ASSESSMENT OF RISK MANAGEMENT CAPABILITY LEVEL OF BUILDING CLIENT IN ABUJA, NIGERIA

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ABSTRACT

Every company today is faced with unexpected events that occur in a variety of settings and have varying characteristics and implications. These unexpected events can have significant implications for the business. Risks are unpredictable incidents that have negative consequences. The construction industry is no exception when it comes to being subjected to these dynamic and diverse uncertainties.The purpose of these study is to examine risk management in relation to the client knowledge of risk management evaluate the current capacity of client in risk management practice and also to developed a maturity model based on previously developed model to determine the effectiveness of building client to control risk with a view to improving the level of competence of the client in management risk. Questionnaire was used to collect data from the response (ministries and parastatals). The data required for the study are the risk management process and the basis for assessing the risk management capacity of building client and were collected from building clients, construction stakeholders in some selected ministries and parastatals within Abuja. Frequency distribution tables and percentiles were used to evaluate the data obtained on the respondents' general knowledge. The Mean Item Score and Relative Importance Index were used to assess the other objectives. It was discovered that the basis of assessing risk management capacity of building client are - risk management is essential to a client successful project. Finally the study concluded that although organization and stakeholders are aware of the existence of risk but to some degree, most of them have not outline a systematic and strategic means of managing risk. The study recommends that Top management should risk management, gives promotion, support and encourage risk reporting, risk management should also be practice on all project and should also be systematic, routine and standardised.

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ABBREVIATION

CSCM- Construction Supply Chain Management

CCMI- Capacity Maturity Model Integration

CMM- Capacity maturity model

SPICE- Standardized Process Improvement Construction Enterprises

CPMB- Construction Project Management Maturity Model

OPMB- Organization Project Management Maturity Model

PMB- Project Management Maturity Model

RMM- Risk Maturity Model

PMI- Project Management Institute

RMM- Risk Management Maturity Model

IACCM- International Association for Contract and Commercial Management

MDAs- Ministry, Department and Agencies

MIS- Mean Item Score

RII- Relative Importance Index

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Every company today is faced with unexpected events that occur in a variety of settings and have varying characteristics and implications. These unexpected events can have significant implications for the business (Jia *et al*., 2013). Risks are unpredictable incidents that have negative consequences. The construction industry is no exception when it comes to being subjected to these dynamic and diverse uncertainties (Zahran, 2010).

Risk is a concept that has been explored extensively in a variety of fields. Danger, according to Hillson (2013), is a measurable risk while uncertainties are risks that are not measurable. Risk management, which is an important part of project management, is used by researchers to reduce or remove risk. Risk management is a constructive and optimistic mechanism that helps to reduce the probability of something bad happening. One of the difficulties that building clients face is determining how to assess a construction organization's ability to conduct successful risk management and how to assist this organisation in improving over time. While risk is a multi-faceted term, and it is normally regarded as the tendency having the occurrence of adverse incidence during the period of construction project execution.

Risk management is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives (Akintoye *et al.*, 2017). It is also defined as a planned form of identifying and evaluating risk and selecting, establishing and applying options for the handling of the risk (Kerner, 2015). As a result, risk management has to do with the identification of risks and implementing strategies aimed at reducing, exchanging, moving, or embracing those risks (Jia *et al*., 2013). The risks associated with construction projects must be handled on a constructive basis in so that the agreed deadlines of the project

can be achieved (Hillson, 2013). Before starting a building project, it is vital to identify and equally classify all the risks associated with the project (Abderisak & Lindahl, 2015). Different means can be adopted when threat is classified. A standard risk management convention is to divide risks into two groups: internal and external. Risks are typically classified as either internal or external; the former being those group of risks that can be controlled while the latter being the group of risks that come with circumstances beyond someone's control in accordance with the standard risk management convention (Ren & Yeo, 2004). According to Tah (2015), risk is viewed from a local or global perspective. Furthermore, in the discussion of risks, risk factors are also considered and identified during certain phases in the course of construction and these include risks associated with planning, construction, operations and financial processes (Sarhar *et al*., 2017). In the view of Hopkinson (2011), it is not adequate enough to depend on only one method of managing risk instead he recommended that different risk management structure should be applied in order to be consistent with best practices which involves selecting suitable techniques in a careful manner when every project is undertaken.

The degree of complexity in which an enterprise can classify risk associated with it, manage it, and then confront the long term implications through its internal business continuity processes is referred to as risk management maturity (Zou *et al*., 2010).

1.2 Statement of the Research Problem

In recent settings, construction has become common environment, despite the constant force of uncertainty and inability to understand it. It was noted that this complexity can be traced back to the construction industry's competitive nature (Ren & Yeo, 2004). Due to the fact that construction industries rely on labour in a way that is not centralized and also due to the fact

that it is integrated with regards to management and design from the beginning to the end, the industry is one of the most diverse and competitive in the industrial world. Larger construction projects will undergo periodic adjustments over their lifespan, impacting the level of involvement of the different stakeholders in the project (Zou *et al*., 2010). The absence of a secured environment shows the need for the adoption of appropriate strategies in risk management, which can be handled by clients or assigned to a third party. The key criterion for making this determination is whether or not the client has the requisite expertise to accurately identify, minimise, or track the project's risks (Kerner, 2015). Risk-sharing strategies disguised as partnering, as well as the option of a general contract or a design-build contract, are examples of this. The study's aim is to assess Building clients' risk management abilities. However, the client organisations' ability to effectively manage the risks associated with inefficient decision, results in various kinds of failure during project execution.

1.3 Research Questions

i. What are the risk management processes in relation to client knowledge of risk?
ii. What are the bases for assessing the risk management capacity of building client?
iii. How can risk management capacity of client be evaluated in order to improve areas of strength and weakness in the risk management practice?
iv. How can a maturity model be developed to determine the effectiveness of building client?

1.4 Aim and Objectives of the Study

1.4 .1 Aim

The purpose of this study is to assess the capability of building client to manage risk in Nigeria, with a view to improving the level of competence of the client in managing risk.

1.4 .2 Objectives of the study

i. Identify and assess risk management process in relation to client knowledge of risk.
ii. Identify and examine the basis for assessing the risk management capacity of building client
iii. To evaluate current capacity in order to improve areas of strength and weakness in the risk management practice
iv. To develop a maturity model based on previously developed model to determine the effectiveness of building client to control risk.

1.5 Justification of the study

Previous studies globally on risk control on construction sites has been conducted. On a global scale, Abderisak and Lindahi (2015) conducted research on construction clients' perspectives on risk management in Swedish public client organisations, and Akintoye and MacLeod (2017) conducted research on risk management in construction projects. In construction procurement and contracting, Abderisk, and Lindahl (2015) wrote about evaluating the client's risk management efficiency. In addition, Mason-Jones, and Towill (2008) conducted research to propose a structure for visualising spatial variability in a construction. Yamusa (2018) also published a paper on assessing building contractors' risk management capabilities.

Previous studies haven't looked at the risk management capabilities of building clients, which this research intends to do in order to enhance risk management practises.

1.6 Scope of the Study

This research will look at risk factors in the construction industry as well as the risk management capacity of building clients in Nigeria. The research would concentrate on Abuja's construction clients (ministries and parastatals).

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 The Nature of Risk

Every organization today is confronted with unpredictable events that occur in a variety of settings and have varying characteristics and consequences. These unforeseen events can have serious ramifications for the business (Akintoye and MacLeod, 2017). Risks are unpredictable incidents that have negative consequences. The construction industry is not immune to these challenges, which include a wide range of dynamic and varied threats (Zou *et al*., 2010). Risk is a concept that has been explored widely in a number of fields. Risk, according to Hillson (2013), is when uncertainty can be evaluated whereas when risks cannot be measure, it is termed as uncertainty. Management of risk is an important aspect of project management and it is used to bring risk to its minimum or possibly removed completely. Ren and Yeo (2004) defined risk management is a constructive and optimistic mechanism that seeks to reduce the possibility of adverse outcomes in the project's various phases, and according to Mills (2011) it includes planning, development and activity.

The reason why the management of risk is vital in project management is due to the fact that it helps in the prediction of adverse incidences that have the tendency to adversely impact on construction projects and then defining measures to mitigate their consequences. One of the most well-known responsibilities of project managers is being able to handle contingencies or threats that arise on a regular basis during the course of the project's management, and this function is made much more difficult and inefficient in the absences of appropriate risk management from the beginning of the project. In order for risk management to be efficient and effective during the course of execution of projects, it is imperative to adopt adequate and

proper methodology and most importantly to have adequate knowledge and experience on the different types available.

Over the years, most companies involved in construction in developing countries like Nigeria have embraced risk management during the course of construction projects by the use of procedures that not only appropriate but inadequate, resulting in poor results and restricting project management performance. This condition can be seen in both contractor and owner-operated businesses. Risk management in these organisations, in general, is insufficient, lacks a structured and standardized approach, and its success is not calculated. One of the current problems is determining how to assess a construction organization's ability to efficiently handle risk and how to assist this organization in improving over time.

Although risk has many definitions, but in construction industry, it usually has to do with the tendency to have negative occurrence during the period a construction project will last (Wong & Fung, 2004) .As a consequence, it is defining risk that the concept of risk management is all about and then putting in place methods to mitigate, exchange, transfer, or embrace the risks associated (Jia, *et al*., 2013). For set time limit scheduled for the project to be met, it become vital to constructively control all risks related to the construction project (Guangshe, *et al*., 2008). This necessitates the identification and classification of project-related risks before construction begins. There are many ways to categorise risks. Risks are typically grouped as internal over which one has some control or an external community over which one is exposed to circumstances outside one's control, according to a standard risk management convention. This is supported by Tah (2015) research, which, in addition to categorising risks as internal or external, often assigns risks to a local or global context. Planning risks, design risks, operating risks, and continuing financial risk are all examples of risk factors that are often defined and placed in the phases of the construction process where they are typically significant (Shaoyan, 2008). When risks are assessed, it is vital to

remember that it is not safe to rely on a particular method of managing risk and not also appropriate to apply the same framework for managing risk in each and every projects (Hopkinson, 2011). It was recommended to adopt best practises which involve adoption of principles in the selection of suitable techniques in the execution of every project. The degree of experience a company has in the definition of its own risks, how they are managed and resolved with regards to it long term implications through internal business continuity planning is referred to as risk management sophistication.

2.2 Risk Management in Construction Industry

The need for infrastructure development drives the construction industry's rapid growth around the world. Infrastructure development is one of the main drivers of global business; it boosts a country's GDP (O'brien, 2011). As a result, countries began to emphasize infrastructure construction and set aside funds in their budgets to fund it. This poses new challenges, as well as the need to consider the risks associated with design and development. By their very nature, construction projects allow for a wide range of environmental and socio-political problems to emerge during the pre-contract, contract, and post-contract phases, resulting in delays in implementation, effective cost, and work done below standard (Ongel, 2009). There is always this major challenge due to cost overrun especially if it involves a substantial sum of money (O'brien, 2011). It is therefore important to manage risk associated with construction project if losses must be prevented or reduced to minimum.

The building method or operation has to do with the components and materials that need to be designed and manufactured by associated suppliers in the construction project and thy make use of different technologies for the creation of the built environment. This involves the planning of the project, regulating the job, designing, fabricating, maintaining and to the point of commissioning of the construction project. Whether local contractors or international

construction firms are employed on complicated or project involving high risk like civil construction or small pavements, the size and scope of activities varies. This implies that by accounting for a certain percentage of a country's annual fixed capital formation, construction will contribute to its economic growth.

On the other side, the building industry provides various work opportunities in the fields of construction, engineering, architecture, and the private sector. It will require the efforts of a number of firms, including seasoned contractors, architects, and engineers, as well as professionals like structural engineers, the manufacturers, firms who supply equipment and the quantity surveyors (QS). Construction may be referred to as simple economic multiplier due to the fact that it is situated as the system integrator and it stimulates economic drivers (Ongel, 2009). Since the industry requires three inputs: land, labour, and capital, government policy can have an influence from a macroeconomic perspective. Owing to the large number of construction companies participating in several construction activities in different nations, this industry in developing countries also work in region beyond their own and in some cases can be seen as a global industry. Project risks are events or set of events (which may be motivated within or outside) that negatively affect the way projects are executed, their performance, project duration and cost. In construction industries, risk is characterised the group of activities that influence a project's completion time, cost, scope, and quality of work. Construction risks can affect total project costs with regards to budgets on the construction project. Construction projects are especially difficult in that they involve a wide range of activities undertaken by a diverse group of people, making them potentially risky (Mills, 2011). Construction risks include technical, management, and socio-political challenges, as well as natural disasters. Construction has more risks and uncertainties than every other industry because risks and uncertainties are involved in any operation from concept to execution (Crawford, 2012). Some dangers are apparent, but others are unpredictable (O'

brien, 2011). There is an urgent need for these risks to be addressed or else there will be the tendency to have high overrun cost, completion date delayed, poorly completed project and these give rise to client and public frustration. To overcome project risks, previous experience, assumptions, and human judgement are used (Zou *et al.*, 2010)

Construction risk management is concerned with construction projects in particular. Its aim is to recognise project threats, find solutions, and minimise their negative consequences (Akintoye & Macleod, 2017). In construction projects, the risk management approach has yet to be evaluated in a real-world environment. The risk management in the construction industry is focused on the contract's life, which is largely based on the contract sum (Akintoye & Macleod, 2017). In this industry, risk management approaches are applied differently than in others. Team analysis and brainstorming are the most common strategies for analysing risks. Accidents may be predicted or predicted in advance, but their magnitude cannot be quantified. Risk management is limited to the detection process. Risk management's cost effectiveness in construction projects is a major concern, since many construction participants believe risk management only consumes resources while the benefits are difficult to quantify financially (Akintoye & Macleod, 2017). As a result of the risk management process being applied, the project is expected to incur additional costs. However, the financial implications of failing to assess risk should be considered in a professional manner. The risk management process is often conducted by a few key individuals, resulting in a personnel shortage. Since there is no industry-wide risk management model, each construction firm must create and analyse its own.

