this also introduces problems of an increased time requirement and a potentially riskier stance (Harrison, 1995; Odonkor, 2011).

2.8.3 Cause-Event-Effect

Cause-Event-Effect technique approaches the problem from a different perspective by tracing the consequences back to discover the possible causes (Jardine Institute of Brokers, 1987; Al-Bahar and Crandall, 1991; Flanagan and Norman, 1993; Odonkor, 2011). This approach acknowledges that a single risk (the effect) can have many causes, each one contributing to the probability of occurrence.

2.8.4 Prototype activities

This technique, by (Klein, Powell, and Chapman, 1994; Odonkor, 2011) for use on construction projects requires a prototype activity to be defined. The risks are then identified as variations from that prototype. The technique was produced to reduce the reliance on using the network of activities and allow the risk aspects of the project to be targeted. The key feature of the prototype activity is that it does contain uncertainty, but at an acceptable level. In this way, rather than identifying every source of uncertainty, only those with above normal uncertainty are considered. This again reinforces the idea that the objective is to gain an acceptable level rather than to minimize risk.

At the pre-analysis stage, the first stage of any analysis is risk measurement, in which the possible effects of the identified risks and their likelihood of occurring are assigned. There are two methods of achieving this; qualification and quantification (Franke, 1987; Odonkor, 2011).

2.8.5 Qualification

Qualification is used when the two parameters are described using words. For example, the impact might be described as low, moderate, or high, and the likelihood as probable, unlikely, etc. Words are used because of the difficulty in assigning actual values. Although such classifications are relatively easy to assign, their usefulness is limited.

2.8.6 Quantification

In Risk Quantification, it is also possible to evaluate the impact of a risk in terms of cost or time, as these have commonly used units. Quantities such as quality cannot readily be quantified due to the lack of suitable units. In such cases, it is suggested that the effect is converted to an equivalent cost (Franke, 1987; Odonkor, 2011). However, in some cases this is not possible or advisable (Drucker, 1974; Odonkor, 2011). The quantification of the probability of the risk occurring is often a more subjective task than that of the impact or effect. Ideally, the probability would be derived statistically from historical data, unfortunately, historical data is generally not available, or is too sparse to make a confident statistical prediction. Consequently, in many cases, a subjective assessment is made, based on the historical data available and the experience and judgment of the participants involved. The following list contains examples of the techniques used for this task: Risk Mapping and Risk Classification.

2.8.7 Risk Mapping

This is perhaps the most common and simplest of the techniques. A risk map is a two dimensional graph; one axis representing the potential impact of a risk, and the other denoting the probability of occurrence. The graph is converted to a map by placing of contours (or iso-risk curves); the contours farther away from the origin denote high risk.

2.8.8 Risk classification

Risk classification has been developed to describe the nature of a risk, either in terms of its origin, consequence, or impact, etc. The risk classification can then be used in determining possible strategies to control each risk in hierarchy or Hierarchical classification system. (Flanagan and Norman, 1993).

This method of risk identification should be taken early in a project's life, because decisions made during the early feasibility and design stages of a project have the greatest impact on the project (Hendrickson and Au, 1989). The uniqueness of construction projects makes the information at this stage most likely to be incomplete or inaccurate.

2.8.9 SWOT Analysis

Institute of Management Accountants (2007) explains that SWOT (strengths-weaknesses-opportunities -threats) analysis is a technique often used in the formulation of a strategy. The strengths and weaknesses are internal to the organisation and include the organisation’s culture, structure, and financial and human resources. The major strengths of the organisation combine to form the core competencies that provide the basis for the organisation to achieve a competitive advantage. The opportunities and threats consist of variables outside the organisation and typically are not under the control of senior management in the short run, such as the broad

spectrum of political, societal, environmental, and industry risks. For SWOT analysis to be effective in risk identification, the appropriate time and effort must be spent on thinking seriously about the organization's weaknesses and threats. The tendency is to devote more time to strengths and opportunities and give the discussion of weaknesses and threats short shrift. Taking the latter discussion further and developing a risk map based on consensus will ensure that this side of the discussion gets a robust analysis.

2.8.10 Scenario Analysis

Scenario analysis according to Institute of Management Accountants (2007) is a particularly useful technique in identifying strategic risks where the situation is less defined and "what-if" questions should be explored. Essentially, this technique is one way to uncover risks where the event is high impact/low probability.

In this process "Managers invent and then consider, in depth, several varied stories of equally plausible futures. The stories are carefully researched, full of relevant detail, oriented toward real-life decisions, and designed to bring forward surprises and unexpected leaps of understanding. Using this technique, a cross-functional team could consider the long-term effects resulting from a loss of reputation or customers or from the lack of capability to meet demand.

2.8.11 Risk Questionnaires and Risk Surveys

Institute of Management Accountants (2007), in their view, a risk questionnaire includes a series of questions on both internal and external events that can also be used effectively to identify risks. For the external area, questions might be directed at political and social risks, regulatory risk, industry risk, economic risk, environmental risk, competition risk, and so forth. Questions on the internal perspective might address risks relating to customers, creditors/investors,

suppliers, operations, products, production processes, facilities, information systems, and so on. Questionnaires are valuable because they can help an organization think through its own risks by providing a list of questions around certain risks. The disadvantage of questionnaires is that they usually are not linked to strategy. Rather than a lengthy questionnaire, a risk survey can be used. In one organization, surveys were sent to both lower- and senior-level management. The survey for lower management asked respondents to "List the five most important risks to achieving your unit's goals/objectives." The survey to senior management asked participants to "List the five most important risks to achieving the company's strategic objectives." The survey instruments included a column for respondents to rank the effectiveness of management for each of the five risks listed, using a range of one (ineffective) to 10 (highly effective). Whether using a questionnaire or survey, the consolidated information can be used in conjunction with a facilitated workshop. In that session, the risks are discussed and defined further. Then interactive voting software is used to narrow that risk list to the vital few.

2.8.12 Risk Estimation

After the risks have been identified, they must be evaluated in terms of the probability of occurrence and impact. An understanding of the possible effects on project objectives is needed. Since most projects have only a limited amount of resources to use for risk management, concentration on only the major risks is essential (Baccarini et al. 2001; Anna and Klemetti, 2006). Reliable estimates of likelihoods and consequences are needed for prioritization.

Klemetti (2006) discusses that Risks can be assessed either using a quantitative or qualitative analysis. The most common ways are to estimate risk probability and impact in simple scales for example, from 1 to 5 or from high to low; boundaries can also be numerically defined. Risk identification and evaluation does not provide enough support for the later risk management

processes: the large amount of risk data from these two phases should be structured to aid in the interpretation and comprehension. Risks also need to be assessed in relation to other risks, since these relations may cause minor risks to become more relevant to the risk management process if they are significant sources for other risks. Risk continuums are cause-and-effect-chains, where one event (risk) causes another to arise. Authors examined risks in four different levels of project delivery. In light of their results, managing risk continuums at all levels of project delivery is a fundamental step towards better and more efficient risk management.

Also Klemetti (2006) suggests assessing risk links. Furthermore, they point out that this kind of risk analysis has to be limited to a relatively small number of single risks (e.g. 20 risks leads to 400 links to analyze). This limitation creates the danger that low-probability risks are left out, even if they were sources of more severe risks. Preventing these low-probability risks from happening might be less than the whole risk management process perspective.

2.9 Formal Risk Management Practice

Klemetti (2006) suggest that there are generally four response types to cope with risk:

1) Avoid: change in project plans in a way that an identified risk is no longer relevant.
2) Transfer: transfer risks to other parties by contracts or insurances.
3) Mitigate: find ways to reduce the probability and/or impact of risk.
4) Accept: take a conscious risk and deal with negative consequences as they occur, but take no action beforehand.

Planning on how to carry risks needs to have clear, shared principles in order to have a consistent attitude towards the risks. The purpose of the process is to ensure that actions that are planned

and taken will have the expected effect on project risks, or if not, will effect whether new methods should be implemented.

Risk response planning and the execution- phase needs an effective control process by its side to ensure that the risk management processes are iterative and ongoing; are not dismissed as project starts and it follows that decisions are implemented and have the expected results. Monitoring and controlling usually means writing and checking documents and conducting meetings.

The main aim of any response and mitigation strategy is to take a course of action in order to eliminate risks from a project or, at least, reduce their potential negative implications (Odonkor, 2011). It includes identifying and assigning responsibility of individuals to take responsibility for the agreed upon risk response/risk mitigation. This can also be achieved either through an immediate response to the project or through a retarded response (contingency plan). The immediate response usually results in the elimination of the risk. On the other hand, a contingency plan would only be implemented should an identified risk materializes. The effectiveness of the risk response/risk mitigation will determine if the risk probability will increase or decrease.

Risk response/risk mitigation strategies needs to be:

1. Suitable to the severity of the risk

2. Cost effective

3. Well timed

4. Reasonable

5. Agreed to by the appropriate managers

Egeland (2009) point out that Risk response strategies are the approaches used to deal with the risks identified and quantified. In the section on risk quantification, risk is evaluated in terms of its impact and probability which is called severity (the combination of impact and probability). This involves ranking them according to their Importance.

Risk response strategy is really based on risk tolerance, which has been discussed. Risk tolerance in terms of severity is the point above which a risk is not acceptable and below which the risk is acceptable (Egeland, 2009).

There are many reasons for selecting one risk strategy over another, and all of these factors must be considered. Cost and schedule are the most likely reasons for a given risk to have a high severity. Other factors may affect our choice of risk strategy (Egeland, 2009). For example, if a schedule risk is identified for a task in the project, and if this task has many other tasks depending on it, its severity may be calculated as being lower than is apparent, and the severity should be adjusted even though the schedule impact due to the disruption may be difficult to judge. The strategy should be appropriate for the risk it is intended for.

Several options should be generated for each risk so that the most effective response can be chosen from the options available. Odonkor (2011) discussed that in previous studies, numerous risk sources were identified based on the checklist from the literature and later classified under risk categories. These risk sources were also assessed in terms of probability of their occurrence and impact on the project cost if they occurred. Having identified and assessed the risk sources, the risk matrix can then guide the project personnel‘s choice of risk response strategy.

Depending on where the risk source lies on the matrix, several risk response strategies are available for dealing with risks. (Alexander et al., 2006, Egeland, 2009).

These are:

1. Risk avoidance

2. Risk acceptance

3. Risk transfer

4. Risk mitigation

5. Risk reduction

6. Risk retention

2.9.1 Risk Avoidance

Gillette (2011) defines risk avoidance as a risk controlling strategy that attempts to prevent attacks to organizational assets, through there vulnerabilities. This is the most preferred risk control strategy as it seeks to avoid risk/treats entirely. Avoidance is accomplished through countering treats, removing vulnerabilities in assets, limiting access to assets, and adding protective safeguards. The following methods are used in controlling risk:

1. Avoidance through application of policy.
2. Avoidance through application of training and education.
3. Avoidance though application of technology.

In the point of view of American System Corporation (2003), risk avoidance is a process of not acting in an attempt to avoid risk occurrence. For instance, by electing not to build a safety-critical software component, the risk of delivering an unsafe system is avoided. The key drawback to this strategy is that the benefits that this software would have afforded the user are never realized. .

According to Egeland (2009) and Odonkor (2011), when the chance of occurrence of risk sources and the impact associated with it are high, then avoidance is the risk response technique that should be followed. Simply speaking, this means not choosing to do the activity. However, if this means there is a big opportunity loss by avoiding the activity, the effort should be towards clarifying the requirements by obtaining more information (Hillson, 1999; Odonkor, 2011).

Changing the scope of work so that risky items in the scope of work are no longer undertaken is also a risk response technique. Sometimes it may not be easy to map the risk sources exactly in one of these quadrants. It may be that some of these risk sources lie on the border of these quadrants. In such cases, strategies that are most effective should be chosen. In most cases, the effectiveness is measured in terms of the cost associated with mitigating these risks.

2.9.2 Risk Acceptance.

Acceptance of a risk as defined by Egeland (2009), means that the severity of the risk is low enough that we will do nothing about the risk unless it occurs. Using the acceptance strategy means that the severity of the risk is lower than our risk tolerance level. If this were not the case, it would not make sense to accept the risk. Once the risk occurs, we will fix the problem and move on. The risk is acceptable because the severity of the risk is lower than our risk tolerance. Accepting a risk does not mean that we will not do something about the risk when and if it occurs; it means that we will do something about it only if it occurs. Many of the project risks will fall into this category. It is the category where the many insignificant risks are put. Many of these risks cost less to fix when they occur than it would cost to investigate and plan for them.

There are two kinds of acceptance, active and passive. Acceptance is active when a risk is identified as being acceptable but we decide to make a plan for what to do when and if the risk

occurs. It is much more effective to have a plan in place when these types of risk occur rather than trying to deal with the risk when there is little time and lots of hysterics. There is also another risk involved: the wrong thing can be done to solve the problem because its solution was not clearly thought out under pressure in the heat of the moment.

Acceptance is passive when nothing at all is done to plan for the risk occurrence. Many of the identified risks in the project will be passively accepted. These risks are simply too small to be of concern. The cost of developing a plan and documenting it can be higher than the cost of dealing with the risk without preparation.

An example of risk acceptance is the risk that off-the-shelf software that was purchased for the project will be defective. There is a probability of 2 percent that this will occur. That is, that the CD the software is delivered on will not work and will have to be replaced with a new CD. This causes a delay of five days to a task that has twenty-five days of free float. Passive acceptance will probably be used in dealing with this risk. It is probably not worth the effort to anticipate the problem and do something about it. It is simpler to wait and see if something is wrong with the CD and take corrective action. Of course, it would be foolish to receive the CD and not test it until it was needed.

Odonkor (2011) state that when the risk sources fall in the low impact-low probability quadrant of the risk matrix, such risks are deemed acceptable. Acceptance can be passive when the impact is minor for which no prior plans may be required. Acceptance can be active if the impact if it occurs needs to be further reduced and for such risks contingency plan should be put in place by allocating sufficient time and resources (Piney, 2002).

