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Risk Management and Quality Projects Delivery in Nigeria's Construction Industry

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ABSTRACT: *The delivery of poor quality construction projects in Nigeria presents a problem which this paper attributes to low levels of Risk and Risk Management awareness, understanding and practice. The little or none existence of a formalised and regulated Risk Management process means the construction industry which normally has a high presence of risk is not adequately managed hence an uncontrolled and unmitigated effect on the value and quality of projects delivered. This paper verifies this submission by investigating Risk Management awareness and practice levels in the industry through a survey targeting experienced personnel who by their project positions are expectedly knowledgeable enough to provide credible feedback. A review focused on select Risk Management literature with an objective of creating the necessary knowledge and understanding needed to practice and apply Risk Management, and also most importantly, evaluate how it relates and influences the delivery of quality construction projects of value. This paper presents results fed by questionnaires specifically designed and administered to unravel and establish Risk Management awareness and practice levels. It reveals low, inconsistent and a non-formalised Risk Management practice in the industry under assessment. It reveals the absence of a uniform regulatory authority. It presents an acceptance of Risk Management as a viable solution to achieving quality projects of value and performance. Based on this paper's findings, a justified case is made for a more formal, consistent and participatory Risk Management process in the Nigerian construction industry. In making this case, this paper posit that if applied, the industry will experience the delivery of much improved projects of value, quality and performance.*

KEYWORDS*:* risk management, construction risk, construction project, project value/quality, project management, survey respondents.

INTRODUCTION

Project Risk Management is a major aspect of Project Management hence the two cannot be defined or explained without reference to the other, (Gardiner, 2005). The definition of Project Risk as, “the implications of the existence of significant uncertainty about the level of project performance achievable”, and its Management, as the “systematic identification, appraisal and management of project related-risk”, by Chapman & Ward (1997:7-9), posits in agreement with this paper's hypothesis. Risk and uncertainty are often used synonymously. Project Management is simply the formal discipline of managing projects successfully, and successfully managed projects deliver quality outcomes, (APM, 2000).

Chan & Tam (2000:423) citing the British Standards Institution (BSI) and International Standard Organisation (ISO) define Quality as, "the totality of features and characteristics of a product/service that bears on its ability to satisfy stated/implied needs". Atkins (1994), defines Quality in a construction context as "fitness for purpose" and "the conformance to requirement …".

"Poor Risk Management is known to be a major cause of project failure"

- Office of Government Commerce (2003)

The delivery of construction projects which are of relatively low quality symbolises project failure and is very much prevalent in developing countries. Typical examples of poor project outcomes are dilapidated infrastructure such as collapsed buildings, poor road networks, etc. The reasons for these vary widely and range from use of sub-standard materials by contractors to poor compliance to governing regulatory standards; unrealistic project completion targets set by stakeholders (Government); endemic corruption, stakeholder interference and a host of others.

This paper investigates this problem from a Risk Management perspective, agreeing with Chapman & Ward (2003) who submit that Project Risk Management leads to benefits that go beyond threat control or neutralization, but additionally facilitates increased project performance by guiding the project objectives, plans and design while also influencing the stakeholders (e.g. government) towards decisions that are Risk Management compliant.

This paper also agrees with Cicmil (2000) who directly links project quality to project success and completeness. They submit that, ***"until total quality of the end project, building or structure is delivered to its owner/sponsor ... and fully functional with all requirements and expectations fulfilled within approved cost and time, the construction activity can be said to be of no value or purpose"*** - Cicmil (2000:557).

Aim and Objectives

The aim of this paper is twofold i.e. to create an understanding of the topic area, and then to explore, justify and recommend its Risk Management as a means to achieving construction projects of good quality and durability.

The specific objectives of these paper:-

- Create an understanding around Risk Management as a discipline, its importance, and its practice as means to achieving project of value, quality and performance.
- Investigate its current practice in Nigeria as a developing country, and ascertain the levels of awareness and understanding of Risk Management as a process and means to achieving project of value, quality, durability and performance.
- Analyse and make a case for Risk Management as a critical process for achieving high quality construction projects within optimal performance standards.

LITERATURE REVIEW

The measured chance and consequence of a project not achieving its defined objective or goal can be defined as Risk; a given risk event has two component factors i.e. the likelihood of the events occurrence, and its impact on occurrence, (Kerzner, 2006). A probable increase in an

events likelihood or impact means increased chances of risk occurrence. Hence risk was conceptualised and defined as being directly equal to or proportional to the frequency function of likelihood and impact: -

Risk = *f* (likelihood, impact)
Kerzner, (2006:709)

The uncertainty of a future event, its causes, the opportunities or hazard it may present underlines the need for a management process that would help in identifying, analysing and responding to these events in a way as to either optimise the benefits of their opportunities or mitigate the effects of the danger they pose, (Flanagan & Norman, 1993). Monitoring these response processes aids in the creation of risk information, without which there can be no management process, (Chapman & Ward, 2002). A construction project is intended to be a temporary activity that creates a one off outcome hence the need not to return back to it again. Once a number of returns are made to correct, adjust or rebuild a project outcome, then it is originally lacking in value, quality and performance, (Nicholas & Steyn, 2008). This means certain risk events have gone unnoticed through respective project phases leading to impacts which are now being corrected during what is meant to be the product lifecycle.

"Construction risk is generally perceived as events that influence project objectives of cost, time and quality" – (Akintoye & Macleod, 1997:31), it is therefore imperative that there is a risk event management process throughout the project life cycle right from its inception. Furthermore, Perry & Hayes, (1985), identify risk sources central to construction projects as "operational, financial, political, design, environmental, logistics and construction", submitting they have an effect on project performance in terms of quality.

The presence of risk and its high level uncertainties in the construction industry need to be tackled proactively through actions that would prevent potential risk events or issues that would eventually negatively impact the project and the quality of its outcome, (Kerzner, 2006). Kerzner (2006:711) defines Risk Management as a practice designed to deal with risk, comprising acts of "planning for risk, assessing risk issues, developing strategies for risk handling and monitoring these risks to observe expected change". Nicholas & Steyn (2008:363), explains Risk Management as a purposeful plan to reduce risk in the event things go wrong with a project.

From a construction project perspective, Al-Bahar & Crandall (1990:534) defined Risk Management as, "a formal orderly process for systematically identifying, analysing and responding to risk events throughout the life of a project to obtain the optimum or acceptable degree of risk elimination or control". They explained it as an approach that help both contractors and project managers effectively respond to both insurable and uninsurable risk using appropriate techniques. The last sentence is of critical importance considering the widely held belief in developing countries that Project Risk Management is not practicable considering the little or non-existent insurance industry, (Wang et al, 2004). Additionally, Al-Bahar & Crandall (1990) proposed a Construction Risk Management model centred on the Wideman (1986) theoretical model named the Construction Risk Management System (CRMS). The model was modified and designed to serve as a practical framework for the identification, evaluation and response to construction project risks. Also, Al-Bahar & Crandall (1990:541),

present alternative strategies within the Risk Management framework as risk avoidance, risk prevention or loss reduction, risk transfer and risk insurance. Akintoye & MacLeod (1997), describe construction risk as events capable of affecting project objectives in terms of quality, time and cost. They agreed the construction industry is associated with a high level of risk considering the nature of activities involved in the process. In further explaining

Construction Risk, they cited Bufaied (1987), who described construction risk in relation to quality, as a variable in the project construction process whose variation results in uncertainty as to the final cost, duration and most importantly quality of the project. Although not categorically defining Construction Risk Management in the reviewed material, it can be inferred that Akintoye & MacLeod (1997) defined Risk Management based on survey feedbacks obtained through Simister (1994) - as a risk identification, analysis, assessment and control process aimed at helping the construction company ensure unsatisfactory project avoidance and loss reduction.

Ali, (2005), submits that the primary goal of all construction projects is to meet the project owner's functional requirements of quality and performance. He further submits that construction projects frequently fail in terms of quality, budget and time because of failure to "analyse and assess unanticipated risks" – Ali (2005:20). He also identifies as a challenge, the projects reliance on the experience and judgement of the contractor/project manager as a Risk Management approach that can identify risks. This tallies with the position held by this paper that Risk Management practice in developing countries is ineffective because of total reliance on contractor risk experience as a risk management strategy, although it is mostly a ploy to save costs and overhead. In defining Risk Management, Ali (2005:20) refers to it as, "methods which aim to develop a comprehensive understanding and awareness of the risk associated with a particular variable of interest in strategic decision or with the successful accomplishment of the project objectives or project success criteria". The variable of interest he most importantly identifies as project performance, cost and net present value (quality). He confirms earlier stated Risk Management aspects of identification, analysis, assessment, response and control as part of a process of powerful tools capable of confronting unknown risks to ensure project success, performance and quality.

Tchankova (2002), summarises Risk Management as a core aspect or part of the organisations activities with a major objective to enable all other managerial aspects of the organisation to directly achieve overall aims more efficiently. Efficiency is directly linked with quality, Gardiner (2005). Risk Management is a process that is continuous as it depends on equally continuous changes that are internal and external to the organisations project environment, Smith (1999). Continuous changes to a construction project environment require continuous attention for a more efficient identification, assessment and control of risks, Flanagan & Norman (1993).

As a result of these continuously changing risk processes and changes, there is a need for a consistent approach in management, and, a dedicated Risk Management Office or Department is critical to overseeing and achieving a streamlined process that would ensure full implementation of all set strategy aimed towards delivered projects of reliable quality and performance, (Office of Government Commerce, 2003).

Risk Identification

Risk Identification is generally agreed to be the first stage of Risk Management, (Meredith & Mantel, 2003); it lays the foundation for an effective Risk Management process that identifies all potential losses that could undermine and pose a challenge to the organisation in delivering a construction project, (Tchankova, 2002). Certain risks are known to present gains to the successful delivery of a project and it is incumbent on the Project Risk Manager and the project team to identify and make this possible, (Chapman & Ward, (2002). An identified risk that could be beneficial to a project outcome is as strategically important to an unidentified risk that could negatively impact or create a loss for the project outcome, (Crouhy et al, 2006). The two directly have the capacity to influence the quality of the delivered project. Tchankova 2002 submits, that for Risk Identification to be far reaching, it has to look beyond what could be mitigated or insured. He presents a set of basic questions that could serve as a framework for a broad Risk Identification process:-

- "How can the organisational resources be threatened?"
- "What adverse effect can prevent the organisation from achieving its goals?"
- "What favourable possibility can be revealed?"
- Tchankova (2002:291)

In summarising Risk Identification into the three questions above, Tchankova (2002) was literarily emphasising that the Project Risk Managers need to be able to see beyond risks that are common and already known, into the virtual unknown risks hence being capable of undertaking actions that adequately capture risk sources and exposures in addition to perils, and hazard factors. This approach according to Jaafari (2001) also creates a conducive room for an on the spot direct analysis of each risk case hence being able to come up with specific measures aimed at adapting the risks to a control strategy. Continually seeking and identifying risks throughout the project life cycle super-cedes the perception of Risk Identification as a one off activity that takes place once at the start of the project, Fraser & Henry (2007).

Tchankova, (2002), citing Williams et al (1998), argues that for a more in-depth Risk Identification process that is far reaching, risk sources can be categorised and identified based on the environment or project activity from which they arise. This William et al (1998) categorised as physical, social, political, operational, economic, legal and cognitive environments respectively.

The Physical Environment - present risk sources in the form of natural disasters like flooding, landslide and earthquakes, unfavourable site conditions and unskilled labour, Wang et al (2004) – these factors being more common in developing countries. These factors negatively influence project quality through losses which affect the project schedule, time and budget specifications which are prior designed to ensure value (quality) project delivery.

The Social Environment - as a source presents risks in the form of local disputes, industrial strikes, people behaviour and culture. Not understanding these values and the functions under which they apply is a risk that could affect the project activity and eventually performance, (Tchankova, 2002). An identification of the dynamics surrounding these particular ways of doing things and how they could either positively or negatively impact on project environment,

activity and outcome respectively, is necessary as it would help the Project or Risk Manager to make adequate control plans to manage these influences (risk sources) – (Sanchez et al, 2009).

The Political Environment - potentially presents risks in various forms e.g. inconsistent government policy and legislation in support of regulatory industry standards; relaxed project monitoring and compliance policies towards government backed contractors; cutting corners including taking funds from project budget as lobby for government patronage – these sources of risks being very common in developing countries, (Desta, 1993).

Operational Activities - in the construction industry are accompanied with a lot of uncertainty and risk, (Rahman & Kumaraswamy, 1993). The state of the construction machinery, processes, design and structures is an example. Improper health and safety measures in relation to the project team-working conditions serves as a peril with high unpredictability, (Tchankova, 2002). The adopted construction method or strategy could also harm the external project environment which in turn has a domino effect on project activity and then quality. For sake of clarity, operational sources of risk present themselves as benefits if identified and managed effectively, or losses if not detected and controlled hence are hazards needing full attention, Kerzner (2006).

The Economic Environmental - sources of risks like fluctuating credit and interest rates, inflation, foreign exchange, economic recession and raw material availability or unavailability can also be described as hazards that could either make or mar a construction activity and the quality of its outcome, (Al-bahar & Crandall, 1990). Identifying these sources and making adequate contingent and control arrangements for them is where the advantage lies.

The Legal Environment - as a factor is represented by lawsuits, project licensing right, disputes, contractual and sub-contractor failure, according to Tchankova, (2002) and these are potential legal sources of risk which could present a serious form of distraction to the fulfilment of the project aims and objectives, which primarily centres around quality.

The last risk source category identified by Tchankova (2002:295) is that of the **Cognitive Environment** which is the act of relying on the Project or Risk Managers singular ability to - "reveal, understand and assess risk, which is not perfect". He goes further to say, "the difference between perception and reality for different people is an important source of risk for an organisation" – Tchankova (2002:295).

In conclusion, Nicholas & Steyn, (2008) present a holistic variety of Risk Identification techniques which help and serve as a framework to make the identification process possible. They are namely the Analogy Technique which involves looking at past notes and records of project completed; Checklist Technique involving creating checklists of project risk factors from previous project documentation; WBS Techniques which involves an analysis of the work breakdown structure to pick up risks across every work package or process; and the relatively known and self-explanatory ones like Process Flowchart Technique, Cause and Effect Diagram, Project Networks and Convergence point, and the Delphi Technique, itself a survey method that combines opinions on risk so as to develop a collective comprehensive judgement and consensus on identified risk worthy of assessment. Garg, (2005), presents a more simplified Risk Identification set of processes like surveys, inter-project team brainstorming, past

experience, use of risk experts, previous project feedback, workshops and interviews. All these no matter how simple, enable a forward looking and pragmatic risk identification process.

Risk Assessment

Risk Assessment and Risk Analysis are often used synonymously to interpret the same process of evaluating identified risk issues, (Kerzner, 2006, Nicholas & Steyn, 2008; Tah & Carr, 1993; Meredith & Mantel, 2003; Akintoye & MacLeod, 1997; and PMBOK 2010). Additionally, in certain cases this process is simply described as Risk Quantification, (Pinto, 2002). Risk Assessment involves an assessment and analysis of identified risks thereby helping establish the likelihood and severity of their occurrence, as well as the possible impact they could bring to bear on the project, (Tah & Carr, 1993, Kerzner, 2006). Tah & Carr, (2001) describe Risk Assessment as a process that evaluates aspects of each risk and its depending chains so as to help determine the effect on project operation and outcome quality.