Risk management seeks to ensure effective risk identification within the project and to develop a risk assessment, preparation, and reporting process. The essence is to make sure that there are risk control measures to companies managing the project or those representing them. Akintoye, and MacLeod (2017) noted that such factors must be identified so that risk

management could be performed efficiently in the construction industry and this includes all the risks associated with the project. This also involves identifying anything that can be a threat to the project, evaluating and analysing risks at the onset of the project so that costly measure taken can be justified. It can also help you decide whether you should avoid, share, or pass the risk. They claimed there are two approaches to evaluating project risks: qualitative and quantitative approaches. Some of the variables that put projects in jeopardy are as follows:

i. History: Since the procedure has not been tested over time, new projects are often vulnerable to risk. When something is done for the first time, there is still a sense of doubt. However, if a similar project has been completed previously, the chances of a successful operation are increased.

ii. Management Stability: If every member of the management team has the same opinion and idea about the project, the goals of the projects can be achieved effectively with little to no risk. However, if the management team is insecure, they will muck up the entire project, resulting in expense, quality, and other project goals being compromised.

iii. Staff experience and expertise: if members of a team involved in a project do not working experience on the kind of job to be done, the project is bound to experience cost overrun, project delay and poor quality of work.

iv. Team Size: as it is normally said" too many cooks spoil the broth. If there are too many persons involve in job execution and in making of decision regarding a project, the chances of an issue occurring are high. Communication difficulties, infiltration, overconfidence, and other issues will be major issues.

v. Resource availability: If resources are available, issues can be addressed quickly. It is easier to obtain labour, material, and equipment resources when money or cash is

available. However, having enough resources does not guarantee the absence of risk but it can help the team members to eliminate or mitigate risk.

vi. Time Compression: There are certain projects that have a very short completion time relative to the scope of the project; risks are increased in this case.

vii. Complexity: The probability of a risk occurring in a highly complex project is often high. There is high tendency to make mistakes and it important to note that in some cases making minor error can give rise to significant loss.

Risks may arise from the project's business, organisational, or technical aspects. The following are the most common types of risks in the construction industry:

i. Technical risks: incomplete design, inadequate site investigation, specification suitability, and material source and availability uncertainty

ii. Financial threats include fluctuations in foreign exchange rates, funds return, payment delays, rising cost of goods and services and taxes.

iii. Risks associated with management: Problems related to industries, uncertainties regarding productivity, divergent interest and ineffective decisions made.

iv. Risks related to logistics: Is the means of transportation/ availability of equipment needed for construction in order to have a smooth implementation of the project?

v. Others include `socio-political risks and these may include inability to dispose of plants and machineries, constraints related to availability of foreign experts, continued dependence on indigenous businesses, agents and methodologies.

Climate change, weather implications, and natural disasters are all examples of environmental threats. Design issues, a shortage of experienced personnel, changes in project scope and requirements, the contractor's lack of expertise, emerging technologies, unusual local circumstances, inadequately specified roles and responsibilities, and the size of the

workforce are all sources of risk. According to Akintoye and Macleod (2017). risk management entails four major methods, but Ren and Yeo (2004) claimed that the implementation of these strategies is dependent on the organisational plan, project nature, method adopted in managing the project, team members' attitude on how to manage risk, and the amount of resources available for the project. Risk management has a number of advantages, including target achievement, shareholder stability, capital cost reduction, reduced uncertainty, and value creation. Risk management has some disadvantages, such as wasting time dealing with risks that are unlikely to occur if the analysis or evaluation is incorrect; prioritising risk management too highly may prevent a project from ever being completed, particularly if other projects are placed on hold until the risk management process is completed.

Zou *et al.* (2010) noted that from the view point of stakeholders, twenty major risks are involved in construction projects during their life cycle. They attempted to classify specific project threats, as well as their probability of occurrence and consequences. Twenty risks were defined based on their evaluation, along with their probability of occurrence and effect on project objectives. The majority of the risks involved customers, designers, or vendors, with just a handful including subcontractors/suppliers, government agencies, or other external concerns. Tight project schedules, design variations, administrative government approval delays, high anticipation with regards to performance and efficiency, inefficient schedule with regards to programme, ineffective planning, variations related to construction schedule, poor expertise among subcontractors, delayed approval, variation in client's orders, inaccuracies in programme cost estimate, Inflation in the cost of building materials, as well as construction-related noise pollution, and poor coordination, are the twenty main risks. These threats are assessed by considering the view point of project life cycle and the view

point of stakeholders involved. By stakeholders the following are referred: government agencies, the clients, contractors, the consultants and external bodies.

2.3 The Concept of Risk Management

The construction industry has evolved rapidly across the world over the last decade, according to Brady *et al*. (2013), and companies now face more danger and uncertainty than ever before. If the project progresses, multiple points of dispute, misunderstanding, and conflict emerge, placing the project at risk. A risk not recognised and addressed is unquestionably an uncontrolled threat in the achievement of the objectives of construction project, and may result in significant cost/time overruns. As tasks become more complex and competition becomes more intense on a daily basis, risk management has become an essential component of successful project management. In as much as risks are evaluated with regards to the level of impact they can have on the objectives of a project, there invariably a relationship between actual risk management and the level of success that is achieved in success of construction project. As a result, risk control during the project development process must be approached in a systematic manner (Mills, 2011). The main concept of risk management is a proactive measure with regards to decisions made during the processes of execution of construction projects and this involves the acceptance of perceived risks and then taking appropriate steps towards minimising or completely obliterating the impact and likelihood of risks arising, mitigating threats while optimising opportunities (Loosemore *et al*., 2016). In literature, various processes have been suggested by authors as indicted in the works of Akintoye and MacLeod (2017), Tah (2015), Chapman and Ward (2017), Loosemore *et al*. (2016) and PMI (2004). But it is important to note that five basic steps have been identified in the processes involved in when managing risks and they include:

i. Risk planning

ii. Evaluating risks

iii. Analysing risks

iv. Responding to this identified risks

v. Monitoring the risks

vi. And controlling the risks

A well-implemented risk management system not only raises risk perception, but also emphasises the importance of risk management from the start of a project, when major decisions like alignment and construction methods can be influenced (Foti, 2012). The risk management method has many benefits, including identifying and evaluating risks, as well as enhancing construction project management processes and resource utilisation. Advantages include a better-organized methodology, better centralised control that is effective, and increased risk knowledge shared among parties involved. It has the potential to reduce long-term failure costs and project delays (Foti, 2012). Risk evaluation will help evaluate and determine the feasibility of a project to ensure that it is worthwhile (Singh, 2019). It does not, however, fully eliminate all project risks. It simply reduces the probability of occurrence and the associated effects, ensuring that threats are dealt with in the best possible approach that is not just operational but (Loosemore *et al*., 2016). In order to effectively handle risk, uncertainty should be translated to risk and covert to potential. The project and organisation would benefit further by optimising opportunity, bringing risk down to the best minimum and lowering uncertainties.

2.4 Risk Management Process

In an organisation, risk recognition, measurement, and management help to show the project's overall value. The following are the four mechanisms that make up the overall risk management process:

2.4.1 Risk identification

According to Brady *et al.* (2013), being able to identify risks is the first basic step involved in managing risk and by this potentials risks related to construction projects can be spotted. The main goal of risk identification is to figure out which threats are most likely to affect the project and to keep track of their characteristics. Accepting the possibility of danger at some stage during the project is an important aspect of risk identification. It assists in comprehending the danger, its consequences, and the probability of occurrence. If the risk materialises, the project or risk manager may take action. . According to Mackinnon (2012), risk can be identified using the five (5) methods mentioned below:

i. Idea generation: This is one of the most widely used methods. It's typically used to generate ideas, but it's often very useful for identifying risks. All involved in the project is gathered in one location. There is one facilitator who briefs the participants on different aspects before taking notes on the causes. Until concluding, the facilitator goes through all of the variables and excludes the ones that aren't essential.

ii. Delphi Techniques: This approach is equivalent to brainstorming only that the people involved are not familiar with one another and are located in different locations. They'll figure out what the causes are without consulting anyone else. In brainstorming, the facilitators summarise the defined variables.

iii. Interview/expert Opinion: Experts or staff with ample project expertise may be invaluable in preventing/resolving similar issues in the future. For the purpose of identifying risk factors, all participants or related individuals in the project may be interviewed.

iv. Previous Experience: Using previous experience with similar projects, an analogy can be created to identify the causes. This will provide insight into the common factors when comparing the characteristics of projects.

v. Checklists: these are predetermined lists of variables that are possible for the project. They are basic but quite useful. The checklist, which includes a list of risks found in previous projects as well as answers to those risks, gives you a head start in identifying risks.

2.4.2 Risk assessment/quantification

The project's possible results are evaluated using risk management and likely risk experiences with project operations. Risk can be reduced by not executing sections of the project that are at risk, or by changing strategy to mitigate risk that is likely to occur during the project's execution (Brady *et al.,* 2013). Risk qualification/assessment can be achieved using any of the four (4) methods mentioned below, according to Mackinnon (2012), sensitivity analysis: this is used to classify the project elements that are not easily predicted and that impact mostly on the result of the project.

i. Scenario Analysis: scenario analysis depicts various project scenarios or the effects of various risks if they arise at the same time. After this study, a rational decision can be taken, and the choice that will result in the least loss or risk can be chosen.

ii. Monte Carlo Simulation (Probabilistic Analysis): A model is used in a project simulation to demonstrate the possible effect of various levels of uncertainty on project objectives. For this study, Monte Carlo simulation is commonly used. It can calculate the impact of risks and uncertainty on a project's budget and schedule. It repeatedly simulates the entire device. Each time, a value for factor is chosen at random from its probability distribution. For of task in time management, it uses three point estimates such as most likely, worst case, and best case.

iii. Decision Trees: A decision tree diagram is used to conduct this research. Decision trees are extremely useful for formulating problems and evaluating choices. A

graphical model is used to describe a project in this study, and it can clearly show the results of each decision made in the project.

2.4.3. Risk response

According to Brady *et al*. (2013), risk response is described as actions taken in response to risks' opportunities and threats. When a project reaches a high-risk environment, a predictive predictor can be used to keep an eye on it. The risk strategy is to participate in the test process and keep track of the risk. According to Mackinnon, (2012), there are eight (8) risk response approaches, which are listed below:

i. Avoiding Risk: it is possible to bring risks to close to minimum by completely removing source through which risk may appear and by this the project can be achieved by adopting different approach while still pursuing project goals. To remove a hazard, separate the project objective from the risk's effects, or relax a project objective that is in jeopardy, such as extending the timeline or reducing the scope, change the project management plan.

ii. Risk Transfer: Transferring risk entails having another entity able to take responsibility for its management and assume the risk's liability if it occurs. A danger is not eliminated when it is transferred; the threat still remains, but it is now owned and controlled by another group. Risk transfer can be an efficient way to manage financial risk exposure. The aim is to ensure that the risk is owned and handled by the group best suited to handle it.

iii. Risk Mitigation/Reduction: Risk mitigation decreases the likelihood and/or effect of a negative risk incident to a level that is reasonable. Taking steps early to minimise the likelihood and/or danger is always more successful than trying to repair the damage after the risk has passed.

iv. Risk Exploitation: This risk would undoubtedly occur as a result of the opportunity created. Remove the confusion that comes with a specific upside risk. A risk event that, if it occurs, will have a positive impact on project goals is described as an opportunity.

v. Risk Sharing: Assign risk ownership of an opportunity to someone who is better able to maximize the likelihood of it occurring and increase the possible profit if it does. Transferring threats and sharing opportunities are similar in that they both include the use of a third party. Those who receive the threat assume responsibility, and those who receive the opportunity should be able to share in the possible benefits.

vi. Risk Enhance: The aim of this response is to change the "scale" of the positive risk. The opportunity is enhanced by increasing its likelihood and/or effect, thus maximising the project's profit. Attempting to promote or improve the opportunity's case, as well as proactively targeting and reinforcing its trigger conditions.

vii. Risk Acceptance: While it is impossible to remove all threats or exploit all opportunities, it is possible to at least have recognition that they exist and have been detected. This is referred to as passive acceptance by others. This approach is used when other solutions are unable or ineffective in addressing the risk's magnitude, or when a solution is not warranted by the agreed risk. They agree to resolve the risk if and when it occurs.

viii. Contingency Plan: This refers to the use of a backup plan in the event of a risk. Contingencies may also take the form of time set aside to deal with unforeseeable risks.

2.4.4 Risk control

Risk management, according to Mackinnon (2012), is the final stage of the operation. Following the execution of the response operation. Tracking and recording, as well as any improvements in the project risk profile, are required for their effectiveness. Has the response activity aided or hindered the project's achievement of its objectives? As a result of a reform, liability was eliminated over the project's lifespan by passing it through insurance. Any risk response should also be recorded for future reference and project planning.

2.5 Classification of Risk

One important step to take in the managing risks is to classify and by this classification, different risks can be grouped according to their perceived impact on the project contract. There are many proposition with regards to methods of classifying risks and according to Ongel (2019) a number of factors are listed based on various sources and these are grouped into three parts:

i. Contract risks
ii. Consultant risks
iii. Client risk.

With the use of a broader approach involving general system theory as a context, climate, industry, customer, and project, Chapman and Ward (2017) divided risk into four subsets. Santos and Powell (2011) classified the 58 risks associated with Sino-foreign construction joint ventures into six categories based on the nature of the risks, including financial, legal, management, business, policy, and political risk, as well as technical risk. Simply stated, there are many strategies for classifying the risk associated with construction projects, and the reasoning for selecting one should be consistent with the project's goal.

Furthermore, Brady *et al.* (2013) categorised risk into the following categories based on their source:

i. Technical risks: insufficient and inappropriate site survey and investigation, incomplete and defective design, appropriateness of specification, and material source and availability uncertainty.
ii. Logistical risk: Inadequate transportation facilities, as well as a lack of construction equipment spare parts, fuel, and labour.
iii. Management-related risk: Uncertain resource productivity and industrial relations issues.
iv. Hazards to the environment: weather and seasonal changes, as well as natural disasters
v. Financial risk: foreign exchange supply and fluctuation Payment delays, inflation, and local taxes are all factors to consider.
vi. Socio-political risk: risks and these may include inability to dispose off plants and machineries, constraints related to availability of foreign experts, continued dependence on indigenous businesses, agents and methodologies.

2.6 Risk Management Maturity

According to Ongel (2009), once a company adopts the principle of maturity, it is in perfect shape to achieve its objectives. According to the author (Ongel, 2009), the best way to explain maturity to the business community is to incorporate three dimensions: behaviour (being able to act and take decision), attitude (being willing to be engaged) and information (being able to understand the effects of willingness and taking action). In the view of Junior *et al*. (2010), maturity takes on a diagnostic element, and while it denotes the attainment of a degree where management procedures and project control are "institutionalized" in the

organization, it is important to recognize that repeated or institutionalized processes are not necessarily better.

