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The Development Of A Procurement Decision Support System To Enhance Construction Claims Management Practice

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THE DEVELOPMENT OF A PROCUREMENT DECISION SUPPORT SYSTEM TO ENHANCE CONSTRUCTION CLAIMS MANAGEMENT PRACTICE

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School of Energy, Construction and Environment

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DECLARATION

This project is all my own work and has not been copied in part or in whole from any other source except where duly acknowledged. As such, all use of previously published work (from books, journals, magazines and internet.) has been acknowledged within the main report to an item in the References or Bibliography lists.

I declare that in submitting this work I am aware of no health reasons that will prevent me from undertaking and completing the assessment, and will undertake notifying my Director of Studies and Registry Research Unit as soon as any change in these circumstances occurs.

Signed: **O.O. BANWO** **Date: 09/05/16**

DEDICATION

This research work is dedicated to my parents, Mr. and Mrs. O. O. Banwo.

ACKNOWLEDGEMENT

Sincerely, I thank the Almighty God who has been seeing me through life even to the successful completion of this project.

I am most grateful to Dr George Agyekum-Mensah, my Director of Studies, for his meticulous supervision and constructive criticism that has brought me to the successful completion of this project. I would also like to thank Dr Amrit Sagoo who despite his tight schedule deemed it fit to tirelessly guide me through the meandering path of this research work from the inception.

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CBN	-	Central Bank of Nigeria
CCT	-	Compulsory Competitive Tendering
CE	-	Capital Employed
CIOB	-	Chartered Institute of Building
CM	-	Construction Management
CPM	-	Construction Project Manager
D & B	-	Design and Build
DSS	-	Decision Support System
FHWA	-	Federal Highway Administration
ICE	-	Institute of Civil Engineers
JCT	-	Joint Contract Tribunal
MC	-	Management Contracting
MDAs	-	Ministries, Departments and Agencies
MOU	-	Memorandum of Understanding
OBB	-	Opportunistic Bidding Behaviour
P & F	-	Partnering and Framework arrangements
PFI	-	Private Finance Initiative
PPP	-	Public Private Partnership
PPP	-	Public Private Partnership
QUAL	-	Qualitative
QUAN	-	Quantitative
RICS	-	Royal Institute of Chartered Surveyors
RoI	-	Return on Investment
Trad	-	Traditional
UN	-	United Nations

ABSTRACT

Delays resulting from claims are a major source of disputes in construction projects. There are different classifications of claims. However, inherent in any claim is a quest for additional resources – material, time and/or cost. Construction contract claims increasingly constitute significant delays and are often accompanied by additional cost. Existing literature shows that 70% of Nigerian projects suffered delay set-backs in their execution and reveals an average cost over-run of 17.34%. This research investigated the main factors affecting the management of claims in the Nigerian construction industry and results obtained revealed that corruption, lack of claims management experts and procurement strategy, respectively, are the main factors affecting the management of claims in the Nigerian construction industry. Given that corruption is a socio-cultural issue and insufficient claim managers is a human resource issue, the research found procurement strategy adopted in each project case to be the main operational issue affecting claims management in the industry. Consequently, the research developed a decision support system for selecting procurement strategy in order to enhance current industry practice. The passive implementation of the most convenient rather than the most suitable procurement strategy has led to the misfortune of so many projects in the Nigerian construction industry. The aftermath of this has been numerous contractual claims during project execution resulting in cost over-run, time over-run and poor project delivery. In extreme cases, where claims are left unresolved, it has led to arbitration, mediation, litigation and in some cases outright project abandonment. Pragmatic research paradigm was adopted for the study. This research also employed a mixed research methodology, with both qualitative and quantitative methods of data collection for data analysis. The use of structured questionnaires and multiple case studies were also adopted in eliciting knowledge from industry practitioners using a snow-balling technique. An inductive and deductive approach was adopted in developing a strategic procurement decision support system capable of bridging existing knowledge gap(s) among industry practitioners. A total of 66 valid responses were collected through administering structured questionnaires to industry practitioners in two (2) separate surveys and 31 project case studies were further analysed. This research contributes to the body of knowledge in construction management by exploring the key factors affecting the management of claims and developing a strategic procurement decision support system to enhance the successful delivery of construction projects. It is an academic work that provides greater insight as to the problems affecting claims management.