The Risk Assessment process is of more effect and significance if attention is granted to the identified risk issues in terms of their likelihood, impact and consequence, (Dada & Jagboro, 2007). Once these are established, they can then be prioritised. Construction companies without established Risk Assessment or Analysis processes are popularly known to rely on the Project Manager or contractors experience or judgement in successfully passing through that phase of Risk Management, (Kerzner, 2006). The specific hiring of PM's or contractors to execute certain problematic aspects of a project is a testament to this fact and could be interpreted to mean a non consistent and non uniform assessment process that could potentially rub off on the company's ability to deliver project outcomes of quality and durability.

Risk Likelihood - is the probability or chance that a risk or hazard will occur, (Nicholas & Steyn, 2008). It is expressed qualitatively as low, medium or high ratings, and numerically as 1.0 or 0; 1.0 being certainty of risk happening and 0 being impossibility of its happening.

See below for referenced illustration of the qualitative and numerical ratings of risk likelihood.

Qualitative	Numerical
Low	0 – 0.20
Medium	0.21 – 0.50
High	0.51 – 1.00

Fig 2.2.1 - Nicholas & Steyn (2008)

The numerical interpretation of the qualitative may vary depending on the risk associated with the construction project or its magnitude, it is often a subject of discussion amongst Risk or Project Managers and their teams before project commencement as well as during the course of the project. Numerical ratings assigned to risks should therefore be an end product of an extensive judgement process involving risk experts of significant knowledge and experience, (Nicholas & Steyn, 2008). Risks that are interconnected should be subject to more assessment. The likelihood of Risk reduces as the project is completed although loss due to failure will be higher as project progresses, considering that human, material and financial resources are

increasingly invested. Also, risk likelihoods are high in future planned projects due to the influence of uncertainty factors, (Flanagan & Norman, 1993).

Risk Impact - is the resultant effect of the materialisation of a risk hazard factor. Poorly designed building projects are examples of risk hazards while their collapse or state of dilapidation is the risk impact. The impact of risk on a construction project is measured in terms of time, cost and quality, (Odeyinka et al, 2008). Risk impact is also expressed or quantified in numerical and qualitative ratings to help underline the severity and magnitude of impact; these fixed ratings are also subject to the judgement of Risk and Project Managers along with a team of project risk experts. Final decisions on what the rating specifications should be are end products of this deliberation process. The numerical ratings vary between 0.8 and 1.0 where 0 is not serious and 1.0 is catastrophic. The qualitative is similarly expressed as low, medium or high impact.

Risk Consequence - is defined as the combined function of risk likelihood and impact, expressed in function as:-

Risk Consequence = (Impact) x (Likelihood)
- Nicholas & Steyn, (2008:375)

Risk Prioritisation - involves the consideration of risk consequences listed on the log or register with the view to running a conscious review, assessment or analysis on those with high impact, (Kerzner, 2006). This directly influences the planning and implementation of the most appropriate risk response strategy. According to Dey (2001), deciding the risk to focus on is helped by a Risk Management process that places value on the consequence hence placing emphasis on risks that deserve urgent attention. Borge (2001), however points out a drawback to this prioritisation method, arguing low likelihood risk with high catastrophic impacts can often be neglected to the detriment of the project cost, performance and quality. Risk Assessment techniques include the PERT and the Monte Carlo Simulation which according to Nicholas & Steyn (2008:376), "are both used to account for risk in project scheduling and it inform managers about the need to compensate for risks in meeting project deadlines", most importantly in construction projects.

The Program Evaluation and Review Technique (PERT) - is a tool used to estimate the likelihood of a project being completed on time. It analyses the project network and the originating Gantt chart and uses this to create a better perspective or insight as to when a project can be completed within time which can be expected or specified. The PERT methodology is made possible using the three time estimates of, "optimistic, most likely and pessimistic" – Nicholas & Steyn (2008:250). These time estimates are normally sourced from risk experts like project or risk managers or project team members who have played critical project roles in past similar construction activities. PERT however is criticised because it is relatively based on assumptions, takes more time and effort to cover its three separate estimates; besides its accuracy depends on the past project experience and knowledge of the source. The PERT best suits and is often used in construction projects because of their repeatable nature and relative dependence on historical data of past similar projects.

Monte Carlo Simulation - is believed to cover areas of weakness or shortfall encountered by the PERT, hence its reference by Nicholas & Steyn (2008:255) as "Monte Carlo Simulation of a PERT Network". It involves a process that computes critical paths from a variety of construction project activity in time normally obtained from probability distributions hence generating a variety of project completion times or duration. From this variety of project duration or time, it gives a final average that takes all into consideration and gives a figure that is more reliable than that given by PERT. Additionally, Loizou & French (2012:205) argue that by a 'dehumanised' simulation process, the Monte Carlo Simulation creates room for a more comprehensive and clear understanding of risks involved without fear of experimental loss or wastage of scarce material, and enables a consistent and rational decision making process that is informed by the thoroughness of this approach. Notable disadvantages of the Monte Carlo Simulation as pointed out by Loizou & French (2012:206) who cites Johnson (1985) is its subjective nature which relies more on 'estimates and guesstimates', un-reliable historic information, and the high chance of distraction.Essentially, Risk Assessment as a process impacts on the value and quality of delivered construction project by helping management prioritise and focus more on risks which pose serious threat to achieving its core objective. It provides the necessary information or data on undesirable risk events, the probabilities of their occurrence, the outcome of the risks occurrence, the severity of the risk impact and the forecasted time of occurrence, Gray & Larson (2006).

Below is a tabular illustration of typical risk events that potentially occur at critical phases of the project life-cycle and they are often established courtesy of a Risk Assessment/Analysis process that is embedded across all aspects of the project life-cycle.

Life Cycle Phases			
Project Approval	Preliminary and Detailed Planning	Execution	Closure
Typical Risk Events per Phase			
Unavailable subject matter experts. Poor definition of problem. No feasibility study. Unclear objectives. Buy in (By competitive bidding).	No Risk Management Plan. Hasty planning. Poor specification. No management support. Poor role definition. Inexperienced team.	Unskilled labour. Material availability. Strikes. Weather. Changes in scope. Changes in schedule. Regulatory requirements. Compliance. No control systems in place.	Poor quality. Unacceptable to customer. As-Built changes. Cash flow problems.

Fig 2.2.6: Life-Cycle Risk Analysis - Kerzner (2006:723)

The above illustrates earlier points raised and put forward by this research in the previous chapter. A typical example is the 'No Risk Management Plan' risk events found in the preliminary and detailed planning stage of the project, and the 'poor quality' and 'unacceptable to customer' events found in the closure aspect of the project. This clearly illustrates theory reviewed and put forward in achieving the research objective.

Risk Response

With the identification of Risk exposure, and an evaluation of its probabilities and potential impact, the next action is to put together a response, (Al-bahar & Crandall, 1990). The more the uncertainty associated with a project, the more deliberate the response action should be, (Mills, 2001). Effective ways of responding to Risk according to Baldry (1997), are risk avoidance, risk reduction, risk retention and risk transfer. Risk avoidance can also be referred to as risk elimination; risk reduction as risk mitigation; risk retention as risk absorption; and risk transfer as risk insurance, (Kerzner (2006), Nicholas & Steyn (2008), Carter et al, 1994).

Mills, (2001), argues the most efficient risk response strategy is to allocate it to a party that is in the best position to accept or handle it. This he says can be drawn up at the contract tender stage which helps define and allocate responsibilities of each party to the assessed and evaluated risk. However a review of different respective literature indicates differing opinions on which response strategy is the best, (Perry & Hayes, 1985; Bing et al 2005; Mulholland & Christian 1999). This can be interpreted as meaning a particular response chosen is aimed to suit or satisfy the specific risk event, consequence, likelihood or impact in question, hence strategy is meant to vary expectedly though the core overall objective is same which is prevent any occurrence that will impact project quality and performance delivery, (Flanagan & Norman, 1993).

Risk Avoidance – is a response strategy that refuses to accept risks by completely avoiding contracts or project activity with established risk events or likelihood, (Baldry, 1997). For this reason, it is otherwise referred to as risk elimination because it gets rid of the risk completely. It presents as a benefit, the avoidance of the loss that may come with such risk exposure, however risk also present potential opportunities and benefits, hence the opportunity of experiencing these supposed 'risk' will be lost in the event of a complete avoidance, (Chapman & Ward, 2002). For example, a contractor worried about risk associated with asbestos materials in building projects, may avoid any projects that require the use of such, (Al-bahar & Crandall, 1990). Additionally, Chapman & Ward (2002) points out that evaluating the cost of avoiding a risk against its impact on the organisation, creating a balance between the risk exposures associated with undertaking a specific project contract and the potential benefits and gains are factors that should influence the decision on risk avoidance.

Risk Reduction – is a conscious attempt at reducing risk impact, or decreasing the probability of a risk event taking place; it is referred to as a, "loss reduction and risk prevention program" by Al-bahar & Crandall (1990:542). Since potential benefits or opportunities offered by risk is proportionate to the hazard or loss it could pose, risk reduction is said to be the preferred approach as against risk avoidance, (Nicholas & Steyn, 2008). Besides not all risk can be eliminated.

Risk is commonly reduced by distributing financial risk across a number of parties, the impact of risk on an operational (project/construction) activity can be mitigated through alternative strategies set up as contingencies, (Baldry, 1997).

Al-bahar & Crandall, (1990), present risk reduction as being effective in two ways namely, "reducing the probability of a risk" and "reducing the financial severity of risk if it does occur" – (1990:542). They also give an illustrative example from a construction perspective i.e. the reduction of chances of construction equipment theft by installing antitheft devices and the reduction of financial severity caused by fire by installing water sprinkler systems, (Al-bahar & Crandall (1990).

Tah & Carr (2001), emphasise the importance of a risk response attitude which goes hand in hand with selected strategies; some examples are training and education on risk to help increase project staff alertness towards risk; physical safe-guard or protection of equipments to reduce loss or damage likelihood; and the establishment of systems to ensure consistency in risk knowledge, understanding and compliance. Flanagan & Norman (1993), propose an integration of risk management practices into the organisational culture with the view that having it embedded will help improve the risk identification process. An efficiently applied risk reduction process, makes room for a more straightforward and streamlined risk retention, (Edwards, 1995).

Risk Retention – can be planned or unplanned according to Al-bahar & Crandall (1990:542), and they defined it as the complete or partial assumption of the financial risk impact by the organisation.
The planned type of risk retention involves an intentional or deliberate assumption of identified risk, this is workable considering the fact that on identification, the risk has been assessed and considered eligible for retention so as to serve other project or financial need, (Al-bahar & Crandall, 1990).

The unplanned type of risk retention involves the unconscious or unwilling assumption of a risk which had not been identified hence the likelihood of an exposure to potential loss. Underestimating the potential risk impact or hazard posed by an already identified risk could also lead to an organisation having to retain unplanned risk, (Rahman & Kumaraswamy, 1993). Avoiding unplanned risk retention is therefore very possible if the risk identification process is adequately designed, implemented and carried out consistently, (Meredith & Mantel, 2003), this would help work against all the above loopholes.

Risk Retention is made possible through the aid of contingencies planned prior and implemented once the risk materialises, (Gray & Larson, 2006). These alternative contingency plans would help mitigate or reduce the impact of the risk event.

Risk Transfer – could involve either subcontracting to a party more prepared to accept the risk impact or insuring against the impact were the risk event to materialise, (Gray & Larson, 2006). In making an effective Risk Transfer decision, the project team should ensure the receiving party is competent enough to adequately assess, control and minimise the risk, (Kangari, 1995). Risk transfer according to Hartman, (1996), does not change risk, it also comes at a premium

cost as the receiving party (subcontractor) adds a monetary risk factor to the bid price which is paid upfront whether the risk materialises or not, (Gray & Larson, 2006:216).

The most popular form of risk transfer according to Baldry, (1997) is insurance. Although not all risk are insurable, Risk Insurance is considered to be the most effective form of risk mitigation, according to Wang et al (2004). Risk can only be insured if it is quantifiable, measurable; the losses are determinable, proven to be unintentional; risk premium is feasible and the insured possesses an insurable interest in the insurance contract.

Construction companies are known to popularly insure against construction equipments damage, plant damage, materials damaged in transit or storage, third party liability, consequential loss and indemnity for acts of non-negligence, (CII, 1993). Gray & Larson, (2006), however criticise the risk insurance process as being impractical or cumbersome considering the extensive and costly process of defining risk events and conditions to insurance brokers who are often unfamiliar with varying projects.

The decision whether to transfer or not to transfer a risk partly defines Risk Management in the construction industry, (Rahman & Kumaraswamy, 1993). Since many parties with different interests are involved in a construction project, there is bound to be different perspectives on risk, (Chapman & Ward, 1997), e.g. a project client might have a different idea or perspective of risk which is mainly influenced by the need to achieve the target objective, while the contractor might have a different set of ideas influenced by the need to achieve profit. Flanagan & Norman, (1993), explain construction risk insurance as a medium that balances the different perceptions and interests of all interested parties like clients, contractors, engineers, architects and other project team members. To further emphasise this point, Al-bahar & Crandall (1990), stress risk management as often referred to as insurance management in the construction industry.

Risk Control

Risk Control is the last step in Project Risk Management, which involves carrying out the response strategies earlier designed, introducing contingency, and monitoring plans for new risks and events that trigger them, (Gray & Larson, 2006:225). In the risk management literature, risk control is often used synonymously with risk monitoring, (Tah & Car, 1993; Nicholas & Steyn, 2008). It is however important to note that although risk control and monitoring is the final stage of the Risk Management process, "it does not represent the end of the Risk Management cycle" – Car & Tah (2001:855).

The importance of risk control is stressed by Tah & Carr (1993), who explain it as being second only to the Risk Identification process. Flanagan & Norman (1993) however differs maintaining that all stages of construction risk management are equally important as the other. Risk control puts into use and action all risk data and strategy that has being mapped out from the previous risk identification, assessment, analysis and response process, (Flanagan & Norman, 1993). The control process would now involve close monitoring to ensure adopted measures and strategies are working effectively and if not, making use of contingencies and mitigating measures in the event a risk finally occurs, (Car & Tah, 2001). Risk control is an evolving process as it is the Risk Management stage that witnesses risk patterns that continually change hence the need for constant re-assessment and re-analysis, hence improved risk response strategies. Based on this,

Gray & Larson, (2006:225), described risk control as a change management process that handles risk events that would influence constant change in the scope, budget and schedule of the project. Risk profiles should be reviewed often to assure on the effectiveness of the initial response strategies deployed.

Carter et al (1994:73) defines Risk Control as "the work involved in monitoring and reporting to higher management the status of the risks and the effectiveness of the mitigation strategies. They explain mitigation strategies as the means by which risk impact may be reduced, or prevent its occurrence, or avoid it; contingencies are also risk control measures put in place to compensate for risk should it inadvertently occur. Risk Control also involves the financial estimation of risk exposure and is calculated based on risk impact on the project hence specific amounts of money can be allocated to each risk element and the total sum forming the risk contingency, (Carter et al, 1994:74).