Maturity models as opined by Jia *et al*. (2013), enables organizations in the understanding of how much they can make use of the current skills in risk management and it also helps them to see clearly their strengths and weaknesses in dealing with future risk. This will help them to take the required steps to enhance their performance in this management process. A risk maturity model, according to Coetzee and Lubbe (2013), is mainly adopted by risk managers in evaluating the level of maturity to which the risk management method has attained and conveying this understanding to senior management team of maturity who can then use it to guide risk management decisions.

2.6.1 Maturity in relation to construction and risk management

The definition of "maturity" is introduced in this section. The usage of a maturity model is explained, as well as an overview of the Software Engineering Institute's Capability Maturity Model (CMM). Immature and mature organisation characteristics are described. The construction industry's maturity research and the risk-maturity relationship are discussed. Finally, six risk management maturity models that were described and used as the basis for this study are discussed in detail.

2.6.2 Description of the term “maturity”

Maturity, in general, refers to something that has been fully developed or perfected (Cooke-Davies, 2014). If the maturity concept is applied to an organisation, it can mean that the organisation is in a perfect state of readiness to achieve its goals, according to Abderisk, and Lindahl, (2015), this concept is continually applied in finding out reasonable means of improving services rendered by an organization (Crawford, 2012). According to PMI (2004) Best Practice metrics is a concept employed to show rising state of difficulties and other

characteristics. According to CMMI Product Team (2002), maturity in this context has to do with an organization's ability to steadily execute processes that are tracked, controlled, assessed, watched and continuously improved. In the view of Abderisk, and Lindahl, (2015), by combining the three-dimension best practice helps to adequately describe how a business in a given community has matured and these are:

i. conduct (being able to act and take decision),
ii. attitude (being willing to be engaged) and
iii. Information (being able to understand the effects of willingness and taking action).

2.6.3 The need for maturity research

In order to assess current organization's capabilities and evaluate her strengths and weaknesses in the various processes undertaken, benchmarking should be adopted (Hillson, 2013) and this will as a matter of importance improve on performance and helps to identify gaps in areas where there is need (Ren & Yeo, 2004). A company can use the assessment process to compare its project execution to best practises or competitors, according to several authors (Hillson, 2000; Foti, 2012). When an organization's objectives have been assessed, the organization begins to strategize for methods of improvement (Crawford, 2012; Foti, 2012). In the path of seeking higher expectations in an organization, it is important to strive for targets and highest possible level (Hopkinson, 2011) and by having repetition of assessments of methods adopted over time, the effects of these changes can be evaluated (by identifying improvements made), and then used to make modification for better improvement in the future (IBBS & Kwak, 2010).

One of the famous and generally accepted maturity model is called Capacity Maturity Model and this is used as the foundation for other models that follow. The Carnegie-Mellon University developed a model called the CMM which is used for growing and evaluating an

organization’s effectiveness in managing risks and improving on existing methods (Hillson, 2013). The tool's aim, according to Kerner (2015), is to provide a systematic and objective way of evaluating and comparing a software company's development processes to best practises. Software developers benefited from CMM's assistance in recognising specific improvements, according to Kerner (2015), in order to remain competitive in the sector. Hillson (1997) defines five levels of increasing capability and maturity: original (Level 1), repeatable (Level 2), defined (Level 3), regulated (Level 4) and optimising (Level 5). CMM has received global acceptance and it is being used a standard for evaluating process modelling and to measure the maturity of a given organization in various processes (Crawford, 2012). In a similar way, project management techniques and instructions have been adopted to CMM (Kerner, 2015) so that it can be used in other sectors as in the case of software development processes but have not received global acceptance when it was adopted in other organizations (Hillson, 1997). It was further noted by Hillson (1997) that CCM generally works effectively with regards to capability, maturity and business excellence but it applications have not been of significant assistance in risk management. It has also been noted that despite the fact that Capacity Maturity Model Integration (CMMI) has become famous but it has also experience some level of limited because it is intrusive in nature (PMI, 2004).

Based on this PMI (2004) has noted that for CMMI model to gain full implementation especially when it has to do with risk management model, it most requires a significant amount of time and effort, as well as integration into the overall Systems Engineering process. Capability maturity models are made up of process areas and capability levels, according to Cooke-Davis (2014), and the overall maturity level of an organisation is calculated by measuring the capability level of each process area separately. Jia *et al*. (2013) characterise maturity as a ladder of stages, implying that certain phases or stages aid maturity.

In the view of Hopkinson (2011), all the steps involved in maturity model are set in such a way that it will help in assessing risk and setting of goals. It is based on this that Cooke-Davies (2014) noted that every process must move from unstable to stable in order to mature and this result in increased capability.

2.6.4 Characteristics of immature and mature organizations

Setting realistic process improvement goals, according to several authors (Ren and Yeo, 2009), necessitates understanding the differences between immature and mature organisations. It is necessary to make this distinction in order to set practical targets with regards to improve on a process (Sarshar *et al*., 2017). In smaller businesses involved in construction projects, processes flexible and are developed by practitioners involved in the course of development of the project being executed (Sarshar *et al*., 2017). Inexperienced organisations can still produce excellent results on occasion, according to Humphrey (2009), but this is most often due to the courageous efforts displayed by a team who shows dedication instead of a repeated structured and tested procedures often associated with matured organizations. In the view of Sarshar *et al*. (2017), there is no empirical basis for evaluating product quality or solving product and process problems in immature construction organisations. According to Sarshar *et al*. (2017), the organisation is reactionary. Mature organisations, on the other hand, have equipped themselves with planned processes which they accurately dissipate to their employees and this include designs, production routines, processes of maintenance that are managed by the organization as a result of its expanded capacity and a positive organisational culture, according to Sarshar *et al*. (2017). According to Sarshar *et al*. (2017), project and organisational roles and responsibilities are defined and explicit, and product quality and client satisfaction are monitored.

2.6.5 Maturity research in construction industry

As a result of the inabilities to make project predictions in the 1990s, there arose a need to develop through researches the reason behind under-performance in the construction industries in the United Kingdom Love *et al.,* 2018; Singh, 2019). It was suggested that lessons from other industries be learned and skills for efficiently implementing business processes be built in order to resolve performance-related issues. As a result of these results, the construction industry has been motivated to focus on construction processes in particular (Sarshar *et al.,* 2017). According to many academics, developing management skills is important for achieving a competitive edge in the building industry or organisations (Hobday, 2018; Brady *et al.,* 2018).

In response to industry criticism, Salford University launched the SPICE (Standardized Process Improvement for Construction Enterprises) research project in 1998 with the aim of applying the maturity theory to construction organisations. Construction firms, according to Sarshar *et al*. (2017), lack a methodological structure for systematically evaluating the construction process, prioritising process adjustments, correctly allocating resources, and benchmarking their performance against other firms. The reason behind SPICE was to assess whether the concepts and structure of CMM can find application in construction industries and that was achieved, to also see if it can be tailored in such a way that CMM can be embraced in the construction models the same way it has found application in the software industries. This is geared towards the creation of a framework that can revolutionize improvement and to achieve organizational maturity in terms of tools for assessment (Sarshar *et al*., 2017). The basic CMM process concepts are common and applicable to the construction industry, according to Sarshar *et al*. (2017), but the key problem was with complex supply chain systems in construction projects. The system must respond to the project supply chain in order to adapt to the construction industry, it was agreed. Five steps of

maturity were involved in the model and each of them has a set of processes associated with it. Process enablers (such as commitment, capability, verification, analysis, and activities) are also created to enhance the processes of assessment and to make sure the processes were executed correctly. It was based on this that Foti (2012); Ren and Yeo (2004) developed the Construction Project Management Maturity Model (CPM3), whose framework employed the Remy's Model (PM3) the purpose was to evaluate and strengthen project management maturity in construction industries. Similarly, Guangshe *et al.* (2008) examined how suitable the Chinese construction industries could be in the adoption of the Organizational Project Management Maturity Model (PMI, 2004). The results of the study indicate that explicitly applying the OPM3 to construction projects is not acceptable, and that there are obstacles to doing so.

2.6.6 Risk-maturity relationship

From the perspective of Loosemore *et al.* (2006), the risk management sophistication of an enterprise is reflected in the extent of its perception of the risks associated with them, how much is known on how to alleviate the known risks, and how capacity the organization has in continuous business processes in order to manage it and survive the occurrence of risk events. According to Loosemore *et al*. (2016), risk-averse organisations have task-oriented cultures that put profits ahead of people and the remaining organisational objectives. This makes it difficult for them to review their current operational methods and deduce lessons for future use. The only depend on organization's scale and previous achievements to shield them from potential threats and protect them from the environment's volatility.

Usually risk-mature organisations, on the other hand, have a culture of transparency, awareness, and vulnerability to organisational threats as well as their social and financial obligations to stakeholders, the general public, and the broader world, according to several

writers (Ginn, 1989; Lerbinger, 2017). Loosemore, *et al.* (2016) argue that risk-aware organisations prioritise efficient communication processes and foster shared accountability for managing interdependent risks among all parties in their supply chains. Constructive risk management, according to Loosemore, *et al.* (2016), is an important and instinctive part of organisational life at all levels, and it is incorporated into strategic planning processes. Large organisations usually have in their possession stable team with regards to risk management whose responsibility is to implement methodical management plans for risks as well as communicating, organising, monitoring risk, and examine risk-management activities according (Loosemore *et al.*, 2016).

2.6.7 Risk management maturity models

One of the ways that approached that are risk-related can enhance an organization's operation is to increase productivity and strengthening them to confront challenges in the future (Hopkinson, 2011). It is important to clearly examine current approaches to risk in enterprises and make a summary of the intended destination, in order to define the targets, determine the process, and track progress (Hillson, 1997). Hillson (1997) suggest that an organisation requires a broadly agreed-upon framework for the assessment of their present risk management maturity (RMM) and capability, and that this framework can also be used to monitor progress toward increased maturity. A model is termed risk maturity model if it structure is centred on the assessment of the capacity of manage risks and setting implementation goals (Hopkinson, 2011). There are five developed approaches in the determination of the maturity of risk management in a given project or organization. This work examines six models that have been identified for further review. The sub-sections that follow delve further into these models.

2.6.7.1 Model 1: Risk maturity model

The first known approach towards the development of risk maturity model was by Hillson in 1997. Many other maturity models are developed on top of it. In the view of Hillson (1997), the development of RMM is only for establishments that are interested in building or implementing formal management plan with regards to risk. The model is aimed at developing a framework that can be used to assess strategies for managing current risk. In order to determine the level of maturity, a benchmark is set. The model helps organisations determine their current level of risk management capability maturity, set growth goals, and create or improve risk management capability maturity strategies. It also provides guidance on how to progress to the subsequent stage of maturity. When it has to do with RMM, there exists four stages of proficiency maturity and every stage has its associated characteristics. These four stages are described as follows: Level 1: Naive, Level 2: Novice, Level 3: Normalized, and Level 4: Natural. Every stage is concisely defined as shown in Table 2.4. According to Hillson (1997), the framework incorporates four attribute headings so that a comprehensive diagnostic tool needed for the objectives and for assessing how risk management process maturity is carried out and these are community, process, experience, and implementation. In the assessment, this division aimed to use basic standards already accepted by variety of risk management organisations. The author also addressed the challenges that businesses face when they seek step to the subsequent stage of maturity as well as some strategies for overcoming them.

Table 2.4: Risk Maturity Model (RMM) framework (Source: Hillson, 1997)

	Naive	No knowledge of how important it is to manage risk Absence of lay down method for handing uncertainty. There is always a repetition of reaction to risk instead of being proactive to risk management. No willingness to learn using past experience.
	Novice	Few persons are involved during the experiment using risk management . Absence of a generalized framework for approaching risk Despite knowing the potential advantages of risk management, there still exist no effective means of implementation, thereby benefiting little or nothing.
	Normalised	How to manage risk is incorporated into the normal course of business. There is implementation of risk management in virtually every project. Generally, risk process is made official. The is full understanding of the benefits at every level despite the fact that it is not regularly achieved
DEFINITION	**Natural**	Existence of awareness culture and adoption of proactive steps with regards to RM in every aspect of business in the organization. Organization is involve in active application of information about risk for the improvement of the process of doing business and therefore enjoys the advantage Stressing on taking advantage of opportunity in management of risk
	Naive	Not aware of risk Resisting/ unwilling to change. Likelihood to insist on using existing processes
CULTURE	**Novice**	The concept of risk and it process could be seen as increasing overhead with its associated changing benefits. Risk management is employed in certain projects
	Normalised	Making sure there exist standard policy when it has to do with risk management Recognizing benefits and expecting them. Being ready to allocate resource for the organization to gain from it. .
	Natural	A show of management obligation towards risk management by showing example using the leaders. Encouraging proactive risk management and rewarding accordingly.
	Naive	Absence of official process with regards to risk management
	Novice	No general structure in processes even if there exists the use of a few particular methods The efficiency of a process rely strongly on how effective is the skills of risk team and the tendency to get external support
PROCESS	**Normalized**	General procedure is applied to virtually all projects. Official procedures integrated Official procedures integrated into quality system. Risk budgets are allocated and managed in every level. Restriction is set of seeking support from outside
	Natural	The processes involved in doing business are risk based. An all-encompassing risk management is incorporated into every aspect of the business. Processes are updated and refreshed at regular basis. Improvement is achieved by regular feedback by using routine risk metrics.
	Naive	Lack of knowledge when it comes to the principles of risk and language.
	Novice	Centred around few persons having limited knowledge or training
EXPERIENCE	**Normalised**	Use of internal resources in developing technical know-how and then using it to train staff on basic skills of RM. Developing particular processes and tools..
	Natural	Every staff is aware of risk and applying basic skills. Using past experience to learn. Seeking knowledge on risk management from outside the organization in order to develop more skills
	Naive	Non availability of planned application and absence of consistent resources and tools for managing risk.
	Novice	Varying application. Staff availability is not constant Making use of ad-hoc approach in the process of collecting tools and use of methods.
APPLICATION	**Normalised**	Making use of consistent and repetitive approach with regards to every project. Dedicating resources and incorporating a set of tools and methods to risk management . Second-nature, applied to all activities.
	Natural	Writing reports and making of decision is risk oriented. Modern tools and methods.

2.6.7.2 Model 2: **Project management maturity model by project management solutions**

Project Management Solutions' Project Management Maturity Model (PMMM) is used to assess the maturity of an organization's project management processes. The model's key distinction from the other models investigated is its narrow emphasis on processes. Crawford (2012) claims that this model was created to provide a conceptual structure to help companies improve their project management processes. It has become the industry standard in assessing project management maturity, according to Crawford (2012). It also helps with change by laying out a logical path and keeping track of progress.