The following steps are involved in the strategy formulation procedure:

1. Identify risk sources
2. Assess the probability of risk and its impact for the identified risk for the project.
3. Plot risks in the risk matrix.
4. Recommend risk response strategies based on where the risk lies on the risk matrix.

When the risk is beyond an unacceptable level these high risk should be mitigated either by reducing the likelihood of the occurrence of the risk or by reducing the impact of the risk or both.

2.9.3 Risk Transfer

Freelance (2006) define Risk transfer as a risk management and control strategy that involves the contractual shifting of a pure risk from one party to another. One example is the purchase of an insurance policy by which a specified risk of loss is passed from the policyholder to the insurer. Other examples include hold-harmless clauses, contractual requirements to provide insurance coverage for another party's benefit and reinsurance. When done effectively, risk transfer allocates risk equitably, placing responsibility for risk on designated parties consistent with their ability to control and insure against that risk. Liability should ideally rest with whichever party has the most control over the sources of potential liability. Risk transfer can also be accomplished through non-insurance agreements such as contracts. These contracts often include indemnification provisions. An indemnity clause is a contractual provision in which one party agrees to answer for any specified and unspecified liability or harm that the other party might incur. An indemnity clause also can be termed a hold-harmless or save-harmless clause.

Indemnification agreements are completely independent of insurance coverage and transfer the financial consequences of legal liability from one party, the indemnitee, to another, the indemnitor. In addition to direct financial losses, some contracts may also transfer legal defense or product recall costs.

Some ways of managing risk fall into multiple categories. Risk retention pools are technically retaining the risk for the group, but spreading it over the whole group involves transfer among individual members of the group. This is different from traditional insurance, in that no premium is exchanged between members of the group up front, but instead losses are assessed to all members of the group.

Odonkor (2011) said that when the impact is high even though the chance of occurrence of the risk source may be relatively low, risk transfer strategies are applied. The intention is to pass such risks to a third party which can handle them better. There are basically two ways of transferring project risks. Insuring the project against any high impact risk sources like hurricane is one way to transfer the risk to the insurance companies by paying insurance premiums. Risk sources can be transferred through the contracts to either owner or other stakeholders of the project.

2.9.4 Risk Mitigation

From the organization of information security (NFF 2013), Risk mitigation strategies are the action plans they create after making a thorough evaluation of the possible threats, hazards or detriments that can affect a project, a business operation or any form of venture. The purpose of such strategies is to lessen or reduce, if not totally eliminate the adverse impacts of the known or perceived risks inherent in a particular undertaking, even before any damage or disaster takes place.

Best practices require that the known and perceived risks be analyzed according to the degree and likelihood of the adverse results that are anticipated to take place. NFF documents such risks according to their levels of priority in a form known as a risk mitigation plan. NFF then develops

and integrates a corresponding risk mitigation strategy, which will be referenced against the previously prepared risk management plan.

Each critical point identified shall have a set of mitigation strategies incorporated in its procedural guidelines. The risk mitigation strategies are contained in a crisis management plan and shall form part of the initial emergency measures to take, in order to contain and prevent the worsening of the damages caused by an accident or catastrophe.

Not all the risk sources can be solved by risk avoidance, acceptance and transfer Odonkor (2011). In fact most of the risks cannot be addressed by the above two risk responses. Therefore, for majority of the risks, reduction or mitigation techniques need to be applied. Depending on where the risk source lies in the risk matrix, mitigation may be done either by reducing the probability of risks or by reducing their impact or both. If the impact of the risk is high, risk reduction may be done by lessening the extent of the damage. If the risk occurs very often, it is wiser to tackle the risk sources at their root by inhibiting their trigger (Hillson, 1999). Whenever the risk probability and the impacts are high, the response strategy should be to reduce both.

American System Corporation from their Little Aque Book (2003) said risk mitigation is a process of determining an alternative strategy in advance of a risk becoming a problem, in order to minimize the impact of the risk should it occur. For example, establishing a secondary hardware supplier in the event that the primary hardware supplier cannot meet the delivery deadline. The use of metrics to track a supplier's progress toward meeting a deadline can serve as an invaluable "trip wire" that affords a program manager ample early warning of impending schedule slippage.

The HIMSS Advisory Report (2011) highlighted the critical risk mitigation strategies that affect any service provider groups which are:

1. Understand service payment contracts
2. Identify high-volume diagnosis/procedure and focus on these key revenue drivers
3. Understand financial impact early
4. Establish relationship with banking/financial institution partner for line of credit for working capital in advance of implementation date
5. Obtain tax advice
6. Plan ahead to control cash-flow disruption
7. Align funding source early—recommendation is to have a minimum of six months' worth of cash reserves as liquid asset depending on organizational size and overhead
8. Make fraud, waste and abuse of education a priority for key individuals, such as providers, coders and practice managers.

   Also in HIMSS Advisory Report (2011), the risk mitigation strategies for small provider practice are:

1. Identify "priority risks"
   a. Understand the relationship between
   b. Set aside six months of liquid asset at a minimum for operations to offset payment delays post implementation
   c. Manage emotional and physical stress to avoid burnout
   d. Ensure appropriate level of staff support—appoint practice manager to oversee efforts.
2. Be proactive vs. reactive—look for resources on implementation

3. Understand impacts of project claims denials—delayed payment, longer A/R days, possible loss of revenue
4. Build up peer network support—share ideas, best practices
5. Prioritize time—set aside time daily to work on project with staff
6. Prioritize competing projects—put at the top of the list those that impact revenue
7. Invest in provider and staff training
8. Account for training time and loss of productivity for an unspecified period of time (anticipate slower pace due to having to look up codes vs. rote memory)

For larger providers, the HIMSS Advisory Report (2011) listed the following:

1. Communicate with the health plans early on how to test
2. Create a project training plan for staff and new hires—must obtain buy in early
3. Allocate financial resources for medical billers/coders to be trained, along with practice managers/administrators
4. Use practice managers/administrators as "project champions" to train other staff
5. Align outreach to vendor partners—obtain commitment to finish on time
6. Ensure any planned new technology purchases or upgrades encompass project plans

2.9.5 Risk reduction

Risk reduction or "optimization" involves reducing the severity of the loss or the likelihood of the loss from occurring. For example, sprinklers are designed to put out a fire to reduce the risk of loss by fire. This method may cause a greater loss by water damage and therefore may not be suitable. Halon fire suppression systems may mitigate that risk, but the cost may be prohibitive as a strategy.

Acknowledging that risks can be positive or negative, optimizing risks means finding a balance between negative risk and the benefit of the operation or activity; and between risk reduction and effort applied. By an offshore drilling contractor effectively applying HSE Management in its organization, it can optimize risk to achieve levels of residual risk that are tolerable.

Modern software development methodologies reduce risk by developing and delivering software incrementally. Early methodologies suffered from the fact that they only delivered software in the final phase of development; any problems encountered in earlier phases meant costly rework and often jeopardized the whole project. By developing in iterations, software projects can limit effort wasted to a single iteration.

Outsourcing could be an example of risk reduction if the outsourcer can demonstrate higher capability at managing or reducing risks. For example, a company may outsource only its software development, the manufacturing of hard goods, or customer support needs to another company, while handling the business management itself. This way, the company can concentrate more on business development without having to worry as much about the manufacturing process, managing the development team, or finding a physical location for a call center.

Possible Risk Reduction Measures for Manufacture and Industrial/Professional stated by chemical substance Bureau 2007 are:

1. Controls on manufacture;

2. Restrictions on the marketing and/or use of the substance under Directive 76/769/EEC;

3. Re-designing the process itself, or changing the substances or materials used in it;

4. Safe systems of work, such as specified standards of physical containment or extraction ventilation;
5. Application of good manufacturing practice, for example, under ISO standards;
6. Classification and labeling;
7. Separation of personnel;
8. Monitoring and maintenance of equipment;
9. Dust suppression methods, such as the use of substances in tablet or pellet form;
10. Occupational exposure limits and/or air monitoring in the workplace;
11. Accurate hazard information (for example, safety data sheets), and/or better delivery of safety information, such as clearer labeling or the provision of warning signs in the workplace;
12. Biological exposure indices and/or biological monitoring of workers;
13. Medical surveys of workers;
14. Training;
15. Use of personal protective equipment;
16. Licensing of operators of certain operations;
17. 'end-of-pipe' controls to minimize neutralize or render less harmful any emissions that cannot practicably be avoided otherwise;
18. Limit values for emission and effluent monitoring; and
19. Environmental quality standards and/or environmental monitoring.

2.9.6 Risk retention

According to the Dictionary of Business Terms, "risk retention" means the following:

"A method of self-insurance whereby the organization retains a reserve fund for the purpose of offsetting unexpected financial claims."

In the insurance world, risk retention has an even broader meaning. Simply put, every time your policy calls for a deductible, you've retained some of the risk. In fact, risk retention is a common strategy for businesses and individuals alike. Every automobile policy contains deductibles and some auto policy coverage options are even declined (at least for older, fully paid vehicles) such as "Collision" and "Comprehensive." Here again is another form of risk retention. The very act of not insuring something of value is another form of risk retention.

General liability and products/completed operations policies have either deductible or self-insurance retentions (SIR), both of which are forms of risk retention. Businesses that select self-insured reserves do so in order to gain more control over the risk(s) that they have retained.

All risks that are not avoided or transferred are retained by default. This includes risks that are so large or catastrophic that they either cannot be insured against or the premiums would be infeasible. War is an example since most property and risks are not insured against war, so the loss attributed by war is retained by the insured. Also any amount of potential loss (risk) over the amount insured is retained risk. This may also be acceptable if the chance of a very large loss is small or if the cost to insure for greater coverage amounts is so great it would hinder the goals of the organization too much.

2.9.7 Risk Communication

David and Anthony (2010) from their study point out that the first stage in risk management is to conduct a brain- storming session at the beginning of the project. All team members are

encouraged to attend this meeting and uncover risks. A facilitator works with the team to record the risks.

The next step is to gather project hazards, where a hazard is defined as a source of potential risk. There are no wrong answers in this process. Each team member contributes their risks each consisting of a hazard, cause and consequence. Team members are encouraged to voice their opinions about risk management and provide suggestions to reduce the risk of the project. The risk register is communicated to all the project team members, this includes the senior management.

2.9.8 Risk Matrix

According to David and Anthony (2010), the project systems engineer is responsible for creating the risk matrix. The main input to the risk matrix is from the initial brainstorming session. The risk management process continues for the lifetime of the project, and needs to be revisited whenever new information arises. New information may come from operating failures, or requirement changes.

The risk matrix can be applied to both safety/technical risk and commercial risk. Typical uses for the risk matrix are:

a. Comparing the risks of different design options

b. Identifying component that are critical

c. Identifying potential system hazards

d. Identifying risks associated with production processes

A risk matrix is produced containing the findings of the risk management process. For each risk in the matrix the following information is entered:

a. Potential Hazard

b. Potential Causes

c. Potential Consequence

d. Safeguard

e. Risk Consequence

f. Risk likelihood

g. Risk level

2.10 Incentives for overcoming the barriers to utilizing formal risk management techniques

According to Lennon (2007), the following structures are identified to constitute the incentives for the companies to implement FRM. Several of them are context specific, meaning that they are only identified in one single case. Others are identified in all cases.

1. The board and management's attitude towards FRM

If the board and management's attitude towards FRM is positive, the company is more likely to start implementing FRM.

2. Compliance requirement concerning risk management

If a company must carry out risk management to be in compliance with requirements, regardless if it is a written or unwritten requirement, the company is more likely to implement FRM.

3. The company's growth rate

If a company is growing heavily, increase in turnover or growth from M&A activity, the company is expected to be more likely to implement FRM.

4. Stakeholder demands (structure of ownership)

If a company is a public limited company it is expected to be more likely to implement FRM. The reason is partly because several stock exchanges require, at a minimum, that companies

traded on the exchange respond to risk management (the ”comply or explain” principle), whether they do it or not, and partly to meet the shareholders’ interests.

5. Negative events

Companies that have been exposed to cost-intensive events are more likely to use FRM after the events have occurred.

6. The business

If the business is regulated with regard to risk management, e.g. demanding controls in the production processes which is the case in the medical-sector, the company is more likely to start implementing FRM. The structures of non-regulated sectors (e.g. technology-driven) are also expected to influence the choice of implementing FRM. Hence, the business influences the companies’ tendency to implement FRM.

7. Relative Position in Relation to Competitors

If competitors use FRM, the company is more likely to start implementing FRM.

The study also showed two other mechanisms, even though they have not been directly identifiable. They are the culture of the organization and the ability of fulfilling the formulated strategy.

This research of Prapawadee and Wariya (2009) found a set of seven critical success factors which can be used as a guideline on how to increase the effectiveness of formal risk management procedures/techniques. These factors are

8. Commitment and support from top management,

The paper from Zwikael (2008) argues that the high importance of top management support is considered to be among the Critical Success Factors for project management. It is also important to emphasize effective top management support for different project scenarios. Critical top

management support includes a broad range of activities in an organization, including developing project procedures that include the initiation stage, training programs, establishing a project management office, support quality management and so on.

Young and Jordan (2008) suggest that “the essence of top management support related to effective decision-making to manage risk and to authorize business process change”. A crucial part of a successful project is top management support, the benefit of which is related to improving decision making in order to manage risk. Top-level management responds to business processes and manages risk. Successful mitigation or bearing of risk is contingent upon commitment and support from top management.

Moreover, commitment and support from top management plays a key role in influencing the success in almost any initiative within an organization (Hasanali, 2002). Top management formulated and decides objectives and strategies for organizational risk management activities, mission and overall objectives (Henriksen and Uhlenfeldt, 2006).

In one study, it is argued that an organization uses risk management to anticipate the probability of a negative impact and that risk management needs top-level management support. Risk management requires the acknowledgement that risk is a reality and the commitment to identify and manage risk (Galorath, 2006).

