Project Risk Management Issues in the Nigerian Construction Industry

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Abstract— **The construction industry the world over is prone to risk and uncertainty which most often than not requires a sound knowledge of project risk management to contain with. It is based on this assertion that this study aims at identifying the current risk management issues and uncertainties in the Nigerian construction industry with a specific objective of determining the level of awareness and implementation of risk management processes, and ascertain the impact of identified risks on predefined project objectives of cost, schedule, quality and scope through extensive literature and questionnaire surveys of selected construction industry, with a view to making recommendations for future studies which is aimed at developing a risk management framework for adoption by practitioners in the built industry. A total of 84 questionnaires were distributed while 57 was retrieved, representing a response rate of 67.86%. However, 56 questionnaires were found valid for the analyses. The questions were structure using a combination of *Likert* and *ranking scales.* The responses were analyzed using Statistical Package for Social Science (SPSS) version 17. Linear regression was used to determine the impact of risk on project objectives. Relative Importance Index (RII) was also used in the ranking of risk triggers/ events that affects project cost, schedule, quality and scope objectives. The research findings revealed that the level of awareness and implementation of risk management processes in the construction industry is low. The study further revealed that the risk management issues has a linear and positive relationship with construction projects i.e. if risk management issues are not resolved, the attainment of project schedule, cost, quality and scope objectives would be achieved.**

Index Terms— **Project risk, risk management, linear regression, relative importance index**

I. INTRODUCTION

According to Latham (1994), "No construction project is risk free. Risk can be managed, minimized, shared, transferred, or accepted. It cannot be ignored." Risks and uncertainties can cause losses that could lead to increased costs, schedule delays and lack of quality during the progression of a project from its beginning to its end. PMI (2000) defined project risk as an uncertain event or condition that, if it occurs, has a positive or a negative effect on a project objective. Chapman and Ward (2002) on the other hand, defined risk as an implication of significant uncertainty, which may be upside and downside. Risk is present in all the activities in a project. The attitude of most construction firms to risk is very poor in terms of coping with risks related issues, thus resulting in the failure of most projects not to meeting their schedules, budget and sometimes even the scope objectives. As a result, a lot of problem is inflicted on the client and contractors of such projects and also to the general public. Risk in the construction industry is perceived to be a combination of activities, which adversely affects project objectives viz; time, cost, scope and quality. Some risks in construction projects can be easily predicted or readily identified; still some can be totally unforeseen.

Compared to other industries, the construction industry is subjected to more risks prone events due to its unique features, such as long period, complicated processes, unpredictable environment, financial intensity and dynamic organization structures (Akintoye and MacLeod, 1997; Smith, 2003). Hence, applying effective risk management techniques to manage risks associated with various construction activities has become imperative for the successful delivery of a project.

Construction project risks can be related to technical, managerial, financial or sociopolitical aspects or can be related to natural disasters. In the domain of project management, some of the critical effects of risks are failure to achieve operational requirements and the required quality, non-completion of the project within stipulated time and estimated cost.

According to the Project Management Institute (PMI) (2004), Project Risk Management is one of the nine most critical parts of project commissioning. This indicates a strong relationship between managing risks and a construction project success. A disconnect or negligence of this vital relationship leads to project delays and abandonment, cost overrun, scope creep and poor quality of constructed projects which is prevalent in Nigeria and other developing countries.

An effective risk management methodology can help understand what kind of risks one is faced with, and also how one can manage these risks in the different phases of a project. Owing to its increasing importance, risk management has been recognized as a necessity in most industries today, and a set of techniques have been developed to control the influences brought by potential risks.

It is, however, pertinent to understand the risk management issues that affect construction projects, with a view to implementing risk management techniques and processes which would reduce the myriad of projects abandoned in Nigeria, fuelled by risk management issues such as scope

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creep, safety concerns, procurement options, cost and time overrun and poor quality of work among other issues. This study is therefore geared towards identifying the risk management issues in construction projects that can hamper the attainment of predefined project objectives of time, cost, quality and scope, with a view to ensuring construction project success.

Risk and uncertainty characterized situations where the exact outcome of a particular event or activity deviates from the original plan. Most construction projects are by their very nature risky due to the many uncertain variables imminent at the point of implementation which invariably affects project's cost, duration and performance. According to Nguyen and Chileshi (2013), various studies have revealed that the adoption of risk assessment and management practices are closely tied to project performance. They further opined that construction projects are often prone to complexities as a result of incidences of uncertainties. As a result of these uncertainties, cost and quality parameters are affected negatively given rise to risk which most often leads to failure. According to Dada, et al. (2003), most contractors in the developing countries lack experience and knowledge to effectively contain with risk related cases. In as much as they are not familiar with risk factors inherent in construction projects, the consequences becomes obvious thus leading to failure of such projects. Suffice it to say that, schedule overrun, design requirement variations, rising cost of raw materials, increasing labor fee, fluctuating product prices, changing market demand, fluctuating interest and exchange rate etc. point to the fact that they are unpredictable events that can affect or even hinder a project from reaching its predestined destination. These uncertainties are factors that precipitate the incidences of project abandonment, schedule and cost overrun, and poor quality of work in a construction project. Omotosho (2011), opined that there is an estimate of about 11, 886 publicly financed projects that have been abandoned for the past 4 decades across Nigeria. The findings of the study by Omotosho (2011) attributed the causes of these abandoned projects to corruption, lack of funding and most importantly, poor attitude to risk management processes and practices in construction projects. Dada, et al. (2003) further opined that the rate of abandonment, cost and schedule overrun, as well as scope creep in construction projects, will continue to soar until risk management practices are recognized as an integral component of project success and subsequently implemented accordingly. By analyzing the influence, one can make better predications and control the schedule as well as ensure that projects are completed successfully.

This research is focused on the risk management issues in construction projects. Therefore, the scope of this work is narrowed down to studying the impacts and effects of risk issues on project schedule, cost, scope and quality parameters. The impact of the identified construction project risks on the four parameters of *Schedule*, *Cost*, *Quality* and *Scope*, and how these risks affects the overall project success, is what this study seeks to achieve.

Based on the identified problems posed at the beginning of this study, the following research questions arose;

1. To what extent has the level of implementation of risk management techniques been deployed in the execution of construction projects?
2. To what extent has the identified risks impacted on construction project objectives?

II. REVIEW OF RELATED LITERATURE

A lot of studies have been done in the area of risk management for construction projects, a significant outcome of which is the identification of myriad of risks that may influence the construction project delivery. A compendium of risk and risk-related definitions abound in the construction project literature. In the construction industry, risk is often referred to as the presence of potential or actual treats or opportunities that influence the objectives of a project during construction, commissioning, or at time of use. (RAMP, 1998).

Uncertainty means lack of certainty due to limited knowledge that it is impossible to state the outcome exactly, perhaps, more than one possible outcome happens.

In theory, risk is usually defined as a positive or negative deviation of a variable from its expected value. In general parlance, risk is understood only as a loss. Zenghua, (2011). Risk concerns the deviation of one or more results of one or more future events from their expected value. Technically, the value of those results may be positive or negative. However, general usage tends to focus only on potential harm that may arise from a future event, which may accrue either from incurring a cost or by failing to attain some benefits.

Risk management is a discipline that identifies, monitors and limits risks. It is the process in which the project manager and project team identify project risks, analyze and rank them, and determine what actions, if any, needed to be taken to avert these threats. Associated with this process are the costs, schedule, and quality and scope concerns of the project brought about by the solutions to those risks. Chitkara, (2011).

Chitkara (2011) posits that project risk management is the art and science of managing risks caused by unforeseen changes (uncertainties) which may require deviations from the planned approach and may therefore affect the achievement of the project objectives, while Irukwu (1991) describes risk management as a specialist management concept that involves the application of devised principles and techniques in order to promote and ensure the effective management of risks.