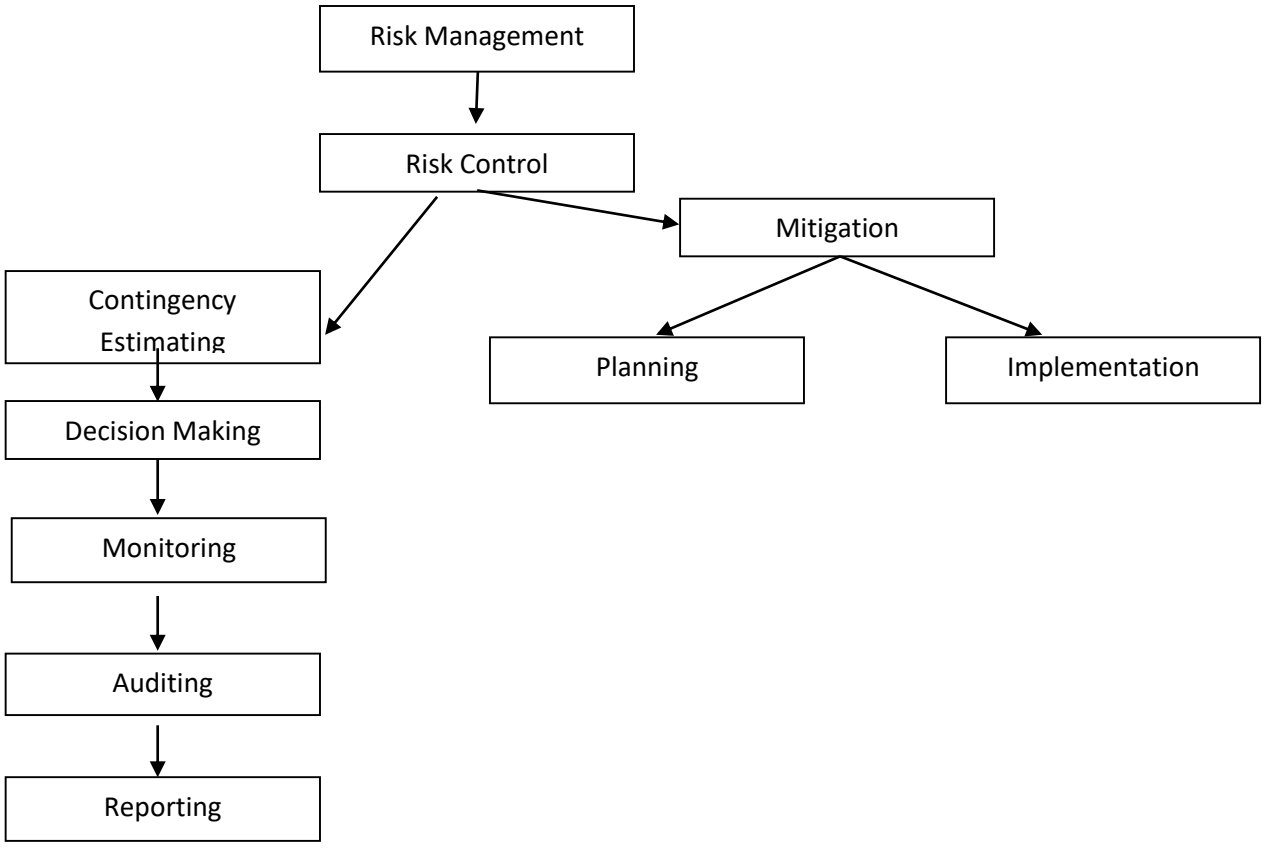

Fig. 2.4. Risk Control/Management Activities, (Carter et al, 1994:73)

According to Gray & Larson (2006), an effective Risk Control process can be achieved if Project/Risk Managers ensure a project environment that would reassure and not penalise project team members if they admit mistakes, raise concerns or report errors.

Project stakeholders should all be involved in the risk discussion and although it may not be practical to have these types of discussions through the project lifecycle, they should be kept updated by the Project Manager.

Risk responsibility has to be assigned and shared amongst the major project stakeholders like project owner, manager, contractor, engineer, designers and other team members and they all need to consistently look out for new risks, (Gray & Larson, 2006).

The table below in summary illustrates the review presented from 2.2 to 2.6 with examples to show risks, risk categories, risk management strategies and actions taken in response to counteract the effect or impact of these risks so as to ensure the desired outcome of quality and reliable construction projects of value.

Type of Risk Category	**Risk Category**	**Risk Mgt Strategies**	**Possible Counteractions**
Fundamental & Speculative * Impersonal * Loss/Gain	Financial & Economic * Inflation * Foreign Currency Fluctuation. *Exchange Rate Changes. *Default by Sub-Contractors and Suppliers.	Risk Retention. Risk Transfer/Sharing. Avoidance.	- Escalation Clause. - Price Contingency in bid. - Project financing by reputable owner. - Owner purchase of equipment and material. - Providing performance bond and prequalification of suppliers. - Forward contracts for hedging exchange rate changes.
Particular & Speculative - Personal - Loss/Gain	Design - Inadequate design - Errors and omissions - Insufficient detailing - Different subsurface conditions.	Risk Transfer. Avoidance.	- Changed condition clause (delay) - Contractor participates in design. - Adoptable Design/Construction methods. - Change the original design.
Fundamental & Pure - Impersonal - Loss/Gain	Political & Environmental - Inadequate design - Errors and Omissions - Insufficient Detailing - Different sub-surface conditions	Insurance. Risk transfer. Loss prevention and reduction.	- O.P.E.C. & A.I.D. Insurance - Contingency Planning - Contractual Clauses for schedule delays and additional payments. - Clear contract clauses - Protection and safety programs
Particular & Speculative - Personal - Loss/Gain	Construction Related - Weather delays. - Labour disputes & strikes. - Different site conditions. - Defective work.	Risk Retention. Loss reduction and prevention. Insurance.	- Physical contingency in the bid. - Insurance for liability for accident. - Contract clause for time - Extension due to delays. - Safety and training programs for employees.

	- Equipment failure and theft. - Labour injuries and accidents.		- Planning procurement activities in advance - QC/QA programs.
Particular & Pure - Personal - Loss/No Loss	Physical - Damage to permanent structures. - Damage to material and equipment in transit. - Personal injuries. - Fire damage.	Risk Transfer Loss reduction and prevention. Insurance.	- Builders Risk Insurance - Adequate site supervision - Contractual clause for delays. - Safety and accident prevention programs. - Contingency plan.
Fundamental & Pure - Impersonal - Loss/No loss	Acts of God - Flood. - Earthquake. - Fire. - Collapse and Landslide.	Insurance Risk transfer	- Insurance carried by owner. - Contractual clauses for delay and payments for incurred damages. - Contingency plan.

Fig 2.4.1 Summary of Risk Management Strategies & Possible Counteractions, (Al-bahar & Crandall, 1990:544)

Risk Management & the Delivery of Quality Construction Projects

Effectively eliminating or mitigating issues feeding poor project quality in the construction industry seems to have defied all solutions and still lingers, (Abdul-Rahman, 1993). This is because of the lack of a management practice that looks beyond the belief that risks are only connected to design, machinery, site and structures within the construction environment.

Risk Management provides an extensive process that looks beyond these limitations into factors that are external to the project. These factors are often the source of unidentified Risk that eventually overwhelm project managers or contractors - hence the delivery of projects of poor quality, (Kerzner, 2006). To support this further, Nicholas & Steyn (2008), Kerzner (2006) and Gary & Larson (2006), in their text argue that Project Risk Management is one of the very few construction based management practices capable of directly influencing the delivery of quality projects, and this is considering the holistic approach that makes up its process. Anything that could potentially affect or impact the means through which a quality objective is met and successfully delivered is a risk, (Holt & Rowe, 2000); hence its management by means of continuous identification, assessment and control is the best form of response demanded of any Project Management practice, (Flanagan & Norman, 1993).

The success of a project should be measured by, "how well the facility performs from an operability, availability, reliability and maintainability perspective" – Lad & Beck (2009:1). They explain further, that this is the real test on how good a project has been designed or built. Pheng & Tan (1996:42) provide key points in defining construction projects of quality they are as referenced below as such:-

- "Good and practical design and layout which are functional and yet aesthetic"
- Projects "which are defect free during the briefing, design, tender, construction, commissioning and maintenance stages"

- "Good workmanship by contractors and sub-contractors"
- "Value for money for both the customers and end users"

It is argued that construction risk originated from either design or engineering/project execution related errors, however, extensive literature review in the course of this chapter indicate quite correctly that construction risk vary especially in the challenges they pose and can be categorised into various factors or forms depending on the risk event, source, likelihood or impact respectively.

Since it has been established that construction project risks go beyond either design or engineering errors, but are also influenced by political, economic, social and environmental factors, Risk Management remains the major viable option to harnessing all these factors, hence ensuring an efficient project management process that would deliver constructions project of good value, reliability and quality.

If construction projects of good quality and reliability must be delivered, then quality and safety standards should be combined as primary strategies of focus, (Lindahl & Ryd, 2007). The presence of government backed regulatory industry standards, formal awareness and full education on Risk Management help ensure construction companies build and maintain healthy Risk Management practices which remain a foundation for project quality. The absence of effective compliance or industry regulatory measures set out from the start impedes the delivery of quality and reliable projects and this is very much visible in developing countries, (Chan et al, 2002).

Compliance levels demanded by such standards means the presence of a Risk Management department or something similar to monitor and oversee adherence to designed strategy as well as risk prevention, control and response measures; and importantly, ensure a critical balance in industry standards compliance and the delivery of quality projects of value, durability and reliability, (Flanagan & Norman, 1993). From the outset appropriate levels of quality must be determined and defined across each and every phase of the project namely the design, engineering, construction, qualification and commissioning phases respectively, Wilkinson & Willmott, (1995). Inability to do this means there is no guiding principle on levels of commitments and adherence required from all project and construction team members; it also means project owners and sponsors cannot be meaningfully engaged in the Risk Management process which itself is important.

Abdul-Rahman (1993), lists some sources of quality failure as "failure to recognise project needs and requirements", "failure to minimise factors associated with risk", "incomplete information", "mid-way changes in design and mistakes", unforeseen conditions (PESTLE), "communication problems" and project uncertainty relating to "labour, material, subcontractor, plant and equipment", (Abdul-Rahman, 1993: 22) .

Risk Management therefore aids the achievement of construction project of quality through its processes that are deliberately designed to identify, assess, respond and strategically control

risk events and impacts to ensure they don't derail the achievement of quality objectives of a construction company.

METHODOLOGY

This paper adopts a deductive approach as it provides a framework through which theory relevant to Risk Management and construction project quality can be identified, and then constructs a hypothesis based on the points not raised by the theory in satisfaction of the research objective. Furthermore, the hypothesis is tested through an empirical analysis that would involve data collection and interpretative finding which would either justify or confirm the hypothesis, or reject or discredit it hence the need to revise the whole objective.

This approach is illustrated in the figure below by Bryman & Bell (2007)

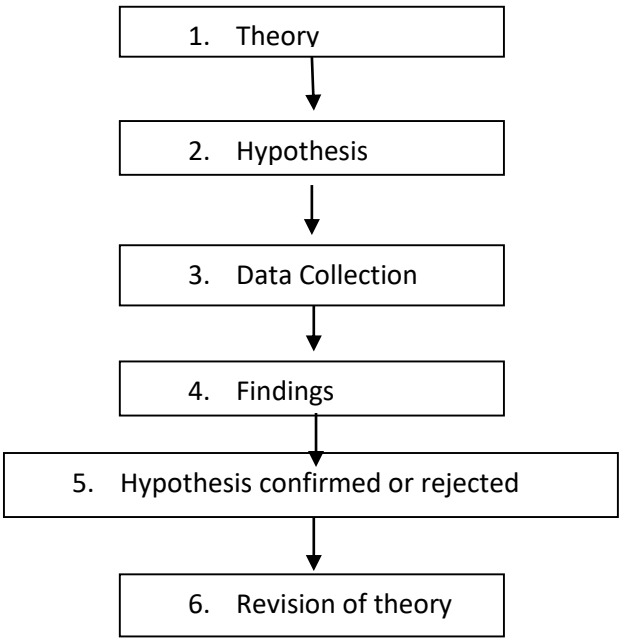

Fig. 3.2 The process of deduction - Bryman & Bell (2007:11)

In designing the adopted Questionnaire, Questions 1 to 10 are questions centred on the personal and background information of respondents; Questions 11 to 27 are designed and structured in such a way as to easily investigate, comprehend and establish the levels of Risk Management awareness, application and relation with project quality; Questions 11 – 13 investigates Risk Management as a whole; Questions 14 – 15 investigates Risk Identification; Questions 16 – 17 investigates Risk Assessment and Analysis; Question 18 investigates risk response; and Questions 19 – 20 investigates risk control; and Questions 21 – 27 investigates project quality in relation to Risk Management.

This paper adopts the probability sampling as it works more conveniently with the quantitative methodology, besides it is more objective and "the findings from the sample data can be generalised to the population with a specified degree of accuracy" – (Hair et al, (2007:170).

This paper's Target Population are project personnel who should ordinarily posses the information or data the paper seeks to obtain, hence, project managers, contractors, architects, engineers make up the target population.

Element: Project personnel playing critical roles in Project Risk Management.
Sampling Unit: Project Managers, Engineers, Contractors and Architects.
Extent: Developing Countries (Nigeria as a case study)
Time: 9/7/2022 – 27/7/2022

Target population for project personnel with Risk Management roles – Hair et al (2007)

RESULTS

Primary data received was tallied and sorted to ensure all feedback were applied for analysis. Thirty two (32) feedbacks were received out of the target sample size of 60. These 32 feedbacks were processed using Microsoft Excel and were presented in bar and pie charts to enable an easier interpretation of the data information to be analysed and discussed.

Table: 4.1Respondent Data

Personal Information	Disclosed		Non-Disclosed	
Name	13	41%	19	59%
Project Position	23	72%	9	28%
Organisation	17	53%	15	47%
Country	26	81%	6	19%
Contact Number/Email	5	16%	27	84%

Respondent and Company Background

This sub chapter presents the respondents feedback on their company specialties, type, number of fellow colleagues and employees in the immediate company; their experience in years of service rendered, and the average monetary value of construction project handled by their respective companies. This gives an indication as to how various variables influence each other and then most importantly the value of the delivered project. For an example, a building construction company handling projects worth billions of naira with the aid of a large number of employees with a dismal knowledge of Risk Management will most likely turnover projects of low quality or value. This will be expanded further and more comprehensively in the next chapter.

Company Specialty

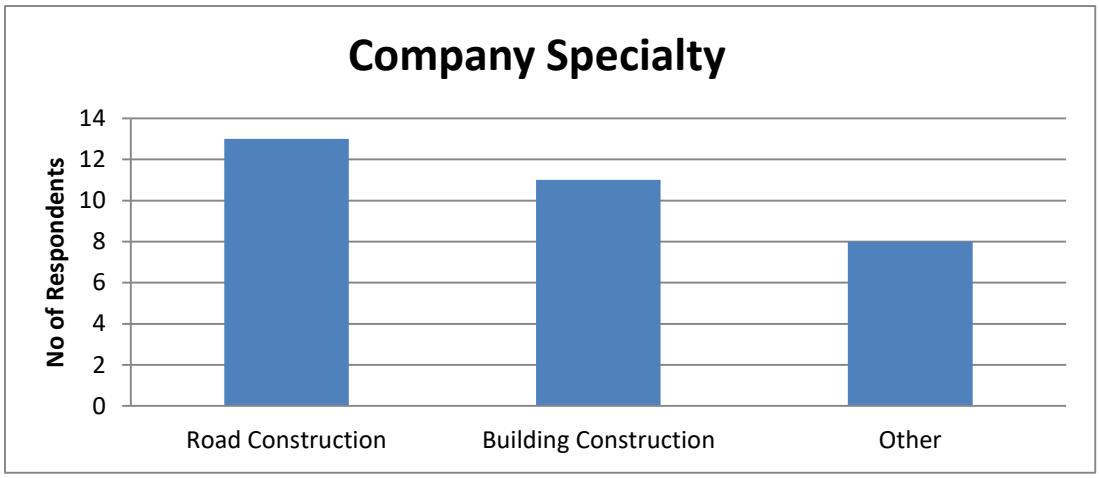

Fig. 4.1.1.1. - No of Respondents vs. Company Specialty

As seen in Figure 4.1.1.1 above, 13 respondents (41%) worked for companies that were into road constructions, 11 respondents (34%) worked for building construction companies and the other 8 respondents (25%) represent companies that were into other types of civil constructions like bridge and infrastructures, telecoms related constructions and other forms of smaller sub contracts.

