A STUDY OF RISK MANAGEMENT PRACTICES IN THE NIGERIAN CONSTRUCTION INDUSTRY

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DEDICATION

Dedicated to the Lord God Almighty and my beloved children Oborakore, Oghenesanero and Oboresiri who gave me inspiration and love.

ABSTRACT

The multiplier effect of the construction industry to both developed and developing countries cannot be overemphasised. The 2012 construction sector review purports that the UK construction industry has an annual turnover of more than £100 billion and accounts for 10 per cent of the country's GDP. In contrast Nigeria, which is urbanising at one of the fastest rates in the world, contributes only 3.2 per cent in terms of Gross Domestic Product. In other words, the contributions of the construction industry warrants persistent review of its gaps; risk and uncertainty are particularly rife in most Nigerian construction projects, and the cost implications are severe enough to influence its low GDP contribution and beyond. The aim of this research effort is to understand the competitive advantage (value chain) of enshrining risk management practices up and down the construction supply chain. A literature review was first conducted to identify and categorise different risk management practices on and off a construction site. In turn, the population for the study was determined using stratified random method of sampling. The units of analysis in this case study are contractual interfaces and organisational structure, of which there can be hundreds in a typical case. After an initial scoping study – the administering of 150 questionnaires – of risk management practices amongst general contractors. Fourteen in-depth interviews were conducted across a typical value chain. Drawing on principles of grounded theory, interview transcripts were analysed through a combination of content analysis and graphical representation of contractual and organisational structures. Clients and contractors were found to be risk averse even though they claimed to have formal written procedures for risk management. Their awareness of the importance of risk management in construction business is more of lip services. A graphical representation of the Nigerian contractual structure, supply chain and

value chain was achieved. Consequently, a conceptual model is developed for enshrining risk management practices in developing countries. The micro and macro implication of the prescribed model is subject to its testing and validation.

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GLOSSARY

Indigenous Contractors: indigenous company or contractor is an organisation or firm which is wholly owned by Nigerians, has recognisable establishment and its resources in Nigeria appropriate to the type and level of work which it claims to be able to perform.

Power: The potential ability to influence behaviour, to change the course of events, to overcome resistance, and to get people to do things that they would not otherwise do" (Pfeffer 1992, p30).

Multinational Contractors: Multinational Contractors are usually multinational enterprises (MNEs) or their affiliate private firms jointly owned by Nigerians and foreigners, but are mostly or fully managed by foreigners.

Risk Management: Risk Management refers to the culture, processes, and structures that are directed toward effective management of risks including potential opportunities and threats to project objectives.

Client: A person or organization that commissions buildings or constructions for itself or for someone else.

Construction sector: The construction sector is made up of consultants for design, clients as owners or commissioners and contractors for managing the construction and installation, plus the suppliers of material.

Consultant: A person or organization engaged by the client, for the design phase of a construction project. The consultant could be a structural engineer, service engineer, quantity surveyor or project manager.

Contractor: An organization that undertakes the construction of a building or infrastructure on behalf of a client for an agreed fee.

Performance: Performance is the degree of success recorded in achieving project objective of time, cost, quality and safety.

Risk: Risk is the degree of uncertainty that a planned event will occur.

Uncertainty: The possibility of two outcomes which could either be a risk or an opportunity.

Residual Risk: Level of risk remaining after internal control has been exercised.

Framework: A scientific statement that is drawn from an observation.

Hypothesis: A prediction made from an understanding of a framework.

Framework Agreement: This is an agreement with suppliers/providers, the purpose of which is to establish the terms governing contracts to be awarded during a given period, based on the most economically advantageous tender (quality and price), but place no obligations, in themselves, on the procurers to buy anything (Kwawu 2009).

Partnering/Partnership: This denotes a management approach used by two or more organizations to achieve specific business objectives by maximizing the effectiveness of each participant's resources. The approaches are based on mutual objectives, an agreed method of problem resolution and an active search for continuous measurable improvements (Kwawu 2009).

CHAPTER 1

INTRODUCTION

Background

Nigeria is undoubtedly one of the most influential and most strategic countries in Africa today in view of its population, its vast hydrocarbon resources and the commitment of the government to democracy, anti-corruption and African Unity. The economy which heavily depends on its oil sector (which also depends on its construction sector) accounts for some 90 percent of export revenues and 41 percent of its Gross Domestic Product (World Bank, 2006). Despite its relative abundance of mineral resources, the expansion of Nigeria's oil sector has been stifled by its antiquated infrastructure and the frustrating slow movement of goods through Nigeria's major ports. It is on record that the rapid economic development in Nigeria has been largely due to the deliberate policy of the government on technological and infrastructural capacity building through investment opportunities that exist in the oil and gas industry, in human capital and institutional building. Looking back on the advent of the oil phenomenon, the Nigerian economy though agro-based was relatively diversified. There existed self-sufficiency in food production, with enough to feed the population and extra for export. The country had a strong export sector and budding industrial base. There were functioning laws, institutions, social and economic infrastructure as well as limitless job opportunities. Above all, security of life and property was adequate and foreign investors had confidence in the economy. This was the situation on ground before Nigeria's first export of crude oil in February 1958.

Since the 1970s, like the the oil and gas industry, the construction industry, which draws on its multiplier effect has become fundamental for wealth distribution in the Nigerian economy. The Nigerian construction industry plays a major role in ensuring the oil and gas industry contributes sufficient revenue as well as the foreign exchange earnings for the country. The discovery of oil and gas opened up the industry, allowing foreign multinational participations like the Mobil, Agip and Texaco/Chevron respectively to join the exploration efforts both in the onshore and offshore areas of Nigeria. This development was enhanced by the extension of the concessionary rights previously a monopoly of Shell BP. The government aims to ensure that construction helps to accelerate the pace of exploration and production of petroleum. Today, the oil and gas industry in Nigeria has risen very fast and steady to host the world's 10th largest reserves at about 25 billion barrels. Within the Organisation of Petroleum Exporting Countries (OPEC), Nigeria is in the 6th position in terms of reserves and daily production. Nigeria's daily average production is over two million barrels and has the capacity to exceed her reserves to 30 billion barrels. The aspiration of government is to accommodate OPEC's oil supply and demand outlook to 2035 (WOO 2013), with a production of about 4m b/d by the target date. As part of the aspiration, the government through Public Private Partnership initiatives is hoping that the needed building and infrastructural services would be in place. Hence the role of Nigeria's construction industry cannot be overemphasized.

1.1. **Research context: the construction industry**

The construction industry has a very strong multiplier effect in developed and developing economies. The UK construction industry has an annual turnover of more than £100 billion

and accounts for almost 10% of the country's GDP (Office of National Statistics, 2013). On the other hand, the Nigerian construction sector, which occupies an important position in the nation's economy accounts for 1.4% of its GDP (Aibinu and Jagboro 2002, Dantata 2007, Banaitienė *et al* 2011, Ogbu 2013). In other words, the contribution of the construction industry warrants persistent review of its gaps. Risk and uncertainty are rife in every undertaken construction project, and the cost implications are severe enough to justify its very low GDP contribution. More so, when uncertainty is linked with infrastructure projects that are stalled due to budget overruns and conflict.

Unlike the developed countries, genuine risk management practices are still at infancy stage in Nigeria (Odunsami *et al* 2002). Clients and contractors' knowledge of its significance is skewed and it is no news that they are risk shy (Winch 2002). Risk exists when a decision is expressed in terms of a range of possible outcomes and when known probabilities can be attached to the outcome. Similarly, uncertainty exists when there is more than one possible outcome of a course of action but probability of each outcome is not known (Smith *et al* 2006). Thus the application of risk management allows for effective management of expected events where the outcome is either to the benefit or detriment of the decision maker where the ultimate purpose of risk management is risk mitigation (Shofoluwe and Bogale 2004). The paucity of theoretically hinged risk management research on evaluating and assessing risk management practices and techniques in peculiar environments like Nigeria is the motivation for undertaking this study. In line with existing frameworks for identifying, monitoring, responding and classifying risk (Flanagan and Norman 1993; Chapman 2001, and Perry and Hayes 1985); this research effort will address the risk management culture of clients, main contractors and sub contractors in Nigeria.

Flanagan and Norman (1993) used general systems of work breakdown structure as a framework to prescribing three ways of classifying risk (identifying the consequences, type and impact of risk). Similarly, Chapman (2001) grouped risks into four subsets of environment, industry, client and project. Also, Shen *et al* (2001) classified risk as financial, legal, management, market, policy, technical and political. Zou *et al* (2007) risk classification is project based and Perry and Hayes (1985) presents a list of factors extracted from several sources which were divided in terms of risk retainable by contractors, consultants and clients.

There is no doubt that lessons from risk management studies in the developed world can contribute to risk management practices in Nigeria. But the peculiar economic environment, culture and political make-up of the Nigerian construction sector affirms the need to understand risk management with emphasis on Nigerian construction projects.

Notably, projects are products of change implementation. However, every project is unique; The construction industry, perhaps more than other sectors, is overwhelmed with risks (Sanvido *et al* 1992). Ehsan *et al.* (2010) argued that the industry is highly risk prone, with complex and dynamic project environments creating an atmosphere of high uncertainty and risk. The industry is vulnerable to various technical, socio-political and business risks. Deviprasad (2007) further stated that too often this risk is not dealt with satisfactorily and the industry has suffered poor performance as a result.

According to Pritchard (2001), most of the decisions of construction projects, including the simplest ones, involve risks. The procedure of taking a project from inception to completion, and then its usage is complex as it involves time-consuming design and production processes (Ahmed & Azhar, 2004). The main role of project management activities is to drive

construction operations in order to reach or even go beyond the objectives of the client and other stakeholders (Monetti *et al.,* 2006). Risk management is fundamental to accomplish those objectives, by not only trying to keep away from challenges caused by some special events or uncertain conditions, but also acting as a guide in order to maximise the positive results.

Risk Management refers to the culture, processes, and structures that are directed toward effective management of risks including potential opportunities and threats to construction project objectives (Shofoluwe and Bogale 2004)**.** Although it is widely studied, risk still lacks a clear and shared concept definition: risk is often only perceived as an unwanted, unfavourable consequence. Such a definition embodies leads to two concepts: firstly, there is an established consensus among professionals that risk needs to be viewed as having both negative and positive consequence. Secondly; risk is not only related to events, i.e. single points of action, but also relates to future project conditions. Conditions may turn out to be favourable or unfavourable. This is because future project conditions are hard to predict in the early stages of the project life-cycle. In addition, conditions can change during the project lifecycle and the risk is that the conditions are different, and potentially more severe than was first estimated.

Risks analysed only as certain events are further criticised for not considering the degree of impact. Risks are seldom one-off-types, meaning that risks either happen or do not happen. The impact of the risk varies greatly, depending on the conditions at the time of the possible occurrence (Finnerty e*t al*, 2006). Variability and the level of predictability (uncertainty) of the future scenarios determine the quality of risk analysis done today.

Risk management is one of the most critical project management practices to ensure a project is successfully completed. Royer (2000) stated that experience has shown that risk management must be of critical concern to stakeholders and not just project managers, as unmanaged or unmitigated risks are one of the primary causes of project failure. Risk management is thus in direct relation to the successful project completion.

Hence, evaluating and managing risks associated with variable construction activities has never been more important for the successful delivery of a project. Davies (2006) asserts that "construction projects are subject to risks at all stages of their development". Planning permission can be hard to obtain and designs may not be complete even before the commencement of a project. These risks can be managed, minimised, shared, transferred or accepted but it cannot be ignored (Latham, 1994). Traditionally, the focus has been on quantitative risk analysis based on estimating probabilities and probability distributions for time and cost analysis. However, dissatisfaction arising from the inability of this type of approach to handle subjectivity in risk assessments has led to research into the use of other approaches. An approach that is preffered is for organisations to use risk quantification and modelling as tools to promote communication, teamwork and risk response planning amongst multidisciplinary project team members (Tar and Carr, 1999).

However, communication of construction project risks tends to be poor, incomplete and inconsistent, both throughout the construction supply chain and the full project lifecycle. Even when risk management is carried out, there is a tendency for it to be performed on an un-formalised ad hoc basis, which is dependent on the skills, experience and risk-orientation of individual key project stakeholders. This lack of formality and the use of risk management by individuals mean that the adoption of different methods and terminologies is not unusual.

This leads to the use of different methods and techniques for dealing with risk identification, analysis and management, thereby producing different and conflicting results.

Risks identified are not rigorously examined and, even when they have been assessed and remedial measures agreed upon, they are not communicated effectively throughout the supply chain. As a result, project stakeholders lack a shared understanding of the risks that threatens a project and, consequently, unable to implement effective early warning measures and mitigating strategies to adequately deal with problems resulting from decisions that were taken without their knowledge. Part of the problem is the lack of a common language and process model in which remedial measures to risks may be identified, assessed, analysed and dealt with in a defined way (Tar and Carr, 1999). It is clear that the success of a project is dependent on the extent to which the risks affecting it can be measured, understood, reported, communicated and allocated accordingly.

Statement of problem

Risks are an inseparable part of every phase of the construction process (Makui, *et al* 2009). Risk in construction has been described as exposure of construction activities to economic loss, due to unforeseen events or foreseeing events for which uncertainty was not properly accommodated (Joshua and Jagboro, 2007). Whenever a construction project is embarked upon, there are some risk elements inherent in it, such as physical risk, environmental risk, logistics risk, financial risk, legal risk and political risk among others (Perry and Hayes, 1985). With construction projects becoming increasingly complex and dynamic in their nature as well as the introduction of new procurement methods, many contractors have been forced to have a rethink about their approach to the way that risks are treated within their projects and organisations. This is because the current economic crises currently witnessed in

the country due to falling oil prices and influx of new construction companies into the country due to global economic melt-down and the drive of foreign contractors to enter into new markets have increased the competition in the sector.

The common risks challenges contractors battle with include changes in work, delayed payment on contract, financial failure of owner (client), labour and labour disputes, equipment and material availability, productivity of labour, defective materials, productivity of equipment, safety, poor quality of work, unforeseen site conditions, financial failure of contractor, political uncertainty, changes in legislation and policies, permits and ordinances, delays in resolving litigation/arbitration disputes, inflation, cost of legal process and force majeure (Zou *et al* 2007). In sum, there are problems of recurring conflict, client and stakeholder dissatisfaction from abandoned projects, and high accident rates. More so, when Nigeria needs to promptly address the infrastructural deficit currently affecting its economic development strategy. In other words, risk management therefore forms a basis for important decision making in procurement of construction projects; and the need to understand how construction contractors deliver projects within its planned objectives of time, cost, quality and safety in a peculiar environment cannot be overemphasized.

1.4. Aim

To develop a conceptual model for integrating competitive risk management practices in the procurement of construction and building services works in Nigeria from inception to completion.

1.5. Objectives of study

- To review existing risk management models with the aim of identifying a framework for mitigating peculiar risk management practices in Nigeria.
- To identify all challenges stakeholders contend with in the Nigerian construction industry.
- To conduct a quantitative assessment of contractors risk management practices in Nigeria.
- To conduct a case study of an ongoing project in the Nigerian construction industry to better understand the dynamics of uncertainty.

1.6. Research questions

Based on the purpose of this study, the following research questions have been formulated in the following pattern:

1. What are the risk management practices of contractors in a peculiar environment like the Nigerian construction industry?
2. To what extent will known risk management practices influence competitive risk management practices in the construction industry?
3. What factors influence the attitudes of stakeholders in these dynamic environments?
4. What is the role of power relations in the construction supply chain? Is power an opportunity cost to competitive advantage in the Nigerian construction industry?

1.7. Significance of the study

Construction projects are usually a one-off endeavour with many unique features such as multiple project participants, long gestation periods (between conception-design-construction), complex procurement methods, large financial requirements and dynamic organization structures. All these have made the risk and uncertainties related to construction project more in peculiar environments like Nigeria when compared with other countries Although it has been recognized that construction risk cannot be eliminated, it can be mitigated and managed effectively, if project risks and uncommon characteristics are identified and assessed at the early stages of the project.

Risk management is of great importance to project stakeholder (contractor, client and consultant) because it will minimize the possibility of conflicts, disputes, cost and time overruns, abandonment, disputes, and quality related issues associated with construction project. The implementation of effective risk management practice up and down the supply chain will improve bid success rate, profits, project cash flow, safety record, business continuity and reduce contingencies. Risk management is all about being able to deliver results with a certain degree of certainty and competitive advantage. Risk management will help project stakeholders (clients, consultants and contractors) achieve projects objectives of cost, time, quality and safety. It will help the society and economies achieve cost effective and efficient projects which will create new business opportunities and generate more for people, investors and government. It will undoubtedly contribute to the development of the Nigerian construction industry as risk management variables like power and competitive advantage are aspects of the Nigerian construction process that needs understanding.

Lastly, findings from the study will enable policy makers and construction industry stakeholders improve project delivery in Nigeria and by extension help improve economic growth through multiplier effect.

1.8. Contribution to knowledge

Presently, there is no known standard framework for managing risk in peculiar environments like Nigeria with exceedingly long history of abandoned projects. A conceptual risk management model has been developed in Chapter 5. This research presents a proposal for understanding the role of power in the incentivisation of risk management practices and its diffusion up and down the construction supply chains. The risk management framework developed as part of this research would aid the integration of risk management into project procurement from inception to completion. There is no evidence from literature that such a model currently exists in Nigeria. Thus, this development should therefore be a positive contribution to the body of knowledge. In particular, development of a new competitive risk management model for evaluating project delivery in the Nigerian construction industry. Also, the peer review publications have enriched the application of the theory of competitive advantage. Furthermore, this research output will encourage new ways of delivering the much anticipated sustainable projects in Nigeria.

Contribution to practice: The contribution to practice at a regional level is to enable providers of infrastructure to learn from each other in terms of establishing reward systems that motivate and incentivize those who deliver infrastructure. At a national level the research may contribute to development of guidance and policy about how the procurement of

infrastructure in the oil and gas industry could or should be arranged to incentivise risk management practices in the supply chain. At the international level, the Nigerian national policy and guidance about the role of power in risk management practices in the supply chain can serve as a case study African countries and other emerging economies in the developing world.

1.8.1 Research dissemination

Presentations of the initial research findings were made at seminars of industry stakeholders in the England and Nigeria. A specially convened seminar was arranged to allow the research methodology and some of the empirical findings to be appraised and evaluated. Feedback and support received during two such sessions helped steer the entire work.

Two conference papers were produced directly as a result of this research, the third is being developed for journal publication (see Appendix 1).

1.9. Organisation of the research study

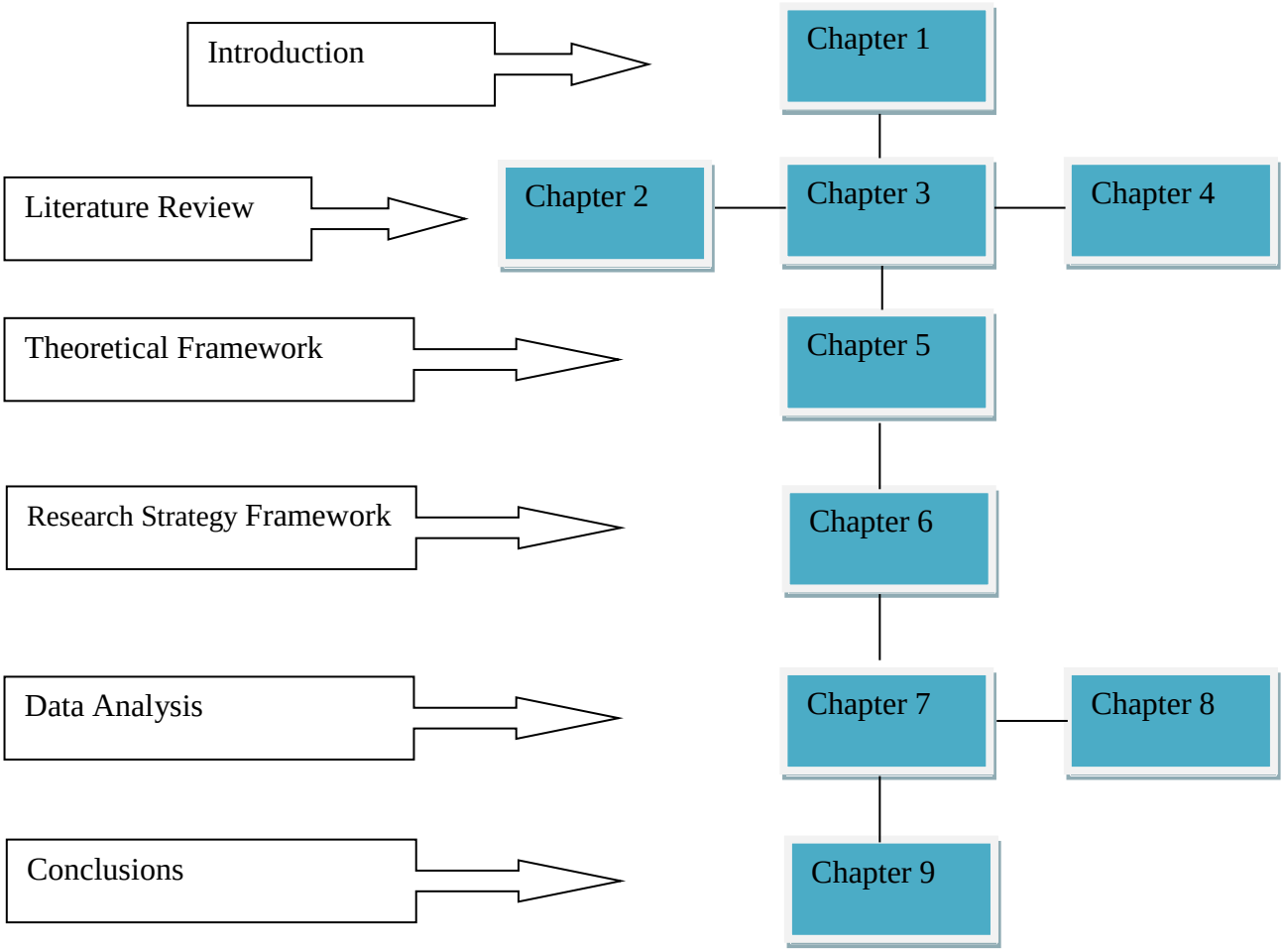

Figure 1.1 Diagram showing the organisation of the research

CHAPTER TWO

RISK MANAGEMENT PRACTICES

2.1. Introduction

Nigeria is a developing country currently focussed on improving her non-oil sectors - the construction sector inclusive. Nigerian corporate leadership is oriented towards performance improvement through continuous indigenous capacity building. The approach to realising this objective in the construction sector includes *inter alia*, attempts to indigenise foreign technology and management techniques such as risk management (RM), through the involvement of multinational construction companies in the local construction market (Amaeshi *et al* 2006).