A. RISK MANAGEMENT ISSUES IN CONSTRUCTION PROJECTS

There are a number of risks that can be identified in the construction industry and which can confront any construction project regardless of its size and scope. Due to the nature of the construction sector, risk management is very important. It is most widely used in projects with high level of uncertainty. These types of risk investments are characterized by more formal planning, monitoring and controlling processes. The easiest way to identify risk is to analyze and draw a conclusion from projects that have failed in the past. To make sure that the project objectives are met, the portfolio of risks associated with all actors across the project life cycle (PLC) should be considered (Cleland and Gareis, 2006).

The changes in design and scope alongside the time frame and cost variations for project completion are the most common risks in the construction sector. The changes in the process, leads to changes in scope or design, the more additional resources, time and cost those changes require. Project completion ahead of time may be as troublesome as delays in a schedule. Late completion may be as a result of insufficient planning or design problems which in fact shortens the completion time but on the other hand leads to a low quality of final product and increased overall cost. On the other hand, being behind schedule generates increased costs for both investors and contractors due to non-compliance with ab initio contracted works (Gould and Joyce, 2002). And thus it is important to keep a balance in the concept of time-cost-quality tradeoff, which is more widely becoming an important issue in the construction sector (Zhang and Xing, 2010).

Depending on the project scope, types of risks may differ among different projects. In the early stages of the project where the planning and contracting of work alongside when the preliminary capital budget are being drawn up, risk management procedures should be initiated. In later stages, risk management applied systemically, helps to control those critical elements which can negatively impact on project performance. In other words, to keep track of previously identified threats, will result to an early warning signals to the project manager if any of the objectives are not being met (Tummala and Burchett, 1999).

Dada, (2010) identified financial, political and physical risks as the most important risk factors. Ojo, (2010) carried out an empirical study and found out the risk factor with the highest occurrence as design changes during construction, followed by inadequate specifications, while Obiegbu, (2010) found out that awarding the design to an unqualified designer is the most important ranked factors in risk categorization.

According to Zenghua, (2011), risk management issues in construction projects may be classified in a number of ways namely:

1. Socioeconomic factors
- Environmental protection
- Public safety regulation
- Economic instability
- Exchange rate fluctuation

2. Organizational relationships
- Contractual relations
- Attitudes of participants
- Communication

3. Technological problems
- Design assumptions
- Site conditions
- Construction procedures
- Construction occupational safety

Scott (2007), opined that risk management issues associated with construction projects include quality and safety, cost management, time management (programme / schedule), scope change management, procurement contracts, people management, information management, external influences, while Harvey et, al. (2001) listed design/ project changes and scope creep, budget/ cost overruns, project progress proposals, safety and site conditions as some of the risks associated with construction project. In his submission, Finnerty (1996) posits that Technological, Completion, Economic, Financial, Currency, Political, Environmental, Force majeure, External Influences are some of the risk management concerns associated with construction projects, while

However, Estate Management Manual, (2001), outlines the following as risks associated with construction projects.

- Commercial risk.
- Financial risk.
- Legal risks.
- Political risks.
- Social risks.
- Environmental risks.
- Communications risks.
- Geographical risks.
- Geotechnical risks.
- Construction risks.
- Technological risks.
- Operational risks.
- Demand/product risks.
- Management risks.

B. RISK MANAGEMENT PROCESS

This part focuses on defining and explaining the elements of risk management and presents the recommended overall structure for implementing risk management in construction projects. The Figure below reflects a structure that mirrors the perspective of the Project Management Institute's PMBOK (® Guide (2004) within the organizational environmental context.

Chapman and Ward (1997) outlined a generic risk management process consisting of nine phases:

1. Define the key aspects of the project;
2. Focus on a strategic approach to risk management;
3. Identify where risks may arise;
4. Structure the information about risk assumption and relationships;
5. Assign ownership of risks and responses;
6. Estimate the extent of uncertainty;
7. Evaluate the relative magnitude of the various risks;
8. Plan response;
9. Manage by monitoring and controlling execution.

In the PMBOK, PMI (1996) presents four phases of the risk management process: Identification, Quantification, Responses development and Control. Risk Management covers the process of Identification, Assessment, Allocation, and Management of all project risks (APM, 2000).

Risk management process is the basic principle of understanding and managing risks in a project. It consists of the main phases: Identification, Assessment and Analysis, and Response (Smith *et al.* 2006). All steps in risk management process should be included when dealing with risks, in order to efficiently implement the process in the project.

C. RISK IDENTIFICATION

This is the first stage in risk management and it entails capturing all the potential risks that could arise within the project. It is commonly acknowledged that of all the stages of risk management process, risk identification stage has the largest impact on the accuracy of any risk assessment (Chapman, 1998). To facilitate risk identification, risks can also be broadly categorized as controllable and uncontrollable risks (Flanagan and Norman, 1993). Further, controllable risks are those risks which a decision maker undertakes voluntarily and whose outcome is, in part, within direct control; and uncontrollable risks as those risks which we cannot influence (Chege and Rwelamila, 2000). Risk identification consists of determining which risks are likely to affect the project and documenting the characteristics of each. Risk identification is not a one-time event; it should be performed on a regular basis throughout the project (PMI, 2008).

Internal risks are things that the project team can influence, such as staff assignments and cost estimates. External risks are things beyond the control or influence of the project team, such as government actions. In project context, risk identification is also concerned with opportunities (positive outcomes) as well as threats (negative outcomes) (PMI, 1996). At this stage, a broad view should be taken to ascertain without any constraint the risks that are likely to impede the project in meeting its cost target. A failure to recognize the existence of one or more potential risks may result in a disaster or foregoing an opportunity for gain resulting from proper corrective action (Enshassi and Mayer, 2001).

The tools and techniques that are applied in risk identification vary as the projects they serve. However, some group of tools and technique types are most commonly applied. According to PMBOK (2004), they include documentation reviews, information-gathering techniques, checklists, assumptions analysis, and diagramming techniques.

Winch (2002) claims that the first step in the risk management plan is usually informal and can be performed in various ways, depending on the organization and the project team. It means that the identification of risks relies mostly on past experience that should be used in upcoming projects. In order to find the potential risks, an allocation needs to be done.

The purpose of identifying risks is to obtain a list with potential risks to be managed in a project (PMI, 2004). In order to find all potential risks which might impact on a specific project, different techniques can be applied. It is important to use a method that the project team is most familiar with and the project will benefit from. Authors describe many creative alternative methods. To systematize this process, all the methods which can be found in the literature have been put together in the table below. (PMI, 2004; Smith *et al.* 2006; Lester, 2007;)

Table 1: Risk Identification Techniques

Information Gathering Methods	Workshops Brainstorming Interviews Questionnaires Benchmarking Consulting Experts Past Experience Delphi Technique Risk Breakdown Structure Visit Locations
Documentation	Databases, historical data from similar projects Templates Checklists Study Project Documentation (plan, files etc) Study specialist literature
Research	Stakeholder Analysis Research Assumptions Research Interfaces

Source: (Smith *et al.* 2006; Lester, 2007; PMI, 2004)

D. RISK ASSESSMENT/ANALYSIS

Having identified the risks in construction projects, the next step in the risk management process is to analyze the risks. Risk assessment involves the overall ranking of risks using qualitative assessment approach and quantifying the risk exposures and developing risk response plan. According to (Grey, 1995; Aven, 2003), risk assessment is performed in numerous ways. Tools and techniques have been developed to consider probabilities and consequences, using historical data, statistical data or estimated judgment translated into numerical information.

Risk analysis is a component of the risk management process which deals with the causes and effects of events which causes harm. The objective behind such analysis is a precise and objective calculation of risks, it allows the decision making process to be more certain (Estate Management Manual, 2002). The essence of risk analysis is that it attempts to capture all feasible options and to analyze the various outcomes of any decision. For building projects, clients are mainly interested in the most likely price, but projects do have cost over-runs as well as time overrun and, too frequently, the 'what if' question is not asked (Flanagan and Norman, 1993).

Risk analysis involves assessing the identified risks. This requires that the risks are quantified in terms of their effect on cost, time or revenue. They can be analyzed by measuring their effects on the economic parameters of the project or process.