At each maturity level, each information area is specified. To provide the most complete description, these information areas are broken down into their basic components. Identification of risk, quantifying risk, response to risk, controlling risk and documenting of risks are the five ingredients found in risk management model. In addition to a concise overview of the features for each maturity level, more comprehensive explanations for each component are given for each maturity level. An array of the level of maturity and the associated components has been created based on the definitions in the risk management knowledge field (Table 2.5).

Table 2.5: Component-maturity level matrix outlined from Crawford (2012)

Level 1	i. There is a day to day solution to problems when new risk event occurs. ii. There is absence of RM plan or and no strategy to respond to risk
Level 2	i. Individuals make use of personal methods in the management and control of risks. ii. Every risk item is assigned as it occurs iii. Risks are discussed during staff meetings iv. The status of risk for large projects are traced v.When reporting risk status to the main stakeholders, a set process is followed vi. A logbook is provided for risk and periodic meetings are done.
Level 3	- If there is an existence of developed processes, there is an active and routine tracking of project risks - Actions are takens as corrective measure, and there is an update on risk management plan
Level 4	Monitoring of programmes, costs and management of time are incorporated in the control systems of the organization
Level 5	Assessments made on risk and the present status of risk are adopted when making decision at management level
Level 1	Absence of records of characteristic risks faced and experiences encountered. Each person depends on his/ her personal experience and what was discussed with other members in a given team.
Level 2	Making a collection of some history on information related to come likelihood of risks No distinctive and central methodology for collection of historical information.
Level 3	Making a history of database with regards to information related to common risks and what triggers them.
Level 4	A history of database is broadened to show how risks between projects are related
Level 5	This involves putting in place a means of improvement on processes Making assessment after the project is completed Lessons are deduced after assessment is done

2.6.7.3 Model 3: Risk management maturity model

PMI (2004) noted that Model 3 is nothing else but an expanded form of Hillson's (1997) initial work, which was adopted as Model 1, in order to improve diagnostic elements and aid in determining an entity's current level of functioning. It is an abridged model that can be

used to quickly identify vulnerabilities and can be useful in any kind of project or company, government establishment and commercial fields.

The names of the levels have been modified, but Hillson's model's basic structure has remained unchanged. Level 1: Ad hoc, Level 2: Initial, Level 3: Repeatable, and Level 4: Regulated are the four levels of the Risk Management Maturity Model (RMMM). The four attribute headings, Community, Process, Experience, and Implementation, were also taken from Hillson (1997)'s model and remained the same. The RMMM architecture is structured as shown in Table 2.6. RMM, the maturity stage descriptions, and the suggested approaches for progressing to the next step have all been built on.

2.6.7.4 Model 4: IACCM Business risk management maturity model

A means of assisting businesses in the determination of how matured their risk management is being created by IACCM in 2003. It is coined around a model called Risk Management Maturity Model (3) who purpose is to assist a company in determining if its risk management approach is acceptable, comparing it to best practises or competitors, and establishing a common benchmark for organisational risk management. The designers of Model 1 were involved in Model 3 and gave a framework. As a result, the basic structure of the system is identical to that of RMM and RMMM. The four key attributes were determined using four levels of organisational business risk management sophistication:

Level 1: Are inexperienced

Level 2: Are qualified,

Level 3: Are proficient

Level 4: Are experts with regards to culture, processes, experiences and application.

The features of each maturity level are shown in Table 2.7 and this provides the maturity characteristics. A comprehensive questionnaire, instead of this large sense, considered as a group of columns with every roll having a characteristic feature. When it comes to culture, 10 rows of characteristic features are shown. Similarly, the technique is divided into eight parts: six for practise and seven for use. The total attribute scores and the organization's maturity score are determined after each trait is scored in accordance the level of maturity either 1,2,3 or 4. The difference between the characteristic and attribute scores reflects the organization's strengths and weaknesses. As a result, the questionnaire can be used to set specific progress goals based on the identified strengths and weaknesses, in addition to assessing the organization's maturity level.

Table 2.6: Maturity level – Feature matrix of Model 4

		LEVEL OF MATURITY			
		Novice	**Competent**	**Proficient**	**Expert**
ATTRIBUTE	**Culture**	- Antagonistic to RM - little or no awareness No understanding Not strategic in approach - Not committed	- not regular, not consistent - Having a level of understanding/ awareness - Careful methodology, reactive	- ready to undertake suitable risks - adequately understand of what the organization stands to gain - Every strategy is targeted at implementing process.	- Proactive - understand by instinct - concise and committed completely
	Process	- where available, tendency to be inefficient, unofficial and ad-hoc in approach	- Not consistent - Not able to learn from experience - make use of general	- Consistent approach - channelled to particular needs	- Adaptable - Developed in a proactive manner - Designed to suit the purpose - most appropriate

		approach		option available
Experience		- Fundamental capability	- Skilful - Formal qualifications	- all round experience - Best qualification
	nothing			- organized from outside
	relevant			Highly competent
Application	- Not used	- Not consistent - on main project	- Consistently applied - Adequately resourced	
		projects only - Process driven - Inadequately resourced		- in every business - Flexible - Measured for Improvement

Working Group, 2003)

2.6.7.5 Model 5: Risk management capability maturity model for complex product systems projects

According to Ren and Yeo (2004), this model was based on RMM, Hopkinson and Lovelock's HVR Risk maturity model, RMMM, and PMI (2004). It gives complex product system projects a framework in which they can equate their current risk management approach to five maturity levels. The approach enables an assessment of the organization's existing risk management sophistication, as well as the identification of attainable development targets and the implementation of risk management maturity improvement plans. The maturity levels used in the model are as follows:

Level 1: the original form

Level 2: Can be repeated

Level 3: It is developed

Level 4: A managed condition

Level 5: Optimized form.

In the opinion of Ren and Yeo (2004), an organization's skills in organisational method of managing risk, their culture, level of knowledge in the management of risk as a matter of importance must all be strengthened at the same time in order to improve risk management sophistication. As a result of the tool's findings, three main competence areas have been identified: organisational culture, risk management method, and risk management knowledge/technology. For each maturity stage, the model defines major organisation culture, method of managing risk, level of knowledge and their theoretical framework as indicated in Table 2.8. In the model, 75 statements are involved which are in the form of a questionnaire. Each of the questions are weighted equally as noted by Ren and Yeo (2004). The major features of the questionnaire for each of the three primary skill areas are as follows:

For the sake of the company's culture;

• Attitude toward danger and unpredictability

• Stakeholders and stakeholders

• Risk management leadership and dedication. For the purpose of risk management;

• Identifying risks

• Risk assessment,

• Risk reduction and management

• Interoperability with other systems.

• Experience and risk management

• Competence and experience.

A list of possible items for measuring each attribute is included in the questionnaire. Ren and Yeo (2004) made suggestion of a scales for responding to risk management and these range from strongly disagree to strongly agree.

2.6.7.6 Model 6: PMI's Risk management maturity model adapted to the construction industry

Loosemore *et al*. (2016) based their research on the PMI (2004) Risk Management Maturity Model (RMMM), which is referred to as Model 3. The authors found the RMMM to be very limited in its description of what defines each level of maturity, despite its usefulness. According to Loosemore *et al.* (2016), it needs to be refined to meet the specific needs of different industries, such as building. Loosemore *et al.* (2016) adapted and expanded PMI's work for the construction industry, resulting in a more comprehensive model (Mitroff & Pearson, 2013; Loosemore *et al.*, 2016).

The structure includes additional attribute headings such as information, picture, trust, and resources in addition to the RMMM attributes. The final model divides the specified headings into four stages of maturity, as shown in Table 2.9: Level 1: Ad-Hoc, Level 2: Established, Level 3: Managed, and Level 4: Integrated. According to Loosemore *et al*. (2016), an organisation can be classified into many maturity stages, each with its own set of characteristics. As Loosemore *et al.* (2016) go on to say, the challenge for any organisation is to reach a consistent degree of sophistication across all risk categories and across all attributes.

Table 2.7. Framework of Model 6

Culture	**Level 1- Ad Hoc**	As a result of lack of awareness on risk, risk management considered inconvenient and are peripheral; irrelevant to main objectives of the business.. Senior management staff not involved/ no support. Unwilling to embrace risk management. Likelihood to stick previous process even in the face of non-performance of project. Managers are scared of problems and therefore presence of many problems not discussed. . There is punishment for the communication of bad news.. Everyone is secretive in behaviour and therefore no communication among teams members
	Level 2 – Established	The processes involved in risk management is seen as extra cost overhead without definite benefits Not sure if risk management can be of any value to the organization. Attention is always on the downside of risk. It is for the purpose of public relation that risk management is discussed but is never implemented
	Level 3 – Managed	Top management is invigorated but do not need risk management Poor communication to stakeholders. The dividends of risk management is identified, acknowledged and proven. Risk reports are required by top management No fear of communication negative information Organizations adopt communication from down – up in management cadre Communication reaches stakeholders efficiently Risk management is considered a function within the organization Risk is considered an innate and performatory manner of reasoning among every staff of the company
	Level 4 - Integrated	No secrecy with regards to sharing of information among partners in business along the whole supply chain. Duties with regards to risk are grouped No blame game is accepted; everyone accepts mistake made. Information is communicated officially to top management.
Processes	**Level 1- Ad Hoc**	Absence of a framework or lay-down procedures when dealing with risk. The system doesn't have formal process, risk management plans and are not proactive with regards to risks. Depends too much on insurance instead of the adoption of adequate risk management
	Level 1- Ad Hoc	Do not understand the principles of risk management No interest to learn using past experiences
	Level 2 – Established	Make use of few enthusiastic people to experiment on risk management. Aware of what can be gained as a result of risk management but cannot be implemented efficiently. Tendency in staff to respond to risk when they occur
	Level 3 – Managed	Every level is aware of the dividends of RM but not regular. Major stakeholders within the organization are involved in the processes of risk management. Adoption of proactive methods to risk when decisions are implemented.
	Level 4 - Integrated	When decisions are being made, proactive actions are taken with regards to risks. Creating awareness of risk is made to pass through every cadre of the organization and even down to the supply chain. Feedback on risks are used to strengthen organization's process in order to gain advantage over competitors
	Level 1- Ad	Do not understand the principles of risk management

Hoc	
Level 2 – Established	Aware of the fundamental language of risk management. Reserved for persons with little or no training.
Level 3 – Managed Resources	Prevalent knowledge of the language of risk management and their principles. . Widespread practice of qualitative analysis as well as a few cases of quantitative analysis
Level 4 - Integrated	Complete awareness of the concepts of risk management, their principles and application to organizations. Makes use of modern tools and approach Extensive memory of the company and able to learn from past risks and how they were managed
Level 1- Ad Hoc	Known for being associated with poor compliance with risk management especially with regards to job delays, inefficiency in job execution and cost overruns
Level 2 – Established	Aware of competence but not reliable in terms of performance and several problems associated between clients.
Level 3 – Managed Resources	High regards as a result of being consistent in efficiently managing risk
Level 4 - Integrated	Respected for respectable knowledge acquired for successfully completed projects with high risks. Civilized clients are attracted by companies with outstanding risk management skills and experience.
Level 1- Ad Hoc	Risk management is scarcely practiced by managers
Level 2 – Established	Application of risk management based on the demands of customers is not consistent and it is only applied to selected projects and this depends on whether the managers are aware of the projects involved.
Level 3 – Managed Resources	There is a methodical and steadfast implementation of risk management in every project and this cuts across every leadership cadre. Risk management considered as vital part of operational risks. Involved in trainings associated with risk management
Level 4 - Integrated	As a result for the value of the system, there is capacity to develop system strength in order to continuously experience improvement. Risk management is modified to many other areas where risk exist like in politics, commerce, operations, strategies and reputation.. Every staff undergo regular training on risk management

(Source: Loosemore *et al*., 2016)

Table 2.7, continued.

Level 1- Ad Hoc	Fear of not being able to manage risk Lack of experience in the implementation of risk processes. No show of confidence in the identification, analysis and control of risks
Level 2 – Established	Constant fear of risk management. Majority of the people cannot analyze risk
Level 3 – Managed	Everyone breaks though the barrier of fear. There is a show of confidence as everyone works at his/ her level and this makes them to search vigorously for information needed to manage risk.
Level 4 - Integrated	Clients and customers are boldly told that risk management is an easy task to handle. A show of eagerness to be taught things regarding risk management and skills. Every staff has access to system support that is both interactive and

	intelligent and this enhances learning by everyone. The system of risk management is self-developing and this is championed by staff. Risk management leaders are chosen by staff.
Level 1- Ad Hoc	No specific resources is allocated to risk management
Level 2 – Established	Every staff involved in risk management are deployed on projects Absence of central assistance. The financing of risk is implemented by the project cost department
Level 3 – Managed Resources	Senior management teams are engaged in risk management . Budget for risk management is effectively shared. Training the fundamentals of RM is done officially within the organization Special procedures and tools are developed and used for the business. Selected people are trained on the system of risk management
Level 4 - Integrated	A given budget and resources is set aside for the management of risk. The system is implemented from top to bottom and this is championed by heads of management. A team or a unit is set aside to manage risk. Skills and resources for the management of risk is centralized and this supports each and everybody in the establishment. By means of motivating, rewarding and training of staff, the activity of risk management is assisted by the human resource department. p

2.7 Supply Chain as a Construction-Specific Entity

In the building industry, many firms work together (Vaidyanathan & Howell, 2017). As a result, Vaidyanathan and Howell (2017) argue that maturity models designed for a single business (e.g. CMM) cannot be directly applied to the construction industry because they ignore multi-enterprise supply chain aspects. Sarshar *et al.* (2017) investigated the applicability of CMM to the construction industry and discovered that the supply chain configuration in construction is the biggest obstacle to implementation, as previously stated. In this regard, the literature is examined for construction supply chain issues, especially in terms of maturity and risk management.

Mackinnon (2012) concluded that a supply chain, in its most basic form, consists of three entities: a company, a seller, and a customer who are all directly involved in the upstream and downstream flows of products, services, finances, and information after conducting a

literature review. According to Mackinnon (2012), supply chain management is concerned with the coordination of activities among these interdependent organisations. “Upstream and downstream relationships with manufacturers and customers are managed to create value in the final marketplace at a reduced cost to the supply chain as a whole (Chapman *et al.*, 2017).