Construction contracting is often regarded as a risky business, and researchers worldwide have severally focused on the management of construction industry risks (Öztas and Ökmen, 2003 and Odeyinka, 1999). In other words, Risks cannot be ignored; the success or failure of a construction project may be solely dependent on how well risks are managed. Construction companies are constrained by this reality and therefore continuously seek measures that will guarantee economic balance between project risks and opportunities (Thevendran *et al* 1998).

Project management literature describes a detailed and widely accepted risk management process (Klemetti, 2006). The uncertainty of a risk event as well as the probability of occurrence or potential impact should decrease by selecting the appropriate risk mitigation

strategy. Walewski and Gibson (2003) categorized the risk mitigation strategies commonly used as follows:

Avoidance – when a risk is not accepted and other lower risk choices are available from several alternatives.

Retention/Acceptance – when a conscious decision is made to accept the consequences should the event occur.

Control/Reduction – when a process of continually monitoring and correcting the condition on the project is used. This process involves the development of a risk reduction plan and then tracking the plan. This mitigation strategy is the most common risk management and handling technique.

Transfer/Deflect – when the risk is shared with others. Forms of sharing the risk with others include contractual shifting, performance incentives, insurance, warranties, and bonds among others.

There is increased difficulty in forecasting the final results of a project (Project Management Institute (PMI, 1992), which implies that contractors cannot predict with absolute certainty that a project will end within their time and cost estimates. This underscores the global search for techniques, tools and procedures for risk management by most construction companies.

It was argued by Nworuh and Nwachukwu (2004) that the following sources of risks are predominant in construction projects; risks of error in estimating, risks of delay caused by client and his representatives, nominated subcontractors/nominated supplier; risks due to inclement weather, risk of clients financial failure, risk associated with cash-flow problems and risk associated with industrial relation. These risks and uncertainties are likely to be

severe or even differ completely in a peculiar environment. A need has therefore arisen to better understand what contractors in these peculiar environments term risk and uncertainty as a prudent step to evaluate such risks and to stem their negative impacts on predefined projects objectives.

The value of systematic risk management of project activity is not fully recognised by the construction industry (Walewski, *et al* 2002). Since no common view of risk exists, owners, investors, designers, and constructors have differing objectives and this has led to common adverse relationships between the parties. Attempts at coordinating risk analysis management between all of the project stakeholders have not been formalised and this is especially true between contractors and owners. Risk management involves four processes, namely:

Risk Identification: Determining which risks are likely to affect the project and documenting the characteristics of each.

Risk Quantification: Evaluating risks and risk interactions to assess the range of possible project outcomes.

Risk Response Development: Defining enhancement steps for opportunities and responses to threats.

Risk Response Control: Responding to changes in risk over the course of the project.

2.2. Categories of contractors in the Nigerian construction industry

The two major categories of construction companies in Nigeria are indigenous contractors (ICs) and multinational contractors (MCs) (Idoro, 2007). With their presence of over 50 years in Nigeria (Akindoyeni, 2008), transfer of technological and managerial competence from

MCs to ICs are expected. However, the extent to which the envisaged transfer of competence to ICs has remained a debate.

2.2.1. Indigenous contractors (ICs)

The Nation (2010) defines an indigenous contractor as one, which is wholly owned by Nigerians, has recognisable establishment and its resources in Nigeria appropriate to the type and level of work which it claims to be able to perform. From this definition, in Nigeria, the indigenousness of a construction contractor is perceived mainly from the perspective of utilisation of indigenous capacity in management formation and the extent of ownership by Nigerians. ICs are mostly small and medium scale enterprises (SMEs) whose ownership and management are constituted by Nigerians.

ICs are given preference in the award of contracts in the public sector where they meet stipulated requirements in Nigeria. The Public Procurement Act 2007 stipulates that a procuring entity may grant a margin of preference to ICs in the evaluation of tenders, when comparing tenders from domestic bidders with those from foreign bidders. Not too long ago, a bill aimed at restricting the participation of MCs in the Nigerian construction market to complex projects is before the National Assembly (Uma, 2010 and Owete, 2009).

Irrespective of these favourable policies, ICs in Nigeria are still bedevilled by poor managerial competence, integrity challenges and poor reputation as constructors of inferior quality products. For instance, Ibem *et al* (2011) observes that all road contracts awarded to

ICs between 1999 and 2003 by the Federal Government were abandoned. ICs are mostly owned by non-construction professionals who are only out to make money in any way and this has contributed to the dishonesty, breach of contract and mediocrity associated with the indigenous contractors (Akindoyeni, 2008). Anyanwu, Oyefusi, Oaikhena and Dimowo (1997), maintains that while MCs dominate the handling of public construction projects, the influence of ICs are felt more in private oriented construction projects. Irrespective of these setbacks, some ICs have survived for many years, indicating that some form of risk management practices are in use by ICs.

2.2.2. Multinational contractors (MCs)

MCs are usually multinational enterprises (MNEs) or their affiliate private firms jointly owned by Nigerians and foreigners, but are mostly or fully managed by foreigners. As MNEs, MCs depend on their competitive advantages for survival in the Nigerian business environment. Commentators have observed that MCs constitute only about 7% of the total number of contractors in Nigeria. Despite this, researchers have found that they dominate in the industry, carrying out over 90% of the total value of construction contracts in Nigeria (Anyanwu, *et al* 1997 and Idoro, 2010).

Amongst justifications for engaging MCs in developing countries like Nigeria are the observed high quality of their products which ICs often cannot attain, their relative integrity and honesty (Idoro, 2010), and the quest to master, adapt and further develop the acquired design and construction technologies and management techniques (Simkoko, 1992). Often

however, risk factors such as those in the Nigerian business environment pose a barrier to MCs' survival in the local market. Such risk factors have their origins from three main sources identified by Hill (1997) as legal, economic and political factors. In Nigeria, specific risk issues to the survival of MCs include the local content and indigenisation policies, the banking sector challenges, insecurity/social unrest, absences of adequate/steady power supply, corruption, public policy instability and good governance. These culminated in the ranking of Nigeria as the 118th out of 181 and 125th out of 178 in *Doing Business* by The World Bank (2009) and The World Bank (2010) respectively.

MCs have however continued to succeed in Nigeria as the preferred type of construction company (Idoro, 2010) irrespective of the hostile business environment. Lucky and Thomas (2007) concluded that significant relationship exists between effective management of risks in the Nigerian business environment and business success. The success of MCs in Nigeria has something to do with their RM practices. However, RM practices of MCs have not been compared with those of ICs to ascertain whether RM stands as one of the competitive advantages of MCs over ICs.

2.2.3 Risk identification and analysis methods

Risk can be managed, minimised, shared, transferred or accepted; but risk cannot be ignored (Latham 1994). For a commercial client, the relevance of risk management is such that it may influence whether to undertake a marginal project or not. For a contractor unforeseen risks may mean incurring losses that are not recoverable. In sum, the need for an effective management process cannot be overemphasised.

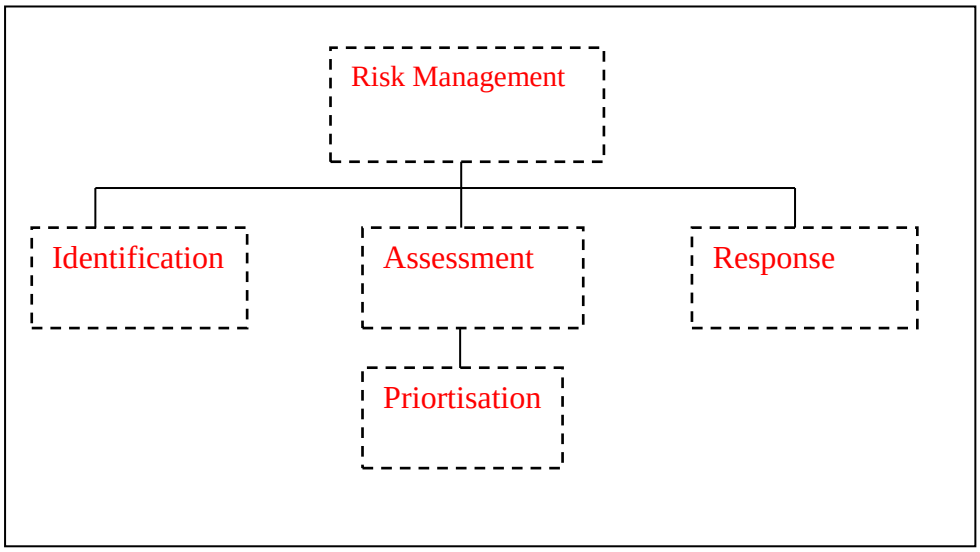

Figure 2.2 A risk management process

Figure 2.2 is a capture of a typical risk management process, which has three levels. The first level deals with the prioritisation of the actual risk. At this level the principal strength and weakness of known procurement models are tested against the cost of project contingencies. Examples of these contingency include lack of management control, poor definition and unclear linkage between risks and overheads. The second level of the risk management process covers risk identification, assessment and response. In particular, the risk analysis and management process is continuous and iterative. It starts with a project briefing that helps in identifying the risk as well as assessing the risk exposure. The third level is concerned with the process of reiteration. This level ensures the process is repeated at every phase of the construction project (Thompson and Perry 1992).

Additionally, the different sources of risk to client's business from construction projects are political (change of government and regulations), environmental (contamination of land, pollution, damage and delays through inquiries), planning (changes to match planning

policy), market (Changes in cash flow, market recession, and strong competition), economic (lower income calculations, inflation, and increase in interest), financial (expected rate of return), natural (making wrong decisions), project (feasibility), technical (incorrect calculations, errors in estimating), human (mistakes made on site, poor planning), criminal (theft), and safety (accidents) (Godfrey 1996).

To this end, principal risks for main contractors and specialist contractors hinge on poor tender/briefing document, inexperienced client, non-standard contract documentation, poor design for construction, unexpected problems related to site conditions, delayed payment and accident to staff.

2.3. Risks in construction projects

Every human endeavour involves risk and the success or failure of any venture depends crucially on how those risks are dealt with (Dey and Ogunlana, 2004). According to Ogunsami, Salako and Ajayi (2011) it was argued that risk occurs in every dimensions of human life and as such construction projects are not an exception from this as they are characterised by activities that are prone to different types of risks ranging from political to construction risk. According to Oxford Advanced Learner's Dictionary (1995), it defined risk as the 'chance of failure or the possibility of meeting danger or of suffering harm or loss. In specific relation to construction, Hackett and Statham (2007) defined risk as 'the possible loss resulting from the difference between what was anticipated and what finally happened'.

As cited by John and Peter (1997) in Cooper and Chapman (1987) where risk was defined as an exposure to the possibility of economic or financial loss or gain, physical damage or injury, or delay, as a consequence of the uncertainty associated with pursuing a particular course of action. Risk can also be defined as the uncertainty that exists as to the occurrences of some events (Odeyinka, 1999). Odeyinka (2006) described risk in construction as a variable in the construction process whose variation results in uncertainty as to the final cost, duration, and quality of the project. In the lights of these definitions, he viewed risk as a psychological phenomenon that is meaningful in terms of human reaction and experiences and as an objective phenomenon that may or may not be recognised in terms of human reaction and experience.

Common consequences of project risks are cost overruns, time overruns, poor quality, and disputes among parties to a construction contract. Risk is an important issue to all stakeholders of the industry. However, the problems of risk assessment are complex and sometimes, poorly understood in practice. According to Baloi and Price (2003), different people attach different meanings to the concept of risk and it also varies according to viewpoint, attitudes and experience. Engineers, designers and contractors view risk from the technological perspective; financial managers and developers tend to view it from the economic and financial side; health professionals, environmentalists, chemical engineers view risk from safety and environmental perspective.

Risks specific to a project are inter active and sometimes cumulative that they affect cost and benefits associated to the project (Smith 1999). Furthermore, risks in construction projects arise from a variety of sources; environmental/political; health and safety/hazard; market

conditions; and technical/functional sources. Fong (1987) argued that those risks sources generally recognised within the construction industry are continually faced with a variety of situations involving many unknowns, frequently undesirable and often unpredictable factors that include timing schedule slippage of the project tasks, technological issues, people-oriented issues, finance, managerial and political issues (Lockyer and Gordon, 1996). According to Osama and Salman (2003), three kinds of construction risks were highlighted and they include: financial-where project exceeds its budget and endangers the financial health of the company, time and design –related risks.

It has been generally established that in the execution of building project, the final contract sum often varies from the budgeted sum of the contract. This could be caused by either a decrease or an increase to the original contract sum and sometimes it is due to the complex nature and time span required for the execution of projects.

2.4. Risks in estimating tender prices and contract sums

It has been established that different contractual arrangements have their individual risks. Oyewobi, Ibrahim and Ganiyu (2012) explained that Lump Sum contracting risks include risk of quantities measurement, works missed out in estimates, subsurface conditions missed or improperly evaluated and subcontractors quoting partial scope of work only while those of Unit Price contracting risks include; overrun or underrun of quantities of work, subsurface conditions missed or improperly evaluated. Therefore, the risks common to both Lump Sum and Unit Price eestimates are schedule, weather, type of construction, design details, labour conditions, site location, duration of project, familiar owner and contract language.

Construction cost can either be initial contract/tender sum, actual construction cost or the final account sum. According to Odeyinka (1999), initial contract sum comprises of site labour cost, material cost and contractor cost, plant and establishments charges. He concluded that initial and final contract sums are never the same due to inherent risk factors like fluctuation, variation, re-measurement of provisional quantities, adjustment of provisional and prime cost sums and some other risk factors. Nworuh and Nwachukwu (2004) deduced that construction projects are expected to be delivered at budgeted costs because of their inclusion of all foreseen and unforeseen costs inherent in construction projects.

Risk is viewed within the context of the probability of different outcomes and that the general attitude towards risk is to identify, evaluate, control and manage (Smith 1999, Chapman and Ward 1997). Nworuh and Nwachukwu (2004) in same manner also concluded that integration of risk management techniques into the estimation of construction projects' cost other than use of individual judgement and instinct would considerably curb cost overrun.

Construction is often seen as a highly risk prone business because of the unique nature of the industry and its projects. These peculiar factors include necessity to price product before production, competitive tendering as a means of awarding work, low fixed capital requirements, preliminary expenses, delays to cash-inflows, tendency to operate with low working capital, seasonal effects, fluctuations and their effects, government intervention, activity related to development, uncertain ground conditions, unpredictable weather, no performance liability or long-term guarantees, etc. Construction projects are complex, have a

long production cycle, involve the input of many proffesionals, and must meet many standards and statutory regulations (Aramvareekul and Seider 2006).

The high business failure rates of the construction industry records may indicate that while the industry has learned to improve on construction techniques, it has yet to master the act of managing risk. For many years, practitioners of the industry have relied on unsystematic mechanisms such as intuition and in-house techniques to value allowances for risk when estimating. Construction risks are often perceived as events that influence the three traditional project constraint objectives of time, cost, and quality (including performance).

2.5. A critique of risk management trends

Risk exists in the construction industry because the future is unknown (Fischer and Jordan 1996) and risk is a consequence of uncertainty (Loosmore *et al* 2006). The difference between information required for a decision, and the information that is available is regarded as uncertainty (Galbraith 1977). The definition of uncertainty and risk if not properly contextualised may be misconstrued to be nebulous. This research effort has defined uncertainty as the difference between the information required for a decision and the information available. And risk is an uncertain event or condition that, if it occurs, has a positive or negative impact on one or more project objectives (PMI 2008).

Because the construction process occurs in phases, the degree and nature of emerging risks tend to vary with the complexity of the project. This will also change depending on the experience and organisational culture of the project team and project type. Consequently, this section of the thesis evaluates a varying dialogue that is best categorised when drawing

on existing risk management frameworks such as, risk description, identification techniques, barriers, response method and monitoring (Winch 2002). For example, to enhance the understanding of industry response and the technique employed for risk analysis and management, Akintoye and Macleod (1997) argued that risk management is essential to construction activities in minimizing losses and enhancing profitability. Construction risk is generally perceived as events that influence project objectives of cost, time and quality. The researcher contends that construction risk is generally perceived as events that influence project objectives of cost, time and quality. Furthermore, risk analysis and management in construction depend mainly on intuition judgement and experience. Formed risk and management techniques are rarely used due to lack of knowledge and to doubts on the suitability of these techniques (Akintoye and Macleod 1997).

In a recent study conducted to assess the risk management practices of top contracting firms in United States, Shofoluwe and Bogale (2010) found that contractors use a wide variety of techniques in their risk management practices. However, for risk analysis, traditional method of analysis involving intuition, judgement and experience were found to be the most predominantly used.

Ritchie and Brindley (2007) have identified factors influencing the formation of risk perception as educational background, practical experience, individual cognitive characteristics, project team and availability of information. Other commentators have identified these variables – physical, environment, design, logistics, legal, political and

operation – as sources of risk central to construction activities (Perry and Hayes 1985, Mustafa and Al-Bahar 1991). In trying to understand the key risks in construction projects in China, Zou *et al* (2007) argue that clients, designers and government bodies should take the responsibility to manage their relevant risks and work cooperatively from the feasibility phase onwards to better address potential risks in time. This way, contractors and sub-contractors with robust construction and management knowledge should be employed to minimize construction risks and carry out safe, efficient and high quality construction activity. Risk factors cannot usually be reduced by a single contractor's performance, but they can be managed by reasonably allocating them among sub contractors through contracts and performance targets (Zhi 1995). Thus, commentators prescribe a hierarchical risk management system, which can be embedded in Analytic Hierarchy Process (AHP) method of risk assessment (Saaty 1980).

In an investigation aimed at understanding risk accountability in the tendering phase of procurement for contractors in Ghana and UK, Laryea (2011) found risk accountability to be higher on the agenda in the tendering process of UK contractors. There were evidence of systematic documentation and risk assessment were performed rigorously. In other words, are contractors in the developing world making decisions based on their intuition, judgement or experiences rather than through a formal and systematic risk management process due to lack of familiarity with the concept and method of risk management?.

2.5. Summary

The peculiarity of the research laboratory is discussed in the context of risk management practices. Drawing on the findings of several commentators on the different phase of the construction process in developed and developing country, gaps are identified in line with the objectives outlined in Chapter 1. Here the gaps encompass cost and time overruns, unclear understanding of risk, adverse relationship between stakeholders, poor reputation amongst ICs and unhealthy competition between ICs and MCs. The various techniques and methodologies have been considered. Risk management should be viewed constructively and creatively. The project manager needs to develop adequate time for risk management culture regardless of the project type. Chapter 3 will aim to understand the link between company failure and risk management.

CHAPTER 3

COMPANY FAILURE IN THE CONSTRUCTION INDUSTRY

3.1. Introduction

In line with the research aim, this Chapter is a review of known cash flow models used in addressing problems of company failures in the UK and beyond. A link is drawn between cash flow modelling trends, payment mechanism and risk management.

3.2. A review of existing models

Construction has always been regarded as a high risk business. The degree of uncertainties involved from the start to the finish of a project is commonplace in the literature. Uncertainties within the construction industry are so high that they often distort functional cash flow systems. Hence, with some level of 'incentivised mobilization' some of these uncertainties can be cushioned. An understanding of how this influence risk management is limited; and very few studies have linked high level of insolvency in the construction sector to uncertainties in having access to cash. Rather the focus has been on improving cash management independent of peculiar regions (Boussabaine and Kaka 1998, Kenley 1999).

In particular, cash flow modelling has been sign posted as an invaluable tool for identifying and/or predicting early warning sign of bankruptcy. More so, previous studies have shown that bankruptcy prediction is both empirically feasible and theoretically explainable. Mutti and Hughes (2002) suggest the major causes of failure are lack of financial control and poor management. If these are largely responsible then are the authors (Mutti and Hughe 2002)

contending that known financial models and corporate failure predictions have added little or no value to problem of SME(s) insolvency.

Given that these financial models have been tested and validated over years this chapter would want to understand the contractual agreements which limits cash and not poor management expertise. This is because the latter (poor management) addresses symptom while the former addresses causes of SME insolvency. For example, focusing on a contractual agreement which improved access and availability to cash is a better redress for SME insolvency. Overall, Mutti and Hughes (2002) conclusion supports the argument that with a functional cash flow management system, SMEs could be kept operating and financially healthy. Additionally, they argue too that there are models available for cash flow management and forecasting and that these could be used as starting point for managers in rethinking their cash flow management practices. Unfortunately same cannot be said of a peculiar region like Nigeria.

The Traditional Financial Ratio (TFR) is a cash flow modelling technique that is not completely new. Introduced in late 1920s in USA; Merwin (1942) also used it to analyse a 6 year trend of ratios of a number of failed and non-failed companies. With 'tax return' as its unit of analysis, Merwin (1942) considered ratio of current assets to current liability, net assets over total liabilities and working capital over total assets. Beaver (1966 and 1968) and Pinches (1980) research work on financial ratio showed that the mean of the ratio in the failed firms a year prior to bankruptcy was negative as against +0.45 in continuing firms. However, there were strong issues of inconsistency (non-methodical) with Beaver (1966 and 1968) approach to data collection. Hence, Argenti (1983) agreed that the use of a ratio will not on its own infallibly predict failure. Drawing on Abidali (1990) it is clear that attempts to

predict corporate failures using financial ratios and Z-score model (non-financial variables) have not stopped SMEs from going bankrupt. Abidali (1990) even argued strongly that there are prevalent risk of inconsistency when researchers fully depend on financial ratio without considering uncertainties for predicting corporate failures. He went further to introduce the A-score model which has not made any significant impact to increasing levels of SME insolvency. Of course the A-Score model helps strike a realistic balance - somewhat validates; the gaps of depending on predictions using financial ratio. Financial ratio only reveal the symptoms of failures and not causes (Argenti 1976); and having to look at the concept of incentivised mobilization will be seen as addressing the causes and the symptom (Slatter 1984, Arditi *et al* 2000, Lowe 1997). Arditi *et al* (2000) distinguished between failure at project level and failures at company level, but can we really separate both without any compromise? However, this research effort will argue that 'predictions' have helped in understanding the problem of bankruptcy and cash flow but have no clear means of leveraging its impact with systematic management of uncertainties. Hence the question "how can we really ameliorate increased SME insolvency in the construction industry? A logical solution may lie in differentiating between a SMEs ability to access cash, availability of cash and cash flow management. This is because some re-occurring variables that are heavily linked with some insolvency and bankruptcy were late payments, pay when paid clause, SMEs over stretching their very limited manpower and financial resources. e-Procurement risk management is another way of leveraging the problem; this is because there are growing evidence to suggest it leverages time, cost, manpower and productivity by enhancing inter-organisation interactions with its efficient suppliers. In addition, e-procurement helps control cost and ensure maximization of supplier performance. Notably these advantages are linked with e-sourcing and e-tendering. Simply put – lack of financial control can be deconstructed

to mean absence of inadequate application of one of the following: cash flow forecasting models; cost systems; and budgeting control.