Although some researchers distinguish between the terms risk assessment and risk analysis and describe them as two separate processes. For the purpose of this research, however, this part of risk management plan will be consistent with the model provided by Smith *et al.* (2006) and described as one process.

In the analysis of the identified risk, two categories of methods – qualitative and quantitative – have been developed.

The qualitative methods are most applicable when risks can be placed somewhere on a descriptive scale from high to low level. The quantitative methods are used to determine the probability and impacts of the risks identified and are based on numeric estimations (Winch, 2002). Companies tend to use a qualitative approach since it is more convenient to describe the risks than to quantify them (Lichtenstein, 1996).

Within the quantitative and qualitative categories, a number of methods that uses different assumptions can be found, and it may be problematic to choose an appropriate risk assessment model for a specific project. The method chosen should depend on the type of risk, project scope as well as on the specific methods, requirements and criteria.

Lichtenstein (1996) explains a number of factors that can influence the selection of the most appropriate methods in the risk assessment for the right purpose. It is up to each organization to decide which of these factors are the most critical for them and develop the assessment accordingly. Table 2 below summarizes the various techniques used for risk analysis.

Table 2: Various risk analysis techniques

Risk Analysis	
a. Direct judgment b. Ranking options c. Comparing options d. Descriptive analysis	e. Probability analysis f. Sensitivity analysis g. Scenario analysis h. Simulation analysis

Adapted from (Ward and Chapman, 1997)

E. QUALITATIVE RISK ASSESSMENT

Qualitative methods of risk assessment are based on descriptive scales, and are used for describing the likelihood and impact of a risk. Qualitative methods are related to the quantitative methods, and in some cases constitute its foundations (PMI, 2008)

Risk Probability and Impact Assessment

By applying the method called risk probability and impact assessment, the likelihood of a specific risk occurring is evaluated. Furthermore, a risk's impact on a project objective is assessed regarding its positive effects for opportunities, as well as negative effects which result from threats. For the purpose of this assessment, probability and impact should be defined and tailored to a particular project (PMI, 2008). This means that clear definitions of scale should be drawn up and its scope depends on the project's nature, criteria and objectives (Cooper *et al.* 2005). PMI (2008) identifies exemplary range of probability from 'very unlikely' to 'almost certain'; however, corresponding numerical assessment is admissible. The impact scale varies from 'very low' to 'very high'. Moreover, as shown in Figure 6, assessing impact of project factors like time, cost or quality requires further definitions of each degree in scale to be drawn up. Each risk listed under the identification phase is assessed in terms of the probability and the impact of its occurrence (PMI, 2004).

Risk impact assessment investigates the potential effect on a project objective such as time, cost, scope, or quality. Risk probability assessment investigates the likelihood of each specific risk occuring. The level of probability for each risk and its impact on each objective is evaluated during an interview or meeting. Explanatory detail, including assumptions justifying the levels assigned, are also recorded.

Probability/Impact Risk Rating Matrix

The probability and impact assessed in the previous steps are used as basis for quantitative analysis and risk response which will be explained further. For this reason findings from the assessment are prioritized by using various methods of calculation which can be found in the literature (PMI, 2008). Westland (2006) computes the priority score as the average of the probability and impact. The range of priority score, the rating and color are assigned to indicate the importance of each risk (Westland, 2006). In order to set priorities, impact is multiplied by probability. The compiled results are shown in the matrix in figure 5 below (PMI, 2008). Such combination of factors indicates risks that are of low, moderate or high priority. Regardless of the method of calculation chosen, such a combination of data shows priority of previously identified risks by use of i.e. corresponding colors or numerical system and helps to assign appropriate risk response. For instance, threats with high impact and likelihood are identified as high-risk and may require immediate response, while low priority score threats can be monitored with action being taken only if, or when, needed (PMI, 2004).

Figure 1: Probability and Impact Matrix

Probability and Impact Matrix

Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05	0.10	0.20	0.40	0.80	0.80	0.40	0.20	0.10	0.05

Impact (ratio scale) on an objective (e.g., cost, time, scope or quality)

Each risk is rated on its probability of occurring and impact on an objective if it does occur. The organization's thresholds for low, moderate or high risks are shown in the matrix and determine whether the risk is scored as high, moderate or low for that objective.

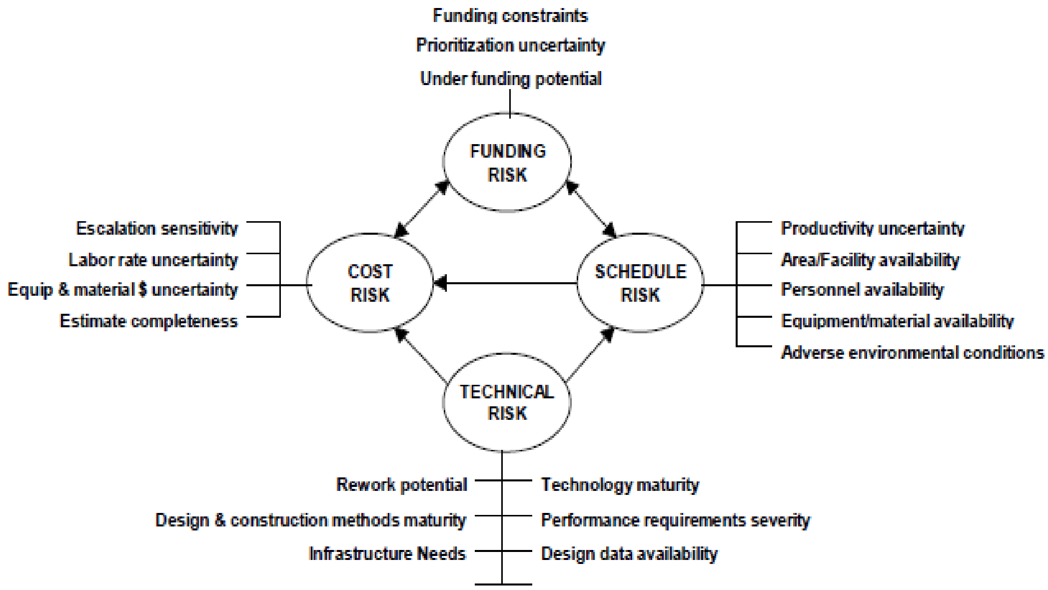
(PMI, 2004)

Lowe (2002) introduced a definition for the qualitative assessment of risk involving the identification of a hierarchy of risks, their scope, factors that cause them to occur and potential dependencies. The hierarchy is based on the probability of the event and the impact on the project. In qualitative risk analysis risk, management acts as a means to registering the properties of each risk (Kuismanen et al, 2002). Qualitative risk analysis assesses the importance of the identified risks and develops prioritized lists of these risks for further analysis or direct mitigation.

Qualitative Risk Ranking Guidelines

A method of systematically documenting the risk for each qualitative risk factor identified in the figure below is needed to perform a consistent evaluation of risk across the different project or program activities. To make this possible, qualitative definitions of risk factors are defined for three categories of risk (none/low, medium, and high). A simple example of a completed evaluation is shown in the figure 2 below.

Figure 2: Qualitative Risk Factor Ranking Criteria



(Kindinger and Darby 2000)

Uses of Qualitative Risk Analysis Results

The result from qualitative risk analysis are used to aid the project management team in three important ways (Kindinger and Darby, 2000):

- The qualitative risk analysis factor rankings for each project activity provides a first-order prioritization of project risks before the application of risk reduction actions. The more meaningful, result from conducting a qualitative risk analysis is the identification of possible risk-reduction actions responding to the identified risk factors. Risk reduction recommendations are often straightforward to make when the risk issue is identified.
- The final use of the qualitative risk analysis is the development of input distributions for qualitative and quantitative risk modeling.