Company Type

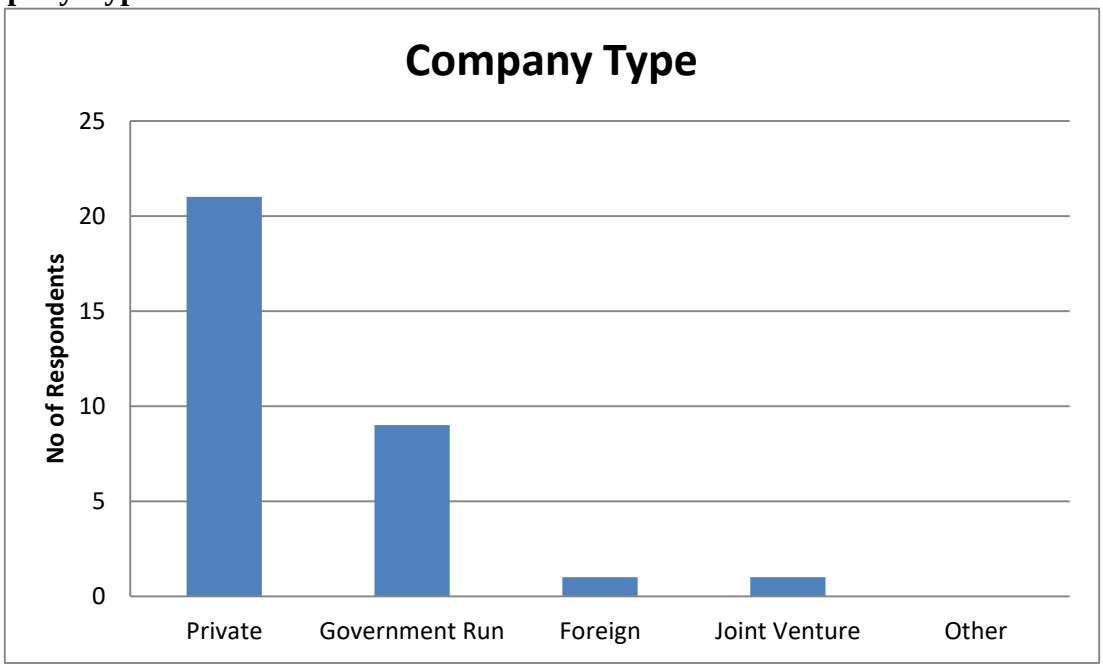

Figure 4.1.1.2:- No of Respondents vs. Construction Company type.

As seen in Figure 4.1.1.2, 21 respondents (66%) represent private construction companies, 9 respondents (28%) represent government owned or run construction companies, 1 respondent

(3%) each represent both foreign and Joint Venture companies respectively . This percentage rightly reflects the predominance of private run construction companies in Nigeria when compared to that of the government, foreign and Joint Venture construction outfits.

Company Employees

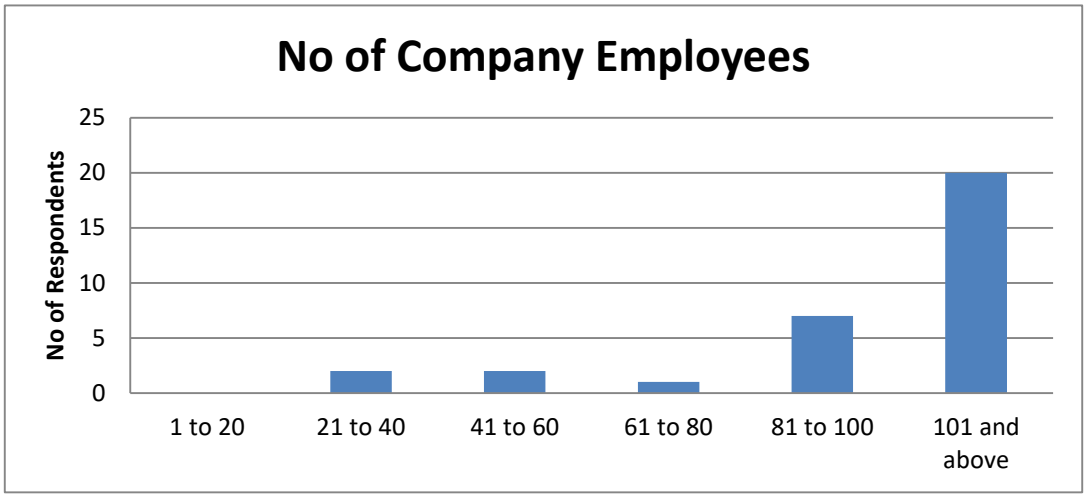

Fig. 4.1.1.3 - No of Respondents vs. No of Company Employees

Out of a total of 32 respondents, none worked for a construction company with 1 – 20 employees. 2 respondents (6%) each work for construction companies with the range of 21 – 40 and 41 – 60 employees respectively. 1 respondent (3%) works for a company with a range of 61 – 80 employees, 7 respondents (22%) represent companies with a range of 81 – 100 employees, and 20 respondents (63%) represent those with 101 employees and above. This frequency distribution also reflects the reality that major civil construction companies have a large number of employee base considering the extensive nature and demand of the projects they handle.

Years of Experience in the Construction Industry

The chart in the next page gives an indication as to how the different respondents come across in terms of their varying years of experience; this is necessary for the Analysis and Discussion chapter of this research as it gives an indication of what should be the expected level of Risk Management knowledge and awareness in the construction industry considering years of practical service rendered.

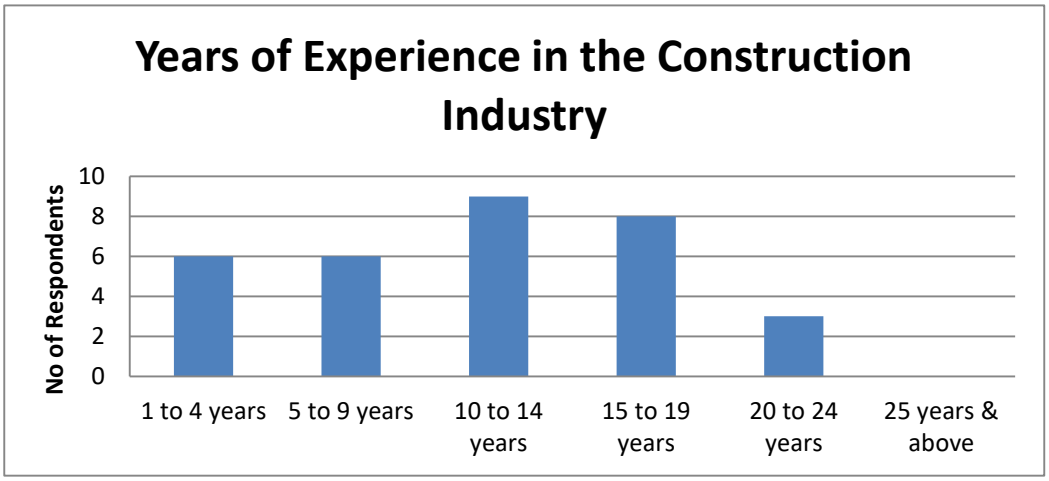

Fig. 4.1.1.4 - No of Respondents vs. Years of Construction Experience.
From the chart above, 6 respondents (19%) each represent the range of 1 – 4 and 5 – 9 years of experience respectively in the construction industry. 9 respondents (28%) fit into the range of 10 – 14 years of construction experience, 8 respondents (25%) fit into 15 – 19 years, 3 respondents (9%) fit into 20 – 24 years of construction work experience while no respondents had put in 25 years or above.

Average Monetary Value of Construction Projects
This sub-chapter presents the monetary value over the last ten years of projects handled by the companies represented by the respondents. As the monetary value of a project gives an indication to its magnitude and influence economically, socially, environmentally, and health and safety wise, presenting this is of importance and will be fully applied in Chapter 5 analysis and discussion. As seen in the next page, 4 respondents (13%) represent companies that have handled construction projects worth between 1 to 200 million naira within the last ten years. 3 respondents (9%) each represent companies handling between 201 to 400 and 401 to 600 million naira respectively in construction projects over the last ten years. No respondent was recorded for project contracts worth between 601 and 800 million. 5 respondents (16%) represent companies that handled an average range of 801 to 1 billion naira in projects over the last ten years. A majority of the respondents i.e. 17 (53%) worked for construction companies that have handled projects worth 1.1 billion naira and above.

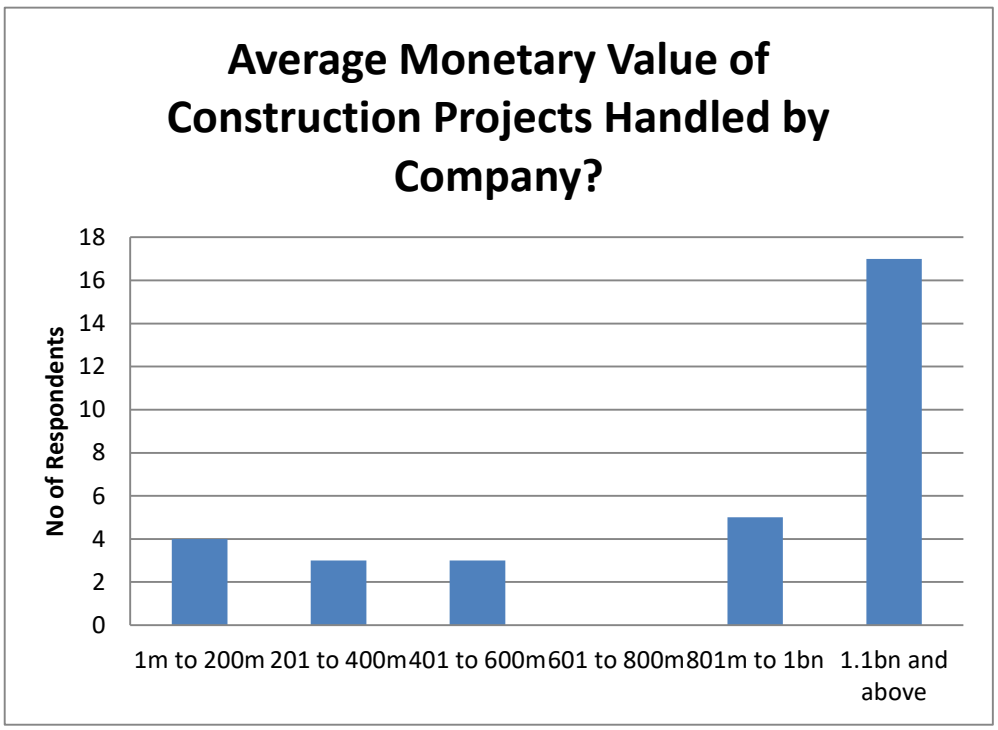

Figure 4.1.1.5:- No of Respondents vs. Average Monetary Value of Projects handled by Employing Companies.

Research Questions

This sub-chapter presents a processed data of feedbacks on 17 specially designed research questions aimed at giving an indication as to the levels of knowledge, awareness, practice and willingness to recommend Risk Management in the Nigerian construction industry.
They are as presented in the following page:

Construction Risk Awareness and Understanding

The chart below presents in percentages and from the respondent(s) experienced view of the industry, the various levels of awareness and understanding of construction risk and risk management. There are four keys in the chart representing the different levels as seen:-

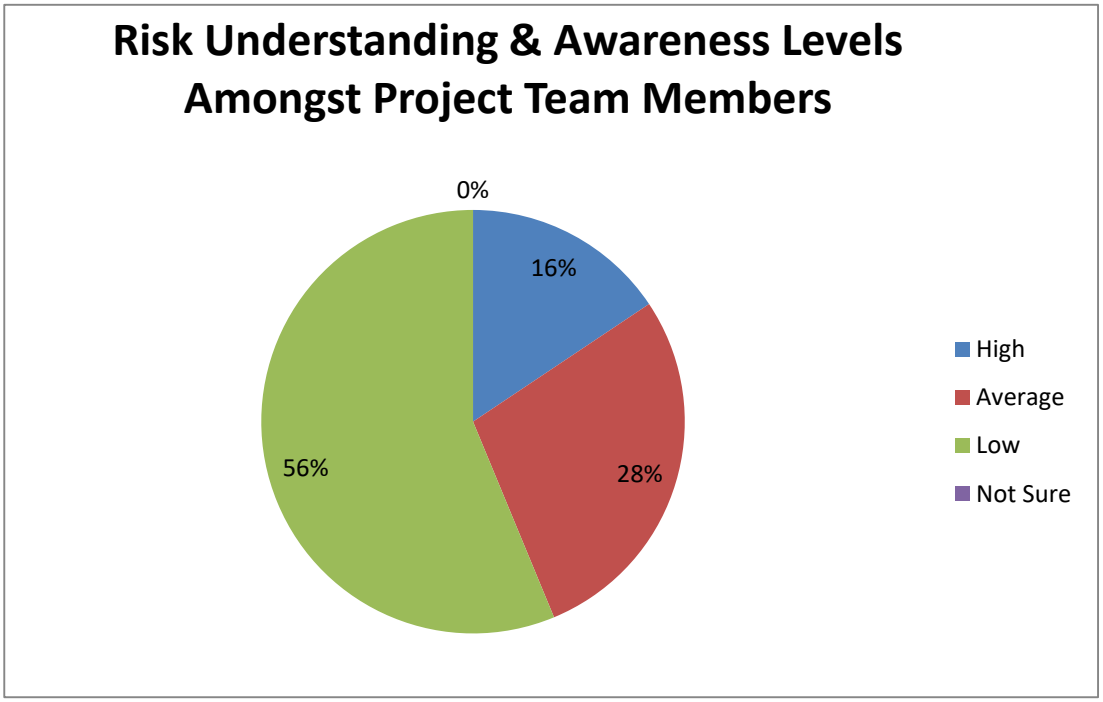

Fig. 4.1.2.1 - Risk Awareness and Understanding Levels

16% representing 5 respondents scored awareness and understanding levels high, 28% (9) scored average, 56% (18) scored low, and no respondent was un-sure hence presented as 0% in the chart.

Risk Management Department

On the existence of a Risk Management Department as would be seen in the next page, 81% representing 26 respondents said there were no such departments in their companies. 16% representing 5 respondents said yes while 3% representing one respondents said not sure.