These are absent in small firms and peculiar regions (Slatter1984). And they will continue to be absent because small firms cannot afford to pay for this expert service. Arguably, cash flow problem and shortage of working capital will push efficient and profitable firms into insolvency.

3.3. Existing models: trend analysis

Attempts have been made towards modelling cash flow. The aim here is to critically evaluate the limitations of existing cash flow models as a justification for distinguishing between the symptoms of insolvency and causes of insolvency. Studies have shown that poor financial management is the cause of high insolvency in the construction industry. While recognising The researcher would argue that whilst we recognise that it is a problem, concentrating or confining cash flow related studies to finding solution to (whether in part or whole) insolvency and bankruptcy in the sector has not helped. More so, when evidence suggests that at times of boomsand bursts the rate of bankruptcy and insolvency with the construction sector always increases. Hence the hypothesis - modelling cash flow 'alone' have no direct impact on reducing insolvency in the construction sector. That is, focus needs to be geared towards the root causes, such as, very high degree of uncertainty, that the bulk of SMEs and stakeholders do not have the financial muscles to cope with uncertainties' and will never do. Another likely cause is that SMEs operate in a highly competitive market where they cannot predict their work packages. The implication of which is that they over commit themselves (financial and otherwise) to more than enough work packages that they can handle. Consequently, Kaka and Price (1991) argued that their findings demonstrated the validity of

modelling as a forecasting tool, which is justification that too much emphasis is being put on addressing symptoms and not its causes. Hence, it is no surprise that Kaka and Price (1991) concluded that a simple net cash flow model was developed to help contractors forecast cash at the tender stage. In other words, it is a good example of addressing symptom and not causes of insolvency. In fact, they contend that inadequate cash resources and failures to convince creditors and possible lenders that inadequacy is only temporary (Kaka and Price 19991). Furthermore, they argue that general cash flow forecast is not enough and extends this to a firm. That is, being able to predict cash flow at tender stage will lead to selection of more financially stable SMEs. One implication of this approach is that the cost of applying it could be high, will limit innovations as good and innovative SMEs who are already committed to ongoing projects would be signposted by the models as at risk, and will in turn loose out at the tendering stage. Also, the very big construction companies are clearly pushing the risks and uncertainties of construction process down the supply chain and would not be encouraged to bear the cost of this dual tendering. Dual because an aspect would mean actors paying heavily to have accountants signing up to artificial cash flow accounts. When the construction industry is already spending a lot on legal experts who help with agreement. In other word, those who can afford good accountants will satisfy the prescribed tender stage requirements.

While it is logical to accept that Kaka and Price (1991) net cash flow model is an improvement on general cash flow forecasting – ideal net cash flow curve, value curves and computer application of value curves, it did not consider the implication of the different procurement methods. In systematically quantifying the effect of supply chain (SC) cash flow performance on the financial performance of construction project. Chen (2010) argued

that a good cash flow in a SC will make it perform better regardless of the different cash flow modelling specific to supply chain management. Payment – term negotiation for improving the SC cash flow performance of a project contractor was identified. Yet, a strand of commentators tends to draw links between SCM and competitive advantage. These studies in particular have tried to improve the overall efficiency of SCM using synergistic integration of SC components (Elmati *et al* 2008, Hill *et al* 2009, and Zailani and Rajagopal 2005). Another strand of commentators argue that SC can be improved through excellence in financial performance and management of SC materials, SC information and SC cash flow (Christensen *et al* 2007, Camelli *et al* 2008, Ellram and Liu 2002, Farris and Hutchinson 2002, Lanier *et al* 2010, fawcett *et al* 2007). On the whole, little evidence exists that systematically links SC cash flow performance to bankruptcy and/or insolvency in the procurement of construction and building services. More so, in analysing how the project owner behaves in the context of payment – term negotiations for improving the SC cash flow performance of contractors.

Particular emphasis is drawn to Lee *et al* (1997) investigates on bullwhip effect. The study demonstrates the relationship between the information flow and physical flow. Where the objective is to move from functional efficiency (reducing operating cost) to organisation wide efficiency such as cash flow efficiency. It is likely this organisation wide efficiency will not extend better contractual arrangements that promotes mobilization. Both approaches should lead to better understanding of the causal relationship between supply chain performance and financial measures, which is critical to the success of both supply chain and financial managers.

3.4. Cash Flow

Some conclusions from modelling cash flow are that payment lags, component and frequency significantly affect cash flows from test results of three-day factorial experiments. Chan (2010) selects cash conversion cycle and return on sales metrics to measure their corresponding performance. Rejects using return on assets (ROA), and return on stockholders' equity (RSE) because they are heavily subject to the manipulation of company's total assets and financial leverage. Pivotal is establishing a relationship with a focus on cash flow risks using a simple framework which allows us to observe the dynamics of SC related cash flow. For example, cash conversion cycle (CCC) equals cash-to-cash cycle. And CCC is heavily dependent on the argument that shorter CCC equals lower financial cost to fund business operations. Hypothetically, to reduce CCC a company can reduce days-in-inventory, shorten days in receivable and prolong days-in-payables. While this is true, reality will not offer new business the option of controlling these variables. Alternatively, link can be drawn between reducing CCC to tying contractual agreements to mobilization. More importantly, it thus allow for a better understanding of the behavioural patterns of payments term in SC.

Furthermore, not all firms (the indigenous firms in particular) will have the leverage of controlling the variables – days in inventory, days in payables and CCC. The example of company discussed in terms of applicability - were huge multinationals with established brand name. This approach may be beneficial to the large and medium size organisations employing 250 people and beyond. It is not likely going to be beneficial to SMEs which make up the bulk of UK and Nigerian SMEs. The key argument here is a construction project contractor's SC cash flow improves the probability of the contractors financial

performance also improving is high. Notably, a means to measure the impact of SC cash flow improvement on financial performance. This supports the argument that mobilisation will also improve the cash flow of SC. More so, it would address the already identified causes of insolvency.

Park *et al* (2005) introduced the development of a project level cash flow forecasting model from a general contractor's viewpoint. Drawing on the argument that most existing models have been focused to assist contractors in forecasting cash flow in the early stage (pre - tendering or planning phase). Where the aim is to provide a tool that can be applicable during the construction phase based on the planned earned value and the actual incurred cost on a jobsite level. The moving average weights of cost categories is adopted (Singh and Lakarathan 1998, Navon 1994). The background to Park *et al* (2005) argument draws a link between insolvency and limited cash. This is not the same as cash flow. That is, companies fail due to lack of liquidity for supporting their daily activities. However, it would be hard to draw a divide between both variables, when 60 per cent of construction contract failure are due to economic factors (Russell 1991).

3.5. Forecasting methods

Overall various forecasting methods that are devoid of peculiarities have been applied to cash flow management. These methods are either probabilistic or deterministic (Navon 1995). The problem is that most existing models are not based on the construction stage, but rather only on the planning or preliminary stages in the project delivery process. They do not consider time lags for the costs and earned values in forecasting cash flow. Not compatible -

regards to integration of cost items and activities - but rather complicated depending on change factors.

More recently, Tsai (2007) aimed to provide an insightful look on how common practices that intend to improve cash conversion cycle (CCC). That is offering early payment discount may contribute to cash flow risk. Aside prescribing the use of Asset-Backed Securities (ABS) to finance accounts receivable as a means to shorten CCC and lower the cash inflow risk. An approach which provides a cushion for companies during difficult times, and enhances company growth. It is also worth noting that studies, too, have assessed the accuracy of existing cash flow models. This is because they focus on addressing what this researcher categorises as symptom and causes. Discusses the optimisation of cash flow models using cost schedule integration (CSI) technique - this draws on pure project estimate and schedule data. Interestingly, Chen *et al* (2005) investigation concludes by recommending extensions of CSI models to include more detailed payments conditions, including differential payment lags components of materials and labour and payment frequency. A finding which compliments this researcher's call for a move to address causes instead of symptoms - where the emphasis remains distinguishing between access to cash and cash flow. In other words, how do we improve access to cash through effective risk management practices? Majority of SMEs do not have the needed collateral which will aid financial funding (Kenley and Wilson 1989, Kirkpatrick 1994).

A few research efforts have focused on generating reliable cash flow prediction model (Abudayyeh and Rasdorf 1995, Ashley and Teicholz 1977, Bathurst and Buttler 1980). Some of these models have utilized limited data - parametric model based methodology to schedule information using computerized systems. Yet, it is worth noting that there are significant

weaknesses in the current methods of predicting. Thus, Kaka and Lewis (2003) prescribes a development of company-level dynamic cash flow forecasting model (DYCAFF) that assist contractors to effectively plan and manage cash flow of individual projects and at company level. In particular Kaka and Lewis (2003) tries to distinguish between forecasting cash flow at project level and cash flow at company level; but offers no interesting insight in terms of differentiating between access to cash and cash flow.

Kenley and Wilson (1986) contend that an idiographic methodology is appropriate for modelling construction project cash flow. Drawing on the idiographic – nomothetic debate which flourish within social science from the 1950s to early 1960s (Runyan 1985).

They argue that most existing models considered two factors - date and project type; but that such convenient divisions ignored the complex interaction between such influences as economic and political climate managerial structure and actions, union relations and personality conflicts. These factors are important to studies that examine the cost, time, quality performance of building project.

In recent times the argument for cash flow modelling is steadily shifting from the rhetoric of curves, logit and moving averages to more contemporary research which incorporates whole systems thinking. Here, direct and indirect managerial and contractual links throughout the supply chain have been conducted to improve project performance. Bearing in mind the challenges of how performance is measured or defined. And the onus of this new argument is that different members of the SC are affected differently by the factors influencing cash flow, payment mechanisms have to be defined to accommodate this uneven sensitivity to cash flow. On the surface, it is logical to argue that this sensitivity is not holistically robust since the involvement along the chain will always remain ‘uneven’. In addressing the need

for performance based contracts Motawa and Kaka (2009) adopted process protocol (Kagioglue *et al* 1998) and argues that supply chain management creates different direct/indirect managerial and contractual links. These links impact payment cash flow mechanism. Consequently, payment mechanism should reflect the sensitivity of these links to the team's performance. While there is no denying the fact that some contemporary studies have looked at payment mechanism. The primary question is what percentage of these studies have looked at using payment mechanism to stimulate access to cash in peculiar environment?

3.6 Payment mechanisms

The categorising of payment mechanism into traditional and non-traditional is commonplace in the literature (IChemE 2002). The different forms of payment have obviously been introduced to somewhat leverage performance. Whether it works is a question beyond the scope of this research effort. What requires attention is that "mobilization" as a form of payment can be used to leverage access to cash which, in turn has significant impact on cash flow. Toor and Ogunlana (2008) identified a group of factors - cash flow, difficulty in receiving payment, monthly payment difficulties, difficulty in financing project by contractors, cash flow during construction - that contribute to delays in major construction projects. Overall, Toor and Ogunlana (2008) support the argument that there is a clear distinction between access to cash and cash flow. It also suggest (by including finance and not cash) that finance is even more important a factor than cash flow. Where cash flows remains a symptom and not a direct cause of increased insolvency. Hence, it is no surprise HMSO (1994) white paper talks about changing existing forms of contract with particular emphasis on the "pay when paid clauses - a government condition. The driver for this change

can be linked to cash flow problems, access to cash, and increased insolvency (bankruptcy). The white paper also suggests that making amends to the payment when paid clause" clause is not enough because the core of the problem is the reluctance of many participants to abide by, or even use, current standard forms of contract without amendment. The fundamental question thus - is it possible to create a new framework within which contracts will be more acceptable and thereby left unchanged? The logical answer is no; but the theory of value chain perception and incentivization will help. This is because there is sufficient evidence to suggest that endlessly refining the existing forms of contracts have taken place for decades, frequently to accommodate decisions of the court. In other words, just as clients should be allowed to choose their procurement routes, there should be the corresponding or alternative option of financing i.e. being able to link procurement to effective management practices, which is very much within the confines of "modern contract also known as supply chain reengineering"(Skitmore 1992).

Supply chain reengineering, which is arguably a form of modern contract aims to provide a flexible and reasonable modelling and simulation framework that enable rapid development of customized decision support tools enables rapid development of customized decision support tools for supply chain management (Swaminatham *et al* 1998). Here, emerging evidence from modelling SC dynamics suggests that SC would be characterised by "centres of decision making heterogeneity in the SC, and relationship with suppliers. Comelli et al (2007) combined financial and physical flows evaluation for logistic process and tactical production planning also compliments the argument that very few studies have shown relationships between cash position and planning in tactical or operational dimension. In line with this arguement, Gorog (2008) comprehensive model for planning and controlling

contractor cash flow moves away from the rhetoric of predicting/forecasting cash flow. Gorog emphasizes the difference between planning and controlling. Indeed, unlike planning, controlling adopts mainly a client-view of the problem.

In identifying new perspectives on construction supply chain integration, Danity *et al* (2001) addresses questions of whether SMEs will be able to cope with the current pace of change within the sectors, and contribute to the ambitious performance targets suggested by Egan. To this end, Dainty (2001) concludes the UK construction sector is a long way from being able to derive benefits from the true supply chain integration and the involvement that supplier companies could add to the construction process improvement agenda. Notably, an adversarial culture seems too ingrained within the industry' operating practices, and there is a general mistrust within the SMEs that make-up the construction supply chain. Additionally, late and incorrect payments tendering process and retention as a key barriers to subcontractor integration into supply chain. Suggest fair payment from main contractor, but main contractor need to focus on value rather than price, trust needs to exist between parties.

3.5 Summary

Company failure is commonplace in the construction industry. This chapter reviewed the different models that have been developed to help understand the dynamics of the variables responsible for high levels of insolvency. Poor financial management is the cause of high insolvency. The need for cash flow efficiency that is depended on forecasting methods that is devoid of peculiarity is highlighted. Contemporary studies a payment mechanism and cash flow model is linked with how risk management can practice can be a mitigating strategy. Drawing on this critical discuss of existing models amid growing rates of company failures in

construction industries the next Chapter will aim to analyse the different procurement methods in conjunction with objective signposted in Chapter 1.

CHAPTER 4

CONSTRUCTION SECTOR: AN ANALYSIS OF ITS' PROCUREMENT METHODS

4.1. Introduction

This Chapter offers a simple definition for the term procurement amid procurement route which reduces substantially stakeholder risk and technological advancements. Drawing on the different types of e-procurement particular emphasis is placed on analysing relevant procurement methods.

4.2. Defining procurement

Procurement is defined simply as the buying of goods and services. However, the complexity or simplicity of procurement is characterised by the type of goods or services that is procured. For example, in procuring a book, payment is made instantly and item collected. The buyer is able to access the quality of the book and dis/satisfaction is easily ascertained between transacting parties (buyer and seller). On the contrary the procurement of any infrastructure will often go beyond immediate payment and collection. In other words, series of issues would be taken into consideration. The client would need to engage with a designer, designer with contractor, and contractor with supply chain. A host of actors are involved; and they are usually bound by formal contracts. This process is even more complex when the specialist contractor or actors involved in the process live in different part of the world with different time zones. Thus commentators have argued that the introduction of e-procurement as an alternative to known traditional forms of procurement would help accommodate some of its current problems which amount to millions of pounds annually. To this end, new management models are introduced into complex processes to add value to its output, product

and services (Slack *et al*, 2010). When deconstructed operations management can be captured (See Slack *et al* pg138-167). Although operations strategy and improvement is not the focus of this dissertation, the author would argue that e-procurement is a subset of operations management because it is aiming to optimise the procurement process by adding value. In the context of this dissertation, e-procurement is defined as a Business-to-Business (B2B) purchasing by means of internet technology applied to gain efficiency and to streamline purchasing processes from a supply chain perspective (Koorn *et al* 2001).

B2B procurement processes often encompasses the purchasing of goods and services as well as higher-level management tasks and logistics. A challenge which the adoption of e-procurement hopes to leverage. However, the distinctive feature for e-procurement is that buying and selling whether simple or complex, occur when the actors (buyer and seller) employ information and communication technology. That is, fundamental things like, contracts, payment and receipt are catered for electronically. However, EDI (Electronic Data Interchange) should not be mistaken for e-procurement. Notably, whether traditional procurement or e-procurement due process is maintained. Due process being that there will always be a call for tender, review of submitted tenders, contract award and commissioning.

The emergence of electronic marketplace in recent years have witnessed a dramatic increase in the use of information technology and e-commerce (Turban *et al*, 2006). In particular, internet based procurement process have influenced several of the process used in gaining competitive advantages. These influences, driven by information technology leads to: a greater information richness of transactional and relational environment; lowering of information search costs for buyers and sellers and greater proximity between time of purchase and time of possession of electronic goods and services (Nwokak *et al*, 2009).

Therefore e-procurement, which is a subset of e-commerce, is an inter-organisational information system that allows the participating buyers and sellers to exchange goods and services facilitated by EDI using internet (Bakos 1999; Turban *et al* 2006).

4.2.1. Types of e-procurement

Turban *et al* (2006) identified six types of e-procurement namely:

1. Web-based ERP (Electronic Resource Planning): this form of web-based site makes it possible for corporations to create, approve purchasing requisitions, place purchase orders, and receive goods and services by using a software system based on internet technology.

2. E-MRO (Maintenance, Repair and Operating): This is very similar to web-based ERP except that goods and services ordered are non-product related but specific to MRO supplies.

3. E-Sourcing: e-Sourcing is key to e-procurement activity. In fact, when implement an e-procurement activity, companies must evaluate e-sourcing. Where e-sourcing is the process and tools that electronically enable any activity in the sourcing process, such as quotation, tendering submittance and response, e-auctions, online negotiations and spending analysis. Simply put – e-sourcing is the automation of strategic sourcing.

4. E-Tendering: like traditional tendering this involves sending requests for information and prices to suppliers and receiving the responses of suppliers using strictly internet suppliers. Here, a buyer requests electronically to would-be sellers to submit bids – often times the lowest bidder wins.

5. E-Reverse Auctioning: this involves using internet technology to buy goods and services from a number of known and unknown suppliers. The buyer places an item for bid

(tender) on a request for quote (RFQ) system. In turn, potential suppliers bid on the job, with the price reducing sequentially and the lowest bid wins. Ebay is a good example of e-reverse auctioning.

6. E-Informing: this is hugely associated with gathering and purchasing information both from and to internal external parties using information technology, such as the world wide web (www).

In Nigeria, the construction industry is still far from adopting e-procurement for material purchases and hardly to gain competitive advantage. A sufficient e-procurement system enhances inter-organisational interactions with its efficient suppliers. It provides actors with a set of built-in monitoring tools to help control costs and ensure maximisation of supplier performance.

EDI supports communication beyond organisational boundaries and automate the exchange of structured messages between independent computer applications. Once a firm has an effective computer-based purchasing system in operation, a logical extension of that system is to link it with order-handling computer system of selected suppliers.

The construction sector is bespoke and very labour intensive (Morton 2002); and its significance to any economy (developing or developed) cannot be overemphasized. In the UK for example, considerable efforts have been put into understanding how construction works – repair, erection or demolition of things as diverse as houses, offices dams and bridges – are best procured (Latham 1994; Levene Efficiency Scrutiny 1995 and Egan 1998) with the hope of achieving heightened client satisfaction.

While it is inconclusive as to whether this 'heightened satisfaction' has been achieved in the UK construction sector, evidence from the literature suggests that there has been a new wave of procurement methods namely partnering, framework agreements, and relational contracting. In the traditional system of procuring construction works the client is tasked with the responsibility of making the critical choices following the advice of professionals who often have vested interest. This in turn influences the contractual conditions and arrangements. Indeed, in the analysis of the different procurement methods, this paper would accept the argument that "the characteristic patterns of participants' involvement, and the disposition of risk among them, constitute the procurement method, or procurement system for as project" (Murdoch and Hughes 2008 pg 10). In other words, what is common to the different procurement methods (traditional or non-traditional) can be identified on its combination key variables. Figure 4.1 which has been adopted from Murdoch and Hughes (2008) is a self explanatory flow chart which may be used in identifying known procurement methods. To this end it can be argued that there is no one best way of procuring construction works. The decision to adopt a particular procurement strategy is the responsibility of a Project Manager (PM). It is worth noting that Figure 4.1 is to be used by the PM as guidance only. In conclusion it is logical to argue that the inclusion of PM and other stakeholders in the briefing stage of any construction process would lead to the adoption of a more suitable procurement method.