These concepts refer to the highly needed support and approval from top management for risk management. The essence of commitment and support from top management supports the effective decision-making process in order to manage risk. Commitment and support from top management is important in every kind of management and it is thus an important factor for risk management.

9. Communication

Most organizations accept that good communication is extremely important. Different employees have different views and discussion between them is therefore based on different conclusions. They simply want to get a clear message across and discussion may be an appropriate channel to deliver messages. Other employees may wish that senior management discuss future plans with staff. Internal communication should support business strategy and improve business processes as well as performance (Quirke, 1996).

Communication is an important skill for leaders and top-level management. The effective leader or managers who are good at communication can set clear mutual expectations, objectives and goals. Communication ensures that the team members understand and support not only where the team is now but also what they want to be (Clutterbuck and Hirst, 2002).

Finniston (1975) said that the gathering, storage, delivery and communication of information in the broadest sense is a growing business. There is an ever-increasing need for communication professionals to ensure that employees are appraised of relevant happenings both inside and outside their organization. A good manager must also be an effective communicator and training in communication must play a larger role in managerial training in the future. Here, communication is another important consideration for effective risk management.

Grabowski and Roberts (1999) claim that communication plays an important role in risk mitigation. It provides opportunities for clarification, for making sense of the organization's progress, and for members to discuss how to improve the organization and the impact of using different risk mitigation strategies.

The communication process provides opportunities for members to understand their roles and responsibilities as the structure of the organization changes. In case, the wide range of people from a broad cross-section of the business. There is involved in the risk identification and assessment process and if there are no “taboo” subjects which prevent conventional wisdom within the organization being challenged when necessary. Financial institutions need to consider the concept of verifiability. If a different group of members were making the same decision about the importance of risks, it would come to the same conclusion (Carey, 2001).

10. Culture,

The definition of culture has been described in many ways. Geert Hofstede is well-known for culture theory. Hofstede (2001, p.9) defines culture as “the collective programming of mind that distinguishes the members of one group or category of people from another”. According Hofstede’s definition, culture consists of patterns of values, ideas, thoughts and feelings and is transmitted by symbols as factors in shaping behavior. Consequences of beliefs, attitudes and skills affect thoughts, emotions and actions.

Another definition of culture is described by Hasanali (2002): “Culture is the combination of shared history, expectations, unwritten rules, and social customs that compel behaviors. It is the set of underlying beliefs that, while rarely exactly articulated, are always there to influence the perception of actions and communications of all employees”. In any situation where cooperation is important to solve a crisis, culture is the key factor for willingness to learn from mistakes and to exchange best practice within organizations. But a supply chain consists of many different organizations and cultures and so developing any single culture is very difficult. It is not only the one factor which encourages the members to work more but also to work more efficiently.

Mosadeghrad (2006) studies the impact of organizational culture on success in TQM management. Organizational culture has a significant effect upon management success. A collaborative and corporate organizational culture is supported by long-term management, team working, collaboration, open communication, risk-taking and so on. A strategic plan must be established as a guideline for alignment and integrated within a quality culture.

Grabowski and Roberts (1999) suggest that risk management requires the combination of several cultures that make the system into a cohesive whole in which the deep assumptions and espoused values of each of the member organizations can be built around the need for melding a culture of reliability. In particular situations, teamwork can develop some behavior by sharing individual beliefs, conducting meetings and seeking consensus in order for management to succeed.

The importance of culture within effective risk management is that knowledge transference requires individuals to come together to interact, exchange ideas and share knowledge with one another. Moreover, culture creates individuals who are constantly encouraged to generate new ideas, knowledge and solutions.

11. Information technology (IT),

Halliday, Badenhorst and Solms (1996, p.22) define Information Technology (IT) as consisting of two components: "(1) the information systems (including related information) on which the critical business functions and processes depend (2) the computer technologies (hardware and software) which support the processing, storage and distribution of the company's data and information". It provides information about being the connector between one human to information and one human to another one (Wong, 2005).

Organizations need to consider IT as an important factor in the face of increasing competition, higher performance levels, globalization, and liberalization. IT plays a key role in achieving an organization's objectives. IT relates to all aspects of the business processes, including access to a shared infrastructure consisting of knowledge, human assets, core competencies, resource allocation, performance management, project tasking and communication support (Mutsaers, Zee and Giertz, 1998).

Shin (1999) focuses on using IT to redesign business processes and to improve business profitability and productivity. IT relates to better information processing, sharing, fast responsiveness, and better coordination between separate units of an organization and across organizations. Moreover, IT is associated with reducing costs such as the cost of documentation, decision information and cost effective monitoring or performance evaluation device. Xenomorph (2007) argues that "Effective risk management is impossible without effective information technology" and describes the IT architecture necessary for this. Additionally, an organization is on such a large scale that it would be difficult for members to communicate and share information without an information technology infrastructure (Hasanali, 2002). Information technology can enable prompt searches, the access of and retrieval of data, and support communication in an organization.

Rolland (2008) suggests using IT to drive effective risk management. IT can create an important link between risk management and corporate performance. IT provides data security by employee level, limiting a user's access by time, line of business, business activity and individual risk. IT tools collect data used in the past so companies can learn through experience and avoid repeating the same mistakes. The effective risk management information make more valuable for

decision making. Therefore, Information Technology (IT) is another imperative factor for successful risk management.

12. Organization structure,

Stank, Daugherty and Gustin (1994) believe that organizational structure involves an organization's internal pattern of relationships, authority and communication. Structure is comprised of formal lines of authority and communication and the information as well as data that flow along these lines. Thus, organizational structure defines the lines of authority and communication, serves to allocate tasks and resources and provides a means of coordination. Hunter (2002) supports the idea that organizational structure provides the authority to predetermine the way employees work. Structure and processes of an organization are most effective when their design functions match their environment and have a positive impact upon the organization's strategies.

Therefore, one of the most important aspects for effective risk management is organizational structure. Organizational structure provides the concept, guideline, direction and support to the employees that are conducted by the steering committee**.** They design and teach employees to share and use a common vocabulary. The employees work as a team in order to prevent a silo mentality and incorporate resistant employees in the process (Hasanali, 2002). NSW Department of State and Regional Development (2005) believes that setting clear objectives and guidelines is necessary for risk management.

The business and financial world is in constant fluctuation. The environmental condition will change and something's new will develop gradually over time, while others may sweep the market quickly. Organizational structure must be reviewed regularly and adjusted to adapt to

changing financial environments. The management's role is to recommend policies for managing risk, the committee's role is to respond to review and approve them, and it is the management's role once more to implement them and report back on their operation (Carey, 2001). Moreover, Grabowski and Roberts (1999) suggest that risk management is primarily associated with the fluidity of organizational structures. Responding in different ways and responding quickly in the face of changing conditions is a flexible approach.

DeLoach (2004) focuses on enterprise-wide risk management process (EWRM) to manage risks and to create and protect enterprise value. EWRM is built on a well-defined organizational structure. Risk management responsibilities and authorities are assigned to appropriate personnel. They decide what must be done for developing and assessing risk management alternatives and selecting a structural approach to evaluating risk management options. The effectiveness of alternative strategies is balanced within established risk parameters and limits.

13. Training

Today, almost all companies provide some type of training to their employees. Some companies have a very formal process of training while other companies use outside consultants to conduct employee training sessions (Hughey and Mussnug, 1997). Treven (2003) maintains that the training methods used by organizations can be classified into two methods. The first method is on-the-job training which provides one-on-one instruction, coaching, job rotation and an apprenticeship / internship. The second method is off-the-job training which is conducted away from the worksite. It covers a number of techniques, classroom lectures, films, demonstrations, case studies, other simulation exercises and programmed instructions.

The success of the training programme is influenced by the following factors; "(1) The high quality of the training manual, (2) The use of an ongoing mentorship programme during the course. (3) The high degree of interactive learning employed during the programme. (4) The extensive use of self and peer group critiquing skills. (5) The extensive use of problem-based learning strategies throughout the programme. (6) The critical support of highly motivated training staff. (7) The motivation of continuous assessment throughout the course. (8) The educator input delivered in a working, subject-oriented context" (Moss, 1997, p.172). It is inevitable that the success of an organization depends upon its staff or employees. It is important to ensure that an adequate supply of staff is equipped with the appropriate skills for special departmental or managerial positions. The process of staff development and training should fulfill an organization's performance. The purpose of training is to improve knowledge, skills and attitudes which in turn increase confidence, motivation and job satisfaction (Fill and Mullins, 1990)

The endless brief, but vital if risk management is to be brought to the organization. A risk manager should set up training sessions through the directorate manager for members of staff and through the risk management team for consultants (Symons, 1995). Carey (2001) shows that the ability to respond to changing conditions in an organization's operations relates to a range of activities including the development of risk training courses and the involvement of staff in responding to early warning systems.

NSW Department of State and Regional Development (2005) suggests that effective risk management become a part of good business practice and include training staff appropriately.

The main reason for an education and training program is not only to ensure that members are comfortable with the system, but also to increase their expertise and knowledge. Training not only uses the new system, but also new processes and understands the integration within the system – how the work of one employee influences the work of others.

14. Trust.

Trust, according to Mayer, Davis and Schoorman (1995, p.711) is "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party. This definition of trust is applicable to a relationship with another identifiable party who is perceived to act and react with volition toward the trustor". The authors study trust within an organization and develop a model of dyadic trust in an organizational context. Trust involves two parties: the trustor and the trustee.

Over the last several years, trust has become a central subject of study in organizations. Trust is important because of the strong desire to understand how to create effective cooperation within organizations. Trust is therefore key because it enables cooperation. The success of an organization is related to its ability to manage effective cooperation (Tyler, 2003). Pinto, Slevin and English (2008) support the idea that trust is important for project performance. Trust, they argue, enhances the strength of working relationships, solidifies partnering roles, and increases the willingness of various project stakeholders to cooperate. Trust comes from responses regarding the sharing of materials, information, resources and displaying good intent behavior (Erden, 2003).

Risk management needs cooperation and teamwork encourages success. Trust among an organization's members is an important prerequisite to changing those related to alliances, thus mitigating risk, as organizations are unwilling to adopt alliance-like organizational structures that make them vulnerable to the fluctuation of the environment (McAllister, 1995). Grabowski and Roberts (1999) suggest that trust permits an organization's members to focus on their mission, unfettered by doubts about other members' roles, responsibilities and resources, and that with trust, synergistic efforts in an inter-organization's mission are possible. Risk management engages in activities that encourage share commitment. Thus, one of the means of driving efficient risk management is trust.

CHAPTER THREE

RESEARCH METHODS

3.1Research Design

According to Viljoen (2010), a research design can be defined as the logical sequence that connects the empirical data to a study's initial research question and ultimately, to its conclusions.

From this understanding, a descriptive research approach was followed in this research Endeavour to investigate and describe the nature of the factors militating against the implementation of FRMT in project delivery in Nigeria and determine strategies to improve it.

Explaining further, Viljoen (2010) point out that a unit of analysis could refer to the following:

i. An individual.
ii. An event.
iii. An object.
iv. A body of individuals.
v. A relationship.
vi. An aggregate.

The unit of analysis in this research is the body of individual firms.

3.2 Study Area

The study area for this study was Abuja (FCT), Nigeria. It was decided to focus this study on a specific study area of Abuja, the Federal Capital Territory(FCT), because being the new capital of Nigeria, the rapid economic expansion has resulted inmany construction activities and has

created a large constructionmarket for both host country and home country firms .It thus provides a rich source of data for the study.

3.3 Study Population

Viljoen (2010) in his studies defines a population as any precisely defined set of people or collection of items which is under consideration andfurther defines a sample as made up of the members of a population, (the target population) the latter referring to a body of people, or to any other collection of items, under consideration for the research purpose. For this survey, the population is the Registered professional construction Firms in Abuja Municipal, FCT, Nigeria.

3.4Sampling Frame

The Sampling frame are the list of firms of Architectural, Quantity Surveying, Builders andFederation of Building &Civil Engineering Contracting Firms found in theDirectories(2013) of ARCON, QSRBN, CORBON and FB&CECN respectively in the study area which according to Cadbury report (1992) are responsible for setting risk management policies and ensuring that the organizations understand all its risks and accepting oversights for the entire process. The most recent Directories of the firms (2013) were obtained to determine the number of firms in Abuja municipal as follows:

1. Building/ Civil Contracting Firms 953
2. Building Firms 16
3. Quantity Surveying Firms 87
4. Architectural Firms 123
5. Clients 123

Total 1302

3.4.1Method of Sampling

Ogunba (2003) observed that there are four basic ones namely: random, systematic, stratified and cluster sampling (demography). Stratified sampling techniques were found appropriate as they have been successfully employed in earlier studies (Ogunba and Ajayi 1998, Ogunba 2003).

3.4.2Sample Size

From the total population of 1302, the sample size of 30% was assumed sufficient as suggested in Kish (1995), and Discombe (2003). Thirty percent of the sample population applied to each firm's population came to 391 which formed the sample size for the study.

3.5Data Collection Instruments/Structure

Many data collection instruments can be adopted to accomplish the tasks in a study of this nature. The various alternative instruments include in-depth interviews, participants' observation and self-administered questionnaires however only the questionnaire was adopted in view of its advantages to cover a wide area considering the sample size arrived at for the study.

3.6Questionnaire Design

Sammy (2008)defines a questionnaire is a quantitative data collection method which has several advantages, namely:

a) It is relatively economical.
b) It can ensure anonymity.
c) It contains questions to cover specific considerations.
d) Existing questionnaires can be used or modified.
e) Wide coverage.

The questionnaire was developed with brevity as an intended goal and was validated by supervisors in the Department of Quantity Surveying A.B.U Zaria for clarity, ease of use, and value of the information that could be gathered. The structure of the questionnaire was broken down into the following major sections:

3.6.1 Structure of the questionnaire

Section i: Background, sex, age, office location, year established, level of education etc

Section ii: Knowledge of formal risk management techniques.

The formal risk management techniques mostly applied to the project. The peculiar FRM strategies in practice.