2.7.1 Construction supply chain and its management

Many authors (Vrijhoef & Koskela, 2011; Tah, 2015) claim that each construction project is special, and the construction supply network is typically temporary, changing with each new project. According to Vrijhoef and Koskela (2011), the building supply chain is characterised by instability and heterogeneity. According to Tah (2015), construction projects are characterised by long supply chains that span a variety of product/service types and commercial interests, and this fact is at the root of a number of current issues, including poor delivery on time, cost, and quality, the fragmentation of design and construction liability, and poor trade relations between parties. Contractors, subcontractors, material and machinery suppliers, engineering and design companies, consultancy firms, and so on are all part of a building supply chain, according to many authors (Taylor & Bjornsson, 2009), O'Brien, 2011; Tah, 2015). Among these agents, there is a flow of information, materials, services, and goods, as well as a flow of funds (Shaoyan, 2008). According to Shaoyan (2008), Vrijhoef and Koskela (2011) regard supply chain problems as a major problem in construction that occurs at the intersections of various organizations or stages involved in the construction supply chain. There are many sources of confusion and participants in a construction project. As a result, as Ongel, (2009) argue, conflicts among these participants can have a negative impact on the project, as each participant attempts to reduce his or her own risk. According to (Akintoye & Macleod, 2017) teamwork among project participants with different goals is the most important factor in increasing construction performance. Better coordination,

communication, and cooperation between customers and suppliers are required in the project supply chain (Love *et al.,* 2018).

According to Shaoyan (2008), construction supply chain management (CSCM) is the integration of key construction business processes with a focus on how businesses use their suppliers' technologies and resources to gain a competitive advantage. CSCM aims to reduce facility construction costs while increasing efficiency and speed, according to O'Brien (2011). CSCM is the strategic management of information flow, activities, tasks, and processes involving various networks of organisations and linkages (upstream and downstream) involved in the distribution of quality construction products and services through firms and to customers (Akintoye & MacLeod, 2017).

2.7.2 Construction supply chain maturity models

"Process maturity must be gained along three dimensions: functional, project, and firm, and not necessarily in that order (Kumar & Viswanadham, 2017). Supply chains have also been subjected to the maturity theorem, albeit to a lesser degree. Two mechanisms for supply chain maturity models were discovered in the literature. In order to improve on how supply chain performs. Ongel (2009) designed a model called Supply Chain Management Maturity model. A view of five of the level with regards to maturity, there is a depiction indicating a drive toward effectiveness in supply chain management. Each level, which are: Level 1: Ad Hoc, Level 2: Defined, Level 3: Linked, Level 4: Integrated, and Level 5: Extended, consist of features related maturity of the process and this include being able to predict, improved capacity, being effective and a sure of effective performance. The supply chain model related with the construction industry was designed by Vaidyanathan and Howell (2007). It contains four stages of maturity which include:

i. Ad-hoc,

ii. Defined,

iii. Managed and

iv. Controlled.

This model is construction-specific, since it addresses the industry's concerns and problems. Overall, these models are geared towards improving the management of supply chain and there are no other records that show maturity models centred on the improvement on the management of the risks related to the supply chain.

2.7.3 Risks in construction supply chain

The vital factors associated with an organization supply chain can be linked to uncertainties associated with project supply in combination with the intrinsic risk emanating from associated firm (Akintoye & MacLeod, 2017).

Based on this, Kumar and Viswanadham (2017) noted that threats occur at various nodes in a building supply chain since it requires hundreds of channels for various materials and facilities. The "focal points" for supply chain risk, according to Jüttner (2015), are disturbances of "flows" between organisations. According to Jüttner (2015), these flows are related to information, energy, products, and capital, and supply chain risk spreads beyond the boundaries of a single firm. According to Giunipero and Eltantawy (2014), several factors contribute to supply chain risk: global political events, product availability (Singh, 2019), distance from source (MacKinnon, 2012), industry capacity Lerbinger (2017), demand fluctuations (Singh, 2019), technological changes (Iyer, 2016), labour markets Kumar and Viswanadham (2017), and financial instabilities (Kumar & Viswanadham, 2017).

Mason-Jones and Towill (2008) propose five overlapping types of supply chain risk sources: environmental risk sources, demand and supply risk sources, process risk sources, and control risk sources. There are environmental, supply, and demand risk sources on one side, and processes and control systems that function as a risk amplifier or absorber on the other. As a result, any possible supply chain uncertainties, such as disruption due to political, natural, or social uncertainties, are considered environmental risk sources. Supply risk refers to the uncertainty associated with supplier activities and general supplier relationships. Any risk associated with outbound logistics flows (Svensson, 2012) and product demand is referred to as demand risk. The creation and execution of processes within and between supply chain entities are referred to as processes. Decision rules and policies about order quantities, batch sizes, and safety stocks are examples of supply chain management mechanisms.

2.7.4 Supply chain risk management

According to Kumar and Viswanadham (20017), the contractor must find various mechanisms to make the supply chain robust and risk tolerant for preventive risk management. Managing risks from a supply chain perspective, according to Jüttner (2015), must have a wider reach and describe the way key processes are performed across at least three organisations, rather than focusing on a single organisation. According to Kumar and Viswanadham (2017), supply chain risk management entails identifying risk events and their origins, prioritising risks, and devising strategies to reduce the likelihood of such events occurring. Supply chain risk management is described by Jüttner (2015) as "the identification and management of supply chain risks through a coordinated approach among supply chain participants to minimise susceptibility of the entire chain of supply." Juttner (2015) opined that method of risk analysis can be adopted in order for the gap between point of view of a

given company and the supply chain to be seen. For effective assessment of susceptibility from the point of view of supply chain, it become imperative for companies to identify what are the direct risk to the individual activities and other risk associated with or susceptibility in supply chain can be determined if the organization identifies direct risk as well as other risk that may confront the organization as a result of relationship with other organizations. Danger, aggressive pursuit of goals, early supplier participation, and careful production, assessment, and management of suppliers are all linked (Giunipero & Eltantawy, 2014).

Giunipero and Eltantawy (2014) included several key points for supply chain risk management. Open lines of contact between all organisations should be established during times of crisis. There should be a willingness to share risk-related information as well as an understanding that supply chain risks are shared risks (trust and open communication). Organizations must reach an understanding of the risks that their supply chain poses. It's important to have processes in place for managing supply chain risk within and through industries. In the supply chain sense, joint continuity planning processes are needed to meet the need to manage supply chain risks as shared risks.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. In fact, the research design is the conceptual structure within which the research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data (Zou *et al.*, 2010). According to Foti (2012) the purpose of a research, as well as research questions, is to develop a research design; because they provide important clues about the problem that a researcher is aiming to assess. It also provides a researcher with the strategies for solving an identified research problem (Kerner, 2015). A questionnaire was prepared and the sample used in the survey was drawn primarily from a database from ministries and Parastatals such as Federal Housing Authority (FHA), Federal Capital Development Authority (FCDA) and also included participants who had earlier conducted notable research on risk management.

3.2 Population of the Study

Jia *et al.* (2013) described population as the total number of people who make up the target community defined by the study's objectives. Ongel (2009) described a study's population as a census of all things or subjects that have characteristics or knowledge of the phenomenon being studied. Federal Capital Development Authority (FCDA), Federal Housing Authority (FHA), and Federal Ministry of Works and Housing Abuja were among the ministries and parastatals that contributed to the population. The population size was 2000.

3.3 Sample Frame

The sampling frame is a list that contains information about all of the things in a population. It's designed to make it easier for the researcher to choose the right samples. The sample frame refers to the number of individual that made up the study population that can be sampled by the researcher. The sample frame for this study is the list gotten from Federal Housing Authority (FHA), Federal Capital Development Authority (FCDA) which comprises of professionals randomly selected from the study area. The management staff of building construction firms in Abuja form the sampling frame for this analysis. Quantity surveying, Architects, Builders, Engineers, and other industry professionals are included.

3.4 Sampling Technique

The sampling methodology used in this research was a quantitative method. In this case, random sampling was used to choose the samples from the wider population.

3.5 Sample Size

This is the subset of the population that has been chosen for observation, analysis, and research. It's the subset of the population that's been defined. Glenn's formula is as follows: $$n = \frac{N}{1+N(e)2}$$

Where, n = the sample size

N = population of the study

e = margin of error, ± 5% or 0.05, at 95% confidence level

Using the glenn’s formula for sample size, the sample size for the research is 200

3.6 Data Collection Method and Instruments

3.6.1 Types of data

This research adopted a primarily sourced data using a well-structured questionnaire. Data were distributed and collected hand to hand to the respondents.

3.6.2 Instrument of data collection

A well-structured questionnaire was used as the study's instrument. The questionnaires are divided into several sections: respondent context, risk management processes in relation to risk expertise, basis for evaluating the risk management ability of a building client, and existing capacity in order to strengthen areas of strength and weakness in risk management practice.

The analysis uses a questionnaire to gather data from respondents, which is a quantitative research method. The questionnaire was carefully crafted such that each question is stated simply, specifically, and in a manner that is easy to comprehend. The questionnaire was divided into two sections. The first section consists of questions about the respondent's demographic profile and company details in general. The second component was created to evaluate the Nigerian building clients' risk management capabilities.

3.7 Method of Data Analysis

The data gathered from the respondents was carefully evaluated in relation to the specified objectives after it was collected through the standardized questionnaire. Frequency distribution tables and percentiles were used to evaluate the data obtained on the respondents' general knowledge. The Mean Item Score and Relative Importance Index were used to assess the other objectives.

Table 3.1: Breakdown of Method of Analysis

S/No	Objectives	Data Collection Tools	Method of Analysis
1	Determine and evaluate the risk management process in relation to client risk awareness.	Questionnaire	Mean Item Score
2	Determine and investigate the criteria for evaluating a building's risk management capability.	Questionnaire	Relative Importance Index
4	To assess existing capability in order to strengthen risk management practice's areas of strength and weakness.	Questionnaire	Mean Item Score and Charts
5	To create a maturity model based on a previously established model in order to assess the efficacy of a client's building in terms of risk management.		Framework Developed from Outcome of Other Objectives

Source: Researcher's construct (2020*).*

3.7.1 Decision rule

Table 3.2 shows the judgement rule that was used in this study. Respondents will rate Mean Item Score and Relative Importance Index on a four-point scale using a likert scale (4). The breakdown is shown in the Table 3.2.

Table 3.2: Decision Rule for Data Analysis

Scale	Cut-Off Point		Level of Agreement	Level of Integration
	RII	MIS		
4	0.85-1.00	3.00-4.00	Strongly Agree	High
3	0.55-0.840	2.00-2.99	Agree	Medium
2	0.25-0.54	1.00-1.99	Neutral	Low
1	0.00-0.24	0.00-0.99	Disagree	None

Source: Researcher's Construct, (2020).

3.8 Reliability Check

Giunipero and Eltantawy (2014) described reliability as the accuracy and precision of a measurement process. The Cronbach's alpha reliability test tests the data quality of a research instrument. The normal range for measuring the internal accuracy of a test instrument is 0.50-0.70 and more, according to 0.50-0.70 and more Ongel, (2009). The findings are more accurate when the alpha values are higher. The reliability checks for each line of the questionnaire are shown in Table 3.2. For the variables studied, the Cronbach's alpha value is 0.888, with a range of 0.860 to 0.908.

Table 3.3 Results of Cronbach's Alfa for Reliability Test

S/N	Variables Tested	Cronbach's Alpha	N of items
1.	Determine and evaluate the risk management process in relation to client risk awareness.	0.860	26
2.	Determine and investigate the criteria for evaluating a building's risk management capability.	0.895	12
3.	To assess existing capability in order to strengthen risk management practice's areas of strength and weakness.	0.908	21
	Average	**0.888**	

Source: Researcher's construct, (2020).

CHAPTER FOUR

4.0 RESULTS AND DISCUSION

4.1 Results of the Study

This chapter describes how data for this study was collected, interpreted and analyzed. The study utilizes primarily sourced data from construction stakeholders in different ministries and parastatals in Abuja, Nigeria, through well-structured, closed-ended questionnaires.

4.2 Research Data

To achieve the research's target, 200 survey questionnaires were distributed among construction professionals in various MDAs (Ministries, Departments, and Agencies) across Abuja. 50 (or 25%) of the 200 questionnaires distributed were not returned, while 17 (or 8.5%) were returned but incorrectly or incompletely filled and could not be used for analysis, leaving 133 (or 66.5%) that were correctly completed and ready for analysis.

Table 4.1: Breakdown of Research Data

S/NO	Category of data collected	Frequency	Percentage (%)
1.	Not returned	50	25
2.	Returned but bad for analysis	17	8.5
3.	Returned and good for analysis	133	66.5
	Total	**200**	**100**

Source: Researcher's Field Survey, (2020).

4.3 Analysis of Respondent's Professional Designation

The analysis below describes the professional designations of the various professionals who took part in the survey. Architects (25 percent), Builders (16 percent), Engineers (14 percent), and other professionals in the built environment got the most responses (25 percent), (11

percent). Quantity surveyors are in charge of costing designs, providing financial advice, and keeping projects on schedule, while architects are in charge of preparing, supervision, and redesigning. As a result, they have a greater understanding of risk occurrence and control. As a result, knowledge obtained from them is trustworthy.

Table 4.2: Respondent's Professional Designation

S/NO	Professional Designation of Respondents	Frequency	Percentage (%)
1.	Architects	33	25
2.	Builders	21	16
3.	Engineers	19	14
4.	Quantity Surveyors	45	34
5.	Others	15	11
	Total	**133**	**100**

Source: Researcher's construct, (2020).

4.4 Analysis of Respondent's Highest Academic Qualification

The academic credentials of the respondents are depicted in the sample below. Master's degree holders received the most responses (44%), followed by Bachelor's degree holders (34%), holders of Higher National Diplomas (22%), and Doctoral degree holders and other credential holders receiving no responses. Since the majority of the respondents have a master's or bachelor's degree, it is evident that they provided accurate details.

Table 4.3: Educational Qualifications of Respondents

S/NO	Educational Qualifications of Respondents	Frequency	%
1.	Higher National Diploma	29	22
2.	Bachelor's Degree	45	34
3.	Master's Degree	59	44
4.	Doctorate Degree	nil	nil
5.	Others	nil	nil
	Total	**133**	**100**

Source: Researcher's construct, (2020).

4.5 Analysis of Respondents Professional Qualifications

The chart below shows the respondents' professional qualifications, with qualified Quantity Surveyors accounting for 29% of the total response, qualified Architects for 23%, qualified professionals from other fields of study not classified in the study for 14%, registered Builders for 14%, and qualified Engineers for 11%. This indicates that the vast majority of the population's respondents are members of their respective professions, implying that they are well-educated and that the data they provide is reliable.