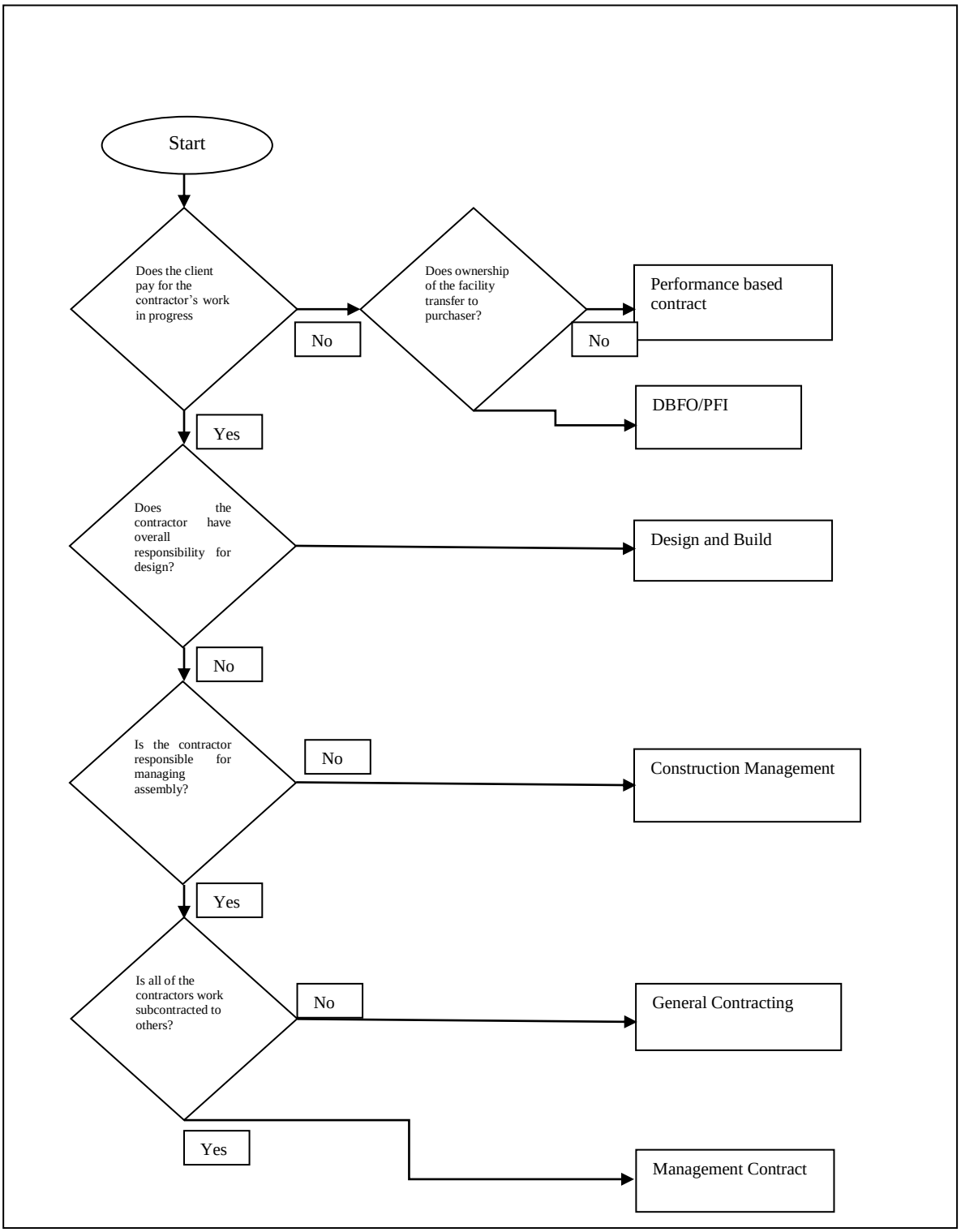

Figure 4.1 Flow chart for selecting a procurement method for a project (Adopted from Murdoch and Hughes 2008)

4.3. Procurement route: a trend analysis

Strategies for the procurement of building projects have not changed significantly in the last 25 years, though time and cost overruns are still prevalent throughout the industry (Smith and Love, 2001). In a response to reduce the incidence of time and costs overruns, the disputes that may often arise, and the likelihood of project success, alternative forms of procurement method such as partnering and alliancing have been advocated (Love *et al*. 1998). Not all forms of procurement method, however, are appropriate for particular project types, as client objectives and priorities invariably differ (Skitmore and Marsden, 1988; Love *et al*. 1997). The objectives and priorities of a client need to be matched to a procurement system. To do this effectively, it is essential that the characteristics of various procurement systems and selection methods available are understood by clients and their advisors before a procurement method is selected.

4.3.1 Identification of risk

The establishment of a procurement strategy that identifies key project objectives as well as reflects aspects of risk, and establishes how the process will be managed are keys to a successful project outcome (Al-Bahar and Crandall, 1990). The unique and bespoke nature of building projects means that clients who decide to build are invariably confronted with high degrees of risk. These risks include completing a project that does not meet the functional needs of the business, a project that is delivered later than the initial programme or a project that costs more than the client's ability to pay or fund. All of these risks potentially could have an impact on the client's core business. Consequently, a procurement strategy

should be developed that balances risk against the project objectives that are established at an early stage.

The nature of the client's business and the business case for a specific project should be used to underpin the basic need for certainty in time and cost. The identification of the factor(s) that will constitute the greatest risk to the business if they fail to be achieved will assist in the development of a weighted list of priorities and the overall procurement system to be considered.

The establishment of an appropriate project team to deliver a project at the right time, for the right cost given the adopted strategy is a vital role for the client, who again should take independent advice (Morledge *et al*., 2006). During the selection of the project team, better outcomes are achieved when 'value' is considered over and above the price for the service that is being offered (Holt *et al*., 2000). When running costs for the building are deemed important or the design itself is complex or given importance, then procurement methods that enable a high degree of integration and collaboration between project team members are deemed to be desirable.

4.4. Factors influencing procurement strategy

For any given project a client can adopt a collaborative strategy, such as partnering irrespective of the procurement method used. Such a strategy has been often used by clients who have series of projects to undertake. The performance of both contractors and consultants can be monitored using pre-defined indicators for each of the projects they are involved with and then compared. This approach is particularly useful to monitor and

evaluate disbursement of incentives where appropriate (Morledge *et al*., 2006). Once the primary strategy for a project has been established, then the following factors should be considered when evaluating the most appropriate procurement strategy (Rowlinson, 1999; Morledge *et al*. 2006):

External factors – consideration should be given to the potential impact of economic, commercial, technological, political, social and legal factors which influence the client and their business, and the project team during project's lifecycle. For example, potential changes in interest rates, changes in legislation and so on.

Client resources – a client's knowledge, the experience of the organisation with procuring building projects and the environment within which it operates will influence the procurement strategy adopted. Client objectives are influenced by the nature and culture of the organisation. The degree of client involvement in the project is a major consideration.

Project characteristics – The size, complexity, location and uniqueness of the project should be considered as this will influence time, cost and risk.

Ability to make changes – Ideally the needs of the client should be identified in the early stages of the project. This is not always possible. Changes in technology may result in changes being introduced to a project. Changes in scope invariably lead to increase in costs and time, especially they occur during construction. It is important at the outset of the project to consider the extent to which design can be completed and the possibility of changes occurring.

Cost issues – An assessment for the need for price certainty by the client should be undertaken considering that there is a time delay from the initial estimate to when tenders are received. The extent to which design is complete will influence the cost at the time of tender. If price certainty is required, then design must be complete before construction commences and design changes avoided.

Timing – Most projects are required within a specific time frame. It is important that an adequate design time is allowed, particularly if design is required to be complete before construction. Assurances from the design team about the resources that are available for the project should be sought. Planning approvals can influence the progress of the project. If early completion is a critical factor then design and construction activities can be overlapped so that construction can commence earlier on-site. Time and cost tradeoffs should be evaluated. Procurement systems can be classified as traditional, design and Construct, management and collaborative.

The decision as to what procurement system to use should be made as early as possible and underpinned by the client's business case for the project. The risks associated with each procurement system and how they can affect the client should also be considered. With this in mind, Figure 4.2 provides an overview of the 'speculative risk' (i.e. risk that can be apportioned in advance as decided by parties in a contract) to a client and contractor for specific procurement methods.

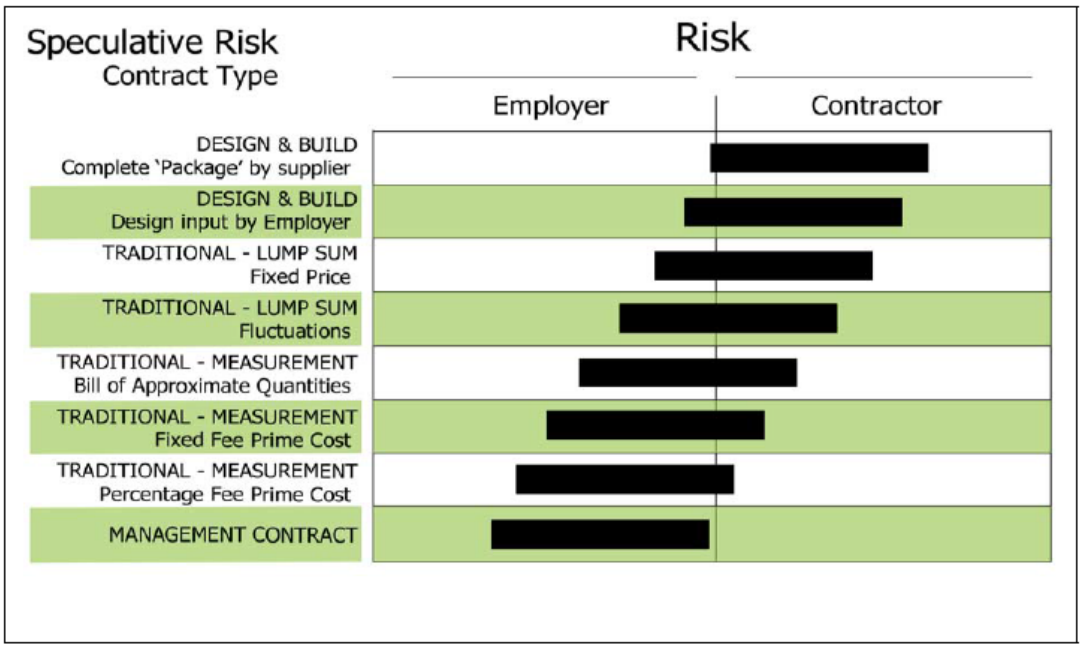

Figure 1 Risk apportionment between client and contractor

Figure 4.2 Risk apportionments between client and contractor (Adapted from Hughes and Murdoch 2010)

4.5. Traditional procurement

In the traditional approach which more prevalent in the Nigerian construction industry, the employer accepts that design work will generally separate from construction, consultants are appointed for design and cost control, and the contractor is responsible for carrying out the works. This responsibility extends to all workmanship and materials, and includes all work by subcontractors and suppliers. The contractor is usually appointed by competitive tendering on complete information, but may if necessary be appointed earlier by negotiation on the basis of partial or notional information. The traditional method, using two-stage tendering or negotiated tendering, is sometimes referred to as the 'Accelerated Traditional Method' – this is where the design and construction can run in parallel to a limited extent.

Whilst this allows an early start on site, it also entails less certainty about cost (Luu *et al* 2008). There are three types of contract under the traditional procurement method, namely:

• Lump sum contracts - where the contract sum is determined before construction starts, and the amount is entered in the agreement;

• Measurement contracts – where the contract sum is accurately known on completion and after re-measurement to some agreed basis;

• Cost reimbursement – where the contract sum is arrived at on the basis of the actual costs of labour, plant and materials, to which is added a fee to cover overheads and profit.

4.6. Design and construct (build) procurement

With design and construct procurement, a contractor accepts responsibility for some or all of the design. There should be express reference to this in the contract, and the extent of design liability should always be set out as clearly as possible. Unless the contract states otherwise, it seems that the liability for design is an absolute liability under which the contractor warrants fitness for the purpose intended. Some design and construct forms limit the design liability of the contractor to the normal professional duty to exercise reasonable care and skill. Independent consultants engaged by the contractor are therefore under a liability no greater than normal. An indemnity or acceptance of liability is likely to be worthless unless backed by adequate indemnity insurance, and this is something that should be checked before a contractor is appointed. If the contractor does not have in-house designers, which is often the case, and the contractor uses external consultants, their identity should be established before a tender is accepted (Dewatripont and Maskin 1995, Love 2002).

The client's requirements might be stated briefly and simply, perhaps little more than a site plan and schedule of accommodation. On the other hand, they may be a document of several hundred pages with precise specifications. The contractor's input might be restricted to taking a scheme design supplied by the client and developing details and production information. It is however better to specify in terms of the performance requirement rather than to prescribe in detail, because this leaves the responsibility for design and selection firmly with the contractor. Design and construct methods offer certainty on the contract sum and bring cost benefits.

The close integration of design and construction methods and the relative freedom of the contractor to use their purchasing power and market knowledge most effectively can provide a client with a competitive price. With a design and construct method, it is possible ensure a quicker start on site, and the close integration of design and construction can result in more effective programming. Time, however, is needed by the client's consultants to prepare an adequate set of requirements, and time is needed to compare and evaluate the schemes from competing tenders. Once a contract is signed, any changes by the client can prove costly Morledge and Smith 2013).

4.7. Management procurement

Several variants of management procurement forms exist, which include; management contracting, construction management and design and manage. There are some subtle differences between these procurement methods. In the case of management contracting, there is direct contractual links with all the works contractors and is responsible for all construction work. In construction management, a contractor is paid a fee to professionally

manage, develop a programme and coordinate the design and construction activities, and to facilitate collaboration to improve the project's constructability.

4.8. Summary

An analysis of different procurement methods formed the onus of this chapter. A flow chart for selecting procurement method for a project is presented amid distinction between procurement and e-procurement methods. Risks associated with alternative forms of procurement are identified alongside factors influencing procurement strategy. Thus lessons can be used to manage strategic procurement in Nigerian construction industry. The advantage of Construction Management (CM) in the sector is the proximity of the client to the trade contractors and the disadvantage is that it depends on a high degree of professionalism and experience (Hughes 1997). The next Chapter is the theoretical framework upon which the remainder of the thesis is hinged.

CHAPTER 5

THEORETICAL PERSPECTIVE

5.0. Introduction

Often the management of uncertainties in a construction process is achieved through risk identification, risk assessment, risk response, risk monitoring, updating and control. In other to gain a better understanding of risk management in a peculiar environment, the theoretical underpinnings and the principles that guide effective risk management practices are reviewed and discussed from the theory of competitive advantage.

5.1. Understanding competition and strategic risk management

Strategy explains how an organisation, faced with competition will achieve superior performance (Porter, 1991; Magretta, 2012). Most managers often think about competition as a form of warfare or a zero-sum battle for dominance. This is a deeply flawed and destructive way of thinking (Porter, 2008).

The key to competitive success lies in an organisation's ability to create unique value. Here Porter prescribes five (5) forces framework; where creating value and not beating rivals is at the heart of competitive risk management systems and ensuring firm's profitability in the long run.

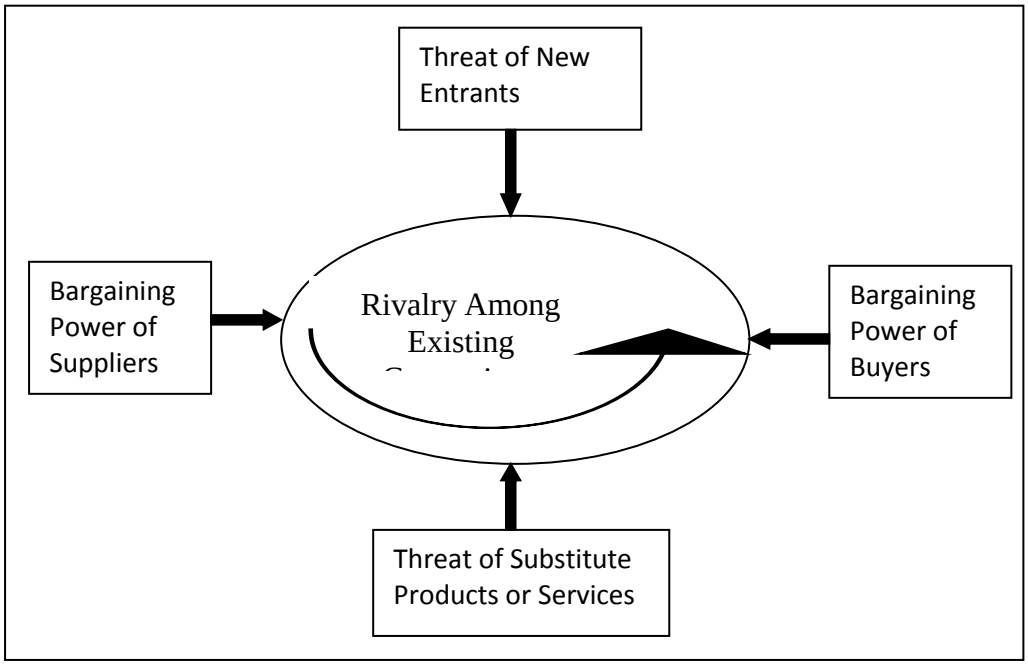

Figure 5.1: The Five Forces That Shape Industry Competition (Porter, 2008)

From Figure 4, strategic positioning reflects choices an organisation makes about the kind of value it will create and how the value will be created. Here choices can be likened to decisions project managers are compelled to make when faced with uncertainty. Invariably, Porter (2008) is arguing that for uncertainty to be a competitive advantage the following must be right:

- The mind-set of the decision maker, and
- The structure of the industry within which the decision maker is operating.

In other words, for a decision to be favourable to the organisation in terms of creating "value", the mind-set of the decision maker must create unique value and not the "best".

Consequently, the instrument of the survey will address questions like “what is your organisation’s strategy for risk management”. Strategies that aim to explain how organisation faced with competition will achieve superior risk management practices. In other to survive organisations must gain competitive risk management advantage. However, what competition is and how it works remain alien to the construction industry in Nigeria. If the structure is not right ‘value’ cannot emerge.

In particular, Porter (2008) argues that the nature of the industrial structure and the position of the organisation within the industrial structure will determine whether it would be able to achieve 'superior competition' or create unique value. More so, the structure of the industry provides information about its use and how the industry works. There is a link between industry structure and effective risk management.

Before Porter's prevailing framework was SWOT. However, SWOT has no coherent underlying economic principles where you end up with random list of items. Studies have critiqued and extended Porter’s Five Forces, for example Karagiannopoulos, Georgopoulos and Nikolopoulos (2005) added the power of innovation to the framework. However, Commentators such Grundy, 2006; Adewole 2005; Oz (2001) have used this framework to analyse competition in different industries. Ofori (2003) adds that this framework does not capture salient factors which affect the construction industry such as “government interference”, “culture” and” institutional arrangement”; furthermore Ofori acknowledges the relevance of Porter’s Five Forces as a predictor of competitiveness within the construction industry.

Each of the 5 forces has a clear, direct and predictable relationship to industry uncertainty. It equips stakeholders with the knowledge of how the industry works, how it creates and share

values. The five forces zeroes in on the uncertainty businesses face and gives Project manager (decision maker) the baseline for measuring superior performance within the industry.

Industry structure is an exponentially more powerful and objective tool for understanding the dynamics of uncertainty. Industry structure can be linked to the income statements and balance sheets of every company in the industry. Insight queried from this kind of analysis should lead directly to decisions about where and how to competitively manage risk. Industry structure is not static but dynamic. Performing industry analysis is simply taking a snapshot of the industry at a point in time.

It is systematic, reducing the odds of omissions. It takes the economic fundamentals of competition in a way that highlights how external forces constrain and create value in a business.

5.2. Value chain

Notably, the value chain plots the flow of goods and services up and down the supply chain. Drawing on this context, the value chain is arguably regarded as a descriptive construct, which can provide a heuristic framework for the generation of data. Trends in value chain theorisation, provides some analytical structure in transformation of heuristic devices into analytical risk management tools. Overall, value chain is an important construct for understanding the distribution of returns arising from design, production, marketing, co-ordination and reverse engineering.

5.3. A Conceptual model

Risk can be defined as uncertainty. Uncertainty is in itself an opportunistic platform for creating "unique value" (Porter 2008). In other words, competitive advantage encourages the creation of unique value. Therefore, this conceptual model captured in Figure 5.3, which is developed based on the theory of competitive advantage, depicts a plot of 'value' against uncertainty where the variable 'value' focuses the actor on the specific activities that generate a new way of evaluating and managing uncertainty. Maximum value is achieved in the quadrant with "High Satisfaction" and "High Information". Minimum value is linked with the quadrant having "Low Satisfaction" and "Low Information".

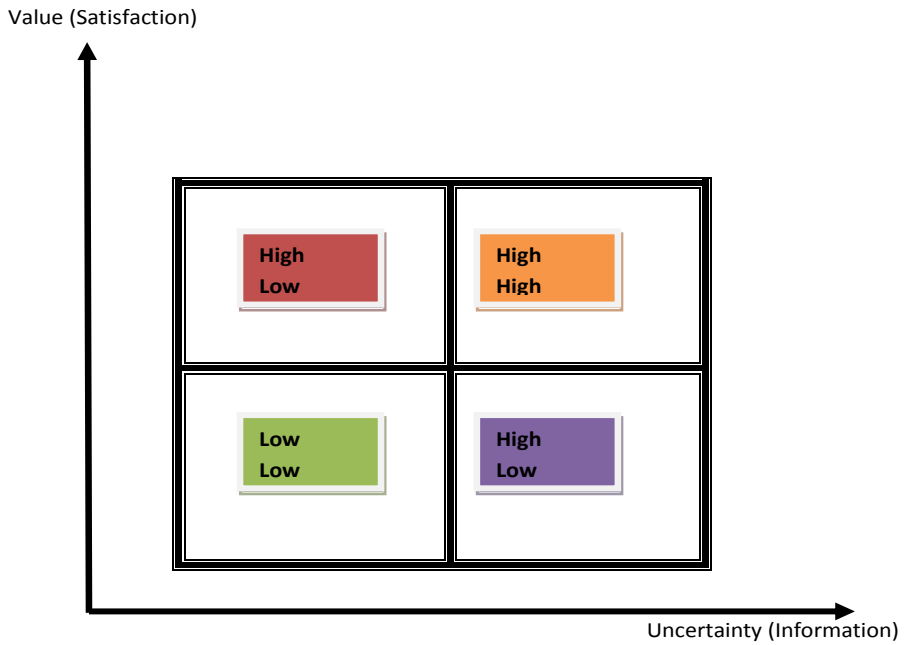

Figure 5: A competitive risk management conceptual model

Thus, a regression model is derived to mimic the application of the conceptual model in order to assess the impact of the attributes of Uncertainty on Value; where a linear model is based upon the algebraic details of a straight line. This multiple regression model consists of one dependent variable and many independent variables.

$Y = \beta_0 + \beta 1X_i + \beta 2X_2 + . \quad \beta nX_n.$ ……..…Equation 1

Where Y = is total project value or the dependent variable; β0 is the intercept (constant); Xi-n = uncertainty attributes (cost, time and quality) or independent variables.