Internal barriers inhibiting the use of the Techniques

Section iii: Reasons for low application of current techniques

The external barriers inhibiting the utilization of the techniques.

Section iv: Incentives

The appropriate strategies that will help overcome the identified barriers.

3.7Measurement and Scaling

i. **Knowledge of FRMT.** The variables were measured by requesting respondents to select appropriate level of their training on FRMT on ordinal scale.

ii. **Difficulties in using the techniques locally**

The variables, difficulties,were measured by asking respondents to rank the strategic constraints their firms face using the techniques on interval scale

iii. **Barriers to effective implementation**

Respondents' opinions were measured by ranking using relative importance indices**(RII)**on interval scale

iv. Strategies for overcoming the barriers

The variables were measured using relative importance index (**RII)**

3.8Data Collection

Theywere primary and secondary data. The primary data were collected using the questionnaire (respondents) and the secondary data were collected from existing literature.

3.9Methods of Data Analysis

The data collected was arranged in excel and the statistical analysis of the collected dataset was performed using SPSS version 18. The data was analyzed using asimple descriptive statistics, ANOVA and Spearman's correlation coefficient.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Demographic Characteristics of the Respondents and the firms in the Study Area

Demographic analysis is obtained through descriptive statistics which provides simple summaries about the sample and about the observations that have been made. Such summaries may be either quantitative, i.e. summary statistics, or visual, i.e. simple-to-understand graphs. According to Mann (1995), Descriptive statistics is the discipline of quantitatively describing the main features of a collection of information, or the quantitative description itself. Descriptive statistics are distinguished from inferential statistics (or inductive statistics), in that descriptive statistics aim to summarize a sample, rather than use the data to learn about the population that the sample of data is thought to represent. Also Dodge, (2003) stated that descriptive statistics are not developed on the basis of probabilitytheory, unlike inferential statistics. Demographic description was therefore, used to summarize the information contained in the data.

4.1.1 Level of Response

A total of 391 questionnaires were distributed out of which 203 were retrieved representing 52% response rate. The details are shown in table 4.1 below

Table4.1; Questionnaire Response Rate

Firms	Sample frame	30% distribution	No. retrieved
Architectural	123	37	30
Quantity Survey	87	26	21
Building	16	5	5
Contractor/Civil	953	286	132
Client	123	37	15
Total	1302	391	203

Source Field survey 2013.

4.1.2 Specific Areas of Specialization

Table 4.2 below shows the specific areas of specialization within the firms. The results show that Architectural firms specialize mostly in Design, Design and Construct; Building firms specialize more in Building Constructions and Agency; Quantity Surveying firms specialize more in Procurements, Property Development, and construction Valuation; Civil engineering and Building Contracting firms specialize in Road construction Building construction, contracting, feasibility and viability appraisal.

Table 4.2: Areas of Specialization of the Firms

Types of Firms visited	Specific Areas of specialization	Respondents (Frequency)	Percentage (%)
Architectural	Design	23	8.21
	Design and construct	17	6.07
	Total	40	14.29%
Building	Building Construction	27	9.64
	Agency	12	4.29
	Total	39	13.93%
Quantity Surveyor	Property Development	13	4.64
	Valuation	5	1.79
	Procurement	13	4.64
	Total	31	11.07%
Civil & Builder Contractors	Road construction	13	4.64
	Feasibility & Viability Appraisal	7	2.50
	Contracting	15	5.36
	Building Construction	7	2.50
	Total	42	15%

4.1.3 Positions of the Respondents in the Firm

The results show that there are thirty-two (32) Sole proprietors across the firms; twenty-one (21) associate partners;twenty-nine managing partners (29); thirty-three (33) senior engineers; and thirty-seven (37) pupil engineers across the firms.Table4.3 shows the details.

Table 4.3 Respondents positions:

Firm types	Position	Respondents	Percentage
Architectural	Partner	8	2.86
	Associate Partner	5	1.79
	Head of Department	8	2.86
	Senior Architect	9	3.21
	Pupil architect	10	3.57
	Total	40	14.29
Building	Partner	8	2.86
	Associate Partner	4	1.43
	Head of Department	8	2.86
	Senior Builder	10	3.57
	Pupil Builder	9	3.21
	Total	39	13.93
Quantity Surv.	Partner	6	2.14
	Associate Partner	4	1.43
	Head of Department	5	1.79
	Senior QS	7	2.50
	Pupil QS	9	3.21
	Total	31	11.07
Civil & Build. Cont.	Partner	10	3.57
	Associate Partner	8	2.86
	Head of Department	8	2.86
	Senior Engineer	7	2.50
	Pupil Engineer	9	3.21
	Total	42	15.00

Sources: Field Survey, 2013.

4.1.4 Professional Qualification

The result shows that Twenty (20) have associate membership (AMNIA) across the firms; Seventeen (17) have full membership (MNIA); Twenty-nine (29) have fellows (FNIA), Six (6) are probationers. This result shows that out of 203 questionnaires recovered from

391questionnaires distributed, 87 (31.07%) have professional qualifications. The summary of the result is presented in table 4.4

Table 4.4 Professional Qualification

The Firms visited	Professional Qual.	Respondents (Frequency)	Percentage (%)
Architectural	AMNIA	6	2.14
	MNIA	4	1.43
	RMNIA	5	1.79
	FNIA	8	2.86
	Probationer	2	0.71
	Total	25	8.93
Building Firm	AMNIOB	4	1.43
	MNIOB	5	1.79
	PPNIOB	3	1.07
	FNIOB	6	2.14
	Probationer	1	0.36
	Total	19	6.79
Quantity Surveyor	AMNIQS	4	1.43
	MNIQS	3	1.07
	PPNIQS	3	1.07
	FNIQS	7	2.50
	Probationer	1	0.36
	Total	18	6.43
Civil & Builder Cont	AMNSE	6	2.14
	MNSE	5	1.79
	PPNSE	4	1.43
	FNSE	8	2.86
	Probationer	2	0.71
	Total	25	8.93

Sources: Field Survey, 2013.

4.1.5 Gender Status

The summary of gender in the firm shows that One hundred and forty-one (141) (50.36%) respondents were males, while Eleven (11) (3.93%) respondents were females. The summary is in Table 4.5

Table 4.5 Gender status

Firm types	Gender	Respondents	Percentage
Architectural	Male	37	13.21
	Female	3	1.07
	Total	40	14.29
Building	Male	37	13.21
	Female	2	0.71
	Total	39	13.93
Quantity Surv.	Male	27	9.64
	Female	4	1.43
	Total	31	11.07
Civil & Build. Con	Male	40	14.29
	Female	2	0.71
	Total	42	15.00

4.1.6 Educational Qualifications

The study shows that most of the respondents in all the firms are HND holders, followed by PGD, BSC, MSC, OND and PhD. Table 4 6 shows that Fifty (50) (17.86%) respondents were HND holders across the firms, Fourteen (14) (5%) respondents were OND holders, Twenty-five (25) (8.93%) respondents were BSC holders, Thirty-one (31) (11.07%) respondents were PGD

holders, Twenty-three (23) (8.21%) were MSC holders, and Nine (9) (3.21%) respondents were PhD holders.

Table 4 6: Educational Qualifications

Firm types	Educational Q.	Respondents	Percentage
Architectural	OND	2	0.71
	HND	10	3.57
	BSC	3	1.07
	PGD	8	2.86
	MSC	13	4.64
	PhD	4	1.43
	Total	40	14.29
Building	OND	4	1.43
	HND	13	4.64
	BSC	7	2.50
	PGD	9	3.21
	MSC	4	1.43
	PhD	2	0.71
	Total	39	13.93
Quantity Surv.	OND	2	0.71
	HND	10	3.57
	BSC	9	3.21
	PGD	6	2.14
	MSC	3	1.07
	PhD	1	0.36
	Total	31	11.07
Civil & Build. Cont.	OND	6	2.14
	HND	17	6.07
	BSC	6	2.14
	PGD	8	2.86
	MSC	3	1.07
	PhD	2	0.71
	Total	42	15.00

Sources: Field Survey, 2013

4.1.7 Age of the Respondents across the Firms.

The summary of the result shows that Nineteen (19) (6.79%) respondents were between the ages of 20 and 30years, Fifty-three (53) (18.93%) respondents were between the ages of 31 and 40years, Sixty-eight (68) (24.29%) respondents were between the ages of 41 and 50years, Eight (8) (2.86%) respondents were between the ages of 51 and 60years, Four (4) (1.43%) respondents were between the ages of 61 and above. Table4.7 shows the details across the firms.

The result shows that majority of the respondents across the firms were between the ages of 30-50 years, which means the job for these firms within the study area are in excess and also, men at this age are most active, devoted, and are duty-bound to provide for their family.

Table 4.7: Age of Respondents

Firm types	Age(yrs)	Respondents	Percentage
Architectural	20 – 30	4	1.43
	31 – 40	15	5.36
	41 – 50	18	6.43
	51 – 60	2	0.71
	61 – 70	1	0.36
	Total	40	14.29
Building	20 – 30	6	2.14
	31 – 40	12	4.29
	41 – 50	17	6.07
	51 – 60	3	1.07
	61 – 70	1	0.36
	Total	39	13.93
Quantity Surv.	20 – 30	3	1.07
	31 – 40	11	3.93
	41 – 50	14	5.00
	51 – 60	2	0.71
	61 – 70	1	0.36
	Total	31	11.07
Civil & Build. Cont.	20 – 30	6	2.14
	31 – 40	15	5.36
	41 – 50	19	6.79
	51 – 60	1	0.36
	61 – 70	1	0.36
	Total	42	15.00

Sources: Field Survey, 2013.

4.1.8 Years of Practicing

The summary results of the year of practicing across the firms shows That Seventy-five (75) (26.79%) respondent have been practicing for between 1 and 10years, Fifty-three (53) (18.93%) respondents have been practicing for between 11 and 20years, Fourteen (14) (5%) respondents have been practicing for between 21 and 30years, Six (6) (2.14%) respondents have been practicing for between 31 and 40years, Four (4) (1.43%) have practiced for between 40years and above. Table 4.8 shows the details of the practices across the firms

The summary shows that the highly experienced which have practiced for 21 to 40years and above in these firms are very few, meaning that most people took the professions for granted for a very long time before getting to know the gains involved.

Table 4.8 Years of Practicing

Firm types	Years of Practice	Respondents	Percentage
Architectural	1-10yrs	19	6.79
	11 - 20yrs	13	4.64
	21 - 30yrs	5	1.79
	31 - 40yrs	2	0.71
	41 - 50yrs	1	0.36
	Total	40	14.29
Building	1 - 10yrs	20	7.14
	11 - 20yrs	12	4.29
	21 - 30yrs	4	1.43
	31 - 40yrs	2	0.71
	41 - 50yrs	1	0.36
	Total	39	13.93
Quantity Surv.	1-10yrs	15	5.36
	11 - 20yrs	12	4.29
	21 - 30yrs	2	0.71
	31 - 40yrs	1	0.36
	41 - 50yrs	1	0.36
	Total	31	11.07
Civil & Build. Cont.	1-10yrs	21	7.50
	11 - 20yrs	16	5.71
	21 - 30yrs	3	1.07
	31 - 40yrs	1	0.36
	41 - 50yrs	1	0.36
	Total	42	15.00

Sources: Field Survey, 2013.

4.2 The Results of the Analyzed Data using Descriptive Statistics and Analysis Of Variance (ANOVA)

The results were analyzedusing ANOVAand Spearman correlation coefficient. Respondents were asked to list the most severe of 32 possible risks identified in the literature, listed in the first section, on a scale of 1–5, where 1 represented negligible risk and 5 extreme risks. The results are presented in Table 4.9.

Table 4.9 – Perceptions of participating firms on severity of risks.

	Overall		Builders		Client		Consultant Achitect		Consultant Qty.Surveyor		Civil/Bldg Eng. Contractor	
Risks	M	R	M	R	M	R	M	R	M	R	M	R
Quality of work	3.6	1	3.7	2	3.7	1	3.9	1	3.2	3	3.5	4
Premature failure of facility	3.56	2	3.5	4	3.5	3	3.8	2	3.2	3	3.8	2
Safety failures	3.5	3	3.4	9	3.4	4	3.6	3	3.2	3	3.9	1
Inadequate or incorrect design	3.4	4	3.8	1	3.7	2	3.2	7	3.0	6	3.3	9
Financial constraints	3.22	5	3.5	6	3.0	11	3.0	14	2.9	10	3.7	3
Failure to identify defects	3.22	6	3.5	3	3.2	5	3.4	5	2.8	14	3.2	11
Materials or equipment quality	3.18	7	3.2	13	3.0	11	3.3	6	3.1	5	3.3	7
Force majeure	3.14	8	3.0	22	2.6	20	3.4	4	3.3	1	3.4	5
Inadequate management method	3.1	9	3.2	13	3.1	9	3.0	14	2.9	10	3.3	7
Inadequate planning	3.02	10	3.5	6	3.2	7	3.0	14	2.3	25	3.1	14
Claims and disputes	3.0	11	3.1	18	2.5	25	3.1	11	2.9	10	3.4	6
Incompetence of subcontractor	2.9	12	2.9	24	3.0	11	3.1	9	2.4	23	3.1	15
Unforeseen site condition	2.9	13	3.1	13	2.4	24	3.0	14	2.9	10	3.2	9
Feasibility of construction method	2.9	14	3.1	18	2.9	14	3.1	9	2.7	18	3.1	15
Shortage of skills/techniques	2.9	15	3.4	8	3.1	9	3.1	9	2.3	25	2.8	23
Delay of drawing supply	2.9	16	3.1	19	2.9	13	2.7	21	2.8	14	3.1	12
Insufficient technology	2.84	17	3.5	5	2.6	18	2.8	18	2.2	28	3.1	12
Poor coordination	2.8	18	3.2	13	3.2	6	2.6	23	2.2	28	2.8	20
Change in codes and regulations	2.8	19	3.2	10	2.8	16	2.5	25	2.6	21	2.9	18
Inappropriate risk allocation	2.72	20	3.0	22	2.6	22	2.7	19	2.3	25	3.0	17
Exchange rate fluctuation and inflation	2.7	21	3.2	13	2.1	31	2.7	21	2.9	10	2.9	18
Third party delay	2.7	22	3.0	22	2.8	16	2.3	29	2.6	21	2.8	20
Quantity variations	2.66	23	3.0	16	2.4	23	2.5	23	2.9	10	2.5	29
Adequacy of insurance	2.58	24	2.7	25	2.3	29	2.6	18	2.6	18	2.7	26
Poor definition of scope	2.44	25	2.5	27	2.4	27	2.3	26	2.4	14	2.6	23
Shortage of labor, materials& equipment	2.4	26	2.3	26	2.4	27	2.6	16	2.1	28	2.6	23
Conflicts in documents	2.4	27	2.4	20	2.4	22	2.1	30	2.6	18	2.7	26
Poor relationship between parties	2.3	28	2.2	29	2.4	20	2.1	23	2.6	18	2.2	28
Organizational interface	2.3	29	2.5	30	2.5	17	2.2	29	1.9	32	2.7	26
Environmental impact	2.3	30	2.5	28	2.0	30	2.2	27	2.3	23	2.5	29
Site access difficulties	2.1	31	2.2	31	2.3	29	1.9	31	1.9	30	2.1	31
Logistics difficulties	1.88	32	2.1	32	1.8	32	1.7	32	1.8	31	2.0	32

Note: M.=mean; R.=rank.
ANOVA is significant at the 0.05 level.
ANOVA is significant at the 0.01 level.