F. QUANTITATIVE RISK ANALYSIS

Quantitative analysis is based on a simultaneous evaluation of the impact of all identified and quantified risks. The result is a probability distribution of the project's cost and completion date based on the risks in the project (Office of Project Management Process Improvement, 2003). The quantitative method relies on probability distribution of risks and may give more objective results than the qualitative methods, if sufficient current data is available. On the other hand, qualitative methods depend on the personal judgment and past experiences of the analyst and the results may vary from person to person. Hence the quantitative methods are preferred by most analysts (Ahmed, et al. 2001). Quantitative risk analysis considers the range of possible values for key variables, and the probability with which they may occur. Simultaneous and random variation within these ranges leads to a combined probability that the project will be unacceptable (ADB, 2002). Quantitative risk analysis involves statistical techniques that are most easily used with specialized software (Office of Project Management Process Improvement, 2003). Quantitative risk analysis assigns probability or likelihood to the various factors and a value for the impact and then identify severity for each factor (Abu 2002).

Methods of Quantitative Risk Analysis

Any specific risk analysis technique is going to require a strategy. It is best to begin by providing a way of thinking about risk analysis that is applicable to any specific tool that might be used (Jaser, 2005). Jaser (2005) went on to describe briefly the various techniques.

- ***Probability Analysis*** is a tool for investigating problems which do not have a single value solution.
- ***Monte Carlo Simulation*** Monte Carlo Simulation is the most easily used form of probability analysis. Is presented as the technique of primary interest because it is the tool that is used most often.
- ***Sensitivity Analysis*** is a tool that has been used to a greater extent by most risk analysts at one time to another.
- ***Breakeven Analysis*** is an application of a sensitivity analysis. It can be used to measure the key variable which shows a project to be either attractive or unattractive.
- ***Scenario Analysis*** is a rather grand name for another derivative of sensitivity analysis technique which tests alternative scenarios; the aim is to consider various scenarios as options.
- ***Decision Tree Analysis***

Sensitivity Analysis and Monte Carlo Simulation are discussed briefly:

SENSITIVITY ANALYSIS

Sensitivity analysis is a deterministic modeling technique which is used to test the impact of a change on the value of an independent variable on the dependent variable. It identifies the point at which a given variation in the expected value of a cost parameter leads to a change in decision. Sensitivity analysis is performed by changing the values of independent risk variables to predict the economic criteria of the project (Merna and Stroch, 2000). Sensitivity analysis enables the analyst to test which components of the project have the greatest impact upon the results, thus narrowing down the main simplicity and ability to focus on a particular estimate (Flanagan and Norman, 1993).

The advantage of sensitivity analysis is that it can always be done to some extent. The major disadvantage of sensitivity analysis is that the analyst usually has no idea how likely these various scenarios are. Many people equate possible with probable, which is not the case with sensitivity analysis (Yoe, 2000).

MONTE CARLO SIMULATION

Simulation is a probability-based technique where all uncertainties are assumed to follow the characteristics of random uncertainty. A random process is where the outcomes of any particular process are strictly a matter of chance (Flanagan, 2003). The Monte Carlo process is simply a technique for generating random values and transforming them into values of interest. Different values of risk variables are combined in a Monte Carlo simulation. The frequency of occurrence of a particular value of any one of the variables is determined by defining the probability distribution to be applied across the given range of values. The results are shown as frequency and cumulative frequency diagrams. The allocation of probabilities of occurrence to each risk requires the definition of ranges for each risk (Merna and Stroch, 2000). Lukas (2004) presented risk analysis simulation steps:

1. Start with a project estimate done for each cost account.
2. Decide on the most likely cost, pessimistic costs, and optimistic costs.
3. Insert data into simulation software then run the model.
4. Determine contingencies based on desired risk level.
5. Prioritize "risky" cost accounts for risk response planning.

In most risk analysis work, the main concern is that the model or sampling scheme used should reproduce the distributions determined for the inputs (Abrahamsson, 2002). On the other hand, Lukas (2004) stated some of the benefits of simulation to include:

- Improves estimate accuracy, it helps determine a contingency plan for an acceptable level of risk.
- Helps determine the bigger cost risks for risk response planning.

Quantitative methods need a lot of work for the analysis to be performed. The effort should be weighed against the benefits and outcomes from the chosen method, for example smaller projects may sometimes require only identification and taking remedial action on the identified risks, while larger projects require more in depth analysis. The quantitative methods estimate the impact of a risk on a project (PMI, 2008). They are more suitable for medium and large projects due to the number of required resources such as complex software and skilled personnel (Heldman, 2005).

G. RISK RESPONSE PLANNING

Risk response is a critical element in the risk management process that determines what action (if any) will be taken to address risks evaluated in the identification, qualification, and quantification stages. All information generated to date becomes crucial in determining what the organization will do, that is, in keeping with the risks, the organization's tolerance, the project tolerances, and the customer's culture.

All risks have causes; sometimes multiple risks within a given project arose from a common cause. In developing risk responses, the project team should work to identify any common cause, as those causes may have common risk responses.

Ahmed, et al. (2001), Akintoye and MacLeod (1997), Enshassi and Mayer (2001), and Education and Learning Whales (2001), (PMI, 2008) argued that there are four distinct ways of responding to risks in a construction projects, namely, risk avoidance, risk reduction, risk retention and risk transfer. Those ways are discussed in below briefly.

Risk Avoidance

Risk avoidance is sometimes referred to as risk elimination. Risk avoidance in construction is not generally recognized to be impractical as it may lead to, projects not going ahead, a contractor not placing a bid or the owner not proceeding with project funding as two practical examples of totally eliminating the risks. There are a number of ways through which risks can be avoided, e.g. tendering a very high bid; placing conditions on the bid; pre-contract negotiations as to which party takes certain risks; and not bidding on the high risk portion of the contract (Flanagan and Norman, 1993).

Risk Transfer

This is essentially trying to transfer the risk to another party. For a construction project, an insurance premium would not relieve all risks, although it gives some benefits as a potential loss is covered by fixed costs (Tummala and Burchett, 1999)

Risk transfer can take two basic forms:

- The property or activity responsible for the risk may be transferred, i.e. hire a subcontractor to work on a hazardous process;
- The property or activity may be retained, but the financial risk transferred, i.e. by methods such as insurance and surety.

Risk Retention

This is the method of reducing or controlling risks by internal management (Zhi, 1995); handling risks by the company who is undertaking the project where risk avoidance is impossible, possible financial loss is small, probability of occurrence is negligible and transfer is uneconomic (Akintoye and MacLeod, 1997). The risks, foreseen or unforeseen, are controlled and financed by the company or contractor. There are two retention methods, *active* and *passive*;

a. Active retention (sometimes referred to as self-insurance) is a deliberate management strategy after a conscious evaluation of the possible losses and costs of alternative ways of handling risks.

b. Passive retention (sometimes called non-insurance), however, occurs through negligence, ignorance or absence of decision, e.g. a risk has not been identified and handling the consequences of that risk must be borne by the contractor performing the work.

Risk Reduction

This is a general term for reducing probability and/or consequences of an adverse risk event. In the extreme case, this can lead to eliminating entirely, as seen in "risk avoidance". However, in reduction, it is not sufficient to consider only the resultant expected value, because, if potential impact is above certain level, the risk remains unacceptable. In this case, one of the other approaches will have to be adopted (Piney, 2002).

H. RISK CONTROL

After risks have been identified, qualified, and quantified, and clear responses have been developed, those findings must be put into action. Risk monitoring and control involves implementing the risk plan, which should be an integral part of the project plan. Two key challenges are associated with monitoring and controlling. The first is putting the risk plans into action and ensuring that the plans are still valid. The second is generating meaningful documentation to support the process. The final step in the description of the risk management flow chosen in this research involves ensuring the use of the prior steps. It is a question of making sure that the identified risks, which are regarded as important, are also controlled in the way that was planned in the response step.

In the control step, it is also possible to identify new risks that emerge and the continuous process proceeds. Zenghua (2011)

Risk control aims at controlling deviations, reduce risks and maximize the project value. It handles risks in a manner that achieves project objectives efficiently and effectively. It is based on a proactive other than a reactive approach by having the right measures in place and improving on them constantly. There are no ready- made solutions to minimize risks, but Chitkara (2011) gives the following remedial measures that can assist in controlling the risks associated with construction projects;

- Adjust plans, scope of work and estimates to counter risk implications.
- Monitor risks regularly, evolve alternate plans to manage foreseeable risks, when necessary.
- Make timely decisions.
- Keep all concerned informed about possible risks.