That is, Value = Cost + Time + Quality + Power ……..…Equation 2

5.4. Assumptions of regression analysis

In drawing conclusions about the population based on a regression analysis carried out on a sample, several assumptions must be satisfied in order to allow for statistical validity of the finding Makridakis and Wheelwright (1989), which are as follows: linearity - that the mean values of the outcome variable for each increment of the predictor(s) lie along a straight line. The implication of modelling a non-linear relationship using a linear model is a limitation in the generalizability of the findings; evidence of homoscedasticity – constant variance of the regression error; that the residuals are independent (random) of one-another – autocorrelation; and multicollinearity – when two or more independent variables are highly correlated.

5.4. Summary

Except a problem is well understood, it cannot be effectively addressed. The theory of competitive advantage has been adopted as a framework for understanding risk management uncertainties in the construction industry. This is because it is encourages the opportunity to do things differently up and down the construction supply chain – correlation between uncertainty and value capture. In turn, a conceptual model is developed alongside its linear model. The mind-set of the decision maker and the value chain within the industry are examples of constructs this framework examines. And the subsequent chapter details the preferred research method for this examination.

CHAPTER 6

RESEARCH METHOD

6.0. Introduction

The preceding chapters have brought about some understanding of the research context particularly on the significance of adopting a theoretical framework. Based on the literature review findings reported in the last four chapters and the research questions posed in Section 1.5 an interpretive standpoint is chosen as a way of looking at peculiar regions and as a way of gaining knowledge about risk management practices. Consequently, the naturalistic approach for addressing these types of research questions is proposed. Notably, an explanation is provided as to why a case study strategy is chosen. The case study involved a quantitative study and an exploratory study of clients and contractors for better capture of perceptions and opinions about current risk management practices.

6.1. Purpose of inquiry

Chapters 1-5 identified the need for research into what construction industry stakeholders are doing differently when faced with peculiar uncertainties in the delivery of projects in the Nigerian construction industry. Stakeholders are expected to seek competitive advantage throughout the project life cycle to overcome issues of conflict, abandoned projects, building collapse, poor safety records and extremely low client satisfaction; but there is little evidence of this kind of use of competitive advantage. Although known risk management practices are important, the focus is on the mindset of the decision maker, and the structure of the industry within which the decision maker is operating. For these reasons, a purely descriptive

approach would not be appropriate. Similarly, an explanatory research approach would not be suitable. Construction industry stakeholders in emerging economies are still being encouraged to deliver creative projects. And the research purpose is neither to explain how construction clients and practitioners stay competitive, not to find the relationship between contracts of risk management phenomenon through stating hypotheses and then validating or repudiating these hypotheses. The purpose is to find out and assess what is actually happening from clients and construction practitioners who profess to application of risk management practices by obtaining a more general, open-ended picture, based on the subjective understanding of the respondents themselves.

For this reason, it was determined that the research approach to adopt would be one of an exploratory nature; where the exploratory approach would allow the investigator the opportunity to ask questions of contractors and practitioners and capture the reality of what is happening in the sector. The outcome of this exploration would lead to a deeper understanding and critique of the experience of risk management practices from the perspective of clients and selected construction practitioners.

Drawing on the above discussion, and previously stated aim and objectives in Chapter 1, the purpose of inquiry is placed inside the exploratory category of Robson's (2002) classification. However, consideration was taken when choosing what research strategies and method(s) to apply. In turn, these choices are the various philosophies of epistemological and theoretical perspectives embodied in the research strategies and method(s).

6.1.1. Theoretical perspective

Null Hypothesis H0: The uncertainty in any procurement process is NOT of competitive advantage to the decision maker. Here the decision maker can be the client, project manager or contractor.

Alternative Hypothesis H1: The uncertainty in any procurement process IS of competitive advantage to the decision maker.

6.2. Epistemology

Following the discussion is Section 6.1, there is obvious need for a process capable of addressing the purpose and answering the research questions. It is often important to make clear the adopted paradigm – a basic set of beliefs based on philosophical perspectives of how the investigator perceive the world (Kwawu 2009, Guba 1990).

Table 6.1: Classification of epistemological, theoretical, methodological and method perspectives

Epistemology	Theoretical Perspectives	Methodology	Methods
Objectivism Constructionism Subjectivism	Positivism (and post-positivism) Interpretivism (naturalistic) • ymbolic interaction • henomenology • ermeneutics Critical enquiry Feminism Postmoderism E t c	Experimental research Survey research Ethnography Phenomenological research Grounded theory Heuristic inquiry Action research Feminist standpoint Research Etc	Sampling Measurement and scaling Questionnaire Observation • articipant • on-participant Interview Focus group Case study Life history Narrative Visual ethnographic methods Statistical analysis Data reduction Theme identification Comparative analysis Cognitive mapping Interpretative methods Document analysis Content analysis Conversation analysis Etc

Source: Crotty (1998)

Table 6.1 above is enquiring about the ontological, epistemological, theoretical, methodological and method perspectives of the investigators undertaking the study. Here, the epistemology inherent in the theoretical perspective is embedded in the accepted research strategies and methods.

It is worth noting that researchers remain guided by conceptual frameworks. This framework is important as it determines the strategy of the research study testing or explanation of a phenomenon. The adopted paradigm and theoretical assumptions depends on the nature of the social phenomena being explored (Sarantakos 2004). In the social science arena commentators propose that in developing an appropriate approach to conducting research, there should be a significant relationship between the chosen epistemological stance, research strategy and methods. This will enhance preferred approaches of conducting the research aligns with the nature of the problem, the state of knowledge and individual experience of conducting investigation (Kwawu 2009). While the others are of the opinion that people deal with many realities, a single ontological paradigm may not show the mindset of people and the structure of the industry. It is commonplace that a single ontological paradigm will produce a potentially narrow but important view of the phenomenon under study.

Crotty (1980) argue that regardless of the existence of a plethora of epistemologies in the social science arena, selection depends on the objectivism and subjectivism epistemologies. In other words, the objectivist epistemology holds that while believe is to accept as true, truth and meaning reside in their objects independently of any awareness. Consequently, appropriate methods of enquiry can bring about precise knowledge of the objective truth. In social science, understanding and values are considered to be resident in mindset of the people being studied (Burrell and Morgan, 1992). Again, the objectivist epistemology is heavily linked with the natural sciences and has featured in most sociological research.

It is safe to argue that the natural scientist depends on everyday understanding when studying natural phenomena in a scientific way. The scientists must lay aside much of the everyday

understandings they bring along, thus viewing the phenomena within a continuum. More so, while scientists use concepts and theories to understand and explain the natural phenomena under investigation, the bulk of the concepts and theories are brought to the study.

On the other hand, the subjectivist epistemology holds that evidence does not come out of interplay between subjects and object rather it is imposed on the object by the subject (Crotty 1998). This is because the object makes no contribution to the generation of evidence (Kwawu 2009). But in subjectivism, humans make meaning out of something, for example under religious beliefs, the need for scientific evidences which are relegated to the back ground. And this leads us to a third epistemology on the divide, the constructionist epistemology.

The constructionist epistemology holds that meaning comes into existence as a result of human engagement with the practicalities of the world (Crotty 1998). Of which, meaning or truth is neither made known in the object merely waiting to be discovered, but rather developed by man as he engages with the world he is interpreting. Overall, the constructionist perspective argue that meaning or truth cannot be simply described as 'objective' or 'subjective' because they covertly reflect the social origin of meaning. According to Kwawu (2009) the sources of the interpretative strategies whereby meaning is constructed are embedded in institutions and cultures that come first and which investigators resonate with. Here culture is captured as the source rather than the result of human thought and behaviour, a set of control mechanisms for guided behaviour (Geertz 1973).

Thus epistemological perspectives are embodied in many theoretical assumptions. These assumptions are ways of de-constructing the world and making sense of it by providing a context for the process involved and grounding for its logic and criteria (Crotty 1998). The

theoretical position lying behind the research approach consists of a number of assumptions dealing with the world that the methodology or strategy envisages. Crotty (1998) identifies a range of theoretical perspectives that include: positivism; interpretivism; critical enquiry; feminism and postmodernism. It is however, not possible to review all these theoretical approaches fully here as several sources provide a detailed discussion (Kwawu 2009). But based on the aim and objectives, a constructionist and phenomenology approach within the interpretivist perspective is preferred. In turn, an ontological position of a socially constructed reality is adopted to exploring the mindset of decision makers in environments with high uncertainties. The phenomenology perspective facilitates the examination of risk management practices for any meaning and interpretation by reviewing the theoretical concepts and themes that exaggerate or hide its practical reality as an alternative to creativity and competitive advantage from the perspective of clients and contractors.

6.3. Research strategy: aligning with a continuum

The underlying philosophical positions are key to deciding the research strategy and method(s) the investigator needs to adopt. This is often regarded as a block of skills, assumptions and practices that researchers employ when collecting and analysing empirical materials (Denzin and Lincoln 2005). Thus it is essential to consider the research problem in terms of appropriateness of the selected research strategy and methods (Kwawu 2009). Where the preferred strategy should be appropriate and well suited to the research problem and questions in sight by showing how well it accomplishes the practical limitations of the research study.

Table 6.2. Research strategies

Research Strategy	Definition
1.Experimental research	This is a systematic and scientific approach to research in which the researcher manipulates one or more variables, and controls and measures any change in other variables. This type of experiment is conducted in a well-controlled environment – not necessarily a laboratory – and therefore accurate measurements are possible.
2. Survey research	Survey research involves the collection of information from a sample of individuals through their responses to questions.
3. Phenomenological research	This is an inductive, descriptive research approach developed from phenomenological philosophy; its aim is to describe an experience as it is actually lived by the person.
4. Case studies	This is an in-depth study of a phenomenon, which can be either prospective or retrospective. The latter involves looking at historical information; and the former is a type of case study in which an individual or group of people is observed in order to determine outcomes.
5. Action research	Also known as participatory research, it calls for insight, reflection, and personal involvement with the topic being explored. It is conducted in real world settings by the people directly involved with the problem or situation being investigated.

Table 6.1 is a capture of several well-known research strategies. These strategies include experimental research, survey research, phenomenological research, case studies and action research (Seymour and Rooke 1995, Fellows and Liu 1997, Root *et al* 1997). While this is

not an exhaustive list commentators have devoted studies and reports on their application and limitations in the field of construction management research. However, for the purpose of this study emphasis will be on case study.

6.3.1. Case study

A case study is a research strategy, which strive towards a holistic understanding of sets of interrelated activities engaged in by the actors in a social situation (Kwawu 2009). It uses several sources of both qualitative and quantitative data. Case study as a research method is commonplace in the disciplines of law and medicine, where "cases" make up the large body of the research work. Arguments for and against the use of case study is commonly held at different levels, often in the mode of explanation of a preference between a collection of multiple methods focused on one or more cases (Yin 1994, Saunders et al 2006, Fellow and Liu 1997, Crotty 1998).

The case study research strategy is preferred as a means of investigating risk management practices in a peculiar environment, as it is assumed by commentators to be the most appropriate to the set of research questions presented in this thesis. A case study might appear to be of limited significance in this regard; however, it is argued that it might not only be of use in demonstrating unknown risk management practices in the Nigerian construction sector, but there may also be insights into the mindsets of decision makers up and down the supply chain. A case study might serve as a filter, through which "the interventions of sanctioning systems, administrative arrangements, understanding of the underlying

phenomenon and behaviourism can be observed over time" (Denscombe 2010). Comprehending the experience of respondents in organisations, in some detail might be used to exemplify wider concerns about the implementation of risk management practices. The restrictions of such an approach are noted, but technologies and measures exist to overcome these restrictions (Yin 1994). The case study approach is particularly suitable in exploratory research as it allows the phenomena under study to be intensively investigated in its real-life context (Kwawu 2009).

6.4. Research methods

The research philosophy and strategy are as established in the preceding sections of this chapter. Therefore there is need to consider the most appropriate methods needed to collect and analyse the research data. Decisions about what type of data is required, the sources of data and the appropriate methods of data collection and analysis (Fellow and Liu 1997); more so, there are strong links between the type of data collected and the type of analysis suitable for them.

In this research, consideration is given to quantitative and qualitative methods. Quantitative methods allow researchers to use standardised measures to fit varied opinions and experiences into preset response categories. On the other hand, qualitative methods will allow the researcher to study issues in depth and detail without being inhibited by preset categories of analysis.

6.5. An overview of data sources

The fundamental difference between qualitative and quantitative data is that quantitative data are in numerical form while qualitative are not. The two approaches of data collection used in collecting data encompassed; a) examining records and b) using self-report measures such as questionnaires and interview. Conducting observations, which is the third known approach was not used because of resource constraints.

This research could not be conducted across the six geopolitical regions of Nigeria because of resource constrains. However, a case study of Lagos State, Nigeria was preferred. This is because Lagos was the first capital city of Nigeria, a status which made it choice city for establishing headquarters of many construction companies, especially those who wanted to leverage on that status to gain proximity to the federal government of Nigeria. Although the capital of Nigeria was moved to Abuja in the year 1991, the economic activities going on in Lagos State did not decrease significantly as Lagos remains the economic and commercial capital of Nigeria.

6.5.1. Population of study

The population of this study was to include registered construction contractors in Nigeria; but in the absence of a reliable database – and since the researcher cannot reach out to all the construction companies nationwide - purposive method of sampling was adopted. Purposive sampling, also known as judgmental, selective or subjective sampling, is a type of non-probability sampling technique. Non-probability sampling focuses on sampling techniques where the units that are investigated are based on the judgement of the researcher.

6.6. Research design

Research design is a blueprint or scheme that is used by the researcher for specific structure and strategy in investigating the relationship that exists among variables under study so as to enable him or her collect data which will be used for study. Asika, (1991) postulated that research design means the structuring of investigation aimed at identifying variables and their relationships to one another. Kerlinger, (1993), also explained that research design is used for the purpose of obtaining data to enable the researcher answer research questions. It is an outline or a scheme that serves as a blueprint or a useful guide as the researcher organises his/her effort to generate data for his/her study. The instrument of survey's design which is informed by literature review has been attached as an appendix.

6.6.1. Interviews

Use of in-depth open-ended interviewing permits the researcher to solicit for detailed description and holistic understanding of an interviewee's view and opinion on a subject. With the aid of interviews, the researcher is able to learn about things she cannot observe directly such as thoughts, intentions and project activities that occurred in time past.

The limitations of in-depth interviews can be accommodated by combining standardised open-ended approach with an interview guide approach, ensuring that the best description is provided while new topics and issues that arise are also dealt with. By combining two of the three approaches, the data collection is arguably flexible and systematic.

6.6.2. Sampling

The primary method of sampling for self-reporting measure is purposive sampling – useful for deliberating selecting respondents and cases with rich information about the phenomenon under study (Patton 1987). Thus the selection of interviewees and case study will be based on clients and practitioners who have experiences in decision making up and down the supply chain.

Sampling is the process of selecting respondents and cases from a population of interest, and there are two types of sampling procedure. There are the random sampling and non-random sampling (Trochim 2001). It is worth noting that any form of random selection is known as probability sampling method as it depends on selecting a truly random and statistically representative sample of the population of interest. The non-probability sampling method are two broad types, the convenience and purposive. Within the purposive sampling method are several different strategies, with varying strength and weaknesses for selecting information rich cases. The logic of purposive sampling lies in the fact that usually the sampling problem is approached with a specific plan in mind and 'information ready' cases are selected for in-depth study. Consequently, the selected samples are based on the investigators judgement and the purpose of the research.

6.6.3. Types of purposive sampling

There is no one best method of purposive sampling. Different research problems require different sampling technique; and there are a wide range of purposive sampling that can be

used (Bradley et al, 2007, Guion *et al*, 2011). Some of the different purposive sampling techniques are discussed below:

Maximum variation sampling - Maximum variation sampling is a search for variation in perspectives, ranging from those conditions that are view to be typical through to those that are more extreme in nature. This technique is used to capture a wide range of perspectives relating to the research laboratory that being studied.

Homogeneous sampling - This is a purposive sampling technique that aims to achieve a homogeneous sample; that is, a sample whose units share the same (or very similar) characteristics or traits Homogeneous sampling is the opposite of maximum variation sampling. A homogeneous sample is often chosen when the research question that is being addressed is specific to the characteristics of the particular group of interest, which is subsequently examined in detail.

Expert sampling – This is used when your research needs to obtain information from individuals that have particular expertise. This expertise may be required during the exploratory phase of qualitative research, highlighting potential new areas of interest or opening doors to other participants.

6.7. Validity of research work

Validity is the principle that is used to judge the quality of the research (Patton 1990). Reliability is concerned with demonstrating that the research procedures can be repeated with

the same results. There are four widely recognised tests of research validity. These are construct validity, internal validity, external validity and reliability.

Construct validity is concerned with establishing correct operational measures for concepts being studied. Internal validity is concerned with whether or not causal relationships have been established – a situation where certain conditions are shown to lead to other conditions distinguished from artificial relationships (Bryman 2004). External validity is concerned with knowing whether or not the findings can be generalised beyond the immediate study and to what degree this is suitable for the research. Because construct validity is problematic in case study research, the researcher will draw on multiple sources of evidence. In other words, ensuring that a sequence of evidence is noticeable in the case study report; pattern-matching will be used is addressing issues of internal validity. Similarly, transferability, a replacement of eternal validity, refers to the degree to which the findings of a qualitative research can be generalised to other context. Describing the research context in detail and the assumption that were central to research approach are accepted strategies for enhancing transferability.

Critical to validity is the attainment of inter-subjective agreement. This is achieved by using a variety of data sources. Given multiple data collection methods, SPSS and Nvivo – quantitative and qualitative data analysis software are used to promote validity of research works (Kwawu 2009).

6.8. Research design

To better address the research question derived in Chapter one, four interrelated research phases are adopted.

Phase 1: An overview of risk management practices from the relevant literature is undertaken in line with varying meanings and constructs attributed to it. The literature review is undertaken to identify and unravel issues relating to uncertainties and peculiar environments in the Nigerian construction sector. This is carried out to build a theoretical framework within which the research study is constructed.

Phase 2: A study on risk management practices of clients, contractors and subcontractors in Nigeria formed the initial phase of the research. Structured questionnaires were designed and administered. This set the stage for the in-depth interviews which formed the case study reported in subsequent chapter. The population for the scoping study was determined using stratified random method of sampling. This approach is preferred in the absence reliable databases of existing contractors and subcontractors (Ejohwomu, 2007). For improved responses, the survey instrument was delivered and collected by hand as suggested by Hammond (2006). Over a period of 12 months a total of 150 construction active participants were selected across two of the four geopolitical regions in Nigeria because of financial constraints. This structured but open ended questionnaire survey was used to gather information relative to respondents' demographics and risk management practices. Also, respondents were asked to indicate what they perceived to be major barriers to implementing risk management systems. In second quarter of 2013 a total of 19 completed questionnaires were collected in the first round of collection. This increased by 47 at the end of the second round of collection.

The data collected was analysed using SPSS 16 software. Descriptive statistics was used to tease the above objectives of the study. One-way ANOVA was used to test for significant differences in the perception of project risk importance and perception of barriers to implementation of risk management among the different data subjects. It was also used to test for significant differences in the practice of risk management techniques among contractors with differing work specialty. And to test for any possible relationship between barriers to implementation of risk management and the practice of risk management techniques; a Pearson correlation analysis was performed using a significance level of 0.05. The theory of competitive advantage acted as analytical framework. This data analysis set the stage for in-depth interviews.

Phase 3: A case study design is developed using the findings from phases one and two. One case study of risk management practices was conducted with data being primarily gathered through in-depth interviews, documents related to the case. The case is chosen on the basis these organisations have experienced uncertainties. All key members of the supply chain will be interviewed.

Phase 4: This phase of the study involves the data analysis and presentation of recommendations. Data from the interview transcript and case is to be analysed using QSR Nvivo. The data analysis will allow for further insight into the decision making process of contractors and clients. Thus a clear picture of how organisation process information is anticipated. These findings provide a conceptual framework for describing and discussing risk management practices of Nigerian contractors.

6.9. Research limitation

The use of more than one interviewer during data collection in phase three may serve as limitation and bias the findings since the data processing involved the investigator only. Within the limited resources at the researcher's disposal, it would not be possible to interview everybody in the firm. However, it is assumed that the key participants are senior managers involved in decision making.

6.10. Summary

The chapter set out to examine the research strategy and method to be used in investigating risk management practice of contractors. Practical choices were considered against set aim and objectives of the study. Attention was given to purpose enquiry and linkage between adopted theoretical framework.

CHAPTER 7

QUANTITATIVE INSTRUMENT AND ANALYSIS

7.0. Introduction

This Chapter draws on a general survey of contractor's risk management practices in Nigeria and stakeholders. In addressing the research questions raised in Chapter 1 an instrument of survey was designed to capture information on risk management practices through risk identification techniques, possible risk description, risk analysis techniques, risk response methods, risk monitoring methods, and barriers to risk management. Risk management practices helps determine what risks or hazards exist or are anticipated, their remoteness in time, duration period and possible outcomes. Fundamental to the instrument's design (Appendix 2) is the theory of competitive advantage. This is because it encourages the opportunistic potentials of uncertainty in projects.

7.1. FINDINGS

Respondents were asked to identify their top two work specialty areas. The instrument of survey is attached as Appendix 1.

The mean rating values were determined using the formula below:

$$\text{Mean rating} = \frac{\sum_{i=1}^{5} W * F_i}{n}$$

Where:

W = weight assigned or scale value of respondent's response for the specified project risk: W=1, 2, 3, 4 and 5;

Fi = frequency of the ith response;

n = total number of respondents to the specified project risk;

i = response scale value = 1,2,3,4 and 5 for negligible risk, low risk, moderate risk, high risk, and extreme risk, respectively.

Analysis of the findings (see Table 7.1) shows how the participants have ranked the identified construction project risk in order of very important or severe. The top five risks include: financial risk, defective material, defective design, incompetence of subcontractor and delayed payment. Thus it is very likely that projects would be abandoned due to financial risk. Table 7.1, shows that the risk associated with construction with construction projects in Nigeria. It is evident that the most significant risks are financial, defective designs and incompetence of subcontractors is significant risk. However, claims and disputes, Act of God, and others are least significant.