CHAPTER 1

INTRODUCTION

1.0 BACKGROUND TO THE STUDY

On initiating any construction project, arguably, huge amount of time is spent on planning before the project execution begins. This is because a project is undertaken to meet pre-determined set of goals and objectives according to Barnes and Wearne (1993); Atkinson (1999); Frigenti and Comninos (2006); Wysocki (2007); Smith (2008); and Kezner (2009). Agyekum-Mensah (2013) discussed the three main processes in project management, which are planning, monitoring and control, and evaluation. Projects are usually monitored and controlled during execution and at the evaluation stage (normally referred to as project closing stage), its pre-set goals and objectives are usually appraised and looking forward plan and strategies are drawn. Despite ample planning, Murphy's Law as presented by Roe (1951) asserts that "if anything can go wrong, it will go wrong". Common sense from real life project experiences suggest that project situations/issues are neither completely arithmetical nor can simply be calculated out with a pen on paper. Some inherent risks in a project may be completely unforeseeable at the project inception. The cumulative result obtained from attempting to resolve issues (requiring additional cost, material or time) that arise in the course of a project will depend largely on the structures in place (in terms of the contract conditions) and the approaches/strategy adopted per time. Therefore terms such as 'contingencies' are always included in project costing to cover for costs of items that were originally unforeseeable (not capable of being anticipated) and/or unforeseen (unanticipated) at the project inception.

Similarly, claims arise as a result of the decision or indecision of the client which result in the contractor incurring loss or extra expense in terms of materials, costs or time by undertaking certain activities which were not originally contained in the project documents. Any unforeseen activity that inhibits the normal progress of work, either caused by the client or external factors which were not initially provided for in the contract document may give rise to a claim.

According to Yogeswaran and Kumaraswamy (2003), delays resulting from claims are a major source of disputes in construction projects. There are different classifications of claims; however, inherent in any claim is a quest for additional resources – material, time and/or cost. Olanrewaju and Anavhe (2014) argues that unsettled claims arising from projects in the Nigerian construction industry has led to so many cases of litigation, arbitration and in some cases outright project abandonment. Their research also reveals that up till present day, there is no precise empirical research on issues affecting claims management which is currently plaguing the industry.

Consequently, it is imperative in this study, to investigate the root causes of these claims considering every stage of managing projects, right from inception/initiative, planning, through project execution, to practical completion. In order to investigate causes of claims, strategic decisions taken which affect their possible occurrence and/or impact and how they are managed must be examined. The responsibility of professionals in the construction industry transcends beyond the management of these claims when they occur (Corrective Approach), as strategic decision making at the project planning stages (Preventive Approach) go a long way to mitigate the possible occurrences of claims and potential impact should they occur.

This study is therefore geared towards the investigation of the causes and impact of claims and to develop a decision support system to enhance successful project delivery in the Nigerian construction industry. This ensures practitioners make more informed decisions at the pre-construction or project planning stage to minimise the occurrence and impact of claims.

1.1 STATEMENT OF THE PROBLEM

Construction contract claims increasingly constitute a significant extension of previously agreed contract periods and are very often accompanied by additional costs. Project delay is one of the main issues in construction that leads to claims. Agyekum-Mensah et al. (2012) claimed that delay is a global phenomenon. However, the issue of delay is worst in developing countries, which include Nigeria where this study focuses. Odeyinka and Yusif (1997) asserted that 70% of Nigerian projects suffered delay set-backs in their execution. The outcome of these, as evidenced by different on-going and so many abandoned projects, has been time over-run, cost over-run and disputes. Some of these project disputes have over the years resulted in arbitration, prolonged

litigation, and in some cases outright abandonment of projects. Aibinu and Jagboro (2002) carried out a research on 61 building project cases in Nigeria and concluded the construction delay has become endemic in Nigeria as the mean percentage of cost over-run across all project case studies was about 17.34%.

From the contractors' perspective, it is unfair to impose expenses (on the contractor) caused by external factors such as weather conditions, act of God (force majeure) or by the client's action or inaction, for which the contractor is not responsible and cannot be held liable.

The impact of the aforementioned issues may be linked to the knowledge gap that exist among construction industry practitioners on how to identify effectively present and evaluate contractual claims.

According to Olanrewaju and Anavhe (2014), arguably, there are currently no definite empirical findings on the factors affecting claims management in Nigeria. Regardless of the fact that the effective management of claims determines the fate of many construction projects, claims are not considered during the execution stage of construction project; however, to fully mitigate claims it should to be considered in the pre-construction decision making such as procurement selection process.

It therefore becomes imperative in this study to empirically analyse the causes of claims, procedures used in claims management, the underlying factors which affect the management of construction claims, the impact of claims on the delivery of construction (building and civil engineering) projects with a particular focus in Nigeria. The study also assesses how construction practitioners manage claims and how it could be improved.