ANOVA was performed to test the perceptions of the consultant architects, consultant Quantity surveyors, Builders and civil/building contractors. The one-way ANOVA is used to test whether several means are equal (SPSS 1997). The perceptions of the groups are different on the "premature facility failure" (mean=3.6, ANOVA p=0.043) and "safety" (mean=3.54, ANOVA p=0.013), which were given much lower ratings (2.57 and 2.33, respectively) by Builder. This can be because Builders are only involved in project execution at the post contract stage. Different perceptions exist on "claims and disputes" (mean=3.09, ANOVA p=0.020), which is given an apparent low rating (2.47) by Client. There are different perceptions on "insufficient technology" (mean=2.94, ANOVA p=0.006), which was given a much high rating (3.5) by Architects who need sufficient technology to fulfill their designs. There are also different perceptions on "poor coordination" (mean=2.88, ANOVA p=0.013)and "organizational interface" (mean=2.57, ANOVA p=0.017), showing the groups have different concerns on these factors. Despite the different perceptions on the above six risks, there are no significant differences among the groups on the ratings of the other 26 risks, suggesting all groups have a common view on the severities of most project risks.

Overall, the five most important risks are "poor quality of work," "premature failure of the facility," "safety," "inadequate or incorrect design," and "financial risk." To test whether there was consensus among the various groups on the rankings of the severity of project risks, the Spearman rank correlation coefficient $rs$was computed, as shown in Table 4.10.

Table 4.10 – Correlation among participants on severity of risk on project delivery

	Builder	Client	Consultant Achitect	Consultant Qty. Surveyor	Civil/Bldg Eng.
Contractor					
Builder	1.000	_	_	_	_
	_	_	_	_	_
Client	0.642	1.000	_	_	_
	0.000	_	_	_	_
Consultant Architect	0.655	0.823	1.000	_	_
	0.000	0.000	_	_	_
Consultant Qty. Surveyor	0.734	0.699	0.660	1.000	_
	0.000	0.000	0.000	_	_
Civil/Bldg Eng. Contractor	0.348	0.709	0.650	0.483	1.000
	0.051	0.000	0.000	0.005	_

Correlation is significant at the 0.05 level _2-tailed_.
Correlation is significant at the 0.01 level _2-tailed_.

The Spearman rank correlation coefficients *rs*between groups show that the risk ranking of Client has significant agreement (*p*=0.00) with the risk rankings of contractors, Architects and Quantity surveyors. Client also has significant agreement with the ranking by Architects (*rs*=0.435 at the significance level of 0.013). Contractors have significant agreement with Clients, Architects, and Builders at the *p*_0.001 level, and disagree only with the rankings of the Quantity surveyors. This is understandable, as Quantity surveyors consider the project risks mainly at a very early stage, whereas contractors focus on the project delivery stage. Similarly, the rankings of Quantity surveyors (QS) have significant agreement with the rankings of contractors, Architects, and Builders, but have a low correlation with the ranking of QS. Architects have significant agreement with all other groups at the level of *p*0.01, showing that they tend to consider the project risks from a project lifecycle perspective, which is consistent with all other groups. QS Have significant agreement with Client at the 0.05 level and with Architects at the 0.01 levels, showing the risks considered by QS at the early stages are also figured at later stages by Architects and Client.

The principal participants' (Clients, Builders, contractors, QS, and Architects) have significantly similar perceptions on project risks. As project risks are mainly allocated to Client and contractors, it is necessary to further discuss the priorities on the same risks for these two groups. For clients (beneficiary) the five most important risks were "poor quality of work," "inadequate or incorrect design," "premature failure of the facility," "safety," and "failure to identify defects," whereas the top five risks for contractors were "safety," "premature failure of the facility," "financial," "quality of work," and "force majeure." Clients are most concerned about "quality of work," which also obtained a high rank (fourth) from contractors. Both clients and contractors are very concerned about "safety" and "premature failure of the facility."

However, there are notable disparities among these risks. "Inadequate or incorrect design" was ranked second by clients. Responses confirmed that many problems such as rework, delay, additional costs, and claims originate from this aspect. Contractors ranked this risk only ninth, which is reasonable because normally clients take most of the risks regarding design. There is also a disparity regarding "financial risk." This was ranked third by contractors, but clients only ranked it 11th. Responses show that normally contractors have to bid for jobs with narrow margins and high risk under the pressure of the competitive market, whereas clients have much less financial pressure. "Failure to identify defects" was ranked fifth by clients, whereas it was ranked 11th by contractors. Responses reveal that contractors tend to rely on Architects to identify project defects. "Force majeure" was ranked fifth by contractors, whereas it was ranked 19th by clients. This is because clients have much more capability of bearing risks than contractors. Responses show that most clients are able to use a contingency to cover unforeseen risks, but it is difficult for contractors to cover serious risk incidents because of their narrow margins.

There are also disparities between clients and contractors beyond the top five risks. “Claims and disputes” was ranked sixth by contractors, but clients ranked this risk only 25th. The different perceptions on “claims and disputes” between clients and contractors are largely attributed to the risk allocation in contracts. Most contractors indicated that to win the contracts they have to price their work with a small margin and bear high risks. This leaves them with significant financial pressure, which is confirmed by contractors ranking “financial” as the third risk. Thus, “claims and disputes” has been seen as an important way for contractors to mitigate their risks and recoup their profit margins for the improvement of financial capabilities. However, as clients drive the contracting process, they are able to avoid many risks in advance through contracts, and this gives clients more flexibility than contractors to deal with claims and disputes. Besides, clients normally have stronger financial capacity than contractors. This is consistent with the established disparity regarding “financial risk” between clients and contractors and thus the impact of “claims and disputes” on financial for clients is not as crucial as for contractors.

Therefore, reducing risks through claims and disputes is emphasized by contractors, whereas clients considered costs from claims and disputes as normal expenditure that can be covered by contingencies. “Unforeseen site conditions” was ranked ninth by contractors, whereas this risk was ranked 24th by clients. Responses show that “unforeseen site conditions” can bring greater difficulties to contractors that may not be recoverable through claims. “Exchange rate fluctuation and inflation” was ranked 18th by contractors, whereas clients ranked it 31st. Responses show that this risk for contractors mainly comes from the increasing cost of construction materials. Many projects last a considerable period, and in most circumstances contractors have to cover the additional costs from the rising price of the construction materials.

Generally results show that there are significant differences in the perceptions of the integrated team on six top risks listed 1-6 in Table 4.9. This is supported by Tang et al (2006) who observed that each project team cannot assume the risk of another because each is concerned with risks critical to his own organization.

Results further show that the team (Table 4.9) have a common perceptive on the severity of risks listed 7-26 , suggesting that these risks are very severe which is supported by Elkington and Smallman (2000) ‘s assertion that it is imperative for all project participants (team) to come to grips with risks on overall perspectives.

4.2.2 Application of Risk Management Techniques

Respondents were next asked to identify the risk management techniques being used in their projects. These techniques are summarized based on the literature listed in the first section, in a way that facilitates understanding for respondents. Respondents were asked to respond on a scale of 1–5, where 1=never used; 2=seldom used; 3=sometimes used; 4=often used; and 5=always used. The results are given in Table 4.11.

Table 4.11 – Application of Formal Risk Management Techniques.

Contractor	Overall		Builder		Client		Consultant Achitect		Consultant Qty. Surveyor		Civil/Bldg Eng.	
Techniques of Risk Management	M	R	M	R	M	R	M	R	M	R	M	R
(a) Risk identification												
Checklist	2.6	13	2.2	15	2.7	12	2.8	11	2.8	13	2.5	13
Brainstorming	3.3	5	2.8	9	3.6	3	3.5	2	3.1	9	3.4	3
Consulting experts	3.1	7	3.6	2	3.7	7	3.8	6	3.6	9	2.6	11
(b) Risk analysis												
Qualitative analysis	3.3	4	3.2	5	3.7	2	3.4	4	3.3	5	3.1	6
Semi-quantitative analysis	2.7	12	2.6	10	3.0	10	2.6	14	2.8	13	2.5	13
Quantitative analysis	2.5	13	2.0	17	2.8	11	2.7	12	2.4	16	2.6	11
Consulting experts	3.1	5	3.7	1	3.32	5	3.3	5	3.3	5	2.6	9
Joint evaluation by key participants	3.7 2		3.0 3		3.0 2		3.5 2		3.9 1		3.6 1	
Use of computers and other modeling	2.4 17		3.3 17		2.0 17		2.4 16		2.3 17		1.9 17	
(c) RISK Response												
Avoid the risk	3.0	8	3.0	8	2.7	14	3.1	10	3.5	2	2.8	8
Reduce the likelihood of occurrence	3.3 7		3.2 5		3.3 7		3.2 8		3.6 5		3.4 3	
Reduce the consequences	3.3	5	3.2	5	3.4	4	3.4	4	3.3	5	3.2	5
Transfer the risk	3.1	13	3.4	28	3.5	9	3.2	8	3.0	11	3.1	7
Retain the risk	2.5	15	2.5	11	2.4	16	2.3	17	2.6	14	3.5	15
(d) Risk monitoring												
Periodic document reviews	3.0	8	2.3	13	3.1	8	3.1	10	3.3	5	3.2	5
Periodic risk status reporting	2.6	13	2.3	13	2.7	14	2.5	15	3.0	11	2.5	13
Periodic trend reporting	2.4	15	2.3	13	2.5	15	2.6	14	2.5	15	2.3	16

Note: M.=mean; R.=rank.

ANOVA was performed to test the perceptions of all groups on the use of the risk management techniques listed. All computed results of ANOVA p= 0.10, shows that all groups have varying differences in the ratings of the techniques. This suggests the extent to which all groups use risk management techniques is both similar and different. To test how well the different groups agree on the priorities regarding application of risk management techniques, the Spearman rank correlation coefficient *rs*was calculated, as shown in Table 4.12

Table 4.12 – Correlation among participants on Application of Formal Risk Management Techniques

	Builder	Client	Consultant Achitect	Consultant Qty. Surveyor	Civil/Bldg Eng. Contractor
Builder	1.000	_	_	_	_
	_	_	_	_	_
Client	0.842	1.000	_	_	_
	0.000	_	_	_	_
Consultant Architect	0.758	0.983	1.000	_	_
	0.000	0.000	_	_	_
Consultant Qty. Surveyor	0.940	0.853	0.773	1.000	_
	0.000	0.000	0.000	_	_
Civil/Bldg Eng. Contractor	0.704	0.812	0.774	0.746	1.000
	0.002	0.000	0.000	0.001	_

Correlation is significant at the 0.05 level _2-tailed_.
Correlation is significant at the 0.01 level _2-tailed_.

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On risk identification and classification, consulting experts is used by QS 3.6, Arch 3.8, and Builders 3.6. The Contractor rated it low,2.6 probably because they rely on adding contingencies. Risk analysis is next explored. While the Builders ranked ‘consulting experts \3.7 along with Clients 3.32, the Arch, QS, and contractors ranked 3.5, 3.9 and 3.6 respectively using joint evaluation in their respective offices This is not surprising because while most professionals seek opinion from experts aligned to their own fields in order not to mess themselves up in fields not their own, others use internal experts to address issues. On risk response Builders and Clients ranked ‘risk transfer, 3.4 and 3.5 respectively while risk reduction was chosen by Arch 3.4, QS 3.6, Contractor 3.5, probably relying on internal expertise. On risk monitoring ‘,status reporting was mostly used by Builders 2.3, Clients 2.7, and Arch 2.5 usually at site meetings but the QS and the Contractors utilize ‘documents review, rating 3.3 and 3.2 respectively. This is so because the contract Bills are usually reviewed during post contract services for reasons arising from change orders and other issues. The Spearman rank correlation coefficients among clients,

contractors, QS, designers, Builders, and contractors are all at the significance level of 0.01, except for QS, who have a correlation with contractors and Architects at a significance level of 0.05. This shows that all five groups have significant agreements as well as differences on the priorities of using risk management techniques. This is collaborated by Tang et al, (2006) who observed that project participants /team view and utilize the techniques differently.

Overall, the ratings on the application of risk management techniques is not high and this is also supported by Laryea and Hughes (1997)'s observation that the extent of application varies and is generally low across the Middle East and parts of Africa.