An assessment of the risk management practices shows that site visit and brainstorming were the most frequently used risk identification techniques. Quality of work, duration of the work and location of the project were factors that were widely considered in assessing the severity of a project risk. Qualitative risk analysis methods were found to be the most frequently used among the data subject. This method of risk assessment can be a very straightforward process based on judgement requiring no specialist skills. Consequently, decision analysis and intuition/judgment/experience were the most widely used risk. Also, periodic document review was identified as a risk monitoring technique. Lack of joint risk management

mechanism by parties involved, lack of formal risk management system and inappropriate risk allocation were found to be the top three barriers to implementation.

Table 7.1: Significance of risk

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Financial risk	33	1	5	3.73	1.180
Defective design	33	1	5	3.61	1.499
Incompetence of subcontractor	33	1	5	3.52	1.253
Safety	33	1	5	3.42	1.173
Defective material	33	0	5	3.36	1.578
Quality of work	33	0	5	3.33	1.451
Labour and equipment productivity	33	0	5	3.27	1.257
Site access/right of way	33	1	5	3.18	1.261
Delayed payment	33	0	5	3.15	1.439
Inflation and sudden changes in price	33	1	5	3.12	1.166
Labour, equipment and material availability	33	0	5	3.09	1.284
Differing site condition	33	0	5	2.94	1.413
Claims and disputes	33	1	5	2.79	1.386
Act of God	33	0	5	2.67	1.429
Others	33	0	2	.09	.384

Based on the survey data, most frequency used for risk identification has been identified (see Table 7.2). Brain storming, site visit and consulting of experts were the most used method. In contrast, using risk data compiled from previous experience, case based approach and other were the least used.

Table 7.2: Risk Identification

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Brain storming	33	1	5	4.15	.972
Site visit	33	2	5	4.12	.927
Consulting experts	33	2	5	4.03	.918
Check list	33	0	5	3.91	1.378
Using risk data compiled from previous exp	33	1	5	3.15	.939
Case based approach	33	0	5	2.97	1.212
Others	33	0	3	.09	.522

According to Table 7.3, it can be seen that the following risk factors are most considered during risk assessment, these are; **quantity of work**, **duration of the work** and **recent economic condition** of the country with corresponding mean scores of 4.15, 3.97 and 3.55. However, contract method, likelihood of risk occurrence and others with corresponding mean scores of 3.15, 2.79 and 0.06 were the least considered.

Table 7.3: Factors considered when assessing risk

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Quantity of work	33	2	5	4.15	.870
Duration of the work	33	2	5	3.97	.883
Recent economic condition of the country	33	0	5	3.55	1.227
Location of project	33	0	5	3.45	1.460
Insurance coverage	33	1	5	3.42	1.300
Allocation of risk	33	1	5	3.36	1.220
Financial capability	33	0	5	3.36	1.617
The extent of the impact of the risk	33	0	5	3.21	1.495
Contract method	33	0	5	3.15	1.349
Likelihood of risk occurrence	33	0	5	2.79	1.536
Others	33	0	2	.06	.348

Table 7.4, shows that qualitative risk assessment, consulting expert and decision analysis were the most used risk assessment tool with corresponding mean scores of 4.06, 3.91 and 3.67. In contrast, algorithm, Monte Carlo simulation and others were the least used with corresponding mean score value of 2.58, 2.48 and 0.21.

Table7.4: Risk assessment

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Qualitative analysis	33	1	5	4.06	1.248
Consulting expert	33	1	5	3.91	1.208
Decision analysis	33	0	5	3.67	1.451
Quantitative analysis	33	0	5	3.36	1.342
Institution/judgement/ experience	33	0	5	3.27	1.606
Computer use and modeling tools	33	0	5	3.15	1.439
Sensitivity analysis	33	0	5	3.12	1.431
Probability analysis	33	0	5	3.00	1.414
Decision tree	32	0	5	2.94	1.390
Semi qualitative	33	0	5	2.79	1.269
Risk premium	33	0	5	2.58	1.437
Algorithm	33	0	5	2.58	1.393
Monte carlo simulation	33	0	5	2.48	1.623
Others please specify	33	0	5	.21	.927

In Table 7.5 the relationship to risk monitoring and transfer is considered; and avoidance of the risk ranked highest among respondents. The intent to retain risk is surprisingly least on the table. And this supports the argument that Nigerian contractors are still very risk averse - a mindset which the adopted framework is focused on incentivising by given room for work to be done differently when uncertainty is rife.

Table 7.5: Risk Monitoring and transfer

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Avoid the risk	33	1	5	4.18	1.286
Periodic document review	33	0	5	3.82	1.530
Reduce the consequences	33	0	5	3.73	1.281
Reduce the likelihood of occurrence	33	0	5	3.67	1.291
Periodic risk status report	33	1	5	3.42	1.324
Insurance	33	0	5	3.42	1.621
Periodic trend reporting	33	1	5	3.27	1.506
Transfer the risk	33	0	5	2.91	1.444
Contingencies	33	1	5	2.88	1.317
Retain the risk	33	0	5	2.27	1.232
Other please specify	33	0	4	.39	.867

Based on survey results presented in Table 7.6, it can be seen that lack of joint risk management mechanism by parties involved, lack of formal risk management system and shortage of knowledge/techniques on risk management were major barriers to risk management practice. In contrast, unavailability of sound data to ensure the result of analysis, lack of risk consciousness and lack of time were considered as minor barriers to risk management practices.

Table 7.6: Barriers to risk management

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Lack of joint risk management mechanism by parties involved	33	0	5	3.76	1.582
Lack of formal risk management system	33	1	5	3.73	1.306
Shortage of knowledge/techniques on risk management	33	1	5	3.33	1.216
Ineffective risk control and monitoring strategies	32	1	5	3.31	1.355
Lack of expertise in risk management	33	1	5	3.27	1.376
Inappropriate risk allocation	33	1	5	3.27	1.232
Unavailability of sound data to ensure the result of analysis	33	1	5	3.18	1.310
Lack of risk consciousness	33	1	5	3.09	1.208
Lack of time	33	0	5	2.94	1.478
Others please specify	33	0	0	.00	.000

The one-way ANOVA did not indicate any significant difference in the perceptions of the data subject of differing work specialty regarding the top ranked five construction project risks. However, significant differences exists in the perception of the data subjects regarding

safety only (F = 4.055, P = 0.029). Notably, there was statistically significant difference in the practice of risk management techniques and quality of work.

The one-way ANOVA also showed thatthere was no significant differences in their perception of site visit and use of qualitative analysis method, there were some evidence of significant differences in their perception of safety, delayed payment, act of God and incompetence of subcontractors for risk assessment. There was no statistically significant difference between the data subjects in their perception of major barriers to risk management implementation in Nigeria.

In order to assess any correlation between barriers to risk management implementation and various risk management practices and techniques, a Pearson correlation analysis was performed. Surprisingly, no significant correlation was found between the identified barriers to risk management and indicated description of risk. Use of computers and other modelling tools correlates positively with shortage of knowledge/techniques on risk management and inappropriate risk allocation. There was no correlation among the risk assessment factors and barriers to risk management. In terms of risk response techniques "avoid the risk" was by far the most used response method, which affirms the argument that Clients and Contractors are often risk averse.

For risk analysis techniques – decision analysis, decision tree correlated with lack of time. And periodic risk status report correlated with the barriers of risk management and periodic trend reporting correlates with shortage of knowledge, lack of formal risk management system and unavailability of sound data to ensure the results of analysis. There was no

statistically significant difference between the data subjects in their perception of major barriers to risk management implementation.

7.2. Summary

This Chapter is a quantitative analysis of contractors risk management practices. It examines risk description, identification, response, monitoring and barriers to management. While the findings do not completely address the research question on the creation of unique value it sets the stage for probing the mindset of the decision maker and role of its immediate environment. The subsequent Chapter is a case study report.

CHAPTER 8

QUALITATIVE INTERVIEW AND ANALYSIS

8.0. Introduction

Besides Belel and Mahmood (2012) not many studies have attempted a qualitative review of risk management practices in Nigeria. The reason for this cannot be immediately ascertained but the environment is a peculiar one. The implication is that decision makers face a number of issues in the wake of limited information. Little attention is paid to the factors that influence the client and contractor's decision on the extent which risk management mechanisms have to be applied in order to control and coordinate the information diffusion up and down the supply chain. In order to identify and understand these factors an interview protocol was designed based on the findings of the quantitative study to carry out exploratory interviews with experienced practitioners in the sector. A case study is presented alongside procedures for analysing the interview data are explained. The finding of this in-depth investigation is discussed below.

Case study

Construction is a very complex activity as a result of its various inter-related activities and processes. Its complexity can also be viewed from the angle of the various professionals and specialists involved in the process. Due to these complexities, it is assumed that challenges related to uncertainty, materials, workmanship, and health and safety will arise; and these issues needs to be understood, controlled, minimised or eliminated totally so that the three

main factors of construction: time, cost and quality (performance) are achieved with the minimum amount of resources.

The case study projects are a new built (Lump Sum Contract with a finish time clause) project valued at N120m in the suburb of Lagos State. The project which is a prototype of an existing Halls of residence was undertaken due to the usual intake of students for the various academic programmes coupled with the fact that the school has just recently been granted licence to commence new programmes in different fields, thereby, making the construction of additional accommodation facilities a necessity.

Construction of these buildings commenced in June 2012 with each building comprising of 2-storey floors and each floor capable of accommodating almost 200 students. Construction stage has reached timber roof carcass construction, but according to the work programme of the contractors handling the project, the hostels are to be delivered before the commencement of the 2014/2015 academic session.

Risk management problems in construction can arise as a result of uncertainty, poor planning of the project, poor workmanship, wrong construction methods and use of poor quality materials. However, problems can also be as a result of the contractor trying to cut corners. Irrespective of the origin of problems, these challenges are bound to become visible as construction reaches complex stages. These problems needs to be understood in order for the proper and adequate response to be used in correcting them and also as a form of project monitoring by the site engineer to ensure such problems do not show up in subsequent projects.

Here, construction refers to the sum of various activities carried out in the development phase of a building/civil engineering project. These post briefing activities include carpentary

works, concrete works, reinforcement works, block work, and plastering/rendering. Below are the construction activities covered by the case study:

Formwork/Carpentary works: Timber members used for the roof trusses (carcass) had some defects e.g splits. Also the timber used for the beams and slab formwork (sawn timber) were not adequately propped/braced and not also sawn to size which lead to unequal dimensions or poor finishing surface of the concrete elements. In addition, striking off technique was poor such that some beams that needed plastering could not be plastered because some timber boards (adhered to the concrete) were not totally removed from the beams.

Concrete works: Batching of concrete materials (granite, cement and sharp sand) was done by volume (use of shovels, wheelbarrows and headpans) which could lead to different mix ratio and mix quality/homogenity. Due to the poor bracing/propping of formwork and falsework as explained above, the finished beams and columns had unequal faces which needed to be chiselled or corrected with plaster mix. There was also no ground beam to support the landings of the stairs and no form of monolithic construction between the stair landing and the columns around the stair well.

Plaster works: Plaster work was of poor quality because most of the walls were undulating as a result of some of the masons using 2”X3” (50X75) timber sections as ranges. While trying to correct (fill) with plaster mix, the errors made by the formwork of concrete elements during concreting, the plaster mix, whose materials

were also batched by volume, were not homogenous as this was shown in the different patches of colours after setting.

Blockwork/Brickwork: These were both done due to the fact that the external cladding is to be of brick walls while the internal partitioning walls were of sandcrete blocks. Blockwork was sometimes done without proper use of plumb. This was the same for the blockwork.

Materials

The quality of a project in terms of getting value for money begins from the level of quality of the materials used for construction. A sound material coupled with a high level of workmanship with adequate supervision will bring the best of every construction work. The quality of any type of material before being utilised for construction begins with its stocking and handling. Whether it is timber or masonry, any form of poor storage will lead to a depreciation in the quality of such materials. Below is the analysis of materials handling and stocking as it affects the case study:

Cement: These were stored haphazardly in the store whereby some were left lying directly in contact with the ground which would lead to moisture absorption into the cement thereby causing the cement to set making it harden and lead to low cement quality and wastage of cement.

Reinforcement Bars: Rebars were kept in the open thereby making them prone to corrosion which affects the bonding between the cement and steel.

Steel Pipes: Steel pipes needed for window burglary were also left in the open which would lead to corrosion.

Bricks/Blocks: Stacking of blocks and bricks was in the open and on uneven grounds that could lead to breaking and wastage.

Sharp/Plaster Sand: These were tipped on erosion-prone terrains which would lead to them being washed away.

It was noted during the site visit that the materials supplied to the site varied in terms of colour especially the timber board for fascia board. This is assumed to be as a result of the presence of two contractors on the project, that is, each building was handled by different contractors (Contractor X and Contractor Y).

Workmanship

Quality workmanship is a major ingredient in achieving good value for money in construction. Irrespective of the level of the quality of the material used, a good artisan with proper use of tools and interpretation of maesurements can produce a good work. Unfortunately workmanship on this project were not top notch. It was noticed during the site visits that the "so much preferred" artisans from neighbouring countries especially Benin Republic were not as good as clients believe. This could be due to the Nigerian factor of "do it as you like, I just want the project to be delivered on time", they are not up to the task or they have become negligent like our Nigerian artisans. A typical example of poor workmanship is a case of a certain mason using timber sections as a range while plastering a beam.

Health and safety

Health and Safety (in the Nigerian Construction Industry) is the major problem on the site. It was a disappointment and issue of concern that the health and safety practice on the construction site was totally on level zero. The **ONLY** health and safety material on site was the first aid box, some few hard hats and rain boots (which were not being used). The site engineers who were to enforce the use of basic PPEs were not at all protected themselves from all the potential hazards on the site and since leadership is by example, the whole site personnel (site operatives/craftsmen) were all exposed to hazards that could lead to accidents, near-misses and dangerous occurrences and even death. Below are the various hazards noticed on the site:

No signpost at entry/exits point of site: There was no sign of information to the general public and passers-by indicating construction activities going on around the site area.

No use of PPEs: Site operatives were not putting on the minimum and basic PPEs (Personal Protection Equipment), there was no evidence of overalls, safety boots, and hand gloves.

No safety signs on site: Since there was no signpost to indicate that construction was going on around the area, there was no sign of safety signs and symbols that would inform visitors and site operatives of safety information especially on areas where they shouldn't move to (areas where heavy plant/equipment are being used).

No site gantry/fencing: The construction site was too open to anybody walking by because there was no form of site fencing all around the working area.

Poor handling/usage of materials: Materials such as used timber sections/boards, electrical cables and reinforcement bars were lying around the whole site vicinity.

Poor site hygiene: General environmental condition and hygiene of the site was so poor as bushes/weeds were seeing all around the site.

No fall protection: Craftsmen/Site operatives especially the steel benders working on the 1st floor slab formworks were not anchored to any form of support.

Likely hazards exposed to site workers

Musculoskeletal injuries: These could be caused due to poor lifting methods by the site labourers.

Accidents/Injuries: Passers-by/visitors to the site who are not aware of the different on-going processes may get caught in-between machines or even fall into excavated trenches.

Falls: People working at heights may fall when distracted because there was no fall protection on site.

Harm from external aggression: Due to the fact that there was no site fence, harm could come to the workers on site either from external aggression or from wildlife.

Deep Cuts: Materials like timber sections, reinforcement bars or even nails could pierce the bodies or legs of site workers.

Trips: Electrical cables or building lines lying around could trip the site workers.

It should be noted that the above mentioned hazards are just the few amongst many the workers were exposed to at the moment of site visitation. Uncertainty decreases as construction activities progresses, and more hazards exposed to workers.

As part of this case study, several sites visits were made. The basic methods adopted while investigating the problems include:

Use of Photographs: This was first met with objections especially from the artisans and site labourers who did not want their pictures taken while at work. After some deliberations with the site engineer (Contract X), the researcher was allowed to take pictures. This was also the same when the researcher moved to the site of Contractor Y.

Observations: While on site visits, all works going on were closely observed in order to learn i.e. see how practical is being merged with theory and also try to correct the artisans on the actual things to be done.

Note taking and in-depth interview: All observations where noted. In addition, client, site manager and project engineer were asked questions and their answers were recorded and transcribed. See appendix 6 for relevant pictures.

8.1. Interview objectives and design

An in-depth study was chosen to carry out this phase of the research to enable a better analysis of risk identification, description, control, monitoring and barrier to risk management. These interviews were intended to give an insight into the overall

design and implementation of risk management practices as well as provide new ideas by tapping into the experience of main contractors and other stakeholders who are involved in the decision making process of risk management in the sector and an overview of uncertainty in preconstruction, construction and post-construction. As such, an assessment could be made of whether the theoretical framework adopted in Chapter 5 will enhance creativity in a peculiar environment. Based upon the aim and objectives (Section 1.3 and 1.4) and semi-structured interview method justified in the methodology chapter, the interview guide was developed to cover the main areas categorised in the theoretical frame work (Section 5). This ensured some degree of comparability while allowing for flexibility in pursuing greater insight in competitive advantage. The interview guide was structured in accordance with the basic scheme of exploratory questioning advocated by Yin (1994) – this encompasses 'how', 'what', 'who', and 'why'.

8.2. Interview procedures

Procedural issues relating to selecting interviewees, conducting the interview and collecting data are detailed in this section. Although a review of the literature had resulted in the acceptance of a theoretical framework, additional information which highlighted issues of peculiarity in the Nigerian construction industry emerged from the qualitative study. The data collected for this phase of the research is derived from fourteen in-depth interviews undertaken, each lasting between an hour and two hours. The researcher also had access to paper trails on different phases of the construction process. Table 8.1 shows the range of practitioners interviewed. The sample consists

of clients, main contractors and consultants. The client has significant experience in commercial and educational infrastructure projects. The two academics with significant experience of promoting risk management practices in peculiar environment like Nigeria. Of the 14 interviewees, 8 allowed the interviewer to record the interview while 6 allowed only notes to be taken, which a characteristic of a what the researcher means by peculiar environment. The freedom of information Act does not encourage access to public records. The implication on this on validity will be difficulty in achieving generalizability - the degree to which the results of a study based on a sample can be said to represent the results that would be obtained from the entire population from which the sample was drawn - of research efforts. To this end, it was necessary for the investigator to disassociate investigation from any foreign affiliation for fear of distortion in facts by participants. Four of the interviews took place in the respondent's site office while the other happened in the respondent's office.

Table 8.1 Summary of interviewees

Client	Main contractor	Consultant	Academic
2	5	5	2

8.3. Selection of interviewees

Drawing on the analysis of the quantitative study, respondents were chosen using purposive sampling. The fundamental decision of who will be the most appropriate participant came

from the quantitative analysis and conversations with my supervisor. In order to achieve heterogeneity in the sample, a range of practitioners of different professional background, company size, and experience were interviewed.

8.4. Coding the interview

Issues central to the coding of the transcribed interview are twofold: i) development of the template was not separated from its usage in the analysis of the text (King 1998); ii) some of the data were coded as free nodes in order to avoid excluding any potential data and to ensure an exhaustive iteration (Fellows and Liu 1998; Kwawu 2009).

In keeping with due process (Creswell and Miller 1997), the text was initially coded using the interview guide as pre-determined codes. Each main section of the structured interview guide was considered as a tree node with each supplementary question or probing question as a child node. This provided the template (See Appendix 3) as well as an overview of the general direction of coding the interview transcripts. In particular, the analysis will emphasise the distinction between the client and contractor perception of risk management practices. Where the nodes most coded on the contractor side are risk analysis methods and techniques, risk identification technique, risk description, risk management, safety, peculiar business activity and exposure of economic loss and gain.

The nodes most coded on the client side varied significantly to that of contractor perception. Why? Their priorities in terms of project delivery are completely different. The client is contending that the risk of project failure rests in the hands of the artisan and contractor - a claim which is evident in the case study.

The peculiarity node which is represented using a purple colour was common to both client and contractor. See appendix 5 for screen shots of Nvivo content analysis.

8.4.2 Managing and analysing the coded data

With the aid of Nvivo the presentation and analysis of data used here is embedded in the subjective interpretation of the coded data. The analysis provides a map of the investigator's understanding of contractor's risk management practices in Nigeria. "Challenges help us to do more". Client adopts more of a reactive risk management practice rather than the preferred pro-active approach recommended by practitioners. In this case study the primary duty of the client's architect is to "produce architectural design for future projects, analyse brief, liaise with end users. The interior of the building, choice of colour and brief taking – cost and budget is key to what we do". Notably, the client depends on contract document and administration for risk management. The client's role in terms of driving risk management practices is very weak or negligible. This is because the client depends on the contract clauses. What this implies is that the project delivery risk is transferred to the contractor, which is contrary to best practices. For example, Heathrow Terminal 5 proponents argue that innovation is rife when the client takes responsibility or share in the risk instead of transferring down the supply chain.

On the techniques by which clients identify risk, no systematic approach to identifying risk through the construction process emerged. The client's position on the barriers to risk management was more of "human factor". Here emphasis was on poor manpower planning not skills shortage. It is worth noting that the client has a peculiar way of managing market fluctuation in this case study. Where necessary the client will assist with the supply of

material where fluctuation in market price puts the supply chain at disadvantage. Yet, manpower related problems and poor supply chain management is signposted as a major challenge “they do not bring support technical staff who understands what you are about to do, we would have to argue back and forth before we stand our ground. The contractor would not do the work himself, he will employ artisans. And when the artisans have problems with the contractor, the contractor sources for other ones. That is where the problem comes”. A supply chain manager is recommended to better coordinate actors involved in project delivery.

There is little or no trace of investment in personnel development. Staff often depends on professional memberships for continued personnel development. This impact of limited training is reflected in the quality of supervision and management of onging construction projects. Professional ego is commonplace. Need for team work is a recipe for effective risk management practice. Overall, the client devolves risk management responsibility to the contractor – a culture which should be discouraged.

Risk management practices

It is clearly evident from the responses of the participants that formal risk management practices is absent in their firms. The respondent on the client side has clear idea of what risk is and what types of risk affect projects; however, based on response from the contractor, risk is viewed as safety risk alone. When asked about risk his response was “we have first aid box here to quickly attend to wounds and if beyond us taken to clinic”, this clearly shows he views risk as safety issues alone.

Risk identification

It is evident that risk identification, assessment, and response are done in an informal way. Most of the decisions on risk are based on intuition. Hence, the risk management process is not systematic as it should be. The client representative points out that on some projects meetings are held prior to contract award. At such meetings, the individuals present brain storm on issues that could affect the project.