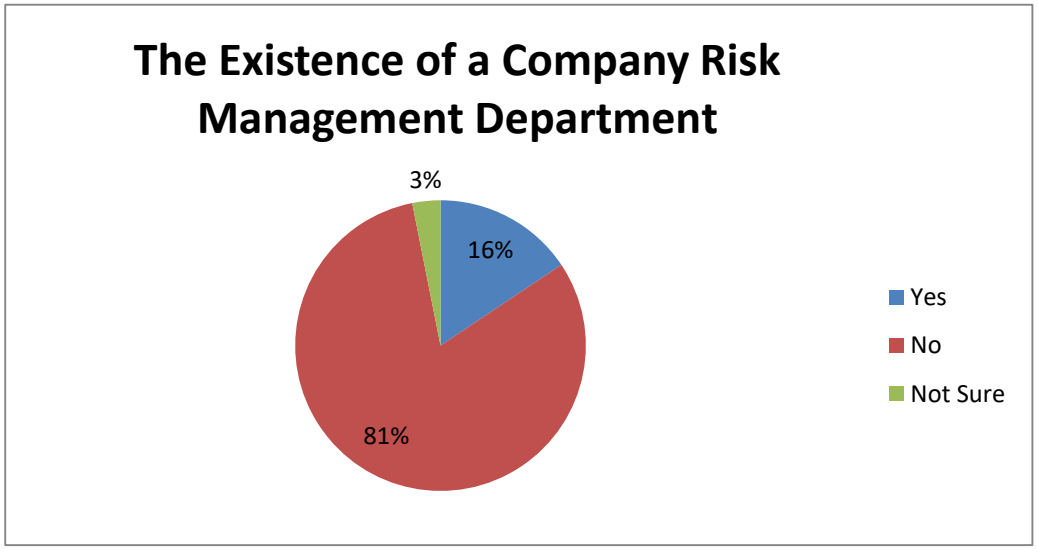

Fig. 4.1.2.2 - The Existence of a Risk Management Department

Risk Management Regulator

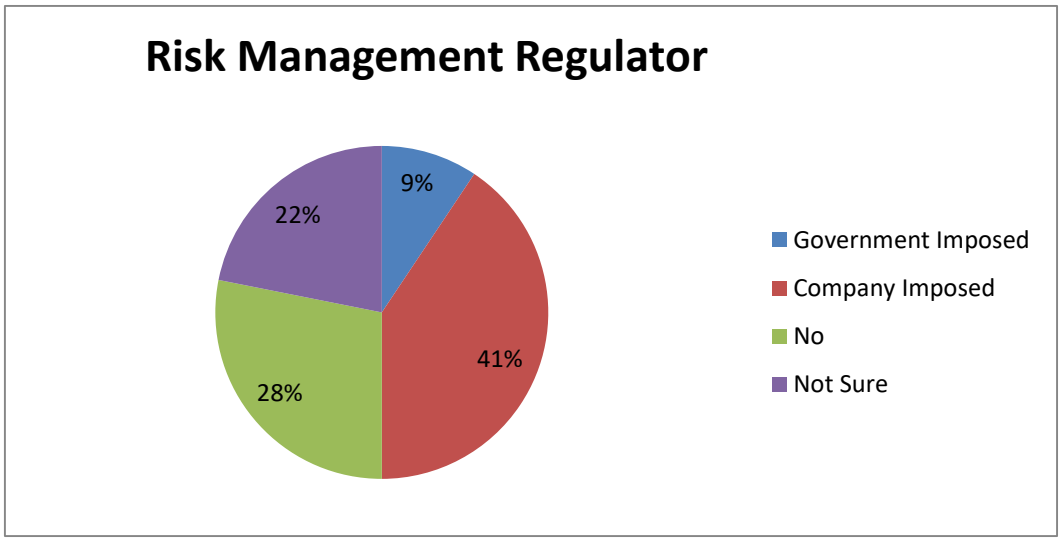

Fig. 4.1.2.3 - Risk Management Regulator

Nine percent representing 3 respondents agreed their companies were subject to Government imposed Risk Management regulatory standards. 41% representing 13 respondents said theirs was company imposed, 28% representing 9 respondents said they were not subject to any regulatory standards at all, while 22% were not sure of any form of regulatory standards they were subject to - itself an indication to its non existence hence the inability of respondent to express certainty.

Risk Brainstorming (Identification)

Brainstorming according to the Risk Management literature is the most basic and primary means of risk identification and involves a pre, during and post project commencement deliberation on risks that could positively or negatively impact the construction project across its lifecycle.

59% representing 19 respondents said yes to brainstorming amongst project team members across the life of the project. 13% representing 4 respondents said no to the existence of brainstorming in their companies, and 28% representing 9 respondents were not sure – another indication to a possible non existence of this process.

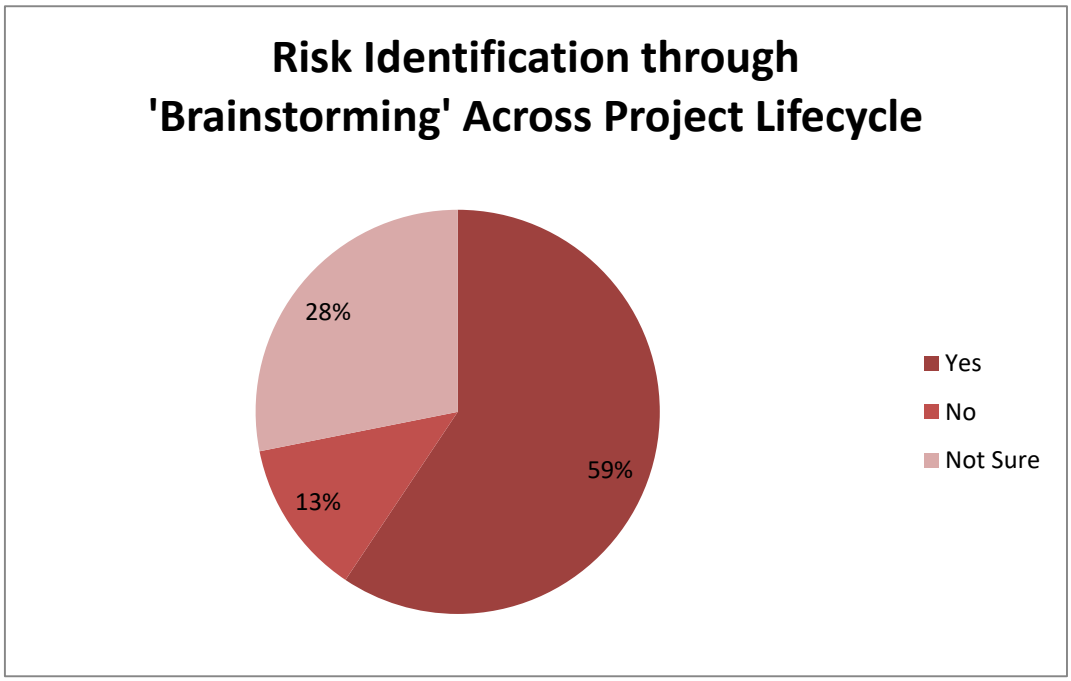

Fig. 4.1.2.4 - Risk Brainstorming

Formal Risk Identification Process

A formal risk identification process involves techniques defined and exemplified in the conclusive part of sub chapter 2.3 and consist of established procedures that enable a more streamlined Risk Identification. In response, 19% representing 6 respondents agreed their companies had a formal risk identification process, 3% representing 1 respondent partially agreed, 41% representing 13 respondents disagreed, 16% representing 5 respondents partial disagreed and 22% representing 7 respondents were not sure a formal risk identification process existed in their companies.

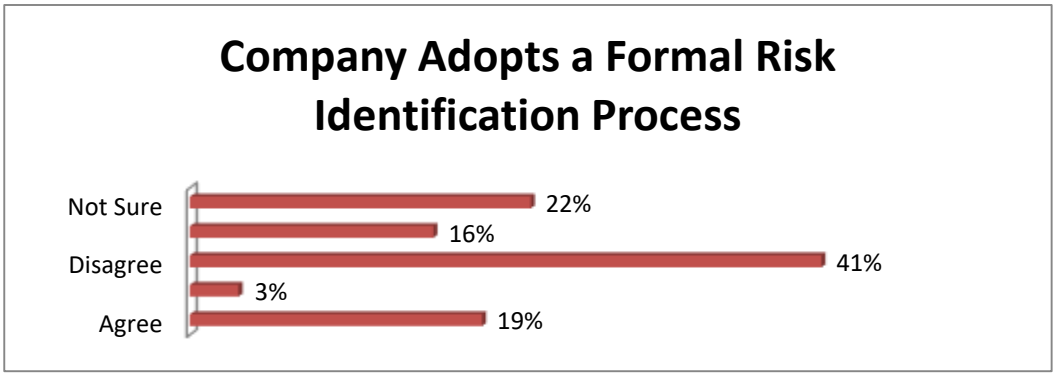

Fig. 4.1.2.5 - Formal Risk Identification process

Project Team Reliance on Project Manager Risk Judgement

Project team reliance on the risk experience and judgement of the project manager or contractor according to the Risk Management literature is frequently a result of a nonexistent and established Risk Assessment and Analysis process, (see sub chapter 2.4). This research question is designed as a litmus test to establish its existence. 66% representing 21 respondents answered yes to their reliance on the project manager or contractors risk judgement, 28% representing 9 respondents answered no to it and 6% representing 2 respondents were not sure.

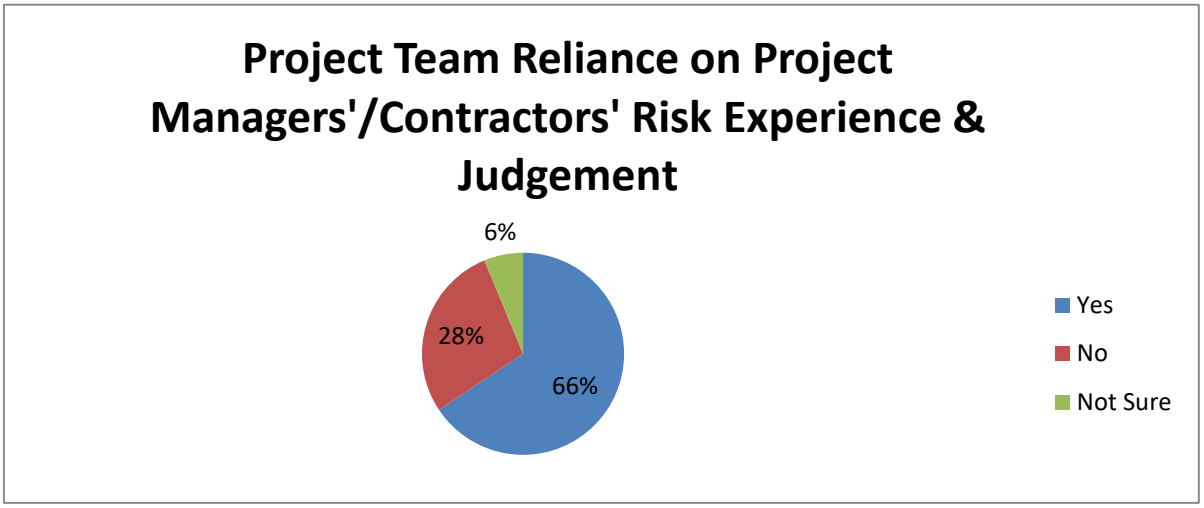

Fig. 4.1.2.6 - Reliance on Project Manager's Risk Judgement and Experience.

Critical Importance of Risk Assessment and Analysis

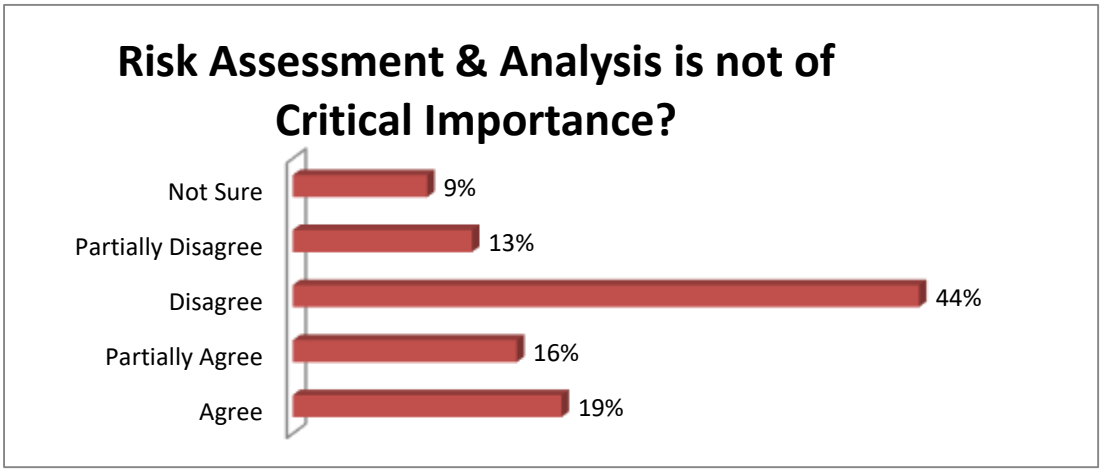

Fig. 4.1.2.7 - Risk Assessment & Analysis is not of Critical Importance.

The figure in the previous page represents the various levels of the respondents' agreement or disagreement with the critical importance of Risk Assessment and Analysis in relation to project time and cost. This question was designed in such a way as to easily establish the respondents' perspective and also as a follow up to the previous question which was more of a test. 19% representing 6 respondents agreed Risk Assessment and Analysis was not of critical importance

hence a drain on project time and cost, 16% representing 5 respondents partially agreed, 44% representing 14 respondents disagreed, 13% representing 4 respondents partially disagreed while 9% representing 3 respondents were not sure.

Company Risk Response Strategy

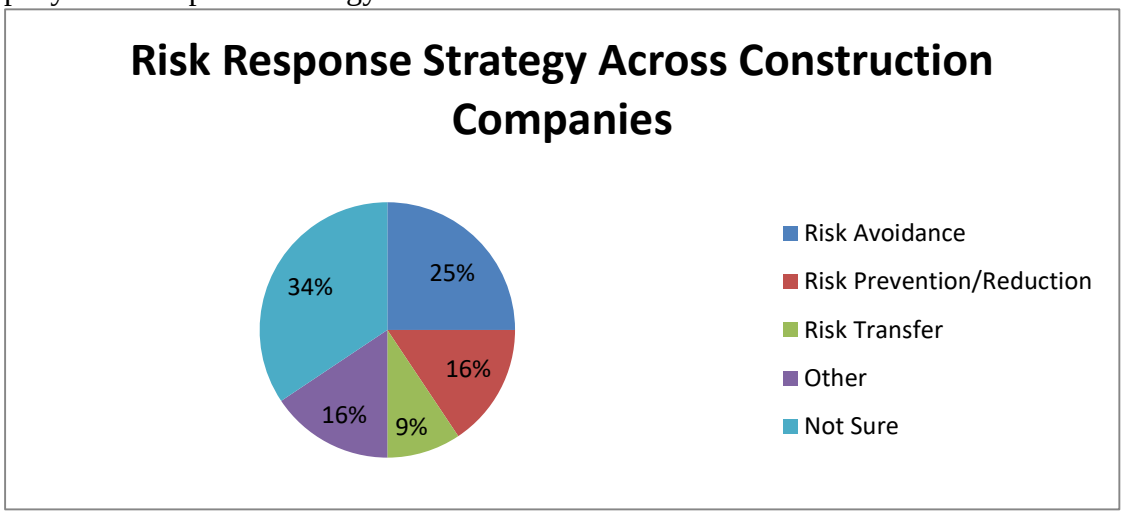

Fig. 4.1.2.8 - Risk Response Strategy.

This research question was designed to ascertain the different risk response approaches (if any), adopted by the construction companies. 25% representing 8 respondents chose Risk Avoidance, 16% representing 5 respondents chose Risk Prevention/Reduction, 9% representing 3 respondents chose Risk Transfer, 16% representing 5 respondents were not specific although they mainly indicated their response strategies were determined by the risk event type or form. 34% representing 11 respondents were not sure if any form of risk response strategies existed in their companies.