Table 4.4: Respondents Professional Qualifications

S/NO	Professional Qualifications	Frequency	Percentage (%)
1.	NIA	30	23
2.	NIOB	19	14
3.	COREN	15	11
4.	NIQS	39	29
5.	Others	30	23
	Total	**133**	**100**

Source: Researcher's construct, (2020).

4.6 Analysis of Respondent's Years of Professional Experience

The analysis below reflects the respondent's years of professional experience. Just two (2) classes of professionals received responses: 90% representing professionals with more than 30 years of experience, and 10% representing professionals with 25-30 years of experience. As a result, the respondents have served long enough for their responses to be deemed reliable for the study.

Table 4.5: Respondents Years of Professional Experience

S/NO	Years of Professional Experience	Frequency	Percentage (%)
1.	15 – 20 years	-	-
2.	20 – 25 years	-	-
3.	25 – 30 years	13	10
4.	Above 30 years	120	90
	Total	**133**	**100**

Source: Researcher's construct (2020).

4.7 Analysis of Risk Management Processes in Relation to Client Knowledge of Risk.

Objective One, which depicts the six (6) risk management processes, was evaluated using the Mean Item Score. Tables 4.6–4.12 show the methods, which have a long list of other variables under each heading.

Table 4.5 indicates that construction professionals strongly agree that "risk identification is a standard activity at the start of the project," which was ranked first with a MIS of 3.308, "risk management has an impact on quality, health and safety, and the environment," which was ranked second with a MIS of 3.203, and "identifying risks has an impact on time and cost," which was ranked third with a MIS of 3.203, and "risk identification has an impact on time and cost," which was ranked.

A documented, repeatable process for identifying project risk and an improvement process to fully identify the risk as early as possible," "a recorded, repeatable process for identifying project risk and an improvement process to fully identify the risk as early as possible," and "identifying risk has an effect on the long-term objective of the project" were ranked fifth, sixth, and seventh, respectively, with MIS of 2.947, 2.947, and 2.947, respectively.

Table 4.6: Risk Identification in Relation to Client's Knowledge of Risk

S/NO	Risk Identification	Mean Score	Ranking	Decision
1.	Danger is defined as a standard operation at the beginning of the project.	3.308	1st	Strongly Agree
2.	The effect of risk detection on efficiency, health and safety, and the environment is important.	3.203	2nd	Strongly Agree
3.	Risk identification has a time and cost effect.	3.045	3rd	Strongly Agree
4.	The majority of the projects are using a formalized risk identification method.	3.015	4th	Strongly Agree
5.	Having frequent risk discussions about the project scope and milestone details.	2.947	5th	Agree
6.	A framework for assessing project risk that is recorded and repeatable, as well as an enhancement process to fully identify the risk as early as possible...	2.939	6th	Agree
7.	Identifying risk has an effect on the project's long-term goals.	2.782	7th	Agree
		3.034		**Strongly Agree**

Source: Researcher's construct (2020).

Risk analysis using qualitative methods such as risk rating techniques, probability impact matrices," which placed first with a MIS of 3.000, was highly agreed upon by the respondents.

The respondents, on the other hand, agreed with "System's operational impact project assessed intuitively," which was ranked second with a MIS of 2.993, "risk analysis using advanced techniques such as simulations, sensitivity testing, and decision support tools," which was ranked third with a MIS of 2.917, and "risk analysis using statistical tools as well as qualitative methods," which was ranked fourth with a MIS of 2.917, and "risk analysis utilizing statistical tools as well as qualitative methods," which would have been.

Table 4.7: Risk Analysis in Relation to Client's Knowledge of Risk

S/No.	Risk Analysis	MIS	Ranking	Decision
1.	Qualitative approaches such as the risk rating methodology and probability effect matrices are used to determine risk.	3.000	1st	Strongly Agree
2.	The effect of a systematic approach on a project is intuitively evaluated.	2.993	2nd	Agree
3.	Advanced risk analysis approaches such as modeling, sensitivity testing, and decision support techniques are used.	2.917	3rd	Agree
4.	Risk analysis using both quantitative and qualitative approaches.	2.316	4th	Agree
	Mean Score	**2.807**		**Agree**

Source: Researcher's *construct*, (2020).

Table 4.8 shows that the stakeholders strongly agree that "historical information such as basic risk items and risk causes is collected and organized in the historical database," which was ranked first with an MIS of 3.090, and "besides gathering the information such as basic risk items and risk causes, the historical database is subject to a continuous interdisciplinary review," which was ranked second with an MIS of 3.090. The respondents agree that "team members place more emphasis on their previous history and discussion with the project team" with the MIS of 2.993, "have a particular method to collect statistical information, although some historical information about general trends in risk on similar projects might've been collected," and "Organisation having a database on typical MIS" with the MIS of 2. 993.

Table 4.8: Risk Information Database about Client's Knowledge of Risk

S/No.	Risk Information Database	MIS	Ranking	Decision
1.	The historical data base collects and organizes historical information such as common risk items and risk causes.	3.090	1st	Strongly Agree
2.	The historical database is subject to a quality improvement process in addition to gathering information such as common risk items and risk causes.	3.000	2nd	Strongly Agree
3.	Members of the project team make choices based on their own prior interactions and discussions with the project team.	2.993	3rd	Agree
4.	Have quite a particular approach for collecting historical data, even though some historical data on risk patterns on related projects might have been collected.	2.993	4th	Agree
5.	An Organisation with a database of traditional risk encounters and related interactions may have a positive effect on a project.	2.910	5th	Agree
	Mean Score	**2.997**		**Agree**

Source: Researcher's construct, (2020).

According to Table 4.9, respondents strongly agree that "risk management plans, contingency plans, and risk allocation plans are prepared, and risk control strategies, as well as risk finance strategies, are formulated," "contingency plans and mitigation strategies are developed for each risk item, so that project reserves can be allocated to cover such items as needed," "risk management plans, contingency plans, and risk allocation plans are prepared, and risk control strategies, as well as risk finance strategies are formulated," and "organizational risk is formulated. With a MIS of 2.707, "danger consideration in broad emerge" was the lowest ranked factor under risk response growth.

Table 4.9: Risk Response Development in Relation to Client's Knowledge of Risk

S/No.	Risk Response Development	MIS	Ranking	Decision
1.	For each risk item, contingency plans and mitigation measures are created such that project reserves may be allocated to cover	3.233	1st	Strongly Agree
2.	those things as they arise.			
	Risk management plans, contingencies, and	3.226	2nd	Strongly Agree
3.	risk allocation plans are created, as well as risk control and risk finance strategies.			
4.	For potential risk incidents, the Organisation develops mitigation mechanisms or contingency plans.	3.008	3rd	Strongly Agree
	Large-scale risk considerations emerge.	2.707	4th	Agree
	Group Mean	**3.044**		**Strongly Agree**

Source: Researcher's construct (2020).

Table 4.10 shows that respondents strongly accept that "a formalised system for risk monitoring is used for project and risk management plan revisions on a regular basis," which came in first with a MIS of 3.083. With MIS of 2.932, 2.865, and 2.865, respectively, project teams apply their own approach to risk management and contingency planning as a former practise, "responsibility is assigned for each risk item as it occurs," and "formalised generic framework for actively and regularly tracking risks for projects" were ranked second, third, and fourth, respectively.

Table 4.10: Risk Monitoring and Control in Relation to Client's Knowledge of Risk

S/No.	Risk Monitoring and Control	MIS	Ranking	Decision
1.	For project and risk management plan updates, a formalised risk reporting mechanism is used	3.083	1st	Strongly Agree
2.	As a previous process, project teams apply their own approaches to risk management and contingency planning.	2.932	2nd	Agree
3.	As each risk item arises, responsibility is delegated.	2.865	3rd	Agree
4.	Formalized generic process for actively and routinely tracking risks for projects	2.865	4th	Agree
	Group Mean	**2.936**		**Agree**

Source: Researcher's construct (2020).

Table 4.11 shows a MIS of 3.083, the respondents strongly believe that "prepare report stored on server, shared and used forthcoming projects" is a significant factor in risk evaluation, according to the results of the study below.

"prepared report stored as hardcopy and shared" and "prepared report on an ad-hoc basis and failed" were ranked second and third, respectively, with MIS of 2.925 and 2.850.

Table 4.11: Risk Evaluation in Relation to Client's Knowledge of Risk

S/No.	Risk Evaluation	MIS	Ranking	Decision
1.	Prepare a report that will be saved on the screen, shared, and used in future projects.	3.083	1st	Strongly Agree
2.	Equipped report stored as hardcopy and collective.	2.925	2nd	Agree
3.	Equipped report on an ad-hoc basis and unsuccessful.	2.850	3rd	Agree
	Group Mean	**2.953**		**Agree**

Source: Researcher's construct, (2020).

Table 4.2 describe the study of the level of agreement of the six risk management processes as it relates to client knowledge of risk yielded a group mean of each of the six processes as it relates to client knowledge of risk, which shows that stakeholders in various ministries and

parastatals strongly agreed that “risk response development” and “risk identification,” which were ranked first and second, respectively, were the most important.

With a community mean of 2.997, 2.953, 2.963, and 2.807, “risk knowledge database,” “risk evaluation,” “risk monitoring and control,” and “risk analysis” were ranked third, fourth, fifth, and sixth, respectively.

Table 4.12: Summary of Risk Management Processes

S/No.	Risk Management Processes	Group Mean	Ranking	Decision
1.	Risk Response Development	3.044	1st	Strongly Agree
2.	Risk Identification	3.034	2nd	Strongly Agree
3.	Risk Information Database	2.997	3rd	Agree
4.	Risk Evaluation	2.953	4th	Agree
5.	Risk Monitoring and Control	2.936	5th	Agree
6.	Risk Analysis	2.807	6th	Agree
	Average Mean	**2.962**		**Agree**

Source: Researcher’s construct (2020).

4.8 Analysis of the Basis of Assessing the Risk Management Capacity of Building Client

Table 4.13 shows that based on the review of the basis for determining the building client's risk management capability. Risk management is a critical success factor that significantly improves project performance (RII=0.94), risk management is needed to complete successful projects (RII=0.92), risk management provides benefits and adds value to Organisation performance (RII=0.89), risk management minimizes cost increase/profitability (RII=0.88), risk management provides benefits and adds value to Organisation per capita (RII=0.89), risk management provides benefits and adds value to Organisation per capita (RII=0.88), risk management provides benefits.

Risk management, on the other hand, improves credibility (RII=0.84), decreases project time (RII=0.79), increases contact level (RII=0.79), and minimizes conflicts/legal disputes (RII=0.79), according to the respondents.

Table 4.13: Analysis of the Basis of Assessing the Risk Management Capacity of Building Client.

S/No.	Basis of Assessment	RII	Ranking	Decision
1.	Risk management is a vital success factor that improves project efficiency dramatically.	**0.94**	1st	Strongly Agree
2.	Risk management is critical for a project's success.	**0.92**	2nd	Strongly Agree
3.	Risk management helps and adds value to the success of an enterprise.	**0.89**	3rd	Strongly Agree
4.	Risk management helps to keep costs down and profits up..	**0.88**	4th	Strongly Agree
5.	Risk management improves the protection and dependability of a system.	**0.88**	5th	Strongly Agree
6.	Risk management improves project efficiency.	**0.86**	6th	Strongly Agree
7.	Organizational learning is aided by risk management.	**0.86**	7th	Strongly Agree
8.	Organizational learning is aided by risk management.	**0.86**	8th	Strongly Agree
9.	Risk management improves the company's image.	**0.84**	9th	Agree
10.	Risk management shortens project timelines.	**0.79**	10th	Agree
11.	Risk management raises the level of coordination.	**0.79**	11th	Agree
12.	Risk management helps to keep disagreements and legal disputes to a minimum.	**0.79**	12th	Agree
	Group Mean	0.86		**Strongly Agree**

Source: Researcher's construct, (2020).

4.9 Analysis of the Current Capacity in order to Improve Areas of Strength and Weakness in the Risk Management Practice.

Figure 4.1 depicts the respondents' questionnaires "do you agree risk management is critical for your Organisation?" Risk management is “definitely” important for their company, according to 92 % of respondents, with the remaining 8% agreeing that it is “definitely” important for their company. As a result, none of the respondents questioned the importance of risk management in their organizations.

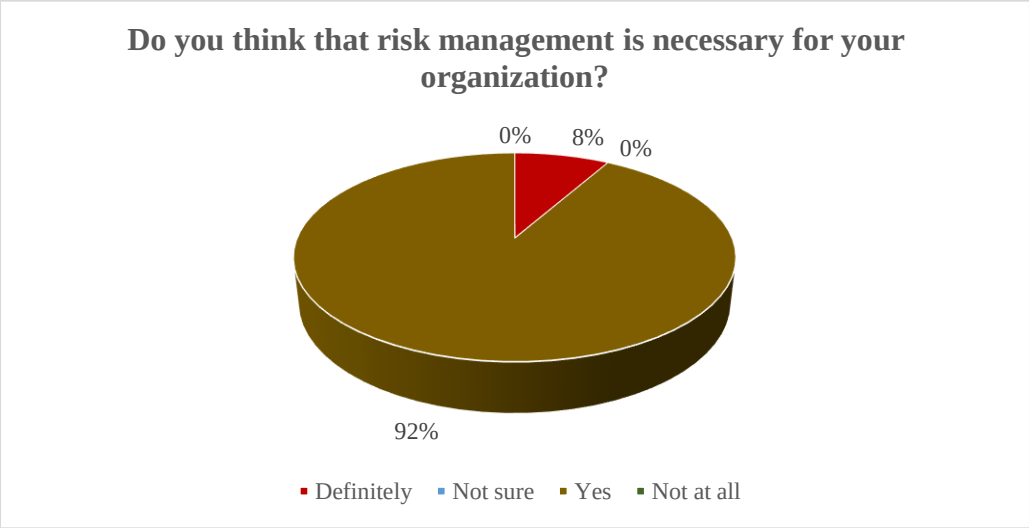

Figure 4.1: Necessity of risk management in the organization

Source: Researcher’s *construct*, (2020).