4.2.3 Internal Barriers to Risk Management

Internal barriers are those barriers that are within the control of the organization but discourage them from using the techniques. Respondents were requested to identify from their experiences the most significant processes that discourage them from regularly utilizing the different techniques identified in the literature. They were asked to respond on a scale of 1 – 5 where 1 = strongly disagree and 5 = strongly agree. The results were given below in Table 4.13:

Table 4.13 – Internal barriers to Formal Risk Management Techniques.

	Overall		Builder		Client		Consultant Achitect		Consultant Qty. Surveyor		Civil/Bldg Eng. Contractor	
Difficulties with Each technique	M	R	M	R	M	R	M	R	M	R	M	R
(a) PERT												
Is subjective analysis	3.6	1	3.0	8	2.7	14	3.1	10	3.5	2	2.8	4
Is only time focused	3.6	2	2.3	13	2.7	14	2.5	15	3.0	11	3.5	13
Is Resources intensive and complicated	3.5	3	3.2	9	3.2	2	3.8	11	3.5	8	2.9	12
Not easily scalable	3.4	4	3.0	28	3.0	9	3.2	8	3.0	11	3.1	7
Network is too large	3.4	5	3.1	13	2.4	24	3.0	14	2.9	10	3.2	9
Lacking timeframe	3.3	6	3.6	10	3.2	23	2.6	12	3.2	23	3.7	1
Lacking Prediction	3.3	7	3.7	26	3.2	22	2.9	18	2.3	29	3.6	2
(b) Monte Carlo Simulation												
Usually requires a computer	2.3	8	3.5	24	3.3	12	3.8	12	3.0	21	2.8	10
Calculations take long time	3.4	9	2.6	21	3.4	8	3.1	14	3.4	12	3.9	34
Solutions are not exact	3.1	10	2.5	17	3.5	7	3.2	25	3.7	14	2.9	21
Outputs are estimates	3.2	11	3.1	12	2.2	3	3.0	26	2.9	16	3.4	30
Depends on a number of repeated runs	3.0	12	1.9	9	2.6	4	2.7	29	3.1	18	3.1	29
(c) Causes and effects												
Difficult to represent true interrelationship of problems	3.0	13	3.0	8	2.9	5	3.4	21	3.5	31	3.7	21
Requires a large space to draw the fishbone diagram	3.0	14	3.0	7	2.8	6	3.6	21	3.7	32	3.5	18
Cannot explore the cause and effect relationship as required	3.0	15	3.0	6	3.4	7	3.9	32	2.9	27	3.4	19
(d) Sensitivity Analysis												
The term optimistic, pessimistic have varying interpretations	2.9	16	2.9	5	2.1	8	3.9	24	2.8	25	3.2	13
Fails to focus on variables	3.1	17	2.8	4	1.9	9	2.8	34	3.0	22	2.9	12
Is a novel approach	2.7	18	2.7	3	3.2	23	2.4	26	3.8	21	2.8	21
Involves complex statistical analysis	3.7	19	3.9	2	3.3	24	2.4	26	3.9	32	2.7	22
(e) Fuzzy Set Analysis												
Incorporates imprecision & subjectivity into model formulation& solution process	2.7	20	3.8	1	3.7	5	2.6	25	3.7	31	2.7	32
Does not provide clear cut result	2.8	21	3.2	27	3.9	30	3.7	32	2.8	32	2.8	24
Fails to focus on interrelationship between variables	3.6	22	2.1	18	3.9	20	2.2	39	3.0	21	2.6	13
(f) Checklists												
Does not identify risks specific to the projects	2.5	23	2.1	19	2	17	3.0	31	3.0	21	2.6	7
(g) Brainstorming												
Is time consuming	2.5	24	2.7	25	1	18	1.9	31	2.8	12	2.9	5
Inclusion of experts of different backgrounds raises costs	2.5	25	2.6	12	2	19	2.0	29	2.7	13	2.0	1
Has potentially a riskier stance due to Arguments	3.5	26	2.4	29	2	33	2.1	19	3.0	32	2.4	2

(h) Prototype activities												
Contains uncertainties	2.5	27	2.4	15	2	32	2.2	29	2.9	31	2.3	10
Identifies only major sources of uncertainties	2.5	27	3.2	16	2	31	2.2	28	3.1	11	2.2	22
(i) Risk Qualification												
Usefulness is limited	2.4	29	2.3	17	2	21	3.1	28	2.7	10	2.6	17
(j) Risk Quantification												
Quality cannot be quantified	2.3	30	2.2	10	1	8	3.0	15	2.8	20	2.4	12
Is subjective approach in assigning cost or/time	2.3	31	3.9	29	2	29	2.0	14	2.6	30	2.1	15
Historical data for assigning probabilities is not available	2.3	32	3.7	24	2	9	2.0	10	2.7	20	2.0	25
(k) Risk Mapping												
Difficult to interpret	2.3	33	3.0	27	3.0	5	3.2	8	3.0	11	3.1	33
(l) Risk Classification												
Information may be inaccurate	2.3	34	3.4	31	2	15	1.9	2	3.2	22	2.7	30
Information are usually incomplete at inception	2.3	35	2.3	10	2	13	2.9	1	2.5	33	2.5	29
(m) SWOT Analysis												
Requires a lot of time	2.2	36	3.5	11	2	10	2.7	24	2.5	34	2.3	12
Requires a lot of effort to think out the risks	2.1	37	1.8	22	2	32	2.6	4	2.8	42	2.3	11
(n) Scenario Analysis												
Identifies only strategic risk	2.0	38	1.9	21	1	28	2.3	33	2.4	29	1.9	22
Identifies risks only when the event is high impact and low probability.	2.0	39	2.1	31	2	38	2.4	22	2.2	31	2.0	23
(o) Risk Survey												
Requires a workshop to facilitate the information.	1.9	40	3.1	44	2	39	2.2	37	2.3	2	2.0	14
Costs involved are high	1.9	41	3.0	28	3.0	40	3.2	8	3.0	11	3.1	37
(o) Risk Estimation												
Requires detailed understanding of project objectives	1.8	42	1.9	40	2	44	2.1	39	2.1	41	2.1	32
Does not provide support for latter risk management	1.8	43	2.3	41	2	32	1.9	35	2.0	42	2.2	31
One estimated risk generates another risk.	1.7	44	2.5	42	2	43	2.0	44	1.9	44	2.0	44

Note: M.=mean; R.=rank.
ANOVA is significant at the 0.05 level.
ANOVA is significant at the 0.01 level.

From Table 4.13, it is generally noted that the rankings of the respondents are on the negative side which constitute barriers to utilizing the techniques. For PERT. The rankings of QS, Archand, Builders, are different from those of the Clients and Contractors. The former group believes that the analysis is subjective 3.6, time focused 3.6 and resource intensive 3.5 and the latter group believes it lacks prediction 3.3 and resources are intensive 3.2.The difference in the ranking is because the consultants i.e. QS, ARCH, BLD believe and apply theory at the onset

while the Clients and the Contractors believe more in outright practical application. These according to the five group respondents are what discourage them from utilizing PERT.

The next evaluated barrier is on Monte-Carlo Simulations. The rankings of builders and contractors are significantly different from those of the clients, ARCH, and QS. On the barriers such as 'calculations takes too long,' outputs are estimate and 'depends on repeated computer runs whose solution are not exact. This implies the builders and contractors seldom use this techniques in their offices to address risk management. The clients rely on expertise of QS or ARCH to address their risks.

The ARCH and QS ranked the barriers high, suggesting that the barriers are a hindrance to risk management.

The next evaluated barriers is' cause and effect', there is no significant difference between the mean ranking of the five project participants as the general ranking is 3.0.This implies that the barriers such as 'requires a large space to draw the fishbone diagram me' and 'cannot explore the cause effect relationship' constitute major barriers to utilization of this techniques. Further explained, this technique is not fully understood going by the scanty ranking exhibited by the integrated project participants.

Like cause and effect, sensitivity analysis is not well understood: The term 'optimistic, pessimistic', have varying interpretations were ranked high by the ARCH 3.9.The rankings of the builders and QS are similar for 'it involves complex statistical analysis', 3.9.while the ARCH ranked 'it is a novel approach' very high, 3.8 among the group.

What these rankings imply is that the group agrees that the difficult processes constitute a hindrance to effective implementation of the techniques.

Fuzzy set analysis was next evaluated. There are three listed barriers: that were mainly ranked. The mean rankings of the first two 'incorporates imprecision' and 'does not provide clear cut results,' 2.7 and 2.8 are similar for the five groups while the mean ranking for 'fails to focus on interrelationship between variables'.3.6 were ranked highest by the five groups, which impliedly constitutes a barriers to utilization of this technique.

Checklist was next evaluated. The listed barrier is only one 'it does not identify risks specific to the project 'was ranked by the five groups with a mean of 2.5, which is not high. This implies that this does not constitute a major barrier to implementation of the technique. Checklist being an already prepared list of risks to be used for any project, is widely used; the only limitation being that once a peculiar risk to a new project is not on the list, it could be forgotten totally. Checklist is commonly used among ARCH, QSand Contractors on their projects for joint risk evaluation after 'consulting experts' technique, as derived from literature.

The next evaluated technique is brainstorming. The barrier 'it creates a riskier stance', was ranked moderately low, 2.5 by the five groups. This implies brainstorming as a technique is widely used by the project team individually as literature suggests that it is not jointly utilized as builders ranked it 2.8 and contractors 2.9 respectively.

This means the argumentative sessions in brainstorming constitute a barrier or a discouraging factor to effective utilization of the technique.

The next evaluated techniques are' prototype activities, risk qualification, risk quantification, risk mapping, risk classification, SWOT analysis, scenario analysis, risk survey and lastly risk estimation.

The mean rankings are basically the same 2.5, 2.3, 2.2, are low; and the barriers are basically the same: **Table 4.14**;'the approaches contain uncertainties, cannot be quantified, information may be inaccurate, is

time consuming, is cost consuming, and is subjective.' Spearman correlation coefficient was computed as in Table 4.14 to test the consensus among the group.

Table 4.14 – Correlation among participants on barriers to Formal Risk Management Techniques

	Builder	Client	Consultant Achitect	Consultant Qty. Surveyor	Civil/Bldg Eng. Contractor
Builder	1.000	_	_	_	_
	_	_	_	_	_
Client	0.131	1.000	_	_	_
	0.702	_	_	_	_
Consultant Architect	0.382	0.371	1.000	_	_
	0.246	0.261	_	_	_
Consultant Qty. Surveyor	0.328	0.179	0.177	1.000	_
	0.325	0.598	0.867	_	_
Civil/Bldg Eng. Contractor	0.123	0.300	0.108	0.479	1.000
	0.719	0.370	0.751	0.136	_

Correlation is significant at the 0.05 level _2-tailed_.
Correlation is significant at the 0.01 level _2-tailed_.

The low ranking suggests the techniques are perceived by the group as insignificant probably because the processes of implementation are not well understood.

On the whole, the extent to which the difficult processes discourage the implementation of risk management are perceived differently.

4.2.4 External Barriers to Risk Management

To better understand the barriers to risk management, some possible factors that may affect risk management were further investigated. Respondents were asked to identify from their experience the most important barriers to risk management. To do this they were asked whether they agreed with a number of suggested barriers, by responding on a scale of 1–5, where 1=strongly disagree and 5=strongly agree. The results are given in Table 4.15.

Table 4.15 – External barriers to Formal Risk Management Techniques.

	Overall		Builder		Client		Consultant Architect		Consultant Qty. Surveyor		Civil/Bldg Eng. Contractor	
Factors affecting Risk Management	M	R	M	R	M	R	M	R	M	R	M	R
Lack of collaboration by parties or risk management offices	3.88	1	3.6	5	3.9	7	3.7	7	4.1	2	3.8	3
Lack of suitable techniques /operational ability on risk management	3.87	2	3.2	6	3.1	2	3.0	5	2.9	4	3.7	6
Lack of consensus on any set of risk control strategies	3.85	3	2.2	3	2.4	7	2.1	2	2.6	6	3.8	3
Ineffective implementation of available risk control strategies	3.83	4	2.2	1	2.3	7	1.9	7	1.9	7	3.4	10
Ineffective monitoring of FRM by BOARDS	3.82	11	3.2	5	2.8	2	2.5	3	2.6	3	3.3	6
Lack of FRM Model	3.81	3	3.1	6	2.4	4	3.0	10	2.9	10	3.8	3
Lack of incentive to apple better risk management model	3.73	7	3.5	9	3.2	5	3.4	8	2.8	2	3.7	6
Low lend of risk consciousness	3.71	8	3.0	7	2.8	11	2.3	1	2.6	11	3.4	10
Lack of historical data for risk trend analysis	3.69	9	2.1	9	1.8	10	1.7	4	1.8	9	3.8	3
In appropriate risk allocation mechanical	3.63	10	2.0	9	2.8	2	2.7	11	2.4	9	3.5	8
Insufficient ongoing project information for better decision-making	3.61	11	2.2	11	2.3	5	1.9	10	1.9	10	3.5	8

Note: M.=mean; R.=rank.
ANOVA is significant at the 0.05 level.
ANOVA is significant at the 0.01 level.

ANOVA was performed to test the perceptions of different groups. The perceptions of the groups are different on the "lack of FRM models" (mean=3.81, ANOVA p=0.027), "lack of incentive to apply better RM model" (mean =3.73, ANOVA p=0.004), "lack of historical data for risk trend analysis" (mean=3.69, ANOVA p=0.043), "inappropriate risk allocation mechanism" (mean=3.63, ANOVA p=0.008), and "insufficient ongoing project information for decision-making" (mean=3.61, ANOVA p=0.022). Except for the different perceptions on the

above five barriers to risk management, there are no significant differences among the groups on the ratings of the other six factors.

To test how well the different groups agree on the rankings of the barriers to risk management, the Spearman rank correlation coefficient *rs*was calculated, as shown in Table 4.16.