Risk Control and Monitoring

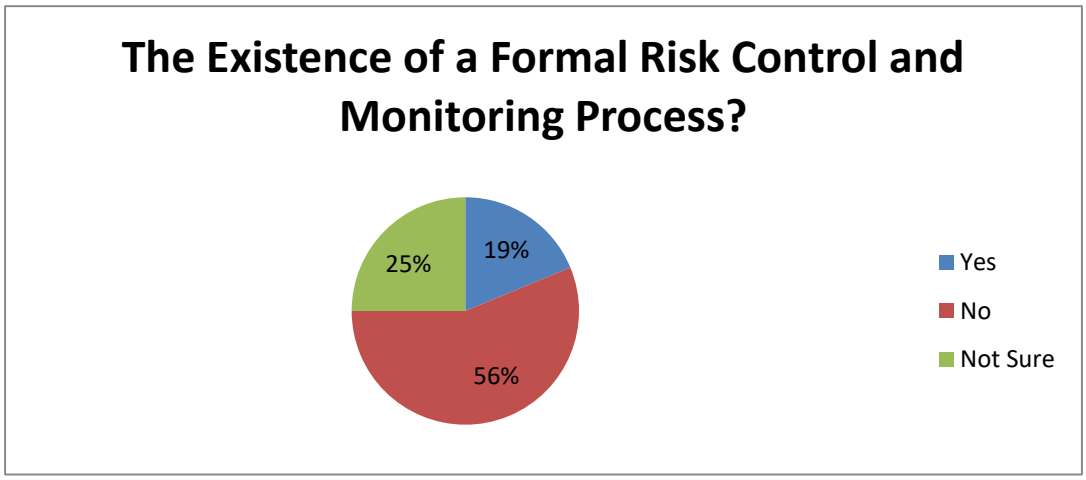

Fig. 4.1.2.9 - Existence of a Formal Risk Control & Monitoring Process.

On the construction companies applying a formal risk monitoring process designed to effectively monitor and report back on the effectiveness or otherwise of the mitigation strategies and contingencies put in place to control risk, 19% representing 6 respondents said yes, 56% representing 18 respondents said no, while 25% representing 8 respondents said not sure.

Risk Information Register

This question is designed to investigate if risks, risk events and their control measures are documented for subsequent use or reference in the respondent's organisation. 25% representing 8 respondents put down yes to their company's use of a Risk Information register, 59% representing 19 respondents put down no, while 16% representing 5 respondents were not sure of its use in their companies – itself another possibility to its lack of holistic use or non consistency in its use.

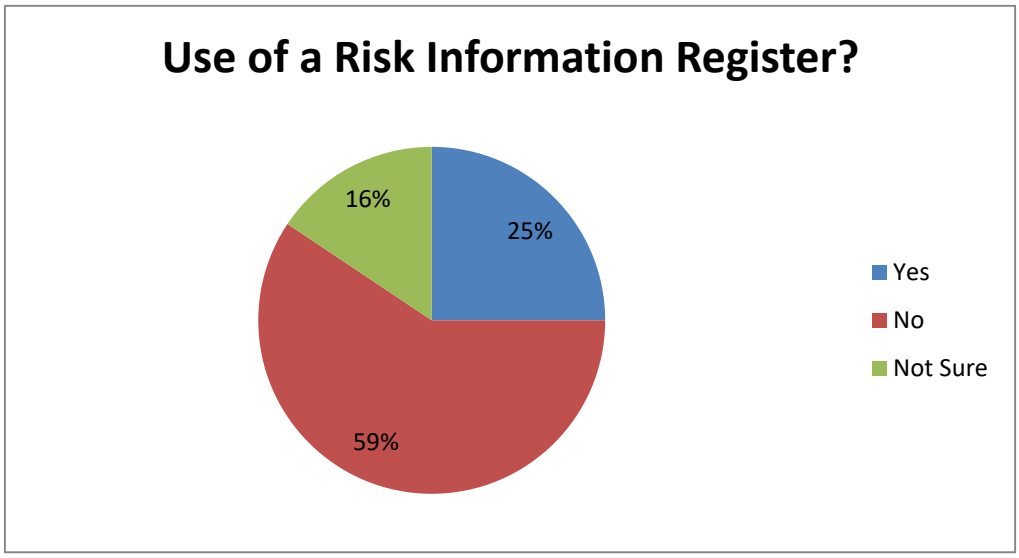

Fig. 4.1.2.10 - Use of a Risk Information Register

Agreement with Construction Project Quality Definition

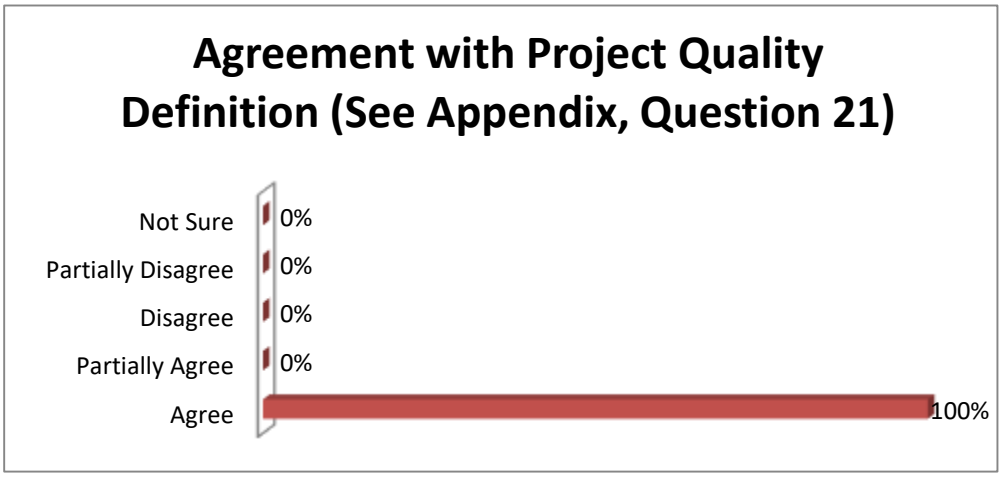

Fig. Fig. 4.1.2.11 - Agreement with Project Quality Definition

This apt definition was referenced to create an immediate impression of what a quality project of value should be in. In response, there was a 100% agreement with this definition.

On-ground Projects in relation to Quality definition

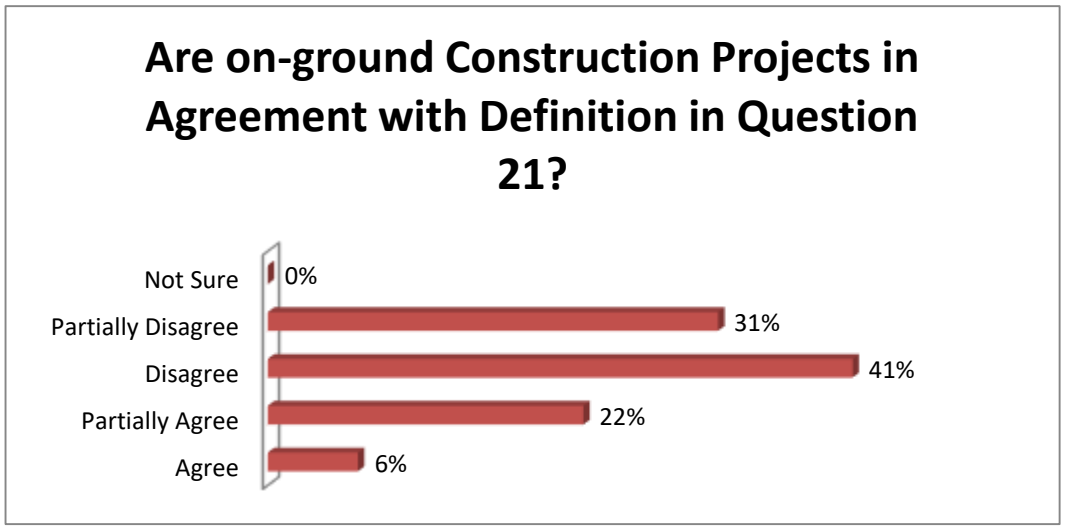

Fig. 4.1.2.12 - Construction Projects on ground in relation to Quality definition.

In response to this research question investigating if the referenced definition of quality (see Appendix) reflects what is on ground in Nigeria, 6% representing 2 respondents agreed it did reflect, 22% representing 7 respondents partially agreed, 41% representing 13 respondents disagreed and 31% representing 10 respondents partially disagreed. None of the respondents were unsure.

Risk Management as the best manager of risk benefits and threats

There was 100% agreement with Risk Management as the critical balance between construction risks and threats which helps ensure project performance and quality. This can be seen in the following chart:

Fig. 4.1.2.14 **Quality Construction Projects as End Results of Risk Management**

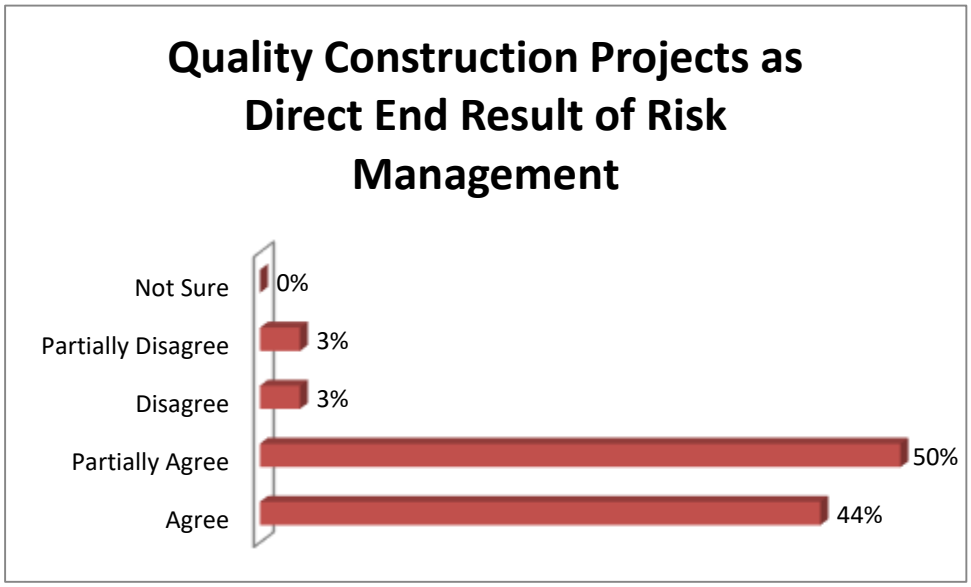

Fig. 4.1.2.14 - Quality Projects as end results of Risk Management.

In response to the research question for which the above data was presented, 44% representing 14 respondents agreed quality projects were direct end results of an effective Risk Management process; 50% representing 16 respondents partially agreed, 3% representing 1 respondent each both disagreed and partially disagreed respectively while none of the respondents was unsure.

Risk Management as a deep rooted Practice and Discipline

In response to the research question investigating Risk Management as a deep rooted practice in the Nigerian construction industry, 13% representing 4 respondents agreed it was deep rooted, none of the respondents partially agreed, 72% representing 23 respondents disagreed with its deep rooted practice, 16% representing 5 respondents partially disagreed while none of the respondents were unsure.

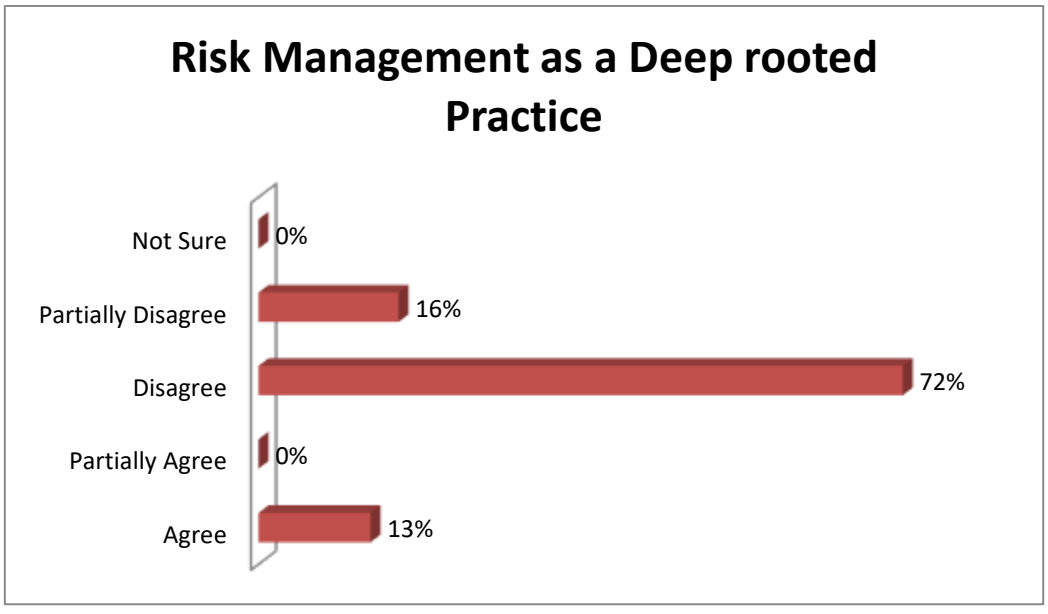

Fig. 4.1.2.15 - Risk Management as a deep rooted practice in the construction industry

Need for Risk Management Education in the Industry

There was a 100% agreement with the need for Risk Management education in the Nigerian construction industry. This can be seen at the top of the next page and reflects the fact that current levels are low or poor hence the unanimous agreement.

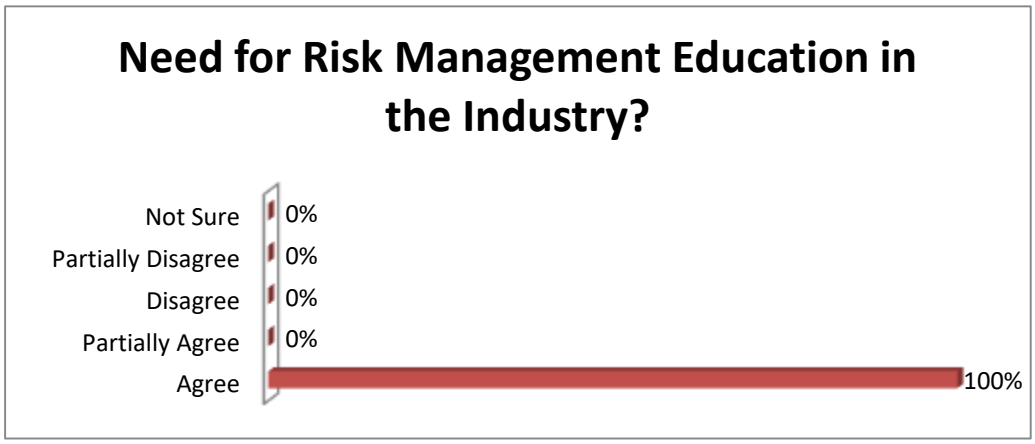

Fig. 4.1.2.16 - Need for Risk Management education in the construction industry.

Recommend Risk Management as a means to Quality Projects

Fig. 4.1.2.17 - Recommend Risk Management as a means to Quality Projects

69% representing 22 respondents agreed with a recommendation of Risk Management as a means to achieving quality projects of value. 31% representing 10 respondents partially agreed while none of the respondents neither disagreed, partially disagreed nor weren't sure.

CONCLUSION

In conclusion, data was gathered using research survey questionnaires, and was processed, simplified and presented using tables and charts such as pie and bar charts. Microsoft Excel was used as a medium in ensuring all the 32 feedbacks were adopted, applied and summarised in the respective subchapters above.