Figure 4.2 shows what best defines the mindset of the respondent's company toward risk management. “Risk management is a vital success factor and it can greatly boost business efficiency, advantages of risk management shown by different applications,” agreed 54 percent of respondents. 15 percent of respondents agreed that “risk management is a critical success factor and it can significantly improve business performance, benefits of risk management demonstrated by various applications,” and 23 percent of respondents agreed that “although not all of the benefits are consistently gained, we are aware of the value and

benefits of risk management," and 15 percent of respondents agreed that "risk management is a critical core competence and it can significantly boost sales, benefits of risk management demonstrated by various applications," and 15 percent of respondents accepted that "risk management is an essential factor in the success and it "Risk management is a crucial success factor, and "while risk management can have certain advantages, the additional costs it incurs and the value it brings to our company are debatable."".

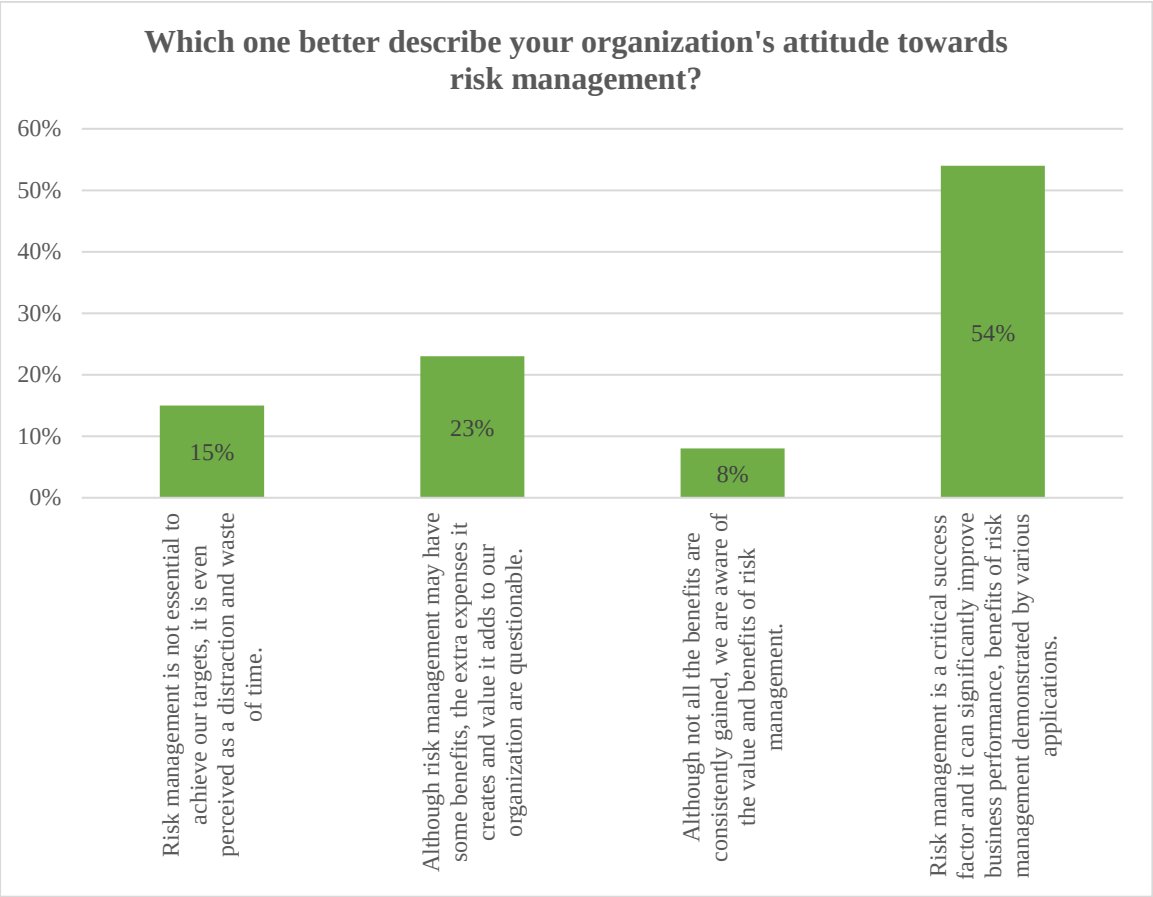

Figure 4.2: Organization's Attitude towards Risk Management

Source: Researcher's construct, (2020).

Figure 4.3 depicts the top management approach to risk management at the respondent's business. According to 53% of respondents, top management has a "full dedication to risk management, gives promotion, support, and includes risk reporting"; top management has

"partial encouragement and passive support," according to 23% of respondents; and top management "supports risk management," according to 17% of respondents.; and top management "supports risk management," according to 7% of respondents.

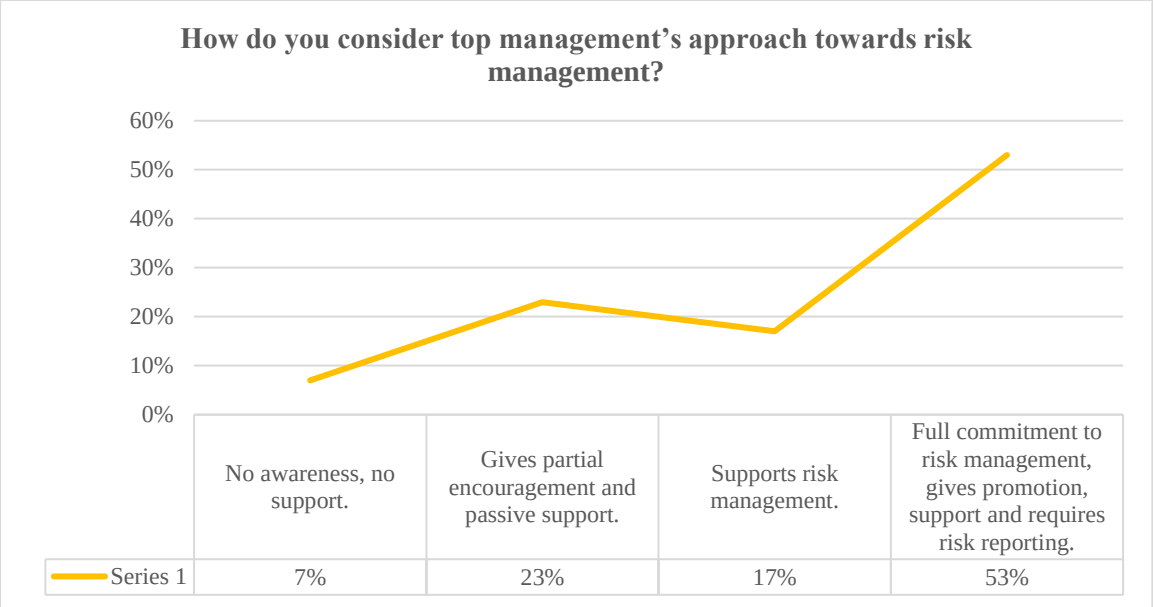

Figure 4.3: Top Management Approach Towards Risk Management

Source: Researcher's construct, (2020).

Figure 4.4 depicts how respondents defined risk management practices in their companies. "Risk management is performed on all projects, and it is systematic, routine, and standardized," according to 39% of respondents; "risk management is practiced on most projects, and there are attempts to standardize practices," according to 35% of respondents; and "risks are not dealt with until they become a current concern, no risk management," according to 35% of respondents 26 % of respondents.

Figure 4.4: Describing the Risk Management Practices in Respondent's Organization

Source: Researcher's construct, (2020).

From the study in Figure 4.5, which shows the scope of risk management practise in their business. It was discovered that 40% of respondents agreed that "project basis (total project risks are covered, but no risk management planning across projects)", 26% agreed that "supply chain basis (besides the organisational basis, risks related to supply chain members are also taken into account)", and 20% agreed that "organisational basis" although 14% of respondents believe risk management practises are "not applicable" in their organisation.

Figure 4.5: Scope of Risk Management Practice in Respondent's Organization

Source: Researcher's construct, (2020).

Table 4.13 The degree to which risk management and project management practises are incorporated in the organisation is demonstrated. According to the respondents, risk management works well with the following project management activities: performance management (MIS=3.143), quality assurance and management (MIS=3.075), contract management (MIS=3.075), and environmental impact management (MIS=3.000). According to the respondents, risk management seems to have a moderate degree of overlap with the following project management tasks: resource management (MIS=2.985), cost estimation (MIS=2.977), supply chain management (MIS=2.774), scheduling (MIS=2.752), and health and safety management (MIS=2.707).

Table 4.14: Risk Management Integration with Project Management Tasks

S/No.	Project Management Tasks	Group Mean	Ranking	Decision
1.	Value Management	3.143	1st	High
2.	Quality Assurance and Management	3.075	2nd	High
3.	Contract Management	3.075	3rd	High
4.	Environmental Impact Management	3.000	4th	High
5.	Resource Management	2.985	5th	Medium
6.	Cost Estimation	2.977	6th	Medium
7.	Supply Chain Management	2.774	7th	Medium
8.	Scheduling	2.752	8th	Medium
9.	Health and Safety Management	2.707	9th	Medium
	Average Mean	**2.943**		**Medium**

Source: Researcher's construct, (2020).

Table 4.14 shows the company's degree of risk management coordination with corporate management activities. According to the respondents, risk management is closely associated with the following organisational management activities: market development (MIS=3.158), strategic planning (MIS=3.060), financial/portfolio management (MIS=3.023), and procurement management (MIS=3.000).

According to the stakeholders, risk management has a medium degree of integration with the following organisational management tasks: human resource management (MIS=2.632).

Table 4.15: Risk Management Integration with Corporate Management Tasks

S/No.	Corporate Management Tasks	Group Mean	Ranking	Decision
1.	Business Development	3.158	1st	High
2.	Strategic Planning	3.060	2nd	High
3.	Financial/Portfolio Management	3.023	3rd	High
4.	Procurement Management	3.000	4th	High
5.	Human Resource Management	2.632	5th	Medium
	Average Mean	**2.975**		**Medium**

Source: Researcher's construct, (2020).

Figure 4. 8 determines who is in charge of risk management in the business. Risk management issues are managed by a "risk management unit or team with specialised risk

management training," according to 43% of respondents; 24% believe their organisation has "no expertise and skills related to risk management," and 22% believe risk management issues are handled by "in-house experts with formal training on basic risk management." “No external support,” according to 11% of respondents, manages their risk management problems, while “individuals with minimal knowledge.” Their company's "risk management" needs outside assistance.

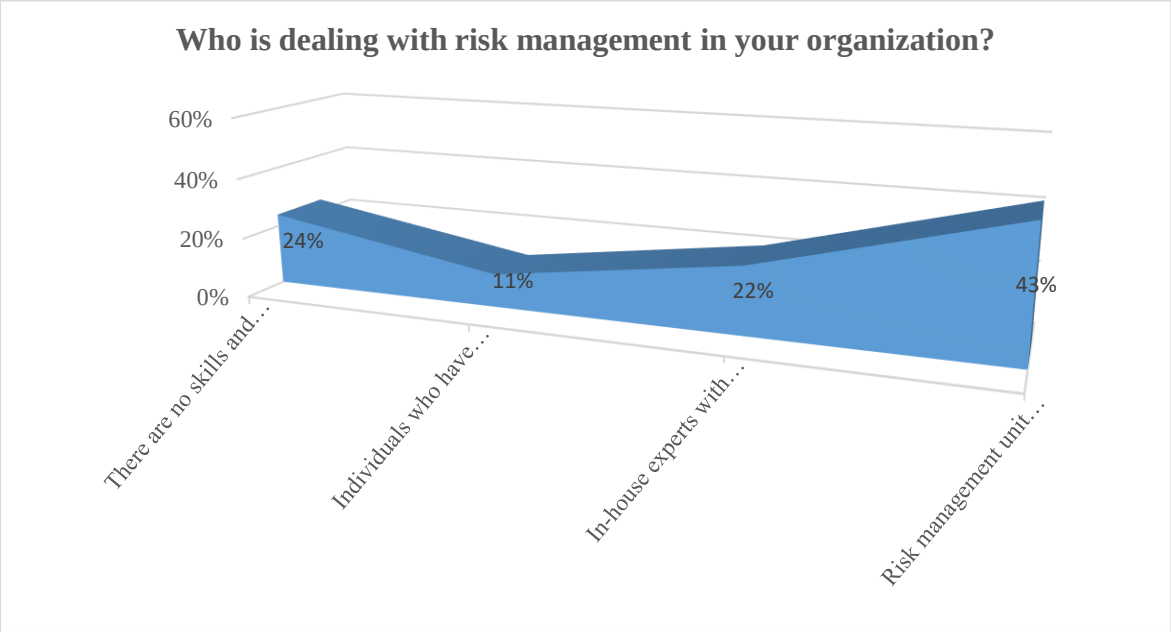

Figure 4.6: Who Deals with Risk Management in the Respondent’s Organization

Source: Researcher’s construct, (2020).

Figure 4.9 shows the study's results to see whether the respondent's company provides risk management or personal growth instruction. According to the results, 34% of respondents believe that their organisation encourages “regular training to improve risk management skills, training encouraged,” 30% believe that “no” training or personal development in the area of risk management is encouraged in their organisation, and 25% believe that training/personal development in the area of risk management is encouraged in their

organisation.

Figure 4.7: Training/Personal Development in the Area of Risk Management

Source: Researcher's construct, (2020*).*

Figure 4.10 demonstrates how to evaluate the effectiveness of building clients in risk control and outline the main activities that will improve building clients' competence level in risk control using a maturity model based on the aforementioned survey results and previous maturity models studied in the literature. The maturity model is divided into five levels: the first (initial) level establishes that the organisation understands the need for a risk management mechanism. The organisation does not have a safe environment in which to implement a risk management system. The company lacks a secure atmosphere in which to develop a risk management mechanism. Risk management results are inexact and challenging to reproduce, and they depend more on the company's people's abilities than on the implementation of a well-established technique. The second level (managed) indicates that the company makes an effort to plan and carry out risk management process activities in accordance with the risk management strategy developed with stakeholders. Risk management responsibilities are assigned to individuals who have the experience, unique responsibilities, and sufficient resources to produce repeatable results. At the third stage, the

risk management process is described and depicted in standard procedures, tools, and methods. The procedure is used to ensure continuity in the organisation, and risk control is handled centrally. The risk management method has evolved over time. The fourth level (quantitatively managed) depicted how the organisation uses quantitative and statistical methods to manage, calculate, and analyses the risk management process. The final level (optimizing) demonstrated that the risk management process is continually improved based on the data gathered in the previous stages. Risk management is seen as a strategic tool, and everybody is committed to it. Organizations at this maturity stage contribute scientifically to the development of risk management as a domain because they are actively innovating and expanding the risk management process.