He concluded that the monitoring of risks response plan serves many purposes. The monitored records form the basis for making risk related decisions. Such generated statistical data leads to a greater understanding and envisioning of risks in future projects. Risk reports reveal the effectiveness of the risk management process and brings out the strengths and weakness at various levels of management.

III. RESEARCH METHODOLOGY

Questionnaire survey was used to elicit information on risk management issues from contractors, clients and consultants in the Nigerian construction industry using selected organizations. The questionnaire was designed to identify risk management issues involved in construction projects, analyze the different risks identified as per their impact on cost, scope, time and quality objectives of construction projects, determine the techniques adopted for the analysis and response of identified construction project risks and proffer suggestions and recommendations as to how to minimize the effects of construction project risks and maximize the project's objective of time, cost, quality and scope. A four-page questionnaire, accompanied with a covering letter, was distributed to contactors, consultants and clients in the construction industry. Respondents were asked to score/rank certain questions using these scales; "Strongly disagree-1", "Disagree-2", "Indifferent-3", "Agree-4", "Strongly agree-5"; and "Most significant-1", "Very significant-2", "Fairly significant-3", "Significant-4", and "Least significant-5" as the rating scale for answering the questions that followed. In order to ensure that the data collected were reliable and adequate, it was necessary to have a population sample that is homogeneous and comprehensive in such a way that the population gives a true representation of the contractors, consultants and clients. The population of this research work comprises of contractors, consultants and clients of construction projects in Aba, Owerri and Portharcourt. In arriving at the sample size, the formula below was used (Creative Research Systems, 2001):

$$SS = \frac{Z^2 * P * (1-P)}{C^2}$$

Where SS = Sample Size.

Z = Z Value (e.g. 1.96 for 95% confidence interval).

P = Percentage of picking a choice, expressed as decimal, (0.60 used for sample size needed).

C = Confidence interval (10.48% or 0.1048)

$$\frac{SS \times 0.6 \times (1 - 0.6)}{0.1048^2} = 83.94 \cong$$

The sample size of the research was 84. This means that a total of 84 questionnaires were given out to respondents. The firms contacted for the study were selected based on their scale of operation and number of employees. Each of the construction companies were given fifteen (15) questionnaires each, while twenty four (24) questionnaires were distributed to two (2) consultancy firms. The questionnaires were distributed both through e-mails and by personal contact.

The results from the study were analyzed using the Statistical Package for the Social Sciences (SPSS) version 17.0 software. The various responses from the respondents were analyzed to determine their frequencies and descriptive characteristics. Frequency tables and bar chats representing respondents' opinions on some questions (Likert scale questions) were gotten from the analysis. The responses were then developed into tables, using specific formulas, from which the means of both the dependent and the independent variables were later subjected to linear regression analysis in the first instance. Secondly, the ranking of risk triggers was done to ascertain the risks management issues associated with construction projects and their attendant effect on predetermined project objectives. Relative Importance Index (RII) was also used in ranking of the risk triggers that leads to project cost, time, quality and scope related risks. The result of the analysis was then interpreted to determine the relationship that exists between risk management issues and construction projects- in terms of predetermined project objectives of cost, time, quality and scope.

IV. DATA ANALYSIS AND FINDINGS

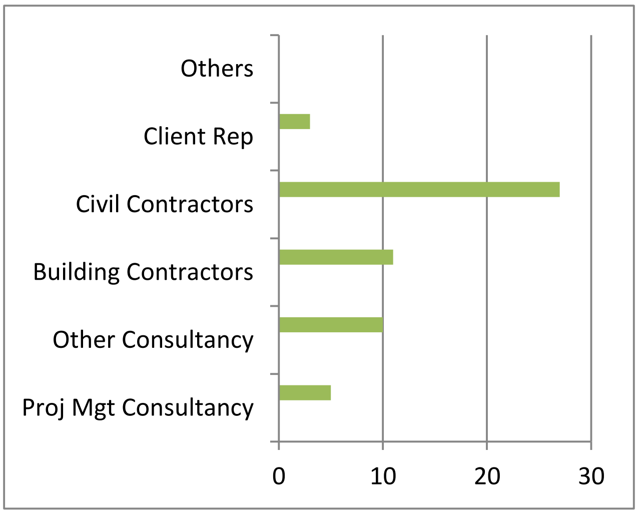
Based on the sample size, a total of 84 questionnaires were distributed to construction companies, consultants to construction projects, and clients. The table below represents the number of questionnaires distributed to the various stakeholders and the number retrieved.

A total of 57 questionnaires were returned representing 67.86% total response rate while 56 questionnaires were valid for the analysis.

A. INFORMATION ON DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

(Type of Company/ Organization)

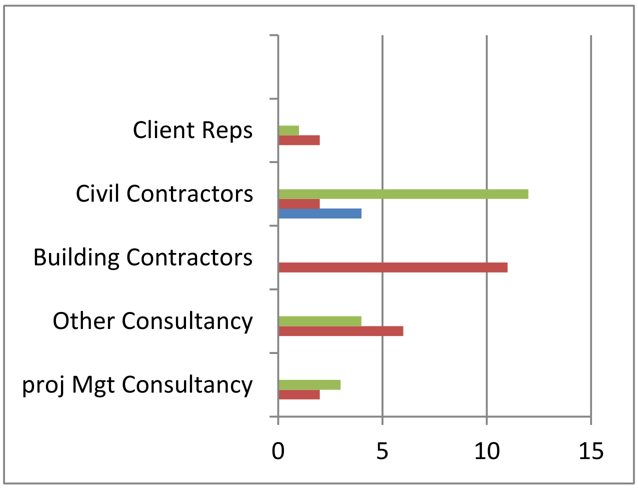
Figure 3: Type of Company / organization.



Source: Analysis of Field Data 2013

From the above data, consultancy firms' accounted for 26.8% of the total respondents, while 67.8% represents the percentage of construction companies that took part in the research. The Client accounted for 5.4% of the total number of respondents.

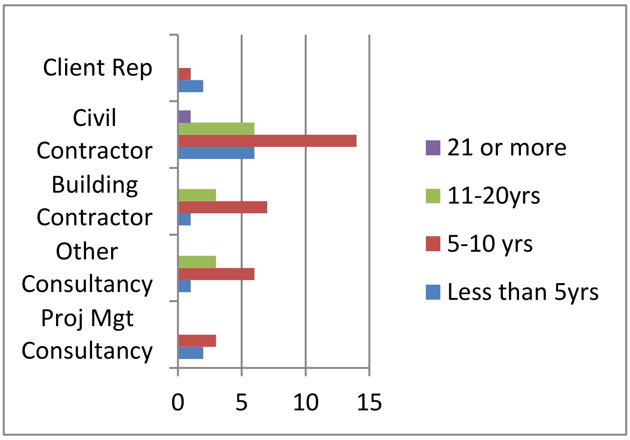
Figure 4. Number of employees Source



Source: Field data 2013

From the data above, 8 respondents indicated that they worked with consultancy firms with staff strength range of 21-50, while 7 respondents indicated that they work with a consultancy firm with a staff strength ranging between '51-100'. Furthermore, 4 respondents indicated that their organization have staff strength ranging from 51-100, while 13 respondents indicated that the staff strength of their organization ranges from 101-300. 12 respondents indicated 301-500 as the number of employees in their company, while 9 respondents indicated 'above 500' as the number of employees in the payroll of their company. 2 respondents indicated that their organizational strength ranging from 1-20 while a respondent indicated '51-100' as the staff strength of the organization. The essence of the classification into "number of employees" is to determine the size of the company in terms of scale of production/ operation. Arguably, this criterion helped in determining, to a greater extent, the awareness of risk management in such organizations.