1.2 AIM & OBJECTIVES

1.2.1 Aim

To investigate the causes and impact of claims and to develop a decision support system for selecting procurement strategy in order to enhance current claims management practice in the Nigerian construction industry.

1.2.2 Objectives

1. To critically examine and determine the causes and impact of claims on the delivery of construction projects.
2. To ascertain the main factors affecting the management of claims in the construction industry.
3. To evaluate the extent of application of theoretical claims management concepts in current practice in the construction industry.
4. To determine the impact of pre-construction decision making processes such as procurement strategies on claims management.
5. To develop a decision support system to enhance claims management practice in the construction industry.

The above research objectives would be achieved based on the framework set out in Table 1.1. This presents the relationship between the research objectives and research questions; and also highlights how each objective will be met.

1.3 RESEARCH QUESTIONS

1. What are the main factors affecting claims management and how do they impact the delivery of construction projects?
2. How can the current claims management practice be improved as a result of pre-construction strategic management decisions?

1.4 RESEARCH METHODOLOGY

The research is based on an underpinning positivism philosophical stance which relates to a preventive approach (rather than corrective approach) for managing the successful delivery of construction projects. From a management perspective, it is not enough to proffer solutions to already existing problems (Corrective Approach); but rather, it is more helpful to anticipate the occurrence of potential problems and develop a structure to curtail the probability of their occurrence and possible impact should they occur (Preventive Approach). The research adopts both qualitative and quantitative research methodology (mixed research methodology) in order to achieve its objectives. The research strategy incorporates both epistemological (theoretical knowledge search) and ontological (reality in practice) research paradigms in critically eliciting

knowledge from industry practitioners. An inductive and deductive approach is also adopted in developing a strategic procurement decision support system capable of bridging existing knowledge gap(s) among industry practitioners. A total of 66 valid responses were collected through administering structured questionnaires to industry practitioners in two (2) separate surveys and 31 project case studies were further analysed. This is a descriptive, explanatory and exploratory research that can be termed an action research as it presents an intervention study into current industry practices. It can also be termed as an ethnographic research, as it takes into account current political, economic, socio-cultural, technological, legal and environmental factors prevailing in the industry.

The table below summarises the relationship between the research aim objectives and methodology.

Table 1.1: Relationships between Research Aim, Objectives and Methodology

<table>
<tr><td colspan="4">Research Aim:
To develop a Decision Support System for selecting procurement strategy in order to enhance current claims management practice in the Nigerian construction industry.</td></tr>
<tr><td></td><td>Research Objectives</td><td>Research Questions</td><td>Research Methodology</td></tr>
<tr><td>1.</td><td>To determine the impact of claims on the delivery of projects in the Nigerian construction industry.</td><td rowspan="5">What are the main factors affecting claims management and how does it impact on the delivery of construction projects?

How can the current claims management practice be improved from pre-construction strategic management decisions?</td><td>Extensive literature search (Chapter 2) and Knowledge elicitation from industry practitioners through administering structured questionnaires in Survey 1, subsequently analysed in Chapter 5.</td></tr>
<tr><td>2.</td><td>To ascertain the main factors affecting the management of claims in the Nigerian construction industry.</td><td>Extensive literature search and knowledge elicitation from industry practitioners through administering structured questionnaires in Survey 1.</td></tr>
<tr><td>3.</td><td>To evaluate the extent of application of theoretical claims management concepts in current claims management practice in the Nigerian construction industry.</td><td>Critical analysis of current industry practices, as well as, theoretical best practices through administering structured questionnaires in Survey 1 and 2.</td></tr>
<tr><td>4.</td><td>To determine the impact of pre-construction decision making processes such as procurement strategies on claims management.</td><td>Extensive literature search (Chapter 3) and knowledge elicitation from industry practitioners through administering structured questionnaires in Survey 2, subsequently analysed in Chapter 6.</td></tr>
<tr><td>5.</td><td>To develop a decision support system for selecting an appropriate procurement strategy in order to enhance claims management practice in the Nigerian construction industry.</td><td>Synthesis of results gathered from Objective 1, 2 and 3, through inductive and deductive concept development into a strategic decision support system.</td></tr>
</table>

1.5 SCOPE OF THE STUDY

A lot of research has been done in the area of managing construction contract claims in the global construction industry. However, research has been scarce in the area of construction claims management in the Nigerian construction industry, hence the limited availability of literature. Owing to the fact that claims management is grossly an unexplored research area in the Nigerian construction industry, the consequential limited availability of existing literature and insufficient number of claims management experts, information gathered for this research mostly lends itself to field surveys and knowledge elicited from industry practitioners.