4.10 Discussion of Results

The aim of this study was to determine the level of risk management capability of building clients in Nigeria. Data was collected from building customers, construction stakeholders in a few selected ministries and parastatals in Abuja to achieve this aim, and the descriptive research results are discussed below.

According to the findings of the study, when it comes to client awareness of risk, respondents strongly agree with risk response creation and risk detection. They have agreed on risk information databases, risk assessment, risk management and control, and risk analysis, all of which are related to the client's risk awareness.

These findings are in line with those of Jia, *et. al*. (2013), who discovered that risk management entails defining risks and devising methods for reducing, sharing, transferring, or accepting those risks. It also backs up the conclusion of Hobday,(2018) that a risk

information database is essential because new projects are often exposed to risk because the technique has not been tested over time. As a consequence, there is always a sense of uncertainty when something is done for the first time. However, the odds of a successful operation are increased if a similar project has been completed and registered previously. Through the study of the basis for assessing the risk management capability of a building client, some significant bases for assessing the risk management capability of a building client were discovered: Risk management is a critical success factor that significantly improves project performance; risk management is required to complete successful projects; risk management provides benefits. This is in line with Akintoye and Macleod, (2017) findings that cost overruns will inevitably affect projects, especially those involving large sums of money, necessitating the need for a reliable basis for risk management.

Risk management is important for any company to enhance its competitive advantage, according to findings from an overview of current capacity in order to improve areas of strength and weakness in the risk management profession. Risk management is a key success factor that can greatly boost business efficiency, as numerous implementations have shown. This is in line with the study of Akintoye and Macleod (2017). Top management commits fully to risk management, promotes, supports, and mandates risk reporting. Risk management is a systematic, regular, and structured process that is used on all projects. The risks of the whole project are protected, but there is no risk management preparation across projects. This is in line with Mills' (2011) assertion that managing risks during the construction of a project requires a structured approach which is also consistent with the findings of Akintoye and Macleod, (2017).

Some project management activities, such as value management, quality assurance and management, contract management, and environmental impact management, have a high level of integration with risk management. Some corporate management activities, such as

business growth, strategic planning, financial/portfolio management, and procurement management, have a high level of integration with risk management which is in line with the findings of Hobday, (2018).

Finally, The results from the other goals, as well as a study of the literature, were used to establish a maturity model that includes a generic contingency plan, low management commitment, and risk management as a minor field of expertise, middle management commitment, people assigned to risk management, and risk management resources available, Risk management team training, risk identification, comparison, and prioritization of those to be handled, frequent and comprehensive reporting of risk management results, preventive and detective controls, including greater use of automation to reduce human error, full commitment and continued involvement of top management, and procedures and controls are continuously reviewed and improved. This is in line with the model of Ongel,(2009).

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The aim of this paper is to establish a maturity model for determining the effectiveness of a building client in risk management. The maturity model can also be used as a governance tool by the risk management functions to analyse and assess the risk management process' existing strengths and limitations. The model, on the other hand, isn't just for empirical purposes. It can also be used to create a roadmap for strengthening risk management functions in terms of their capabilities, efficacy, and performance over time. As a result of the thorough examination and research conducted, the following conclusions were reached:

The highest rated risk management processes that contribute to client information about risk are risk response production and risk recognition, according to the six (6) risk management processes listed. According to this study, risk management is a critical success factor that significantly improves project performance, risk management is essential to achieving successful projects, risk management provides benefits and adds value to organisation performance, risk management reduces cost increase/profitability, risk management improves safety and reliability, and risk management improves quality. Risk management is a critical success factor that significantly improves project performance, risk management is essential to achieving successful projects, risk management provides benefits and adds value to organisation performance, risk management minimises cost increase/profitability, risk management increases safety and reliability, and risk management increases quality, according to this study. Top management fully commits to risk management, promotes, supports, and involves risk reporting, risk management is performed on all programmes, and it is systematic, routine, and standardised, according to the assessment of existing capacity to

strengthen areas of strength and weakness in risk management practise. Top management fully commits to risk management, promotes, supports, and involves risk reporting, risk management is performed on all programmes, and it is systematic, routine, and standardised, according to the assessment of existing capacity to strengthen areas of strength and weakness in risk management practise. Finally, while most companies and stakeholders are aware of the nature of risk to some degree, the majority of them have not established a formal and strategic risk management strategy.

5.2 Recommendations

The aim of this paper was to evaluate the risk management capacity of building clients in Abuja, Nigeria, in order to improve the client's level of competence. In this regard, the following suggestions have been made.

i. Organizations and construction stakeholders should promote and facilitate involvement in risk response growth and risk assessment in order to determine the likelihood of risk occurrence and how to react if it does.

ii. Because risk management has been identified as a critical success factor for achieving successful programmes, providing benefits and adding value to the organization's efficiency, and minimising cost increases, it has been identified as a critical success factor. The aforementioned basis of evaluation should be implemented and changed, according to this report, in order to enhance an organization's competitive advantage.

iii. According to the findings, top management should fully commit to risk management, promote, endorse, and facilitate risk reporting, risk management should be practised on all programmes, and risk management should be systematic, routine, and standardised.

iv. According to this analysis, top management should fully commit to risk management, promote, endorse, and facilitate risk reporting, risk management should be practised on all programmes, and risk management should be systematic, routine, and standardised.

v. Value management, quality assurance and management, contract management, environmental impact management, market development, strategic planning, financial/portfolio management, and procurement management are both project and organizational management practices that should be encouraged to be incorporated. Value management, quality assurance and management, contract management, environmental impact management, business growth, strategic planning, financial/portfolio management, and procurement management can all be integrated into project and corporate management activities.

vi. Finally, organizations and construction stakeholders should facilitate, ensure, and promote the proper implementation of the risk management maturity model, as it is designed to assist organizations and stakeholders in assessing their risk management maturity level on a regular basis, and if well implemented, will assist them in achieving the level of maturity they desire.

5.3 Contribution to Knowledge

This research was primarily focused on information about risk factors in the construction industry and the level of risk management capacity of building clients in Abuja, Nigeria. As a result, the results of this study will benefit construction companies and stakeholders in the following ways.:

i. Organizations will recognize that the evaluation process will help them identify risk management performance deficiencies and incorporate best practices to

improve risk management performance. It will help companies determine their risk management maturity level on a regular basis and adopt practices that will help them reach the desired level of maturity. The findings from this study will allow construction organization to measure their risk management capacity against five (5) standard levels of maturity.

ii. It will help construction stakeholders figure out what they need to do to improve and extend their risk management capabilities.

iii. iii. Consumers, suppliers, and other company stakeholders will be able to determine how well a project or Organisation is managing risk..

iv. Finally, the results of this study will help in the development of specific strategies for achieving a higher level of maturity.

5.4 Areas of Further Studies

Since this study was restricted in certain ways, further qualitative research in the following areas is suggested:

i. Further research is needed to test and optimize the risk management maturity model across different market sectors, leading to a more generalized risk management maturity model that can be benchmarked across industries. Since the financial investment in a risk management maturity model is unknown, this should be investigated further, as well as the extensive benefits of developing a risk management maturity model.

ii. Additional research in private construction firms around the world is required.

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APPENDIX

Department of Quantity Surveying,
School of Environmental Technology,
Federal University of Technology Minna,
Niger State.

Dear Sir/Madam,

RESEACH QUESTIONNAIRE: ASSESEMENT OF RISK MANAGEMENT CAPABILITY LEVEL OF BUILDING CLIENT IN ABUJA, NIGERIA

I am Muhammad Nma Ahmad, a Post graduate student of Quantity Surveying Department, at the Federal University of Technology, Minna. I am undertaken a research in partial fulfilment of the requirement for the award of Master's Degree in Quantity surveying.

While appreciating your busy schedule, I humbly solicit that you spare time to help respond to the attached questionnaire which is crucial to the success of my on-going research titled above.

Your response will be treated with strict confidentiality and used only for the purpose of this research work.

Thank you for your anticipated cooperation

SECTION A: RESPONDENT'S PROFILE

Please kindly respond to the following questions by ticking (√) the appropriate box(s) for each item.

1. **What is your profession?**

a. Architect [ ] b. Builder [ ] c. Engineer [ ] d. Quantity Surveyor [ ] e.Others [ ]

2. **What is your highest qualification?**

a. HND [ ] b. B.Tech/B.Sc. [ ] c. M.sc/M.Tech [ ] d. PhD [ ] e.Others

3. **Professional Qualification of Respondent**

a. NIA [ ] b. NIOB [ ] c. COREN [ ] d. NIQS [ ] e. Others[ ]

4. **Age or Years of existence**

a. 15 – 20 [ ] b. 20 – 25 [ ] c. 25 – 30 [ ] d. above 30 years [ ]

SECTION B: Identify and assess risk management processes in relation to client knowledge of risk.

Please rank the following Risk management processes in relation to client knowledge of Risk.

S/NO	Please tick as appropriate	Strongly Agree 4	Agree 3	Neutral 2	Disagree 1
1.	**Risk Identification** a. At the beginning of project risk is identify as a standard activity. b. Having risk discussion on the project scope and milestone information at regular interval. c. Applying formalized risk identification process to most of the projects. d. A documented, repeatable for identifying project risk and an improvement process to completely identify the risk as early as possible. e. Identifying risks has impact on time and cost. f. Risk identification has impact on quality, health and safety, environment. g. Identifying risk has effect on long term objective of project.				
2.	**Risk Analysis.** a. Systematic approach impact project assessed intuitively. b. Risk assessment using qualitative methods such as risk rating technique, probability impact matrices. Risk analysis using statistical tools as well as qualitative methods. c. Risk analysis using advanced methods such as simulation, sensitivity testing and decision support tools.				

3.	**Risk Information Database** a. Organization having a data base on typical risk encounter and related experiences impact on project. b. Team members take decisions based on their own past experiences and discussion with the project team c. Have specific method to collect historical information, although some historical information about general trends in risk on similar projects may have been collected. d. Historical information such as common risk items and risk triggers are collected and organized in the historical data base. e. Besides collecting the information such as common risk items and risk triggers, historical database is subject to a continuous improvement process.				
4	**Risk Response Development** a. Organization determines mitigation strategies or contingency plans for the future risk events. b. Risk consideration in large emerge. c. Contingency plans and mitigation strategies are developed for each risk item, so that project reserves can be allocated to cover such items when needed. d. Risk management plans, contingency plans and risk allocation plans are prepared and risk control strategies are formulated as well as risk finance strategies.				

5. 6.	**Risk Monitoring And Control** a. Project teams apply their own approach to management and con trolling risks as a former process. b. Responsibility is assigned for each risk item as it occurs. c. Formalized generic process for actively and routinely tracking risks for projects. d. A formalized process for risk monitoring is used for project and risk management plan updated periodically. **Risk Evaluation** a. Prepared report on an ad-hoc basis and failed b. Prepared report stored as hard- copy and shared c. Prepare report stored on the computer, shared and used forthcoming projects.				

SECTION C: Identify and examine the basis of assessing the risk management capacity of building client.

S/NO	Please tick as appropriate	Strongly Agree 4	Agree 3	Neutral 2	Disagree 1
1	Risk management is essential to achieve successful projects.				
2	Risk management provides benefits and adds value to organization performance.				
3	Risk management is a critical success factor which significantly improve project performance.				
3	Risk management minimizes cost increase/profitability.				
4	Risk management reduces time of projects.				
5	Risk management increase quality of projects.				
6	Risk management increase safety and reliability				
7	Risk management enhances reputation.				
8	Risk management increase organization learning				
9	Risk management increase communication level.				
10	Risk management minimizes conflicts/legal disputes.				
11	Risk management increase client satisfaction				

SECTION C: To evaluate current capacity in under to improve areas of strength and weakness in the risk management practice

1 Do you think that risk management is necessary for your organization? *Please tick the appropriate box.*

- ☐ Not at all
- ☐ Not sure
- ☐ Yes
- ☐ Definitely

2. Which one better describes your organization's attitude towards risk management? *Please tick the appropriate box.*

- ☐ Risk management is not essential to achieve our targets, it is even perceived as a distraction and waste of time.
- ☐ Although risk management may have some benefits, the extra expenses it creates and value it adds to our organization are questionable.
- ☐ Although not all the benefits are consistently gained, we are aware of the value and benefits of risk management.
- ☐ Risk management is a critical success factor and it can significantly improve business performance, benefits of risk management demonstrated by various applications.

3. How do you consider top management's approach towards risk management? *Please tick the appropriate box.*

- ☐ No awareness, no support
- ☐ Gives partial encouragement and passive support
- ☐ Supports risk management
- ☐ Full commitment to risk management, gives promotion, support and requires risk reporting

4. How do you describe the risk management practices in your organization? *Please tick the appropriate box.*

- ☐ Risks are not dealt with until they become a current problem, no risk management practice
- ☐ Risk management practiced only on selected projects, usually in response to client demands
- ☐ Risk management practiced on most projects and there are efforts to standardize practices
- ☐ Risk management practiced on all projects, it is systematic, routine and standardized

5. What is the scope of risk management practices in your organization? *Please tick the appropriate box.*

- ☐ Not applicable
- ☐ Project basis (Total project risks are covered, but no risk management planning across projects)
- ☐ Organizational basis (Total project risks, the risks on other projects and other parts of the organization are all covered)
- ☐ Supply chain basis (Besides the organizational basis, risks related with the supply chain members are also taken into account)

6. How do you consider the integration of risk management with other management tasks in your organization? *Please tick the appropriate box for each task.*

Integration with other project management tasks	**Level of integration**			
	None	Low	Medium	High
Scheduling				
Cost estimation				
Resource management				
Quality assurance and management				
Supply chain management				
Contract management				
Health and safety management				
Environmental impact management				
Value management				
Other *(Please specify)*…….. ……..				

Integration with corporate management tasks	**Level of integration**			
	None	Low	Medium	High
Business development				
Strategic planning				
Financial/portfolio management				
Procurement management				
Human resources management				
Other *(Please specify)*…….. ……..				

7. Who is dealing with risk management in your organization? *Please tick the appropriate box.*

- ☐ There are no skills and capabilities relevant to risk management

- Individuals who have limited knowledge. External support is needed for risk management.
- In-house experts with formal training on basic risk management skills. Limited need for external support.
- Risk management unit or team with advanced training on risk management.

8. Is there training/personal development in the area of risk management in your organization? *Please tick the appropriate box.*

- None
- Sometimes/not frequently
- Training on risk management when required
- Regular training to enhance risk management skills, training encouraged