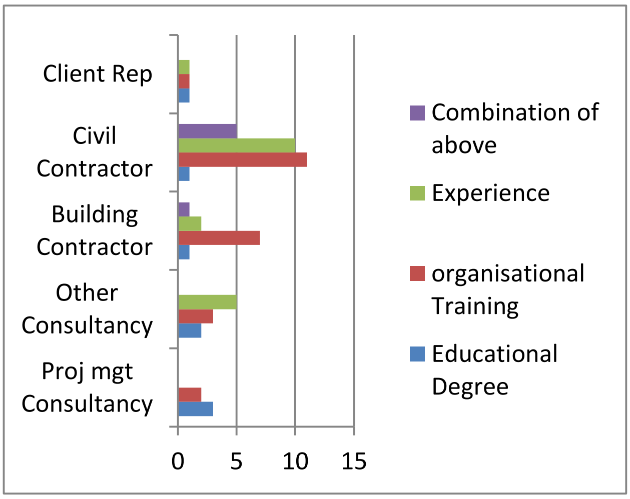
Figure 5: Years of Experience in the construction industry



Source: Analysis of field data 2013.

For construction consulting companies, 1 respondent had less than 5 year- experience while 8 respondents indicated between 5-10 years of experience in the construction industry. However, 6 respondents had a work experience of 11-20 years. On the construction company side, 7 respondents had less than 5years work experience while a large chunk of them i.e. 21 had between 5-10 years. This shows that the responses will be relatively reliable and accurate as they will be responding based on their years of experience in the construction industry. 1 had an experience of '21 and above'. 2 respondents had between 5-10 years of experience from the client perspective while 1 had an experience of 11-20 years in the field of consulting.

Figure 6:Knowledge of risk management.



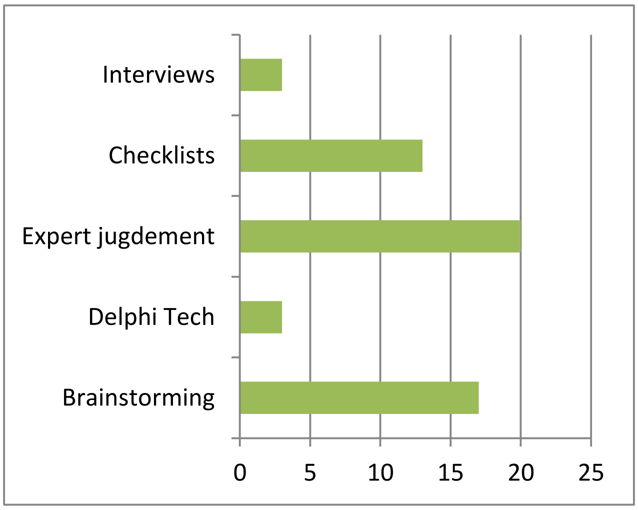
Source: Field data 2013

From the perspective of the consultants, 5 respondents each indicated that their knowledge of risk management came from organizational training, experience and a combination of the above. 2 construction company's respondents indicated that they got wind of risk management while attending an educational institution, while 18 indicated organizational training as their source of awareness of risk management. This shows that certain construction companies are aware of risk management and do well to acquaint their workers through training. 12 respondents leveraged on the experience in the construction industry as their source of knowledge. 6 respondents said a combination of the above is their source. 1 each of the respondents from the client group stated that organizational training, experience and a combination of all is their source of awareness of risk management.

B. ANALYSIS OF 'SECTION B' OF THE QUESTIONNAIRE

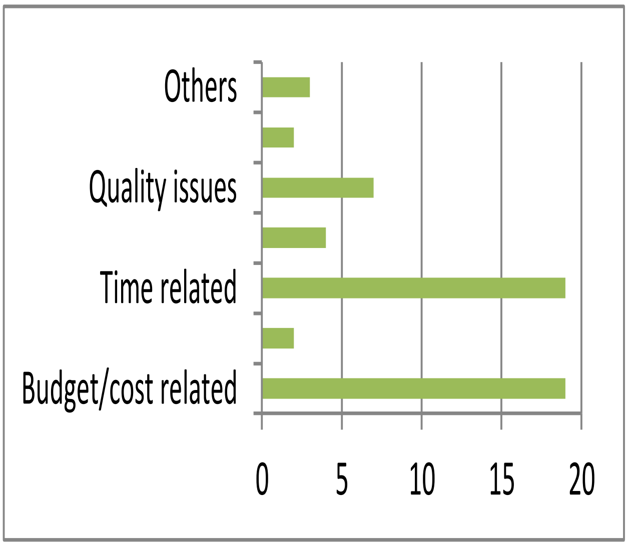
QUESTION 1: Techniques for Risk Identification

Figure 7: Techniques for the Identification of risk management



QUESTION 2: Risk Management Issues in Construction Projects

Figure 8: *Risk Management Issues in Construction Projects*



(Source: Field data 2013)

C. PERCENTAGE ANALYSIS:

In this analysis, the percentages of the frequencies of the responses for all the questions were analyzed with respect to the sample. This is given by the formula:

$$\frac{x}{y} \times 100$$

Where x = the number of true outcomes for each question

y = Total number of possible outcome.

The use of the above formula in concert with the frequency and descriptive statistics (representing respondent's opinion on questions asked) gave rise to the summary tables below.

Table 3: Effects of Risk Management Issues on project objectives 'X' Variable

	RISK MANAGEMENT ISSUES		SD	D	I	A	SA
S/N	**QUESTION**	**FREQ.**	**1**	**2**	**3**	**4**	**5**
1	You rely more on intuition, experience or expert judgment rather than risk management techniques in the identification of construction risks/issues	56 100%	3 5.4	11 19.6	9 16.1	26 46.4	7 12.5
2	Your company is not aware of risk management processes and techniques and therefore relies on "non-scientific" means in the identification of construction issues/risks.	56 100%	11 19.6	31 55.4	8 14.3	4 7.1	2 3.6
3	The risk management processes does not reduce the issues/risks associated with construction process	56 100%	20 35.7	22 39.3	7 12.5	7 12.5	0 0
4	The risk management culture prevalent in the construction industry today is not strong enough to effectively tackle construction risks/ issues	56 100%	1 1.8	8 14.3	5 8.9	28 50	14 25
5	Your organization does not see the need to implement risk management processes in construction projects being handled by it.	56 100%	13 23.2	28 50	9 16.1	5 8.9	1 1.8
6	The low level of awareness and implementation of risk management in construction projects is due to the absence of strong regulatory framework in the country	56 100%	1 1.8	8 14.3	0 0	26 46.4	21 37.5
	Mean **Mean percentage**	**56** **100%**	**8.17** **14.58**	**18** **32.15**	**6.33** **11.3**	**16** **28.55**	**7.5** **13.4**

Table 4: Construction Project Objectives.

			SD	D	I	A	SA

S/N	EFFECT OF RISK MANAGEMENT ISSUES ON PROJECT OBJECTIVES	FREQ.	1	2	3	4	5
1	Risk management does not have much effect on predetermined project objectives of time, cost, quality and scope	56 100%	18 32.1	31 55.4	0 0	7 12.5	0 0
2	The most important construction issues/ risks that impact more on construction projects are cost, time, quality and scope related risks/issues	56 100%	0 0	6 10.7	14 25	24 42.9	12 21.4
3	Organizations do not adopt risk management in construction projects due to its addition cost to the overall cost of the project.	56 100%	0 0	11 19.6	18 32.1	20 35.7	7 12.5
4	The non- implementation of risk management processes is what majorly leads to time and cost overrun in construction projects.	56 100%	8 14.3	17 30.4	10 17.9	18 32.1	3 5.4
	Mean **Mean percentage**	**56** **100%**	**6.5** **11.6**	**16.25** **29.03**	**10.5** **18.75**	**17.25** **30.8**	**5.5** **9.83**

Source: Field data 2013

Table 5: X and Y Data for Regression Analysis

X	Y	X^2	Y^2	XY
8.17	6.5	66.75	42.25	53.11
18	16.25	324.00	264.06	292.50
6.33	10.7	40.07	114.49	67.73
16	17.25	256.00	297.56	276.00
7.5	5.5	56.25	30.25	41.25
56	**56**	**743.07**	**748.62**	**730.59**

The "X and Y" data are imputed into Statistical Package for Social Science (SPSS) version 17.0, and the regression analysis was carried out. The following figures and tables below were the results gotten from the analysis of table 10 using SPSS 17.