The scope of this study encompasses the study of construction contract claims and their impact on project delivery. It also includes a study of the main factors affecting construction claims management. However, the scope of this research is delimited to the operational aspects of strategic decision making process involved in procuring building and civil engineering projects in the Nigerian construction industry.

1.6 CONTRIBUTION TO KNOWLEDGE

A lot research has been carried out in the area of construction claims management. However, its relationship with construction project procurement has arguably remained unexplored. This research contributes to the body of knowledge in construction and engineering management by empirically investigating the key factors affecting the management of claims in the Nigerian construction industry and developing a decision support system to aid practitioners make more informed strategic procurement decisions for successful project delivery. This research is intended to be beneficial to the following stake-holders in various ways:

- **Professionals in the Nigerian Construction Industry;**

  Over the years, claims management has not been studied explicitly in partial fulfillment of the requirement for a degree in architecture, quantity surveying, engineering, building studies and other disciplines in the built environment. The management of claims has been an area predominantly learnt by practitioners on the basis of hands-on industry experience and its management practice developed over time. However, due to the increasing pressure to deliver projects on tight budget and time deadlines, claims management has become an integral part of managing projects. This research will serve as a bridge to close-up the knowledge gap amongst industry professionals.

- **Clients / Consultants;**

  Clients who are represented by their employees or appointed consultants will be able to access a very useful tool which will help to improve successful delivery of construction projects by mitigating the possible occurrence of claims and potential impact. This is in a bid to achieve value for money spent and ensuring that projects are successfully delivered to required standards.

- **Contractors/Sub-Contractors;**

  This research will provide contractors as well as sub-contractors with a very useful tool in maximizing their profits while reducing their overheads; it will also provide a fair play ground between clients and contractors for enhancing the delivery of construction projects.

- **The Populace;**

  The research will be beneficial, to the general public in that it will improve the delivery of basic public amenities and infrastructural projects in the country as so many of them are presently abandoned and have been abated uncompleted due to unresolved disputes.

- **Academia;**

  The successful completion of this study will contribute immensely to the existing body of knowledge in construction management, especially in the area of claims management and construction projects procurement.

1.7 ORGANISATION OF THE THESIS

This thesis is structured into eight chapters and the relationship between the chapters is summarized in Figure 1.1 below:

Chapter 1 sets out the research aim and objectives. It also provides an introduction to the research, background to the study, problem statement, research significance, research questions, brief summary of the research methodology, contribution to knowledge and finally the scope and delimitation of the research.

Chapter 2 provides an extensive literature review on claims management with particular interest in the Nigerian construction industry. It carefully examines different types of construction claims, their, their causes, management processes, and different perspectives. It further critically reviews issues bothering on claims presentation, evaluation, validation, and their importance. This chapter also studies the political, economic, socio-cultural, technological, legal and environmental factors affecting the management of claims in the Nigerian construction industry. It forms the basis for the preliminary survey carried out in Chapter 5.

Chapter 3 presents an extensive literature review on choice of procurement strategy from claims management perspective. It carefully studies the type of contract, type of competition, contractor selection process and procurement methods adopted in construction projects and their implications

on project delivery, from a claims management stand-point. It forms the basis for the main studies analysed in Chapter 6.

Chapter 4 describes the research methodology adopted for the purpose of this research. It sets-out the research process, philosophy and design used. Furthermore, it explains the justification for the adoption of the research methodology.

Chapter 5 involves the collection, presentation and analysis of pilot survey data carried out following the extensive literature search in Chapter 2. It aims at eliciting information form industry practitioners in order to appraise the current state of the Nigerian construction industry in the light of current practices, knowledge gap amongst practitioners and the factors affecting the management of construction claims.