Both set of respondents have no risk register. The respondent on the client side made it clear that risk are transferred via contract documentation. The client makes it evident that contract documentation is a mode the client uses to transfer risk to the contractors. Also, advance payments are used in the clients fixed sum contracts so as to avoid/ minimize cost risk in projects. The participant were of the opinion that Human factors constitute the main barrier to risk management. Based on the responses from the contracts personnel, it is evident that design and finance i.e. delayed payment is a significant risk associated with construction projects.

It is worth noting that the perception of risk amongst clients and contractors can be categorized into seen and unseen. Where seen is associated more with the actual construction phase and unseen embedded in the pre-construction phase. To this end, clients and contractors do not seem to the need to imbibe known risk management practices that fosters proactive risk management in organization.

8.4. Summary

Discussed within this Chapter is a case study of a typical project in the Nigerian construction industry with common and peculiar problems. In particular, the Chapter has addressed the research objective – to conduct a single case study of an ongoing project in the Nigerian construction industry.

Next is a conclusion of the research findings as well as recommendations of realistic but contemporary risk management practices in a peculiar region.

CHAPTER 9

CONCLUSIONS, RECOMMENDATION AND NEXT STEPS

9.0. Introduction

Against the background that contractors in developing countries with peculiar environments (such as Nigeria) need to employ effective risk management frameworks, this research has developed a conceptual model for integrating competitive risk management practices in the procurement of construction and building services works. Subsequently, the link between uncertainty (information) and value (satisfaction) is established. The eight chapters presented so far have outlined the literary, theoretical and methodological approaches for addressing the research agenda.

This Chapter summarises the issues addressed in the study. Key definitions are used in the study with respect to the terms uncertainty and risk management practices. This is then followed by restating the research aim, objectives and research questions. A summary of how the objectives were satisfied is elucidated followed by the conclusion and recommendations for future research.

9.1. Definition of risk management

In this thesis, it has been noted that the term risk management albeit widely used in construction management is subject to debate among contractors and stakeholders. Risk management refers to the culture, process, and structures that are directed toward effective

management of risks including potential opportunity and threats to project objectives. Portier 2008 however contend that there is correlation between uncertainties and opportunity when managing risk. In other words, when uncertainty in High value is also High. In the Nigerian construction industry the variables cost, time, quality and power have been identified by contractors as the primary determinant of achieving client satisfaction. Therefore, with this research context, the contractor is defined as an organisation that undertakes the construction of a building or infrastructure on behalf of a client for an agreed fee.

9.2. Research questions

In undertaking this research four research questions were posed, namely:

- What are the risk management practices of contractors in a peculiar environment like the Nigerian construction industry?
- To what extent will known risk management practices influence competitive risk management practices in the construction industry?
- What factors influence the attitudes of stakeholders in these dynamic environments?
- What is the role of power relations in the construction supply chain? Is power an opportunity cost to competitive advantage in the Nigerian construction industry?

9.3. Review of objectives

The main aim of this research, as noted earlier, was to develop a conceptual model for integrating competitive risk management practices in the procurement of construction and building services. Subsequently, a number of research objectives were developed in order to collectively satisfy the aim. The research objectives are revisited to highlight the extent to which they were accomplished in the research.

Objective 1: To review existing risk management models with the aim of identifying a framework for mitigating peculiar risk management practices in Nigeria.

Some important issues regarding the significance of risk management practices were identified from the broader organisational management literature including recent contributions in construction management publications. While the peculiarity of the research laboratory was discussed, cost and time overruns, unclear understanding of risk, adverse relationship between stakeholders, and unhealthy competition between ICs and MCs were identified as gaps. Therefore, the project manager needs to develop adequate time for imbibing risk management culture. In particular, the literature revealed that while some attempts have been made towards effective risk management practices in the construction industry in developing countries, the focus of most of these studies have been embedded in quantitative research methods. The review was therefore helpful in underscoring the view that there is a dearth of qualitative research towards improving risk management practices in a peculiar environment like Nigeria; and thus provided modest justification for the need for the research.

Objective 2: To identify all challenges stakeholders contend with in the Nigerian construction industry.

The second objective was satisfied by conducting a quantitative analysis of contractor risk management practices, which was reported in Chapter 7. The chapter examined risk description, identification, response, monitoring and barriers to management. The analysis revealed that lack of joint risk management mechanism by stakeholders and lack of formal risk management systems are the two most important challenges to risk management practices in Nigeria. Lack of risk consciousness and lack of time were considered contractors to be less of a challenge to stakeholders.

Objective 3: To conduct a quantitative assessment of contractors risk management practices in Nigeria.

While there exist an acknowledgement of the contribution made by other commentators in the Nigerian construction industry, a lack of detailed research into the lukewarm attitudes of construction firms in the context of risk management practices still exist. Objective 3 and objective 4 were achieved in Chapter 8, which is an in-depth study of a typical Nigerian construction project. Surprisingly, the case study is Chapter 8 showed the emergence of a new variable (power relations) in the Nigerian construction industry - a variable that subdues the theory of competitive advantage.

9.4. Conclusions

The main conclusions are summarised is that in Nigeria contractors now depend on uncommon strategies and networks to improve their chances of winning and delivering new

projects. However, very little is known about the uncommon risks – high cost of opaque tendering processes, lack of information, skills shortage and seasonal bankruptcy - contractors face in peculiar developing countries like Nigeria. In other words, the contributions of the construction industry warrants persistent review of its gaps; risk and uncertainty are particularly rife in most Nigerian construction projects, and the cost implications are severe enough to influence its low GDP contribution and beyond. The aim of this research effort is to develop a conceptual model for integrating competitive risk management practices in the procurement of construction and building services works in Nigeria from inception to completion.

In non peculiar regions cost, time, quality, safety and satisfaction are variables used commonly in defining the success of construction projects. However, central to this definition is the amount of information available to the decision maker from inception to commissioning of the project. This is where uncertainty is anticipated to decrease with time. SMEs are an aggregate representation of the Nigerian construction industry - to ensure that the findings reflect the general trend nationally.

This study which is part aimed at assessing the risk management practices of clients, main contractors and subcontractors in Nigeria. Evidence from Table 7.5 suggests that both clients and contractors are very risk averse. Yet, they claim to have formal written procedures for risk management, and similar perception towards the importance of project risks. Thus, indicating that their awareness of the importance of risk management in construction business is one of 'lip services'. A finding which complements the quote from a main contractor "Case 2... risk management practice cannot be effective without enforcement till safety

becomes a way of life"; this also resonates with the findings of Akintoye and McLeod (1997). More so, "avoidance of risk" was regarded by participants as their preferred risk response technique. Additionally, Construction projects are likely to be abandoned due to financial risk and lack of joint risk management mechanism between the client, main contractor and subcontractor. It was not possible to reliably predict what will happen in a construction project under certain situations.

Following the discussions above, the research described herein evolved around the main aim which is to develop a conceptual model for integrating risk management practices in the procurement of construction and building services works in Nigeria from inception to completion was achieved in Section 5.3. The objectives of the research were achieved by answering the research questions posed in Section 1.6. However, the main limitation of this study is that the developed conceptual models requires testing and validation for generalizability to be achieved..

Overall, an assessment of risk management practices on the value chain of the case study presented various problems on the site, it was discovered that most of these issues arose as a result of poor supervision, poor workmanship, inadequate planning of the work as a whole and little or no attention for unseen risk.

The client and contractor did not do enough to see that every artisan carry out their job with the right and proper value chain. The artisans also were doing the job without precision because most of the beams plastered had little curves or arcs when viewed from far. The

walls plastered were also undulating and the timber used had defects and were also allowed to be used that way.

The whole work was not adequately planned as the non-existence of site gantry or fencing shows that the contractor did not care about the welfare of those working on the site or any passer-by because the site workers could be attacked by external aggression while the construction activities especially works at heights could make objects hit anybody passing thereby leading to accidents and injuries.

9.5. Recommendations

- Clients and contractors should make sure that their workforce is linked with an integrated supply chain management system.
- Clients and contractor should carry out effective supervision. In cases whereby the project is massive, they should seek for assistance of relevant professionals.
- Clients and contractor should see insurance schemes as tool for incentivising risk management practices up and down the supply chain.
- Clients and contractor are to ensure the best quality material as specified in the BOQ should be supplied to site.
- Contractors should always ensure that there is basic risk management training for the field workers and the technical staff.

LIST OF ABBREVIATIONS

GDP – Gross Domestic Products
MNE – Multinational Enterprise
BP – British Petroleum
OPEC – Organisation of Petroleum Exporting Countries
RM – Risk Management
ICs – Indigenous Contractors
MCs – Multinational Contractors
SMEs – Small Medium Enterprise
TFR – Traditional Financial Ratio
SC - Supply Chain
SCM – Supply Chain Management
ROA – Return on Investment
CCC – Cash Conversion Cycle
ABS - Asset Backed Securities
CSI – Cost Schedule Integration
DYCAFF – Dynamic Cash Flow Forecasting Model
B2B – Business-to-Business
EDI – Electrical Data Interchange
ERP – Electronic Resources Planning
RFQ – Request for Quote
PM – Project Manager
CM - Construction Management

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APPENDIX 1

Ejohwomu, I.J, Hammond,F, Shofoluwe, M, and I. Akinwumi. (2013). A quantitative assessment of risk management practices of general contractors in Nigeria. 3rd International Conference on Infrastructure Development in Africa (ICIDA). 14-16 March 2013

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APPENDIX 2

QUESTIONNAIRE

This questionnaire is intended to collect information from construction contractors and stakeholders on **Risk Management Practices and how it affects the Nigeria Construction Industry.**

Everything you tell us will remain completely private and confidential.

Please tick a box wherever you see this sign ✓or write in your answer wherever you see this sign ✎

Section -1 – General organizational information

Please provide information about you and your company. (All responses are confidential)

1. Personal information

Job/Administrative title of responding officer ✎_____

Years of experience in the Construction Industry✎ _____

Years of experience in current position✎_____

2. Company information

What type of work is normally undertaken by your company? ✓ (Please mark your top 2)

- ☐ Commercial Construction
- ☐ Industrial Construction
- ☐ Residential Construction
- ☐ Engineering/Highway/heavy Construction
- ☐ Architectural/Engineering
- ☐ Other (please specify)_____

Number of years your firm has been in operation✓:

- ☐ under 5 years
- ☐ 5- 10 years
- ☐ 10 -20 years
- ☐ 20 – 30 years
- ☐ over 30 years

3. How do you describe your organization's risk management practices? Please mark the best applicable one. ✓

   ☐ Implement risk management practices but do not have a formal written procedure for risk management.

   ☐ Implement risk management practices and have a formal written procedure for risk management.

   ☐ other,specify✎_____

Section-2 – Risk management practices

1. Please rate the following possible project risks based on your perception on their importance or severity in construction projects. ✓ (From 5 to 1 where, 5= Extreme risk , 4 = high risk, 3 = moderate risk, 2 = low risk and 1= negligible risk)

Risk Description	**5**	**4**	**3**	**2**	**1**
Quality of work					
Safety					
Defective design					
Labor and equipment productivity					
Site access/Right of way					
Delayed payment					
Force majeure/Act of God					
Differing site condition					
Incompetence of subcontractors					
Labor, equipment and material availability					
Financial risk					
Inflation and sudden changes in price					
Claims and disputes					
Defective material					
Other ,Please specify :					

2. To identify associated project risks, how often do you use the following techniques? ✓ (Please rate from 5 to 1 where, 5= Always , 4 = very frequently , 3 = frequently, 2= occasionally and 1= Never)

Risk Identification techniques	**5**	**4**	**3**	**2**	**1**
Check list					
Brainstorming (from project participants/risk team)					
Consulting experts					
Site visit					
Using risk data compiled from previous experience					
Case- based approach					
Other , Please specify:					

3. In assessing the importance or severity of risk on a project, how often do you consider the following factors? ✓ (Please rate from 5 to 1 where , 5= Always , 4 = very frequently , 3 = frequently, 2= occasionally and 1= Never)

Possible risk description	**5**	**4**	**3**	**2**	**1**
Capability of bearing the risk/financial capability					
Allocation of risk					
Duration of the work					
Quantity of work					
Recent economic condition of the country					
Insurance coverage					
Location of project					
Contract method (e.g. Lump sum, cost plus...)					
Likelihood of risk occurrence					
The extent of the impact of the risk					
Other, Please specify:					

4. In analyzing the effect of risk on a project, how often do you use the following methods and techniques? ✓ (Please rate from 5 to 1 where , 5= Always , 4 = very frequently , 3 = frequently, 2= occasionally and 1= Never)

A) Risk analysis methods	**5**	**4**	**3**	**2**	**1**
Qualitative analysis					
Semi-qualitative analysis					
Quantitative analysis					
Consulting experts					
Use of computers and other modeling tools					
B) Risk analysis Techniques					
Decision analysis					
Decision tree					
Probability analysis					
Sensitivity analysis					
Algorithm					
Risk premium					
Mont Carlo simulation					
Institution/judgment/experience					
Other ,Please specify:					

5. In handling or dealing with the risk in a project, how often do you use the following response methods and techniques? ✓ (Please rate from 5 to 1 where , 5= Always , 4 = very frequently ,3 = frequently, 2= occasionally and 1= Never)

Risk Response methods	**5**	**4**	**3**	**2**	**1**
Avoid the risk					
Reduce the likelihood of occurrence					
Reduce the consequences					
Transfer the risk					
Retain the risk					
Contingencies					
Insurance					
Other ,Please specify:					

6. In order to monitor and control the risk response method and risk preventive action taken, how often do you use the following monitoring methods? ✓ (Please rate from 5 to 1 where , 5= Always , 4 = very frequently , 3 = frequently, 2= occasionally and 1= Never)

Risk monitoring methods	**5**	**4**	**3**	**2**	**1**
Periodic document review					
Periodic risk status report					
Periodic trend reporting					
Other, Please specify:					

7. Please rate the following possible ***barriers*** to risk management application based on their significance at your organization. ✓ (From 5 to 1 where, 5=highly significant, 4 = significant, 3= moderately significant, 2= low significance and 1= negligible)

Barriers to Risk Management	**5**	**4**	**3**	**2**	**1**
Lack of joint risk management mechanisms by parties involved					
Shortage of knowledge/ techniques on risk management					
Lack of formal risk management system					
Ineffective risk control and monitoring strategies					
Lack of risk consciousness					
Inappropriate risk allocation					
Lack of expertise in risk management					
Unavailability of sound data to ensure the result of analysis					
Lack of time					
Other, Please specify:					

Please write ✎ here or attach separately, if you have any ***Comment or suggestion*** on this research topic

THANK YOU FOR COMPLETING THE QUESTIONNAIRE, YOUR HELP IS GREATLY APPRECIATED

APPENDIX 3

(Analysis Template)

1Risk Management Practices

1 Formal
- a. risk identification
- b. risk analysis
- c. risk response
  - i. retention
  - ii. reduction
  - iii. transfer
  - iv. avoidance

2 Informal

3 Frameworks
- a. General systems theory
- b. Work breakdown structure
- c. Critical path method

2Risk Identification Technique
- a. Risk sources
  1. Physical
  2. Environmental
  3. Design
  4. Logistics
  5. Financial
  6. Legal
  7. Political
  8. Power
  9. Construction
  10. Operation risks

3Risk Description
- a. Classification
- i. Identifying the consequences
- ii. Type
- iii. Impact
- iv. Risk of defective work
  1. National forces
  2. Poor detail design
  3. Lack of proper contract technique
  4. Defective materials
  5. Inadequate quality control
- v. Risk of schedule delay
  1. Incomplete design
  2. Late construction site possession
  3. Bad weather
  4. Unforeseen ground conditions
  5. Fluctuations in labour and material supply
  6. Ineffective communications and coordination and coordination with locals
- vi. Risk of cost over-run
  1. Uncertain boundaries of work packages
  2. Inaccurate estimation
  3. Inadequate insurance
  4. Local labour and material price estimation
  5. Local labour and material price fluctuations
- vii. Risk of power relations
- viii. Other un-identified risks
  1. Financial
  2. Legal
  3. Management
  4. Policy
  5. Technical
  6. political
- b. Group
  1. Environment impact (external risk)
     - a. Owner/employer
       - i. Unclear requirements
       - ii. Funding shortage
       - iii. Contract disadvantageous to contractors

Appendix 3 Cont'd.

2 Internal risk
- d. Unbalanced cash flows
- e. Shortage of human resources
- f. Removal of equipment or plants overseas

2. Project level risk
- a. Defective work
  - i. Natural forces, poor design, poor construction techniques, defective materials and inadequate quality control
- b. Schedule delays
- c. Cost overruns

3 Risk analysis method/techniques

4 Risk response methods

5 Risk monitoring methods

6 Barriers to risk management

7 Act of God

8 Definition
- aTraditional
- bNon-traditional techniques

9 Perception
- i) Factor influencing risk perception
  - a. Educational background
  - b. Practical experience
  - c. Individual cognitive characteristics
  - d. Availability of information
  - e. Peer group influence
- ii) Experience
- iii) Threat
- iv)Uncertainty
- v) Belief
- vi)Attitude
- vii) Judgement
- viii) Feelings

10 Peculiar business activity
- a. Exposure to economic loss / gain

11 Gaps

Appendix 3 (Template) – cont'd

1Risk Management

4 Definition – actors' perception of what risk is
- a. Value engineering
  - i. Examples of risk management practices

5 Client's role in driving risk management
- a. Encouraging new ways
  - i. Open book contracting agreements
  - ii. Performance
  - iii. Repeat business
  - iv. Framework agreements
- b. Resistance to risk management
  - i. Client's as an inhibitor
    1. Contractual liability
  - ii. Cost and targets as inhibitors
  - iii. Funding requirement as inhibitor
  - iv. Quantifiable impacts as inhibitor
  - v. Risk as an inhibitor

6 Incentivisation of risk management practices
- a. Monetary
  - i. Payment
    1. Standard rates
- b. Non-monetary
  - i. Penalty schemes
  - ii. Achieving Zero defects
- c. Continuity of demand
- d. Prompt payments

7 Innovative practices
- a. Package Closeout Report (PCR)
- b. Supply chain management

8 Risks associated with power relations
- a. Diffused through contractual liability

9 Power diffusion
  1. Formal
  2. informal

2PROCUREMENT

10 Contract
- a. Role of Contract
  - i. Implication of unclear contractual clauses and phrases
    1. Section 106 (whole life costing)
  - ii. Barriers to contract efficiency
- b. Contract Types
  - i. Relational
    1. Collaborative work
  - ii. Traditional
  - iii. Package deals
  - iv. PFI
- c. Contractor selection patterns (Tendering)
  - i. OJEU (Framework agreement)
  - ii. Competitive tendering
  - iii. Supply chain (preferred bidder)
  - iv. Negotiation
  - v. Partnering
  - vi. Track records
- d. Contractual structure
  - i. Contractual option
  - ii. Contractual provision

3ORGANISATIONAL ANALYSIS

11 Specialisation
12 Co-ordination
13 Boundaries between actors and/or participants
14 Interfaces and control of work
15 Structure

Appendix 3 (Template) – Cont'd...

4ORGANISATIONAL BEHAVIOUR

16 Power
    a. Decision
        i. Policy decision
        ii. Tactical decision
        iii. Strategy decision
17 Leadership
18 Motivation
19 Structure of the organisation

5CONSTRUCTION SUPPLY CHAINS (responsibility for risk management)

1 1ST Tier Customer (client)
    a. Satisfaction
2 Focal Organisation (architects, service engineers, structural engineers, QS, design engineer)
3 1ST Tier Supplier
4 2ND Tier Supplier
5 3RD Tier Supplier
6 Last Customer (end user)
7 Satisfaction

Appendix 4

Formwork/ Carpentry works: Timber members used for the roof trusses (carcass) had some defects e.g. splits. And those used for beam and slab formwork (sawn timber) were not adequately propped/braced and also not sawn to size leading to unequal dimensions and poor finishing surface of the concrete elements e.g. the stairs in the building handled by Integrated Builders. In addition, striking off technique was poor such that some beams that needed plastering could not be plastered because some timber boards (adhered to the concrete) were not totally removed from the beams.

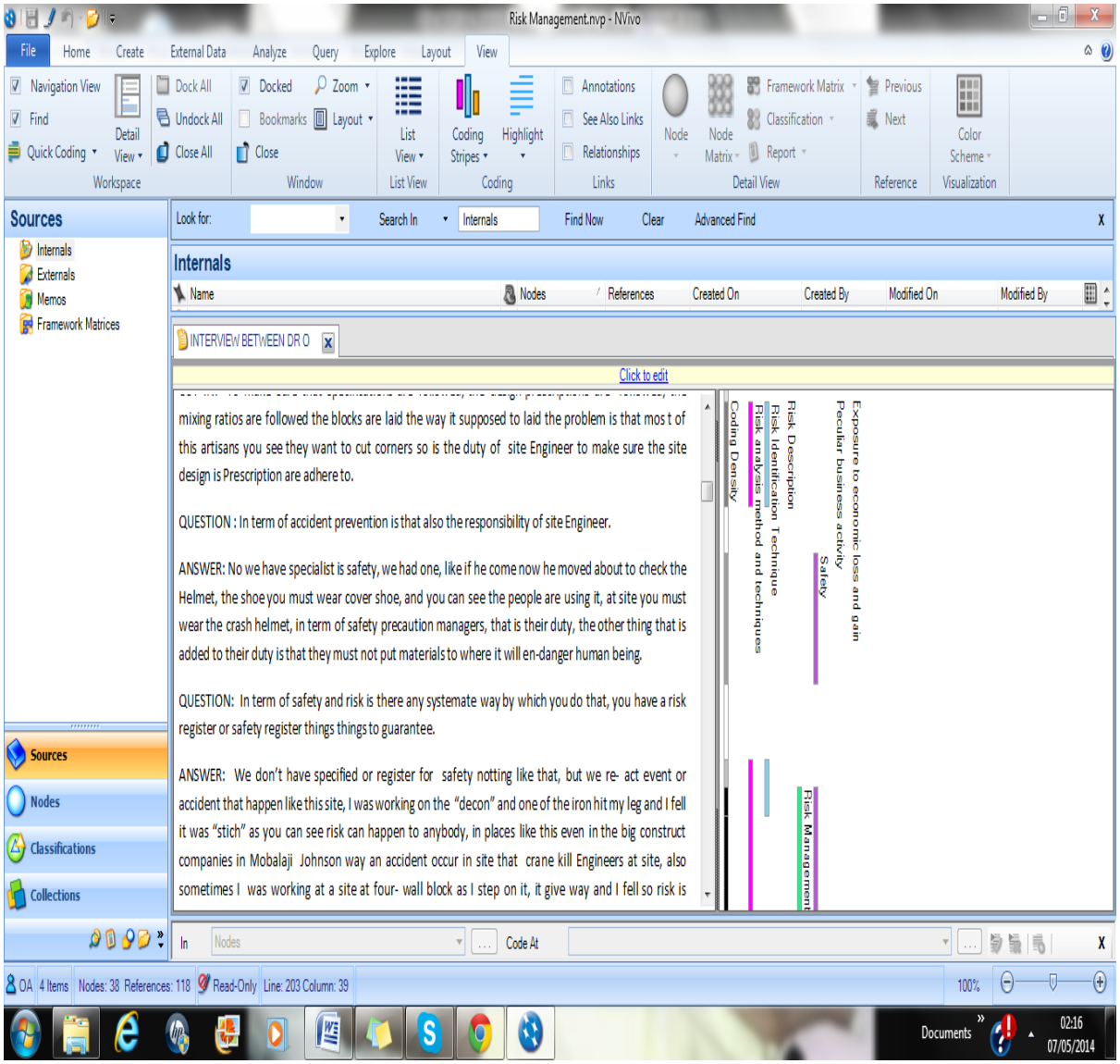
Poor finished beam

Plaster work was of poor quality because most of the walls were undulating as a result of some of the masons using 2'' X 3" (50 X 75) timber sections as ranges. While trying to correct (fill) with plaster mix, the errors made by the formwork of concrete elements during concreting, the plaster mix, whose materials were also batched by volume, were not homogenous as this was shown in the different patches of colours after setting.