Table 4.16 – Correlation among participants on barriers to Formal Risk Management Techniques

	Builder	Beneficiary/ Client	Consultant Achitect	Consultant Qty. Surveyor	Civil/Bldg Eng. Contractor
Builder	1.000	_	_	_	_
	_	_	_	_	_
Client	0.131	1.000	_	_	_
	0.702	_	_	_	_
Consultant Architect	0.382	0.371	1.000	_	_
	0.246	0.261	_	_	_
Consultant Qty. Surveyor	0.328	0.179	0.177	1.000	_
	0.325	0.598	0.867	_	_
Civil/Bldg Eng. Contractor	0.123	0.300	0.108	0.479	1.000
	0.719	0.370	0.751	0.136	_

Correlation is significant at the 0.05 level _2-tailed_.
Correlation is significant at the 0.01 level _2-tailed_.

The Spearman rank correlation coefficients among clients, contractors, QS, designers, and Builders are all at the significance level of higher than 0.05, suggesting that these five groups have no significant agreement on the ranks of the barriers to risk management. Only QS have an agreement with Architects (designers) and Builders at the significance level of 0.05. Clients ranked “ineffective implementation of available risk control strategies” as the first, whereas contractors ranked “lack of suitable techniques/operational ability on risk management” and “inappropriate risk allocation mechanism” as the first (tie), showing clients are more concerned with effectiveness of risk management strategies and the contractors intend to improve risk management knowledge and to have fair risk allocation. This situation shows that the extents to

which the barriers affect the risk management for the main project participants are different from each other.

Improvement of an organization's risk management system should be according to its own features, and development of open communication risk management process for participants should consider these differences. Overall, "lack of collaboration by parties on risk management processes" is given the highest rating (score=3.88), and "lack of consensus on any set of risk control strategies" (score=3.85) is ranked third. This is supported by Tang et al (2006)'s assertion that organizations perceive risks differently and in relation to risks critical to their own objectives.

These barriers can be removed by stressing trust and open communication, which can help organizations to contribute their historical data, project teams to exchange their recognition of the project, and individuals to introduce their personal experience, which can help participants to build a joint risk management mechanism. "Lack of suitable techniques/operational ability on risk management" is ranked second, which is consistent with the survey results on risk management application, suggesting there is a need to increase the knowledge of risk management in the industry. The other eight barriers (Table 4.15) were rated with moderate to high scores, ranging from 3.61 to 3.83, suggesting that the influences of these factors also should not be ignored.

4.2.5 Incentives Promoting Risk Management

To better understand the incentives promoting risk management, some possible factors that may affect risk management were further investigated. Respondents were asked to identify from their experience the most important incentives that promote formal risk management techniques. To do this they were asked

whether they agreed with a number of suggested barriers, by responding on a scale of 1–5, where 1=strongly disagree and 5=strongly agree. The results are given in Table 4.17

Table 4.17 – Incentives Promoting Formal Risk Management Techniques.

	Overall		Builder		Client		Consultant Achitect		Consultant Qty. Surveyor		Civil/Bldg Eng. Contractor	
Strategies M	R	M	R	M	R	M	R	M	R	M	R	
The board's attitude towards	3.8			5			3.7			2		
FRMT will dictate the use of		1			3.9			7			3.8	
FRMT in the organization			3.6			7			3.9			3
Compliance requirements	3.8			6			3.8			4		
will force firms to carryout		2			3.9			5			3.7	
FRM processes			3.5			2			3.9			6
Company's growth rate,	3.7			3			3.7			6		
if rapid, will motivate		3			3.7			2			3.9	
the use of FRMT			3.8			7			3.4			8
Stakeholder's demand can	3.7			1			3.4			7		
mandate firms to implement		4			3.9			7			3.7	
FRMT			3.9			7			3.3			3
Negative events that exposes	3.6			2			3.6			6		
firms to cost intensive events		5			3.9			3			3.6	
will make them implement it			3.5			3			3.5			6
If business is regulated,	3.6			4			3.2			3		
demanding controls, the firm		6			3.8			8			3.7	
will implement FRMT			3.3			4			3.2			5
If competitors use FRMT,	3.5		3.1		3.6		3.1		3.8		3.8	
then the firm will use FRMT		7		8		5		1		8		4
If the organization's culture	3.5			7			2.9			8		
exposes it to guidelines for FRMT,		8			3.9			4			3.5	
they will Be motivated to implement FRMT			3.2			8			3.7			2

Note: M.=mean; R.=rank.
ANOVA is significant at the 0.05 level.
ANOVA is significant at the 0.01 level.

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ANOVA was performed to test the perceptions of different groups. The perceptions of the groups are different on the "Company's growth rate, if rapid, will motivate the use of FRMT" (mean=3.70, ANOVA p=0.027), "stakeholder's demand can mandate firms to implement FRMT" (mean =3.70, ANOVA p=0.004), "If business is regulated, demanding controls, the firm will implement FRMT" (mean=3.60, ANOVA p=0.043), "If competitors use FRMT, then the firms will use FRMT" (mean=3.5, ANOVA p=0.008), and "If the organization's culture exposes it to guidelines for FRMT, they will be motivated to implement FRMT" (mean=3.50, ANOVA

p=0.022). Except for the different perceptions on the above five incentives promoting formal risk management technique, there are no significant differences among the groups on the ratings of the other three factors.

To test how well the different groups agree on the ranks of the incentives promoting formal risk management technique, the Spearman rank correlation coefficient *rs*was calculated, as shown in Table 4.18.

Table 4.18 – Correlation among participants on Incentives Promoting Formal Risk Management Techniques

	Builder	Client	Consultant Achitect	Consultant Qty. Surveyor	Civil/Bldg Eng. Contractor
Builder	1.000	_	_	_	_
	_	_	_	_	_
Client	0.642	1.000	_	_	_
	0.000	_	_	_	_
Consultant Architect	0.655	0.823	1.000	_	_
	0.000	0.000	_	_	_
Consultant Qty. Surveyor	0.734	.0699	0.660	1.000	_
	0.000	0.000	0.000	_	_
Civil/Bldg Eng. Contractor	0.348	0.709	0.650	0.483	1.000
	0.051	0.000	0.000	0.005	_

Correlation is significant at the 0.05 level _2-tailed_.
Correlation is significant at the 0.01 level _2-tailed_.

The Spearman rank correlation coefficients among clients, contractors, QS, ARCH, and Builders are all at the significance level of higher than 0.05, suggesting that these five groups have no significant agreement on the ranks of the incentives promoting formal risk management technique. Only QS have an agreement with Architects (designers) and Builders at the significance level of 0.05. Clients (Beneficiaries) ranked “Stakeholder’s demand can mandate firms to implement FRMT” as the first, whereas civil eng. contractors ranked “company’s growth rate, if rapid, will motivate the use of FRMT” and “If competitors use FRMT, then the firm will use FRMT” as the first (tie), showing clients are more concerned with effectiveness of

risk management strategies and the civil/Bldeng. contractors intend to improve risk management knowledge and to have fair risk allocation. This situation shows that the extents to which the incentives affect the risk management for the main project participants are different from each other.

Improvement of an organization's risk management system should be according to its own features, and development of open communication of risk management process for participants should consider these differences. Overall, "The BOARD'S attitude toward FRMT will dictate the use of FRMT in the organization" is given the highest rating (score=3.80), and "company's growth rate, if rapid, will motivate the use of FRMT" (score=3.70) is ranked third.

These incentives can promote utilization of risk management, helping organizations to contribute their historical data, project teams to exchange their recognition of the project, and individuals to introduce their personal experience, which can help participants to build a joint risk management mechanism. "Compliance requirement will force firms to carryout FRM processes" is ranked second, which is consistent with the survey results on risk management application, suggesting there is a need to increase the knowledge of risk management in the industry. The other five incentives (Table 4.17) were rated with moderate to high scores, ranging from 3.50 to 3.70, suggesting that the influences of these factors also should not be ignored.

Educating those in construction sector about the Formal Risk Management Techniques (FRMT) practices and sensitizing the government on the importance of FRMT practices and what the country intends to benefit from such practices will go a long way to removing the barriers. Also passing the technique into law and implementing it will also reduce the barriers.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The study found that;

I. Though participants' perception differ, the six most severe risks according to the overall severity rating, are quality of work, premature failure of facilities, safety, incorrect design, financial constraints and failure to identify defects.

II. The risk management technique mostly used in the industry is "consulting experts" which implies qualitative techniques are favored more than quantitative techniques.

III. The extent to which the difficult processes discourage implementation of the techniques are perceived differently. The weaknesses in the different approaches constitute internal barriers to utilizing the techniques.

IV. The dominant external barriers that inhibit effective risk management implementation include lack of formal risk management system in place, lack of training in place and lack of risk assessment training in place including lack of collaboration by the project team.

V. The strategies that will promote effective implementation of FRMT were identified as sensitization, legislation, business regulation and mandatory training.

5.2 Conclusions

Based on the findings the following conclusions are drawn:

I. There is lack of a strong consensus on the severity of risks by participating groups.

II. The application of FRMT is generally low.Firms, though aware of the FRMT, have difficulties in implementing them which constitutes the major barriers to their wholesome adoption.

III. There are no strategies in place to promote the implementation of formal risk management in a formal way.

5.3. Recommendations

Based on the conclusion the following recommendations are made;

I. The appraised factors militating against effective implementation of FRMT should be adequately addressed by the affected groups.

II. The internal barriers such as lack of certainties, inaccurate results, novelty, cost and time intensiveness in using the techniques should be addressed through research.

III. The external barriers namely, lack of historical data, lack of joint risk management, lack of training; should be addressed through strategies such as government sensitization, legislation and business regulation including mandatory training for construction managers to improve risk management.

IV. Risk management is cost and time intensive including the techniques lack of acceptance: as such the factors influencing these weaknesses should be addressed.

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APPENDIX 1

DEPARTMENT OF QUANTITY SURVEYING

FACULTY OF ENVIRONMENTAL DESIGN

AHMADU BELLO UNIVERSITY, ZARIA

Dear Sir,

LETTER OF INTRODUCTION

I am a postgraduate student of the Department of Quantity Surveying in Ahmadu Bello University Zaria and I am currently pursuing a Masters of Science degree Study on the topic*: An Appraisal Of Factors Militating against the Implementation Of Formal Risk Management Techniques In Project Delivery In Nigeria.*

The attached questionnaire solicits your expert opinion on the influence of some listed factors in the implementation of Formal Risk Management Techniques in Nigerian construction industry .This would help in completion of the thesis which is meant to determine the reasons why the Boards of directors of firms in Nigeria are not implementing formal risk management techniques in their project delivery and by extension predicting the strategies that will promote their use.

I hereby solicit your kind assistance in filling the questionnaire or ticking the appropriate spaces as the case may be. Your response to the questions shall be treated with utmost confidentiality.

Thank you.

Yours faithfully,

IKOJA NATHAN
23rd January, 2014

QUESTIONNAIRE

(Architectural firms)

SECTION: 1

1. Name of organization……..

2. Location of Firm……..……

3. What is your position in the firm?

   Principal/Managing Partner

   {1} (B) Partner

   {2} (C) Associate Partner

   {3}(D) Head of Department

   {4} (E) Senior Architect

   {5} (F) Pupil architect .

4. Sex: (A) Male (B) Female

5. Age: (A) Below 30 yrs {1} (B) 31-40yrs {2} (C) 41-50 yrs {3}

   (D) 51-60 yrs {4} (E) 61 yrs& Above {5}

6. What is your Highest Educational qualification (A) OND {1} (B) HND {2} (C) BSC {3} D) M.Sc. {4} (E) PhD {5} (F) Others {6}…….....

7. What is your highest professional qualification(s)?

   (A) AMNIA {1} (B) MNIA {2}

   (C) FNIA {3} (D) RMNIA {4}

   Probationer {6}

   (G) Others (Specify)……

8. Years of professional qualification (A) 1-10 yrs {1} (B) 11-20 yrs {2}

(C) 21-30 yrs {3}(D) 31yrs & above {4}

9. Age of the firm (A) 1-10 yrs {1} (B) 11-20 yrs {2}

(C) 21-30 yrs {3} (D) 31yrs & above {4}

10. Number of Architects in the service of the firm?

(A) 1-5 {1} (B) 6-10 {2} (C) 11-15 {3}

(D) 16-20 {4} (E) 21 and above {5}

11. Number of registered Architects

(A) 1-5 {1} (B) 6-10 {2} (C) 11-15 {3}

(D) 16-20 {4} (E) 21 and above {5}

12. Firm's areas of specific specialization?

(A) Design {1} (B) Design and construct {2} (C) Management {3}

(D) Property Development {4} (E) Feasibility and Viability Appraisal

(F) General Practice {6}

13. Number of conferences, workshops or seminars on Architectural issues attended between 2008 and 2013.

(A) None {1} (B) 1-5 {2} (C) 6-10 {3}

(D) 11-15 {4} (E) 16 and above {5}

QUESTIONNAIRE

(Building firms)

SECTION A

1. Name of Firm……

2. Location of Firm……

3. What is your position in the firm?

   Principal/Managing Partner {1} (B) Partner {2} (C) Associate Partner {3}

   (D) Head of Department {4} (E) Senior Builder{5} (F) Pupil Builder

4. Sex: (A) Male (B) Female

5. Age: (A) Below 30 yrs {1} (B) 31-40yrs {2} (C) 41-50 yrs {3}(D) 51-60 yrs{4} (E) 61 yrs& Above {5}

6. Educational qualification

   (A) OND {1} (B) HND {2} (C) B.Sc {3}

   (D) M.Sc. {4} (E) PhD {5} (F) Others {6}……

7. What is your professional qualification(s)?

   (A) AMNIOB {1} (B) MNIOB {2}

   (C) PPNIOB {3} (E) FNIOB {4}

   {5} Probationer {6}

   (G) Others (Specify)……

8. Years of professional qualification

   (A) 1-10 yrs {1} (B) 11-20 yrs {2}

   (C) 21-30 yrs {3}(D) 31yrs & above {4}

9. Age of the firm

   (A) 1-10 yrs {1} (B) 11-20 yrs {2}

(C) 21-30 yrs {3} (D) 31yrs & above {4}

10. Number of Builders in the service of the firm?

(A) 1-5 {1} (B) 6-10 {2} (C) 11-15 {3}

(D) 16-20 {4} (E) 21 and above {5}

11. Number of registered Builders?

(A) 1-5 {1} (B) 6-10 {2} (C) 11-15 {3}

(D) 16-20 {4} (E) 21 and above {5}

12. Firm's areas of specific specialization?

(A) Contracting {1} (B) Agency {2} (C) Management {3}

(D) Property Development {4} (E) Feasibility and Viability Appraisal

(F) General Practice {6}

13. Number of conferences, workshops or seminars on Building issues attended between 2002 and 2008.

(A) None {1} (B) 1-5 {2} (C) 6-10 {3}

(D) 11-15 {4} (E) 16 and above {5}

QUESTIONNAIRE

(Quantity Surveying Firms)

SECTION A:

1. Name of Firm……..…..

2. Location of Firm…….

3. What is your position in the firm?

   (A) Principal/Managing Partner {1} (B) Partner {2} (C) Associate Partner {3}(D)Head of Department {4} (E) Senior Qs{5} (F) Pupil Qs .