Table 6: Correlations between variables

Correlations			
		Y	X
Pearson Correlation	y	1.000	.869
	x	.869	1.000
Sig. (1-tailed)	y	.	.028
	x	.028	.
N	y	5	5
	x	5	5

Source: Analysis of field data 2013

Table 7: Model summary:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.869[a]	.755	.674	3.08935	.755	9.251	1	3	.056
a. Predictors: (Constant), x									
b. Dependent Variable: y									

Source: Analysis of field data 2013

Table 8: Analysis of Variance

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	88.295	1	88.295	9.251	.056[a]
	Residual	28.632	3	9.544		
	Total	116.927	4			
a. Predictors: (Constant), x						
b. Dependent Variable: y						

Source: Analysis of field data 2013

Table 9: Coefficients :

Coefficientsa											
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	1.463	3.499		.418	.704	-9.672	12.598			
	x	.873	.287	.869	3.042	.056	-.040	1.786	.869	.869	.869
a. Dependent Variable: y											

Source: Analysis of data2013

D. ANALYSIS OF SECTION C OF THE QUESTIONNAIRE

The aim of the analysis of this section of the questionnaire was to establish the relative importance of the various factors identified as responsible for affecting certain project objective. The score for each factor was calculated by summing up the scores given to it by the respondents. The relative importance index (RII) was calculated using the following formula (Fagbenle *et al.*, 2004):

Relative Importance Index in the analysis

$$RII = \frac{\Sigma PiUi}{N(n)} \quad \text{……………………(1)}$$

Where,

RII = Relative Importance Index

Pi = respondent's rating of the trigger event

Ui = number of respondents placing identical weighting/rating on trigger

N = sample size, 56

n = the highest attainable score on the rating scale i.e. 5

For example, to compute the RII of Risk trigger (tight project schedule) as per significance to Cost.

Type of Company/ stakeholder group	Most Significant	Very significant	Fairly significant	Significant	Least significant	Total
Consultants	8	4	3	0	0	15
Contractors	20	2	11	4	1	38
Client	2	1	0	0	0	3
Total	30	7	14	4	1	56
Scale	5	4	3	2	1	-

Table 10 Risk trigger: Tight Project schedule

The frequency tables and mean for the various responses were calculated and analyzed using SPSS version 17.0. The tables below were deduced from the frequency table, mean (statistics) table and the application of the above formula on the responses gotten from respondents.

Table 11: Ranking of Risk Triggers as per their Significance on Project Cost

Risk ID	Risk Trigger	RII	Mean	Rank
i.	Tight Project Schedule	0.818	4.09	1
ii.	Inaccurate cost estimates, planning and control	0.686	3.79	2
iii.	Changing Market Conditions/Price inflation of Construction materials	0.679	3.39	3
iv.	Variations by client	0.421	2.11	4
v.	Design variations	0.336	1.68	5

Note: Rank 1=Most Significant Risk trigger, Rank 5= Least Significant Risk trigger

Source: Analysis of field data 2013

At a glance, 'Tight Project Schedule' is ranked '1' with a mean of 4.09 and relative importance index of 0.818. The respondents indicated that it is the most significant risk trigger event that impacts on the cost of the project. This is closely followed by 'Inaccurate cost estimates, planning and control' which has a mean of 3.79 and an RII of 0.686. The least significant risk trigger as indicated through the analysis of the results shows that 'design variations' with a mean of 1.68 and an RII of 0.336.

Table 12: Ranking of Risk Triggers as per their Significance on Project Schedule

Risk ID	Risk Trigger	RII	Mean	Rank
iv.	Delay in release of funds	0.839	4.20	1
i.	Inaccurate Activity time estimates	0.814	4.07	2
ii.	Poor Allocation of Resources	0.511	2.46	3
iii.	Design variations	0.464	2.32	4
v.	Incomplete approval	0.400	2.00	5

Note: Rank 1=Most Significant Risk trigger, Rank 5= Least Significant Risk trigger

Source: Analysis of field data 2013.

'Incomplete approvals', with a mean of 2.00 is ranked '5' as the least significant risk trigger item that affects the duration of projects. However, respondents indicated that the most significant risk trigger event that impacts on the duration of construction project is 'Delay in release of funds', with a mean of 4.20 and an RII of 0.839. This is closely followed by 'Inaccurate Activity time estimates' which has an RII of 0.814.

Table 13: Ranking of Risk Triggers as per their Significance on Project Scope

Risk ID	Risk Trigger	RII	Mean	Rank
i.	Frequent Changing Scope Requirement	0.693	3.46	1
ii.	Ill-defined Project scope	0.639	3.41	2
iii.	High Complexity of Project	0.632	3.16	3
iv.	Ineffective control system	0.625	3.13	4
v.	Design variations	0.379	1.89	5

Note: Rank 1=Most Significant Risk trigger, Rank 5= Least Significant Risk trigger

Source: Analysis of field data 2013

'Frequent Changing Scope Requirement', with a mean of 3.46 and an RII of 0.693 is ranked '1' as the most significant risk trigger item that affects the scope of projects. This is closely followed by 'Ill-defined Project scope' which has an RII and mean of 0.639 and 3.41 respectively. However, respondents indicated that the least significant risk trigger event that impacts the scope of construction projects is 'design variations' with a mean and an relative importance index of 0.379 and 1.89 respectively.

Table 14: Ranking of Risk Triggers as per their Significance to Project Quality

Risk ID	Risk Trigger	RII	Mean	Rank
i.	Unachievable quality specifications and performance	0.786	3.96	1
ii.	Incomplete or Inaccurate cost estimate	0.714	3.57	2
iii.	Unavailability of sufficient skilled workers	0.536	2.68	3
iv.	Absence of Quality assurance plan	0.489	2.45	4
v.	Low management competency of subcontractors	0.479	2.39	5

Note: Rank 1=Most Significant Risk trigger, Rank 5= Least Significant Risk trigger

Source: Analysis of field data 2013

From the analysis carried out, respondents opined that 'unachievable quality specifications and performance' with a mean and an RII of 3.96 and 0.786 respectively, is the most significant risk event that adversely affects the quality objectives of projects. This is followed by 'Incomplete or inaccurate cost estimates'. The least significant risk trigger that affects the quality objective of projects, as indicated by respondents, is 'Low management competency of subcontractors'. This trigger has a mean and relative importance index of 2.39 and 0.479 respectively. It is ranked '5'.

E. INTERPRETATION OF RESULTS ON REGRESSION ANALYSIS

A correlation of + 1.00 indicates that changes in one variable are always matched with changes in other variables, while a correlation of -1.00 indicates that decrease in one variable are matched by increase in the other. Whereas, a correlation close to zero indicates little linear relationship between two variables. Decisions are however taken where the values of X and Y variables tend to +1.00. This implies that the changes in one variable will always be matched with changes in the other variable. In this case however, as X variables (Risk Management Issues) increases, Y variables (factors hampering construction Project Objectives) also increases. This implies that as the risk management issues increases, so also does the possibility of not attaining construction project objectives of time, cost, quality and scope.

However, with the value of R= 0.869 (table 15) representing 87%, it is evident that there is a strong linear relationship between risk management issues and the attainment of construction project objectives.