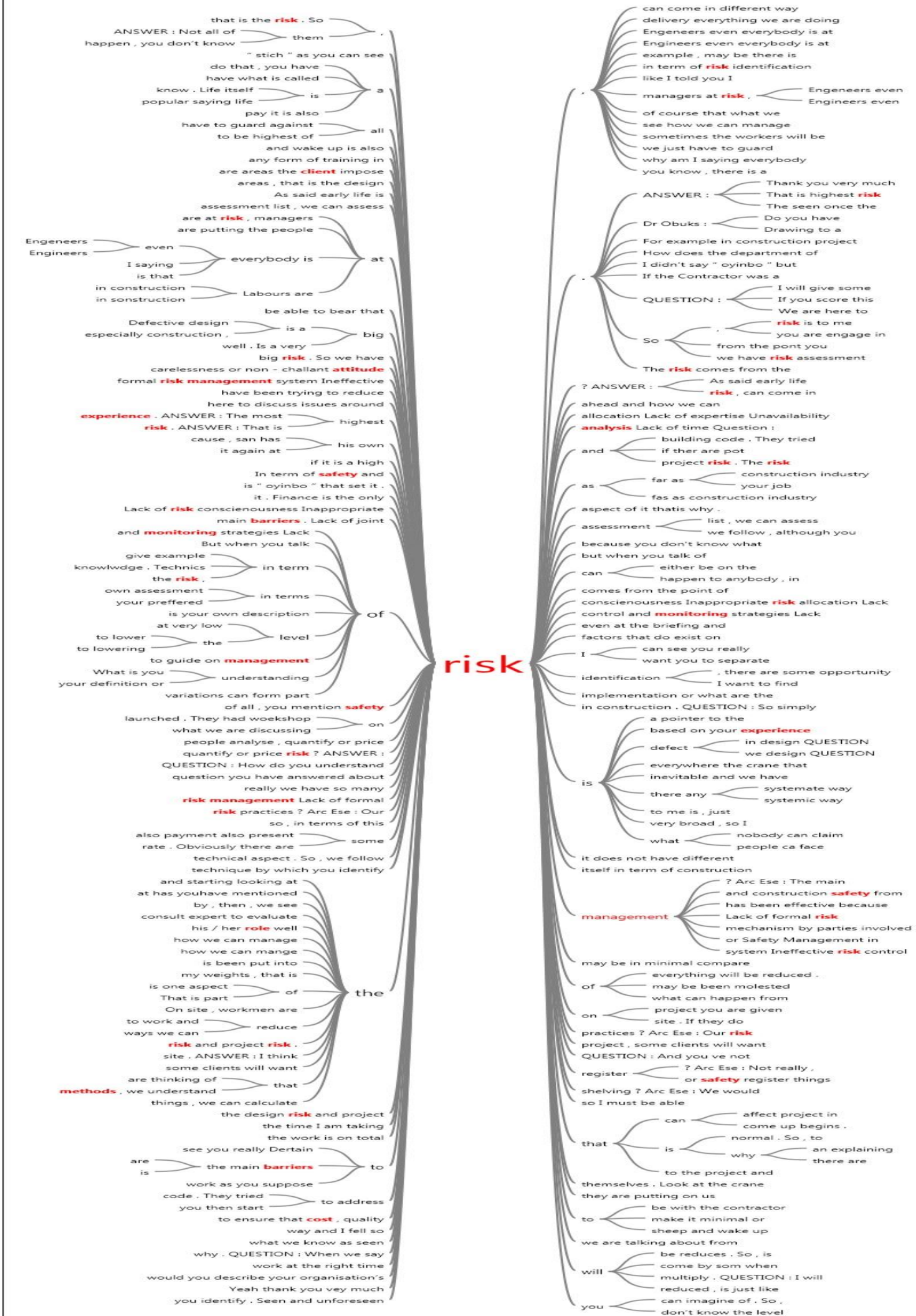
Using timber as range

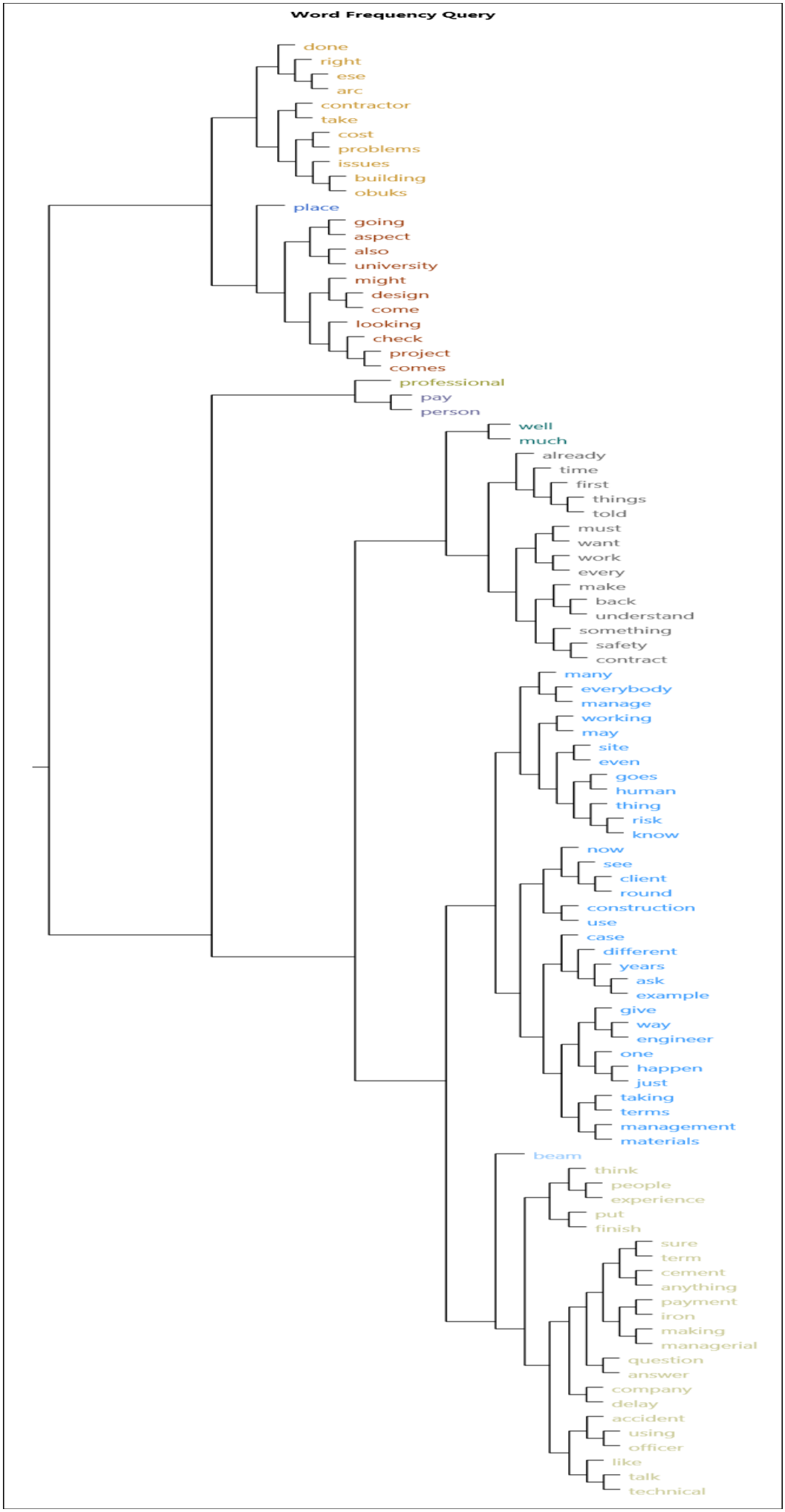
No fall protection

Appendix 5

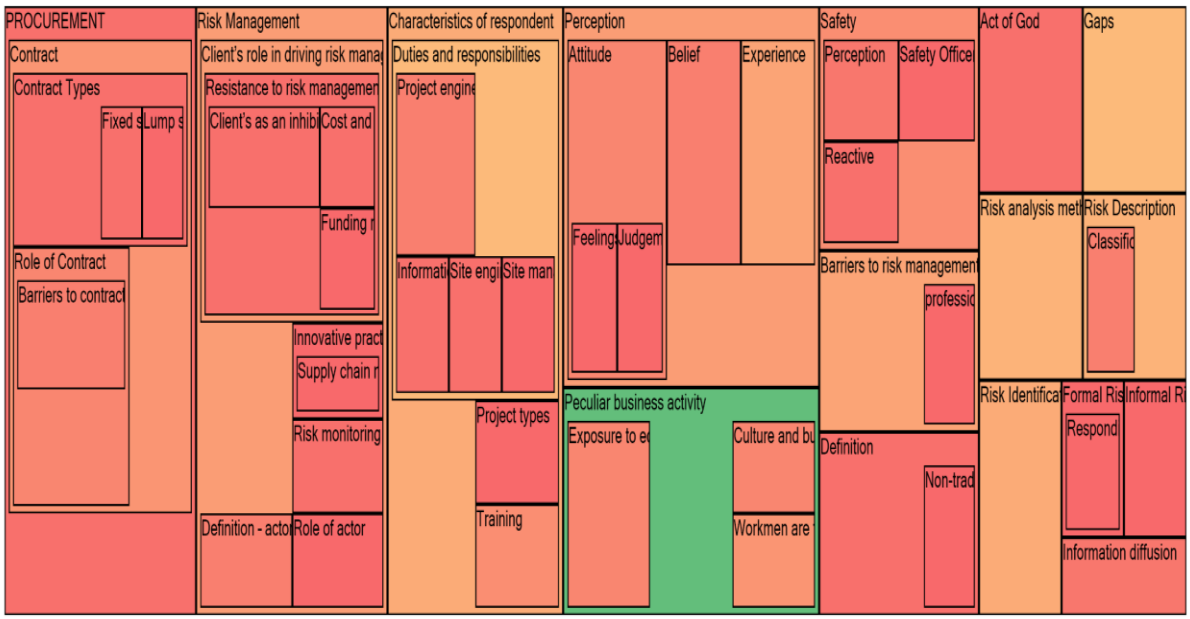

Risk Management.nvp - NVivo
File
Home
Create
External Data
Analyze
Query
Explore
Layout
View
Navigation View
Find
Quick Coding
Detail View
Workspace
Dock All
Undock All
Close All
Docked
Bookmarks
Close
Zoom
Layout
Window
List View
List View
Coding Stripes
Highlight
Coding
Annotations
See Also Links
Relationships
Links
Node
Node Matrix
Framework Matrix
Classification
Report
Detail View
Previous
Next
Reference
Color Scheme
Visualization
Sources
Internals
Externals
Memos
Framework Matrices
Look for:
Search In
Internals
Find Now
Clear
Advanced Find
Internals
Name
Nodes
References
Created On
Created By
Modified On
Modified By
INTERVIEW BETWEEN DR O
Click to edit
mixing ratios are followed the blocks are laid the way it supposed to laid the problem is that mos t of this artisans you see they want to cut corners so is the duty of site Engineer to make sure the site design is Prescription are adhere to.
QUESTION : In term of accident prevention is that also the responsibility of site Engineer.
ANSWER: No we have specialist is safety, we had one, like if he come now he moved about to check the Helmet, the shoe you must wear cover shoe, and you can see the people are using it, at site you must wear the crash helmet, in term of safety precaution managers, that is their duty, the other thing that is added to their duty is that they must not put materials to where it will en-danger human being.
QUESTION: In term of safety and risk is there any systemate way by which you do that, you have a risk register or safety register things things to guarantee.
ANSWER: We don't have specified or register for safety notting like that, but we re- act event or accident that happen like this site, I was working on the "decon" and one of the iron hit my leg and I fell it was "stich" as you can see risk can happen to anybody, in places like this even in the big construct companies in Mobalaji Johnson way an accident occur in site that crane kill Engineers at site, also sometimes I was working at a site at four- wall block as I step on it, it give way and I fell so risk is
Coding Density
Risk analysis method and techniques
Risk Description
Risk Identification Technique
Exposure to economic loss and gain
Peculiar business activity
Safety
Risk Management
Sources
Nodes
Classifications
Collections
In
Nodes
Code At
OA
4 Items
Nodes: 38 References: 118
Read-Only
Line: 203 Column: 39
100%
Documents
02:16
07/05/2014

Text Search Query - Results Preview

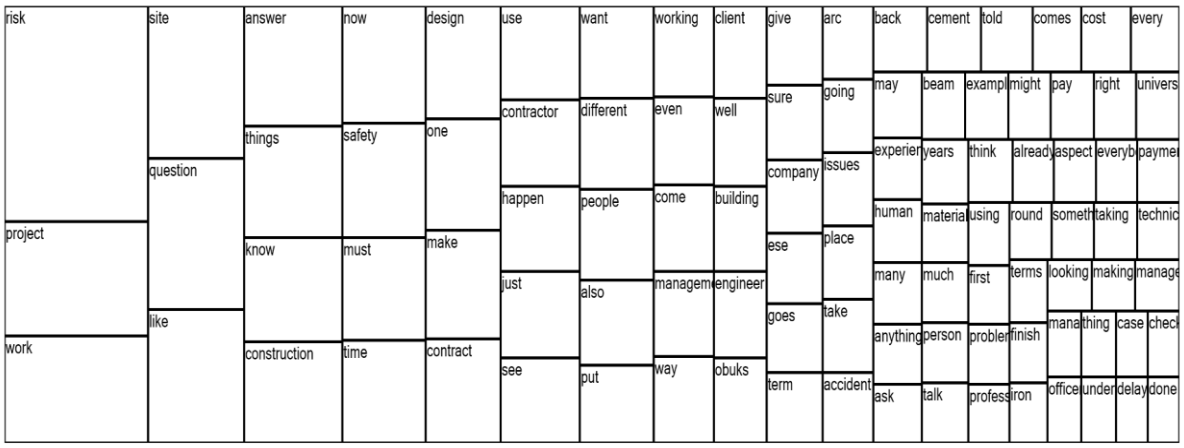


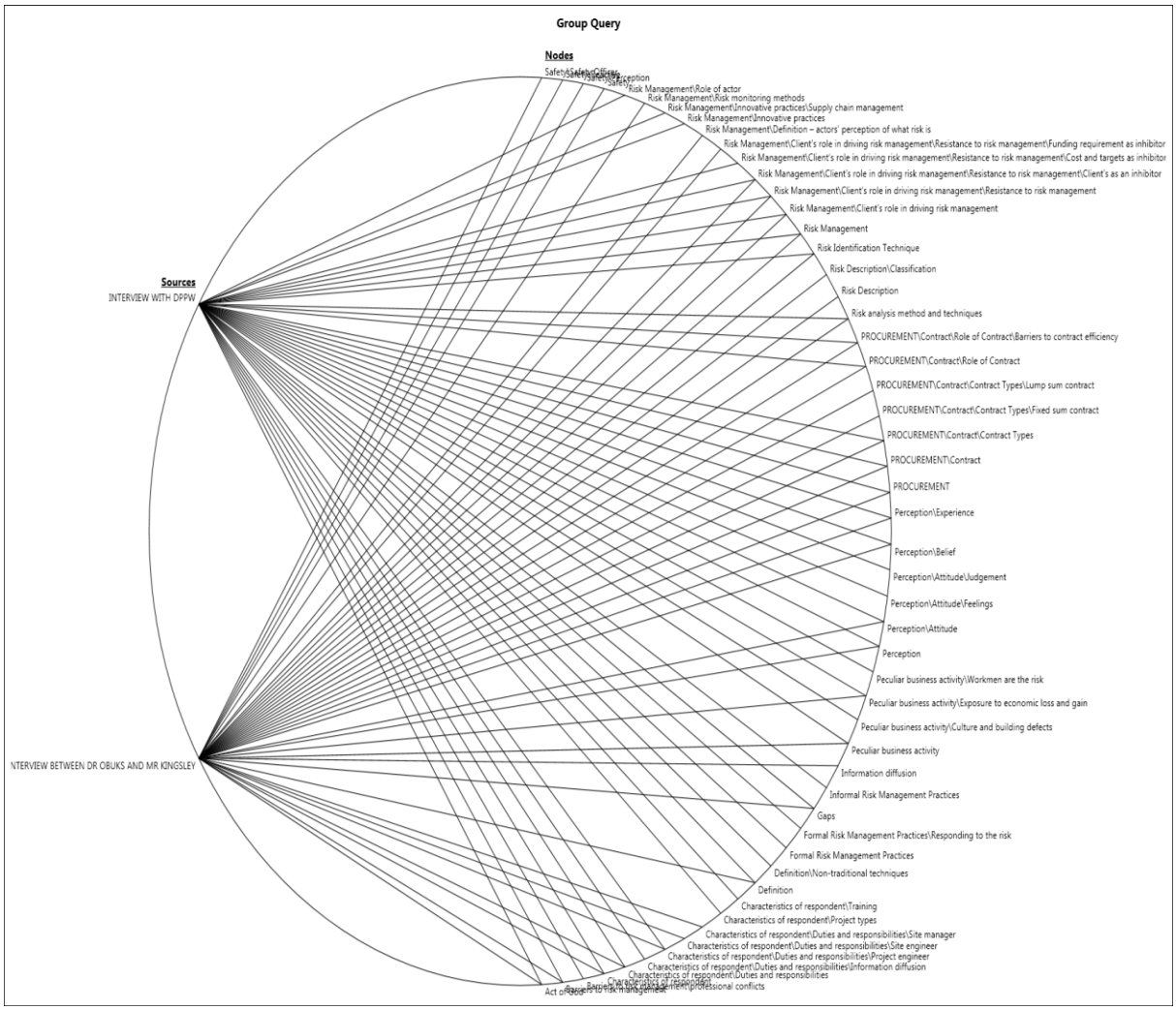

Word Frequency Query
done
right
ese
arc
contractor
take
cost
problems
issues
building
obuks
place
going
aspect
also
university
might
design
come
looking
check
project
comes
professional
pay
person
well
much
already
time
first
things
told
must
want
work
every
make
back
understand
something
safety
contract
many
everybody
manage
working
may
site
even
goes
human
thing
risk
know
now
see
client
round
construction
use
case
different
years
ask
example
give
way
engineer
one
happen
just
taking
terms
management
materials
beam
think
people
experience
put
finish
sure
term
cement
anything
payment
iron
making
managerial
question
answer
company
delay
accident
using
officer
like
talk
technical

Nodes compared by number of items coded



Word Frequency Query




Group Query
Nodes
Safety\Safety Officer
Safety\Safety Perception
Safety\Safety
Risk Management\Role of actor
Risk Management\Risk monitoring methods
Risk Management\Innovative practices\Supply chain management
Risk Management\Innovative practices
Risk Management\Definition – actors' perception of what risk is
Risk Management\Client's role in driving risk management\Resistance to risk management\Funding requirement as inhibitor
Risk Management\Client's role in driving risk management\Resistance to risk management\Cost and targets as inhibitor
Risk Management\Client's role in driving risk management\Resistance to risk management\Client's as an inhibitor
Risk Management\Client's role in driving risk management\Resistance to risk management
Risk Management\Client's role in driving risk management
Risk Management
Risk Identification Technique
Risk Description\Classification
Risk Description
Risk analysis method and techniques
PROCUREMENT\Contract\Role of Contract\Barriers to contract efficiency
PROCUREMENT\Contract\Role of Contract
PROCUREMENT\Contract\Contract Types\Lump sum contract
PROCUREMENT\Contract\Contract Types\Fixed sum contract
PROCUREMENT\Contract\Contract Types
PROCUREMENT\Contract
PROCUREMENT
Perception\Experience
Perception\Belief
Perception\Attitude\Judgement
Perception\Attitude\Feelings
Perception\Attitude
Perception
Peculiar business activity\Workmen are the risk
Peculiar business activity\Exposure to economic loss and gain
Peculiar business activity\Culture and building defects
Peculiar business activity
Information diffusion
Informal Risk Management Practices
Gaps
Formal Risk Management Practices\Responding to the risk
Formal Risk Management Practices
Definition\Non-traditional techniques
Definition
Characteristics of respondent\Training
Characteristics of respondent\Project types
Characteristics of respondent\Duties and responsibilities\Site manager
Characteristics of respondent\Duties and responsibilities\Site engineer
Characteristics of respondent\Duties and responsibilities\Project engineer
Characteristics of respondent\Duties and responsibilities\Information diffusion
Characteristics of respondent\Duties and responsibilities
Sources
INTERVIEW WITH DPPW
NTERVIEW BETWEEN DR OBUKS AND MR KINGSLEY

Word cloud tool