ANALYSIS AND DISCUSSION

Respondent and Company Background

Company Specialty

Road and Building constructions were the two emphasised areas of specialty in the questionnaire because these are areas were the lowest quality projects are mostly recorded or pronounced in Nigeria. As stated in Chapter 1, poor quality construction projects in the country is measured by the prevalent cases of poor road networks, collapsed and dilapidated buildings and infrastructures amongst others. The option for 'other' was provided to enable scenarios whereby the construction companies provided related civil construction services like architectural design, works sub contracting and infrastructural renovation or maintenance which remains another area of low quality project delivery.

The respondent balance of 41%, 34% and 25% for road, building and other type of civil constructions readily matches the aim of this research which is to almost uniformly target a cross section of major practitioners in the industry hence being able to generalise the conclusions with due deference to its limitations.

Company Type

Companies carrying out civil construction projects in Nigeria are known to be predominantly privately owned or limited firms heavily patronised by the government. There exists in the minority, government run construction companies, they however largely sub contract most of their project work to private contractors hence play more of supervisory roles. There is also the presence of foreign and joint venture constructions companies of which though prominent, are relatively smaller in number compared to the indigenous ones. The balance of the data feedback received reflects this fact, and figure 4.1.1.2 rightly illustrates this balance; 66% represent privately owned companies, 28% represent government owned or run companies and 3% represent both Foreign and Joint Venture construction companies.

Company Employees

Major civil construction companies normally maintain a large employee base due to the complicated nature and demands of the projects they have to handle within time. Figure 4.1.1.3 indicates these much as majority of companies (63%) represented in the survey feedbacks have a range of 101 and above employees. 22% represent the employee range of 81 – 100 which from available disclosed personal data also represent constructions companies and civil works contractors. The relatively low range of employees i.e. 21 – 40, 41 – 60 and 61 – 80 represent to a large extent civil design and architectural companies, maintenance and renovations sub contractors whose services understandably do not require a large employee base.

Years of Experience in the Construction Industry

The intent behind this research question was to help the researcher investigate the years of experience of the respondents so as to give levels of credibility to what should be their knowledge of Project Risk Management practice and processes in the construction industry. For example, this research citing APM (2000) applied in the literature review chapter submits that a project personnel's experience in Risk Management expectedly grows with years of experience in projects handling and management.

Average Monetary Value of Construction Projects

The term 'average monetary value' was designed specifically to give an indication as to the magnitude or reach of construction projects delivered by the companies over the last ten year period. At the current state of the Nigerian currency, construction projects valued at hundreds of millions of naira up to billions are known to be of significant presence, size and impact on the socio-economic environment. The data in Figure 4.1.1.5 therefore gives a clear indication as to the value and impact of construction projects handled and delivered by the respondents companies in the last ten years. At 53%, majority of the companies handle projects worth 1.1 billion naira and above, 16% handle projects worth between 801 million and 1 billion naira, while 13%, 9% and 9% represent handled projects in the range of 1 – 200, 201 – 400 and 401 – 600 million naira respectively – all these an indication to the magnitude of the projects being delivered by companies under survey.

Research Questions

Risk Awareness and Understanding amongst the Project Team

This research question as already highlighted serves to directly investigate and ascertain the levels of understanding, awareness and management of construction related risks amongst the project team or employees. These feedbacks from respondents will be generalised across the sample population i.e. the Nigerian construction industry with due reference to the limitations of this approach.

This question on risk and risk management awareness and understanding remains one of the core objectives of this paper. A look at Figure 4.1.2.1 presents three distinct levels of risk awareness and understanding. 56% represent low levels, 28% represents average levels and 16% represent high levels of risk awareness and understanding respectively. The implications of these respective percentages are clearly seen; they imply a majority in low and average risk awareness/understanding levels when compared to the high levels. The imperfection of this balance in percentages and figures goes to confirm the perspective held in the introductory chapter of this research stating that risk and risk management awareness, understanding and practice levels are relatively low hence the possible dismal delivery of low quality/value construction projects.

Risk Management Department

As earlier emphasised in the literature review, the existence of a Risk Management department is a testament to how adequate or effective a company's risk management processes are. This can therefore be a good litmus test adopted by this paper to investigate Risk Management practice levels across the Nigerian construction industry.

Figure 4.1.2.2 presents the data feedback regarding the existence of Risk Management departments or offices in companies represented in the research survey. A majority of 81% of the construction companies lack Risk Management departments. 16% have existing departments while 3% represent respondents who are not sure of its existence in their companies - the explanation for this being a possible nonexistent or non-conspicuous risk department hence the respondents being unsure of its presence.

The absence of a risk management department implies the absence of a streamlined process or approach that will ensure the effectiveness of mapped out mitigation strategies/contingencies, and the commitment and compliance of the personnel assigned to take responsibility over them. The resultant inconsistency and non-uniformity would ultimately affect the quality of projects delivered. Citing the feedback recorded in the previous paragraph, this can be generalised to be the case in the Nigerian construction industry.

Risk Management Regulator

Risk Management processes are normally subject to regulatory controls that serve as a kind of monitoring framework to ensure critical aspects of its practices are implemented within defined standards and regulations, (PMBOK, 2004). This fact acts to underline the extent or depth to which Risk Management is adhered to and practiced as a discipline in a specific constructions industry. Based on this point, this paper sought to investigate if its practice in Nigeria is subject to any forms of regulatory controls or monitoring. Regulatory standards if we are to cite the UK example using the PMBOK series is normally designed and enforced by a collection of related industry experts well versed in the risk field and who draw inspiration and influence from a government authority. Typical example is the Risk Management regulatory standards backed by the UK Office of Government Commerce (OGC). The OGC is also a known sponsor of best practice programmes like Management of Risk (MOR), Managing Successful Programmes (MSP) and Projects in Controlled Environments (PRINCE2). With these facts established, the intent behind this particular research question can be clearly understood.

Figure 4.1.2.3 presents a picture of non-uniformity in Risk Management standards across the Nigerian construction industry. 9% represent companies subject to government imposed regulatory standards, 41% represent those that are company imposed, 28% are subject to no standards while 22% are not sure if their companies are subject to any standards. It can be implied that Risk Management is not effectively practiced across the industry, and there is a convincing absence of a supervisory regulatory influence to ensure adherence and application. The absence of a central and uniform regulatory risk management authority in the Nigerian industry means construction companies are not subject to credible checks and are open to adopt their own defined standards which are not often reliable. The result of this is the delivery of construction projects inconsistent in quality and durability.

Risk Brainstorming (Identification)

Risk brainstorming is the primary and most basic means of risk identification according to Flanagan & Norman, (1993), and as earlier emphasised, it involves pre, during and post project commencement deliberations on risks or uncertainties that could impact the project either negatively or positively.

This research question acts to help underline how involved the project team members and sponsors are into risk communication through brainstorming in the companies. From a generalised perspective, it gives an indication as to how institutionalised Risk Management is in companies servicing the Nigerian constructions industry, and also the level of input and contributions made by project team members who play active skilled roles in ensuring the delivery of construction projects.

59% represent companies that engage the brainstorming process, 13% represent companies without any form of brainstorming while 28% are not sure - also another possibility to its non existence hence skilled respondents not being sure. These percentages indicate a majority of companies engage in brainstorming while the minority are either not sure or don't brainstorm at all. This result is perfectly normal and expectedly so because respondents will definitely draw responses and examples from pre project commencement meetings, team briefings and allocation of responsibilities which takes place across all companies irrespective of its Risk Management practice or not. The critical question however is, do these meeting involve deliberations or discussions on possible risks and events.

Formal Risk Identification Process

A formal Risk Identification process consist of established processes or procedures that provide a holistic framework through which risks can be identified more proactively and in a more streamlined and defined manner. These processes represent a more institutionalised approach and consist of techniques designed to continuously identify, categorise and prepare them for assessment and analysis.

Figure 4.1.2.5 presents the percentage of companies with regards to their adoption of a formal risk identification process illustrated in the paragraph above. As deduced from Cameron & Price (2009) and Sanders et al (2007), terms like 'Agree' and 'Partially Agree' or 'Disagree' and 'Partially Agree' in the course of interpreting and analysing data, could be discussed to mean the same thing. For example, in Figure 4.1.2.5, Agree and Partially Agree can be interpreted to mean 22% Agreement with the adoption of a formal Risk Identification process and so on.

Having confirmed the above, it is clear the majority of companies at 57% do not adopt a formal risk identification process, 22% represent companies that adopt what they consider to be a formal risk identification process and 22% are not sure – an indication to a possible non adoption, the reason for this interpretation being that the presence of an effective process should leave no doubts about its existence or use.

The absence of a formal consistent risk identification process means the slip through of potential risk and threats without detection and adequate response. This means they carry on and affect the quality of projects that would eventually be delivered. According to Abdul-Rahman (1993), quality failures in civil projects originate at appraisal, design and constructions stages due to the inability to identify them - this presents itself as the problem in the Nigerian construction industry.

Project Team Reliance on Project Managers Risk Judgement/Experience

According to Kezner, 2006, companies with little to no Risk Assessment/Analysis process is mainly characterised by project team members who rely heavily on the Project Managers or contractors risk experience or judgement in satisfying that aspect or cycle of Risk Management. From the survey feedback processed in fig 4.1.2.6, a majority 66% of the companies rely on Project Managers and contractors, 28% don't and 6% are not sure. These figures in percentages could clearly be interpreted to mean an inconsistent or poor risk assessment process that consequently impacts negatively on the ability of the construction company to evaluate potential risk or uncertainties. This also implies response measures which come next in the form

of contingencies or mitigation strategies will not be correctly mapped out or planned hence the eventual negative impact on the quality or value of the project outcome.

This underscores the Nigerian situation, whereby construction companies go into carrying out projects without a clear prioritisation of risk in terms of their likelihoods, impacts and consequence. This means an exposure to uncertainties which often present negative project outcomes.

Risk Assessment & Analysis is not of Critical Importance

Risk Assessment and Analysis is perceived by some companies to be time costly and not of critical importance and this perspective is often shared in developing countries. This research question has being designed to ascertain how much importance the Nigerian industry attach to this critical aspect of Risk Management and if this view is shared by them.

A majority representing 57% of the companies disagree with the notion that these processes are not of critical importance, 35% agree it's not of critical importance while 9% percent are not sure. This indicates that despite the absence of an established Risk Assessment process, the project team and employees are aware of its critical importance hence a majority 57% disagreement with the notion that states it's not of critical importance.

Company Risk Response Strategy

Figure 4.1.2.8 presents in percentages companies and their different risk response strategies. The intent and design behind this question is to investigate the risk taking attitude of the respondent organisations and also the level of awareness and understanding of this strategic risk management term. 25% of the respondent companies adopt risk avoidance as a response strategy and this is likely due to the inability or competence to manage the associated or anticipated risks. Although it presents the benefits of a total elimination of a potential loss, it also costs these construction companies certain benefits that come with effectively managing these risks into opportunities. These opportunities once it materialises potentially impacts on the quality or value of the project delivered. 16% of the respondent companies adopt the risk prevention/reduction strategy indicating not only their willingness to embrace risk but reduce the impact or even the probability of it materialising. This strategy requires a full Risk Management knowledge, awareness and consistent practice before it can be adopted by a company and may be the reason why it records a low percentage.

9% of the respondent companies adopt Risk Transfer as a risk response strategy, this in itself is a lower percentage compared to the previous two. Risk transfer is symbolised by risk insurance as the most effective form of mitigation and this comes at a premium as mentioned in the literature review. Transferring risk also involves subcontracting to a party more prepared to assume and manage the risk and it probable impact. The recorded 9% doesn't come as a surprise considering the lack of established construction insurance structures in Nigeria, insurance is on record not to be mandatory hence the almost total neglect of that sector and its services in Nigeria. The low percentage recorded can be attributed to cases of subcontracts to contractors willing to assume, assess and control related risks; also the low percentage reflects the small population of project subcontractors aware and knowledgeable enough to provide this service. 16% of the respondents companies indicated 'other', which majorly implies non-uniformity in their risk response strategy. A number of respondents who provided extra information cited the

need to be flexible as the risks presenting themselves may vary and would definitely require different strategies in response. This notion is very realistic and indicates a reasonable knowledge and awareness of risk response strategies and processes, it is however a minority percentage.

34% represent companies not sure of the risk response strategy they adopt. This percentage is high compared to others and implies either a low level of awareness or knowledge of risk response processes, or the complete absence of it hence the inability of experienced respondents to specifically confirm so. This yet again underlines the level of Risk Management practice and awareness pointed out in the introductory chapter for which this subchapter analysis tends to justify.

Risk Control and Monitoring

Risk control and monitoring is a follow up to strategies or a combination of strategies adopted in response to a risk, event or impact, it is a follow up to measures discussed in 5.2.8. As earlier indicated, this process involves ensuring the implementation of designed strategies and monitoring to ensure they deliver on set objectives while reporting back on the effectiveness or otherwise. Besides, the monitoring aspect also involves looking out for new risks and their triggers. A construction company that effectively applies this process is bound to benefit from a streamlined Risk Management process that connects through from the identification stage to ensure that the risk event that would eventually affect the quality of project delivered is either avoided, transferred, mitigated or even retained as a benefit to the project. This should be the approach of Nigerian construction companies seeking to improve of the quality of the projects they deliver.

Deducing from Figure 4.1.2.9, a minority 19% of the respondent companies do have a formal risk control and monitoring process, a majority 56% do not and 25% are not sure if they do have one. This implies a formal risk control and monitoring process is largely non-existent in the Nigerian construction industry and amongst most of its practicing companies and this in itself contributes to what is currently being discussed as the low level of Risk Management practice and knowledge in the industry. For 25% of experienced respondents to be unsure of the existence of a formal process testifies to either its non-existence or relative poor consistent practice. This eventually goes to negatively impact the quality of the project delivered as its performance and value would be affected by undetected risks and impacts.

Risk Information Register

A risk information register is of critical importance in Risk Management. As stated in chapter 2, it is a means through which risks, risk events and their control measures are documented so they could be referred to in the event of the company handling a future project of similar risk features and demands. Most importantly, the risk information register presents each logged risk in relation to its full description, chances and consequence of occurrence, impact and the most effective means of response. Gray & Larson, (2006), submit that the risk information register directly aids the risk control and monitoring process and could act as a checklist in monitoring compliance to previously determined risk forecasts or estimates.

Figure 4.1.2.10 presents 59% of companies running without risk information register while 25% use a risk register and 15% are not sure of its use. This implies a relatively low use of risk

information registers in the Nigerian construction industry. With a reasonable 15% unsure of its use, it goes to stress the low level of Risk Management knowledge, awareness and practice especially when placed side by side with 59% respondents companies who specifically don't use the risk register.

As earlier discussed, the absence of this register means construction projects are left to be run with little or no documentation of risks that could impact the project and how best they could be controlled and managed. This eventually weighs down on the project process itself and affects its ability to deliver an outcome that is free of errors fed by undetected and controlled risk events. This also adequately represents the Nigerian situation.

Project Quality Definition

This research question was designed specifically to investigate the respondents' appreciation or understanding of what a quality project means. This question serves as a prelude to the last 6 questions which are centred on Risk Management in relation to project quality. With the levels of Risk Management knowledge and practice analysed and discussed in subchapters 5.2.1 to 5.2.10, this question enables the analysis and discussion of project quality. For the last six questions to achieve the desired outcome, the knowledge behind project quality has to be clarified especially with regards to what this research considers should be the state or definition of construction projects in Nigeria.

Figure 4.1.2.11 presents a 100% agreement with this concise and re-known definition (see Appendix, question 21 for definition), and it goes to show there is a high level of understanding of what a quality project should be and what it takes to measure such.