Table 13 being the model summary shows that R^2 representing 75.5% contributes greatly to the dependent variable Y, while 24.5% of the variation is attributed to the influence of other factors not explained by the regression function. R^2 is the coefficient of determination and is a measure of the regression model as a whole. With 0.755 as value shows that the model is good being that its very close to '1'; r^2 = 1 is a perfect case, (Neter, 1974). R^2 shows that 75.5% of the variability in Y is explained by X while the remaining 24.5% is attributable to error term. This indicates a strong relationship between both. This means that the model is adequate and reliable for any analysis drawn from it. The value of R^2 = 0.755 also shows that risk management issues, if not properly addressed, will account for about 75.5% negative impact on construction project objectives. Therefore, it is concluded that risk management issues has a great impact on construction projects. R_{adj} is the adjusted value that tells that the model accounts for 67.4% of variance in the project objectives which is seen as good. Here we can see that the model accounted for 67.4% of the variance (adjusted r^2 = 0.674).

The fitted regression function **Y = 0.873X + 3.499** indicates that per unit increase in risk management issues, results in the non-attainment of construction project objectives by a rate increase of 0.873, i.e. about 87%. Indicating that as X increases, Y will increase by a constant amount of 0.873.

The regression analysis result of risk management issues in construction projects shows that risk management issues have a positive relationship with construction projects. This means that risk management issues, if not well addressed in a pragmatic way such as the implementation of risk management processes and techniques, can hamper the attainment of predefined construction project objective of time, cost, quality and scope.

V. DISCUSSION OF FINDINGS

It is imperative to note that practitioners in the construction industry- contractors, clients, and consultants (respondents in the study), posits that risk management culture prevalent in the construction industry today is not strong enough to effectively tackle construction risks issues. Half of the respondents 'strongly agreed' to this assertion while 14% of the respondents towed the line of 'agreeing' when asked same question. This is to show that the construction industry practitioners in Nigeria are yet to completely embrace risk management as a veritable tool for steering construction projects to their desired end.

Again, the study revealed that organizations within the construction industry do not work with risk management in such a structured manner, which means that there are some other ways of managing risks when it occurs. One of the reasons for not using such structured methods, according to respondents, was the additional cost to be incurred when performing risk management on construction projects. 20% of respondents 'agreed' that the additional cost associated with risk management in construction projects is what is hindering its awareness and implementation. Also, 7% of the respondents 'strongly agreed' to the above assertion. Moreover, the general lack of knowledge in the area of risk management can result from limited resources such as time, money or organizational culture and priority, as only 2 persons out of the 38 respondents from construction firms had a degree in risk management related area while 18 had training in risk management. The rest of them depended on their experience in the construction industry in the management of risks and issues peculiar to construction projects.

Thirdly, the results obtained from the factors/triggers relating to construction projects revealed that 'tight project schedule' is the most significance (risk) factor that affects construction project in terms of project cost. Outsourcing certain phases of the construction work to specialist contractors can help reduce the risk posed by tight project schedule. 'Inaccurate cost estimates, planning and control' ranked the second significant risk trigger factor that affects project cost. Inaccurate estimates could be as a result of incomplete or poor design because without a complete and properly detailed design, it will be difficult for a professional estimator to prepare a perfect specification and Bill of Quantities for a project, and this may result in cost variations due to under-estimation and re-measurements if not properly done. The remedy to this could be outsourcing the drawing to specialist designers with a track record of performance.

Also, 'delay in the release of funds' ranked first as regards the outlined risk triggers with respect to project cost. The idea of delaying payments meant for contractors for certified works executed has been a major factor in prolonging works beyond their duration and subsequent abandonment of such projects. Reconciliation and verification of claims and other variations made by contractors to the client or client representative/consultant to the project should be fast-tracked so as to keep the project within the stipulated time limit. An introduction of a clause in the terms of the contractual agreement that mandates the verification of claims and other variations within a specified period in which failure to comply with attracts a penalty, this would help in ameliorating the delay for payment to the contractors.

Furthermore, respondents opined that the non-implementation of risk management processes is what constitutes to time and cost overruns in construction projects which invariably leads to delays and abandonment (mostly in publicly funded projects). This fact was corroborated by Omotosho (2011), in his report on the Abandoned Project Audit Commission, set up by President Goodluck Jonathan, that there are an estimated 11, 886 federal government projects that has been abandoned in the last 40 years across the country. The findings attributed the causes of abandonment of construction projects to corruption, poor funding and most importantly, poor risk management processes and practices in construction industry.

The findings of the study also revealed that the quality of most construction works are affected by unachievable quality specifications and performance requirements. About 45% of respondents agreed to this assertion while about 29% of them cited incomplete or inaccurate cost estimates as the trigger factor to low quality of construction work.

It is therefore pertinent to enshrine risk management processes and techniques as a key component of all construction projects so as to mitigate the risks issues that are inherent in most construction projects.

The study also revealed that brainstorming, expert judgment and the use of checklists as the first three techniques employed by the construction industry players. These three 'techniques' for the identification of risk management issues that pertains to construction projects can be classified as 'subjective' techniques as they are based on perception and reliance on years of experience in the industry rather than on more 'scientific' and objective ways of identifying and analyzing risks issues that are provided by risk management processes. In addition to the above, the respondents identified the 'most related' risk management to their construction projects to include budget/cost related issues, time related issues, communication issues/risks, project scope issues, quality issues, design and specification issues and others (safety and environmental issues/ risks). The percentages of respondents' response towards the question are; 33.9% for cost and time related issues/ risks, 3.6%, 7.1%, 12.5%, 3.6% and 5.4% respectively. This shows that the most common risk management issues are cost and time related going by the responses gathered from the research. This serves as a pointer on the area of construction projects that requires the most needed attention.

Also, the developed simple regression model revealed that a linear relationship exist between risk management issues such as price fluctuation of materials, delays in the settlement of claims, variation in scope and design, time and cost overruns etc., has a positive relationship with construction projects. This means that risk management issues, if not well addressed can hamper the attainment of predefined project objectives of time, cost, quality and scope. Therefore, risk management is of paramount importance in the identification, analysis and control of risks issues that are common to construction projects in other to actualize project objectives and provide greater output for the construction industry practitioners and the nation at large.

VI. CONCLUSION AND RECOMMENDATION

An effective risk management process encourages the stakeholders in the industry to identify and quantify risks and to consider risk containment and risk reduction policies. Construction companies and consultants to construction projects that manage risk effectively and efficiently through holistic risk management techniques, enjoy financial savings, and greater productivity, goodwill, improved success and customer satisfaction. It is however pertinent to note that risk management will not totally eliminate the risks associated with construction projects, but it will help practitioners in taking proactive measures in managing these risks by minimizing their probability of occurrence and impact-if they do occur, on the project objectives of schedule, cost, quality and scope.

An advocacy for a regulatory framework that mandates the submission of risk assessment report and risk management plan by contractors when bidding for any construction project could go a long way in promoting the awareness on the implementation of risk management processes and techniques in the construction industry. This is of the essence as 37.5% and 46.4% of the respondents 'strongly agreed' and 'agreed' respectively with the assertion that the level of awareness and implementation is directly traceable to the absence of a regulatory framework.

Also, strict monitoring of the level of conformance to risk management global best practices of construction projects and enforcing statutory requirements before and during execution will also improve implementation and awareness of risk management.

Majority of contractors and construction managers in the Nigerian construction industry are unaware of formal risk management techniques. In light of this finding, it is imperative to educate these professionals about risk management, and thus a formal and informal system of risk management training needs be developed. Graduate level education in construction project management should be used to provide formal education in the area. Informal education could be provided by career development programs and trainings, like risk management awareness programs. Such trainings can be organized by academic institutions or professional organizations such as the Nigerian Society of Engineers, Association of Project Managers, Nigeria Chapter, public sector organizations and universities. Providing such education will yield long term benefits and will be considered as a step in the right direction.

Further research in this area are welcomed and can be done to develop a generic risk management model for the construction industry at both global and national level. Such models can help contractors in the identification and classification of risk as either controllable or uncontrollable. It can also help them in measuring the impact of risks and probabilities of risk occurrence. In addition to this, the model could also help the contractors in deciding under different circumstances when to avoid risks, retain them, try to reduce them by taking preventive steps or transfer them to a third party which could handle them in a better manner. Such a model will definitely lead to an increase in profitability and help the companies, employing it, in maintaining a competitive advantage.

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