4. Sex:

   (A) Male (B) Female

5. Age:

   (A) Below 30 yrs {1} (B) 31-40yrs {2} (C) 41-50 yrs {3}

   (D) 51-60 yrs {4} (E) 61 yrs& Above {5}

6. Educational qualification

   (A) OND {1} (B) HND {2} (C) B.Sc {3}

   (D) M.Sc. {4} (E) PhD {5} (F) Others {6}……..……..

7. What is your professional qualification(s)?

   (A) AMNIQS {1} (B) MNIQS {2}

   (C) PPNIQS {3} (E){5} Probationer {6} (G) Others (Specify)…….

8. Years of professional qualification

   (A) 1-10 yrs {1} (B) 11-20 yrs {2}

   (C) 21-30 yrs {3}(D) 31yrs & above {4}

9. Age of the firm

   (A) 1-10 yrs {1} (B) 11-20 yrs {2}

(C) 21-30 yrs {3} (D) 31yrs & above {4}

10. Number of Quantity surveyors in the service of the firm?

(A) 1-5 {1} (B) 6-10 {2} (C) 11-15 {3}

(D) 16-20 {4} (E) 21 and above {5}

11. Number of registered Quantity surveyors?

(A) 1-5 {1} (B) 6-10 {2} (C) 11-15 {3}

(D) 16-20 {4} (E) 21 and above {5}

12. Firm's areas of specific specialization

(A)Valuation {1} (B) Procurement {2} (c) Management{3}
(D) Property Development {4} (E) Feasibility and Viability Appraisal {5}
(F) General Practice {6}

13. Number of conferences, workshops or seminars on Quantity surveying issues attended between 2002 and 2008.

(A) None {1} (B) 1-5 {2} (C) 6-10 {3}

(D) 11-15 {4} (E) 16 and above {5}

QUESTIONNAIRE
(Civil and Building Contractors)
SECTION A:

1. Name of Firm…….

2. Location of Firm……

3. What is your position in the firm?
Principal/Managing Partner {1} (B) Partner {2} (C) Associate Partner {3}(D) Head of Department {4} (E) Senior Engineer{5} (F) Pupil Engineer .

4. Sex:
(A) Male (B) Female

5. Age:
(A) Below 30 yrs {1} (B) 31-40yrs {2} (C) 41-50 yrs {3}(D) 51-60 yrs {4}
(E) 61 yrs& Above {5}

6. Educational qualification
(A) OND {1} (B) HND {2} (C) B.Sc {3}D) M.Sc.{4}
(E) PhD {5} (F) Others {6}……

7. What is your professional qualification(s)?
(A) AMNSE {1} (B) MNSE {2}
(C) PPNSE {3} (E) FNSE {4}
5} Probationer {6}
(G) Others (Specify)…….

8. Years of professional qualification
(A) 1-10 yrs {1} (B) 11-20 yrs {2}
(C) 21-30 yrs {3}(D) 31yrs & above {4}

9. Age of the firm
(A) 1-10 yrs {1} (B) 11-20 yrs {2}
(C) 21-30 yrs {3} (D) 31yrs & above {4}

10. Number of Civil Engineers in the service of the firm?
(A) 1-5 {1} (B) 6-10 {2} (C) 11-15 {3}
(D) 16-20 {4} (E) 21 and above {5}

11. Number of registered Civil Engineers?
(A) 1-5 {1} (B) 6-10 {2} (C) 11-15 {3}
(D) 16-20 {4} (E) 21 and above {5}

12. Firm's areas of specific specialization?
(A) Road construction {1} (B) Building Construction {2}
(C) Management {3}
(D) Property Development {4} (E) Feasibility and Viability Appraisal
(F) General Practice {6}

13. Number of conferences, workshops or seminars on Civil Engineering issues attended between 2002 and 2008.
(A) None {1} (B) 1-5 {2} (C) 6-10 {3}
(D) 11-15 {4} (E) 16 and above {5}

QUESTIONNAIRE

SECTION 2

Knowledge of formal Risk management techniques

4.1 What is your highest qualification in formal risk management techniques

(i) OND [1] (ii) HND [2] (iii) BSc [3] (iv) MSc. [4] (v) PhD [5]

4.2 How many years ago have you become aware of Formal Risks Management Techniques in Project delivery in Nigeria?

Please tick:

Between

(i) 1980 - 1986 [ ]
(ii) 1986 - 1992 [ ]
(iii) 1992 - 1995 [ ]
(iv) 1995 - 2000 [ ]
(v) 2000 - 2005 [ ]
(vi) 2005 - 2010 [ ]
(vii) 2010 - 2013 [ ]

4.3 Who in your opinion is responsible for carrying out Formal Risks Management Techniques in your firm? Please tick

(a) Board/partners [ ]
(b) Management [ ]
(c) Risk officer [ ]

4.4 What effect would you say has Formal Risks Management Techniques on project delivery? Please tick

(i)	Reduces construction cost	[ ] Yes	[ ] No
(ii)	Reduces design risk	[ ] Yes	[ ] No
(iii)	Reduces duration slippage	[ ] Yes	[ ] No
(iv)	Reduces abandoned projects	[ ] Yes	[ ] No
(v)	Improves construction quality	[ ] Yes	[ ] No
(vi)	Improves team relationship and coordination	[ ] Yes	[ ] No
(vii)	Improves forecasting	[ ] Yes	[ ] No

4.5 Which of the following techniques is mostly applied in project delivery: Please tick

(i) Checklists [ ]
(ii) Brainstorming [ ]
(iii) Cause and effect [ ]
(iv) Fuzzy Set Theory [ ]
(v) Monte Carlo simulation [ ]
(vi) Fassy Set Theory [ ]
(vii) Sensitivity Analysis [ ]
(viii) None in particular [ ]
(x) Others (specify)_____

4.6 From your awareness of risk management, which particular one do you apply most?

(i) Informal techniques (intuition, experience, gut feeling percentage) [ ]
(ii) Formal techniques (4.5) above [ ]

4.7 What particular difficulties do you encounter with informal techniques? please tick

(i)	None specifically	[ ] Yes	[ ] No
(ii)	Uncertainty	[ ] Yes	[ ] No
(iii)	Failures	[ ] Yes	[ ] No

Table 1 SECTION 3 Difficulties with the current Risks management techniques

Statement of difficulties associated with each techniques	**Strongly agree (5)**	**Agree (4)**	**Undecided (3)**	**Disagree(2)**	**Strongly disagree (1)**
PERT – is use to analyze tasks//time in completing a project **Difficulties**					
a. Is subjective analysis					
b. Is only time focused					
c. Is Resources intensive and complicated					
d. Not easily scalable					
e. Network is too large					
f. Lacking timeframe					
g. Lacking Prediction					
Monte Carlo Simulation Is use to resolve multiple critical paths in PERT by building models of possible results for any factor that has uncertainty **Difficulties** a. Usually requires a computer					
b. Calculations take long time					
c. Solutions are not exact					
d. Outputs are estimates					
e. Depends on a number of repeated runs					
Causes and effects is use to list all possible causes and their effects and how they are linked to a problem **Difficulties**					
a. Difficult to represent true interrelationship of problems					
b. Requires a large space to draw the fishbone diagram					
c. Cannot explore the cause and effect relationship as required					
Sensitivity Analysis = Is to determine how sensitive a model/technique is to changes in value of parameters. **Difficulties**					

a. The term optimistic, pessimistic have varying interpretations					
b. Fails to focus on variables					
c. Is a novel approach					
d. Involves complex statistical analysis					
Fuzzy Set Analysis: Collection of objects whose boundaries are not precisely defined= used for under-writing Risks **Difficulties** Incorporates imprecision and subjectivity into model formulation and solution process.					
Does not provide clear cut result.					
Fails to focus on interrelationship between variables					
Checklists = List of risks that commonly occur on projects which can be updated or revised **Difficulties** a. Does not identify risks specific to the projects					
Brainstorming = Is to elicit information on/risks specific to the project **Difficulties** Is time consuming					
Inclusion of experts of different backgrounds raises costs					
Has potentially a riskier stance due to Arguments					
Prototype activities = Defines prototype and identifies variations from the prototype **Difficulties** Contains uncertainties					
Identifies only major sources of uncertainties					

Risk Qualification = Uses words moderate, high or probable Difficult to assign values					
Usefulness is limited					
Risk Qualification Is risk evaluation using impact of cost or time. **Difficulties** Quality cannot be qualified					
Is subjective approach in assigning cost or/time					
Historical data for assigning probabilities is not available.					
Risk Mapping: Uses graph, one axis impact, the other axis probability of occurrence. **Difficulties** a. Difficult to interpret.					

Risk Classification: Classifies risks in hierarchy during inception. **Difficulties**					
Information may be inaccurate					
Information are usually incomplete at inception.					
SWOT Analysis: Used to formulate strategy on risks **Difficulties**					
Requires a lot of time					
Requires a lot of effort to think out the risks.					
Scenario Analysis Used to identify risk when the situation is less defined. **Difficulties**					
Identifies only strategic risk					
Identifies risks only when the event is high impact and low probability.					
Risk Survey: Is to elicit information from various levels of organization to list, say, five most important risks to achieving the company's strategic objective. **Difficulties**					
Requires a workshop to facilitate the information.					
Costs involved are high					
Risk Estimation = Identifies risk in terms of probability and impact **Difficulties** Requires detailed understanding of project objectives Does not provide support for latter risk management One estimated risk generates another risk.					

SECTION 4

Table 2: Perceptions on impact of Risks (Tick whether impact is high or low as appropriate

Risk Impact on selected item	**Extremely High(5)**		**High (4)**		**moderate (3)**		**Low (2)**	**Negligible (1)**
Quality of work								
Premature failure of facility								
Safety failures								
Inadequate or incorrect design								
Financial constraints								
Failure to identify defects								
Materials or equipment quality								
Force majeure								
Inadequate management method								
Inadequate planning								
Claims and disputes								
Incompetence of subcontractor								
Unforeseen site condition								
Feasibility of construction method								
Shortage of skills/techniques								
Delay of drawing supply								
Insufficient technology								
Poor coordination								
Change in codes and regulations								
Inappropriate risk allocation								
Exchange rate fluctuation and inflation								
Third party delay								
Quantity variations								
Adequacy of insurance								
Poor definition of scope								
Shortage of labor, materials and equipment								
Conflicts in documents								
Poor relationship between parties								

Organizational interface								
Environmental impact								
Site access difficulties								
Logistics difficulties								

SECTION 5

Table 3; Barriers to effecting implementation of Risk management techniques

Factors affecting risk management	**Strongly agree(5)**		**Agree 4**		**undecided (3)**		**Disagree (2)**	**Strongly Disagree (1)**
							s	
Lack of collaboration by parties or risk management offices								
Lack of suitable techniques /operational ability on risk management								
Lack of consensus on any set of risk control strategies								
Ineffective implementation of available risk control strategies								
Ineffective monitoring of FRM by BOARDS								
Lack of FRM Model								
Lack of incentive to apple better risk management model								
Low lend of risk consciousness								
Lack of historical data for risk trend analysis?								
In appropriate risk allocation mechanical								
Insufficient ongoing project information for better decision-making								

Table 3: Application of Risk Management Techniques Tick as appropriate

Techniques of risk management	Always used (5)	often Used (4)	Used times(3)	Seldom used (2)	Never used (1)
(a) Risk identification					
Checklists					
Brainstorming					
Consulting experts					
(b) Risk analysis					
Qualitative analysis					
Semi-quantitative analysis					
Quantitative analysis					
Consulting experts					
Joint evaluation by key participants					
Use of computers and other modeling					
(c) RISK Response					
Avoid the risk Reduce the likelihood of occurrence Reduce the likelihood of occurrence					
Reduce the consequences Transfer the risk					
Retain the risk					
(d) Risk monitoring					
Periodic document reviews					
Periodic risk status reporting					
Periodic trend reporting					

SECTION 7

Strategies you consider likely to encourage better implementation and FRMT in Nigeria.

	Strategy	**Strongly agree (5)**	**Agree (4)**	**often (3)**	**Disagree (2)**	**Strongly disagree (1)**
i.	The board or management 's attitude towards FRMT will dictate the use of FRMT in the organization					
ii.	Compliance requirements will force firms to carryout FRM processes					
iii.	Company's growth rate ,if rapid, will motivate the use of FRMT					
iv.	Stakeholder's demand can mandate firms to implement FRMT					
v.	Negative events that exposes firms to cost intensive events will make them implement FRMT					
vi.	If business is regulated, demanding controls, the firm will implement FRMT					
vii.	If competitors use FRMT, then the firm will use FRMT					
viii.	If the organization' s culture exposes it to guidelines for FRMT, then the firm will be motivated to implement FRMT					

Table 4 Please Tick as Appropriate

Thank you very much for sparing your valuable time in attending to the numerous questions.