Quality Definition in relation to Projects on the ground

As a follow up research question, this question was designed with the aim of clarifying and also in the process establishing the presence of low quality construction projects as submitted in Chapter. A direct comparison with subchapter 5.2.11 clearly exposes the fact partly needed to build a case for Risk Management as a means to achieving quality construction projects.

Figure 4.1.2.12 presents a variety of data either in agreement or disagreement with the definition with regards to the quality of construction projects on ground. As earlier indicated in the subchapter under reference, 6% agreed the definition matched what was physically on ground in Nigeria, 22% partially agreed, 41% disagreed, 31% partially disagreed and none were unsure. The implication of this is a majority 72% in disagreement and 28% minority agreement hence a confirmation to the predominance of delivered low quality construction projects in the industry.

5.2.13 Risk Management as the best manager of construction risk benefits & threats

Managing the critical balance between risks that pose threats and those that pose benefits is what gives Risk Management an edge in ensuring the delivery of quality construction projects. In some quarters, risks are all considered to be threats that must be avoided and under such an approach a reasonable amount of benefit that could be drawn from these risks are lost. This research question sought to investigate if this credible perspective on Risk Management is shared by the target population in the Nigerian construction industry. Figure 4.1.2.13 presents

a 100% agreement with this perspective and partly goes to justify the case to be made for Risk Management as a direct influence on project quality.

5.2.14 Quality Construction Projects as end results of Risk Management
This subchapter represents an objective by the researcher to get a more direct confirmation from the respondents regarding the relationship between Risk Management and project quality (value). The aim is to investigate what would be the immediate perception of quality construction projects as the direct end result of Risk Management.

Figure 4.1.2.14 presents a data indicating 44% are in agreement with the notion that quality projects are a direct results of Risk Management, 50% are in partial agreement while 3% each disagree and partially disagree, respectively. This implies a majority average of 94% actually connect Risk Management with quality construction projects and goes to reaffirm the position of this paper.

5.2.15. Risk Management as a Deep rooted Practice and Discipline
This research question is designed due to the need to avoid insinuations and establish emphatically how deep rooted the Risk Management practice and discipline is in the Nigerian construction industry. 13% agreed Risk Management was a deep rooted practice, none partially agreed, 72% disagreed, and 16% partially disagreed while none was unsure. The implication of this result is that a majority 88% on average disagreed with the notion that Risk Management is a deep rooted practice in the Nigerian construction industry and goes to confirm low practice levels reflecting across other results.

5.2.16. Need for Risk Management Education in the Industry
There was a 100% agreement with the need for Risk Management education in the industry. This discipline when established will act as an academic authority, as well as influence a defined framework and check on practice levels, compliance and adherence to standards. This eventually will translate to the delivery of quality construction projects.

5.2.17. Recommend Risk Management as a means to achieving Quality Projects
The willingness to recommend Risk Management as a means to achieving quality construction projects of durability and longevity, must be drawn out of conviction that its practices are holistic and in-depth enough to cover all threats and uncertainties that would impede the delivery of such envisaged construction projects. Figure 4.1.2.17 presents 69% in agreement with Risk Management as a means to achieving quality projects, 31% in partial agreement, while neither of them disagree, partially disagree nor are unsure, respectively. This implies a majority in support, which reflects the practical need and reality on ground.

CONCLUSION: A CASE FOR RISK MANAGEMENT

The subchapters above comprise a fusion of academic theories and primary data feedbacks which have being analysed and discussed with the view to interpreting and establishing various levels of Risk Management awareness, understanding and practice, and then relating it the quality or value of construction projects being delivered in the industry under survey.

Interpretation of data have been made with due reference to credible literature so as to justify the criteria under which the discussion were made and conclusions reached. This adopted method as discussed and defined in chapter 3 was applied across all research questions and conclusions were made based on clear and simple analysed percentages.

In summary, the third objective of this paper was to, as a follow up to the second objective - analyse, discuss and make a case for Risk Management as a means to achieving quality construction projects. The analysis and discussion carried out indicate the research findings are in support of submissions made in the introductory chapter 1.

With reliable feedback gotten from experienced senior personnel in the construction industry who have responsibility for projects worth up to billions of naira, the survey findings although constrained with limitations can be said to have fulfilled the research objective.

Consequently and in summary, the research finding confirms a low to average level of risk awareness, understanding and practice with a non uniform nor consistent Risk regulator nor standard. This lack of Risk Management authority means construction projects are handled without adherence to any defined standards and this means a consistent delivery of defective projects. Brainstorming as an informal risk identification approach is relatively high but there is the absence of an established risk identification process that readily provides the techniques or framework needed to formalise its practice and ensure risk or threats that impact quality don't go undetected. A non impressive level of Risk Assessment/Analysis practice is underlined by relatively high reliance or dependence on the Project Manager's or Contractor's risk experience or judgement, in the absence of formal institutionalised assessment structures or frameworks in the sector or industry. The paper however confirms an agreement with its critical importance as a route to proper response strategies in Risk Management.

A small percentage of companies willing to assume the prevention or reduction of risk as a form of response confirms few companies with competent risk management practice levels; another relatively low percentage are the 'other' companies who are knowledgeable enough to alternate risk response strategies in perfect response to continuously changing risk and factors, this process would be recommended. A higher percentage prefers the avoidance of risk in the absence of the risk management know-how to assume them; a relative low percentage in risk transfer by insurance underlines a deficit in its practicability in the Nigerian construction industry, itself a disadvantage to the risk management practice. A comparative majority not being sure of a specific response strategy their companies adopt is another pointer to low awareness, understanding and practice levels.

The major absence of formal Risk Monitoring and Control processes (which includes its documentation) amongst most companies also signifies low Risk Management practice levels and has a lasting impact on the quality of the project outcome.

Understanding the quality definition, and being able to relate it to low quality projects as end results of poor Risk Management practices was achieved by the paper. The paper's finding also indicates a majority willingness to recommend Risk Management education and its formal practice in the Nigerian construction industry as a solution to improving the delivery of quality construction projects of reliable durability and performance standards.

RECOMMENDATIONS

Based on all the above analysis, discussion and summary, a case can therefore be made for Risk Management in the Nigerian construction industry as follows: -

- A structured Risk Identification process to identify the projects functional requirements and need with due consideration for all variables and risk factors that could potentially impact the construction process and its delivered outcome. The PESTLE sources of risk identification process as reviewed in Chapter 2 is a good example that could be adopted, and serves as a holistic approach to pinpointing risks and events that have all this while gone undetected in the Nigerian construction industry.
- A structured Risk Assessment and Analysis process that evaluates all identified risk with the view to establishing their likelihood of occurrence, severity and possible impact on the construction process and outcome. The Monte Carlo Simulation incorporates and helps manage the Risk Assessment process; it is recommended as a process that enables a comprehensive understanding and evaluation of identified risks helping set up a platform for a thorough and rational decision making.

- A structured Risk Response process that continuously responds to identified and assessed risk. Accordingly, a case can be made for a flexible risk response process that is flexible enough to adopt different measures that match the construction risk or event at hand. Risk avoidance, risk reduction, risk retention or risk transfer are credible response strategies this paper would make a case for to serve different risk events, occurrences, sources and impacts respectively.
- A structured Risk Control and Monitoring process that puts into action all risk data and response strategies mapped out from the previous four Risk Management processes. It involves continuous monitoring to ensure adopted measures are working and reports backs on the effectiveness of the strategies. Fig 2.4 illustrates this process which once applied influences the delivery of quality construction projects of good durability and performance standards by controlling, monitoring and managing the factors that could prevent this.

The table in figure 2.4.1 perfectly illustrates the case made above for Risk Management as the most effective means to achieving quality construction projects. A prerequisite to this of course is the establishment of a Risk Management education system and a regulatory body with the authority to ensure adherence and compliance to set standards.

CONCLUSION

It can be safely concluded based on this paper's findings, that low levels of Risk Management understanding and practice in the Nigerian industry has created a gap through which potential risks, threats, and even benefits have gone unmanaged and unmitigated. The direct result is the delivery of poor quality construction projects which continues to present negative socio-economic, health and safety implications.

Risk Management based on critical issues raised in this paper, provides the most credible solution to this problem and does so through a framework process that adequately covers the

critical construction stages which remain contact points through which manifest risk can influence the construction process, its end product and quality.

Risk Management is symbolised by consistent risk identification, assessment, response and control focusing on the appraisal, design, project execution and delivery stages of the construction process, hence the imperative of Risk Management as a means to achieving or optimising quality construction projects in the Nigerian construction industry.

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Appendix

A Questionnaire on Risk Management and its relationship to Construction Projects

You are kindly invited to participate in this survey investigating Risk Management practices in the Construction industry. Its objective is to provide the researcher with a picture of the current levels of awareness, understanding and application of Risk Management across the industry. This research seeks the opinion of project managers, project team members e.g. engineers, architects, project contractors, project clients, and sponsors as a means to achieving this purpose.

The survey is designed specifically to investigate Risk Management as a Project Management aspect critical to the delivery of quality construction projects with lasting value; and also understand any key challenges or barriers to their implementation.

All information provided will be used for academic purposes only and in strict confidential terms without any form of disclosure of personal information or identity to any third parties. You are not obliged to disclose your personal name or the name of your organisation in Section 1. Survey feedback will be analysed, interpreted and presented in a statistical aggregate format.

Section 1: Personal Information

1. Name: _____
2. Project Position: _____
3. Organisation: _____
4. Country: _____
5. Contact Number/Email Address: _____

Section 2: Background

6. Your Company's specialty?
   () Road Construction () Building Construction () Other _____

7. Your Company Type?
   () Private, () Government Run, () Foreign, () Joint Venture, () other _____

8. Number of employees in your company?
   () 1 – 20, () 21 – 40, () 41 – 60, () 61 – 80, () 81 – 100, () 100 +
9. Your experience (in years) in the construction/project management industry?
   () 26 + years () 21 – 25 years () 16 – 20 years () 11 – 15 years () 6 – 10 years, () 1 – 5 years.

10. Average monetary value (over the last ten years) of construction projects handled by Company?
    () 1 – 200 million naira () 201 – 400 million naira () 401 – 600 million naira () 601 million naira – 800 million naira () 801 million naira – 1 billion naira () 1.1 billion +

Section 3: Research Questions

11. How would you describe the level of awareness and understanding of construction

related risks amongst your Company employees and Project team members?
() High
() Average
() Low
() Not Sure

12. Does your company have a Risk Management department?
() Yes
() No
() Not Sure

13. Is the company subject to any Risk Management regulatory standards?
() Yes (Government Imposed)
() Yes (Company Self Imposed)
() No
() Not Sure

14. Project team members and sponsors as a matter of fact do brainstorm on potential risk and risk events before, during and after the construction activity?
() Yes
() No
() Not Sure

15. My company operates a formal Risk Identification process before, during and after project commencement?
() Agree
() Partially Agree
() Disagree
() Partially Disagree
() Not Sure

16. Project team members, sponsors or stakeholders tend to rely on the Project Manager or Contractors judgement or experience in the absence of a formal risk assessment process?
() Yes
() No
() Not Sure

17. In-depth Risk Assessment and Analysis is not of critical importance hence can be a drain on project time and cost?
() Agree
() Partially Agree
() Disagree
() Partially Disagree
() Not Sure

18. What is your company's best response to risk (risk taking attitude)?
() Risk Avoidance
() Risk Prevention/Reduction
() Risk Transfer
() Other (specify) _____

() Not Sure

19. Does your company run a formal risk control process that monitors and reports back on the effectiveness of mitigation strategies and contingencies set up to act against risk?
() Yes
() No
() Not Sure

20. Does your company maintain a formal risk information register?
() Yes
() No
() Not Sure

21. How much do you agree with this statement? – *"Quality is the totality of features and characteristics of a product/service that bears on its ability to satisfy stated/implied needs"*
() Agree
() Partially Agree
() Disagree
() Partially Disagree
() Not Sure

22. Do you think the statement in 21 above reflects what is currently on ground?
() Agree
() Partially Agree
() Disagree
() Partially Disagree
() Not Sure

23. As construction risks can present benefits just as they pose threats and uncertainties', managing this critical balance is the best option to achieving better project performance and quality?
() Agree
() Partially Agree
() Disagree
() Partially Disagree
() Not Sure

24. I see a quality project outcome as a direct end result of Risk Management?
() Agree
() Partially Agree
() Disagree
() Partially Disagree
() Not Sure

25. Risk Management is a deep rooted formal practice and discipline in the construction industry?
() Agree
() Partially Agree

() Disagree
() Partially Disagree
() Not Sure

26. I think there should be more education on Risk Management in the construction industry?
() Agree
() Partially Agree
() Disagree
() Partially Disagree
() Not Sure

27. I would recommend Risk Management in the construction industry as a viable means to achieving quality project outcomes?
() Agree
() Partially Agree
() Disagree
() Partially Disagree
() Not Sure

Justification: Description of Intent behind the Research Questions

Section 1: Personal Information

1. – Help identify the respondents during the data sorting process. This is not necessary as a code can be provided in the case a name is not provided.

2. – Help categorise respondents according to their project positions of influence.

3. – Help categorise respondents according to their type of construction project organisation.

4. – Helps certify respondent's location is that of a developing country.

5. – Helps provide respondents contact information just in case further clarification is required.

Section 2: Background

6. – Help categorise respondents organisation in terms of type of construction service rendered.

7. – Help categorise respondent's organisation in terms of ownership type.

8. – Help categorise respondent's organisation in terms of employee base and size.

9. – Help categorise respondents' experience (in years) in the construction industry.

10. – Help categorise and investigate the monetary value of construction projects handled by the respondents company as this has a direct relationship to the frequency, size and value of

construction projects delivered.

Section 3: Research Questions

11. – To investigate the level of awareness and understanding of construction related risks amongst employee's in the respondent's organisation.

12. – To investigate the existence of a Risk Management department hence examine how in depth its practice is in the respondent's organisation.

13. – To investigate the existence of any form of Risk Management regulatory standards in the respondent's country of practice.

14. – To investigate the levels of risk identification and communication, and how involved the project team members and sponsors are involved in formal discussions on risks and events in the respondent's organisation.

15. – Investigate the existence of any formal risk identification process across the whole project life cycle.

16. – To investigate the level of reliance on the risk judgement and experience of the project manager and contractors by subordinate project team members. This gives an indication as to how institutionalised the Risk Assessment/Analysis practice is across the organisation.

17. – To investigate how important the respondent perceives the need for Risk Assessment and Analysis.

18. – To primarily investigate the risk response or taking attitude of the respondents organisation, and, secondarily investigate the level of awareness and understanding of strategic terms relating to the Construction Risk Management discipline.

19. – To investigate the existence of a formally structured risk control and monitoring process that feeds-back on the effectiveness of mitigation strategies and other contingencies set up against risk.

20. – To investigate if risks, risk events and their control measures are documented for subsequent reference in the respondent's organisation.

21. - To examine the respondents understanding of construction quality by citing a credible referenced definition in this regard.

22. - To investigate the respondent's practical perception of the quality levels of constructions projects on ground based on the definition in 21.

23. - To test the respondents understanding of how Risk Management works as a catalyst to achieving better project performance and quality.

24. – To examine the respondents agreement with Risk Management as having a direct relationship with quality project outcome.

25. – To investigate how deep-rooted or established Risk Management is, as a practice and discipline in the Nigerian construction industry.

26. – To investigate the respondent agreement with Risk Management education in the construction industry as a way forward.

27. – To investigate the respondents willingness to recommend Risk Management as viable means to achieving quality project outcomes.