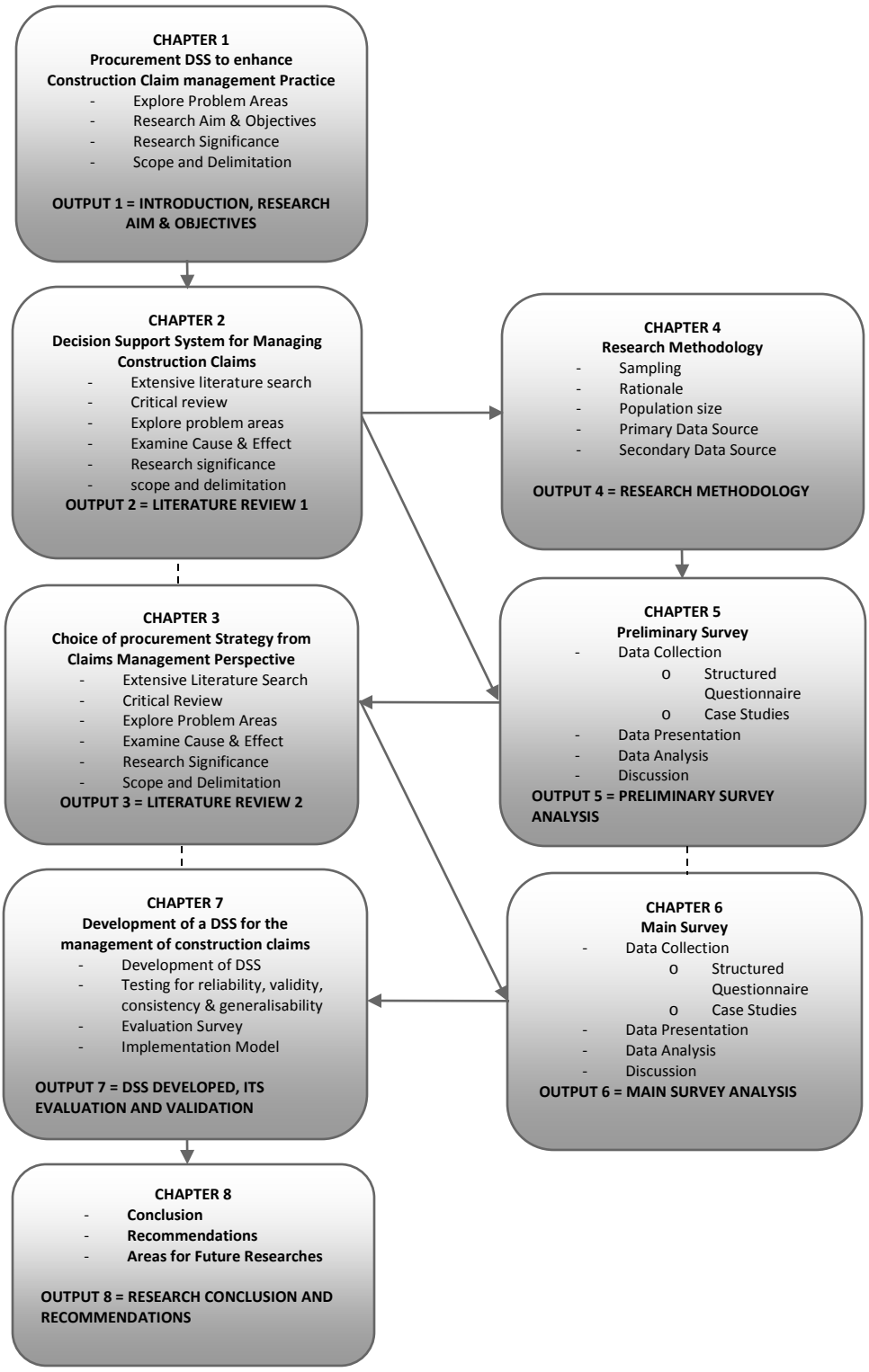
Chapter 6 consists of the collection, presentation and subsequent analyses of data obtained from Survey 2, following the extensive literature search presented in Chapter 3 of this thesis. It aims at assessing the knowledge gap that exist amongst industry practitioners in the area of formulating and adopting the most suitable strategy adopted in every project case and its implication on project delivery.

Chapter 7 seeks to bridge the gap between theory and practice by developing a Decision Support System (DSS), given the extensive literature and theoretical framework studied in Chapter 2 & 3 and subsequent data collection and analyses in Chapter 5 & 6. The Decision Support System is a unique research output which is geared towards aiding practitioners to make more informed decisions, which in turn, will increase successful project delivery and is also capable of significantly reducing the possible occurrence of claims and their potential impact should they occur during project execution. This chapter further outlines the system development process, its scope, applications and delimitation.

Chapter 8 highlights the conclusion of the research work based on its objectives contained in Chapter 1, extensive literature review in Chapter 2 and 3, and the subsequent data collection, presentation and analyses in Chapter 5 and 6 based on the application of the research methodology

outlined in Chapter 4. It further presents strategic recommendations including the application of the Decision Support System developed in Chapter 7 and proposes some potential areas for further research.

Figure 1.1: Research Flow Chart



1.8 SUMMARY

This introductory section provided a general idea of the causes and impact of claims in the industry. The initial inquiry articulates claims and procurement related issues in the Nigerian construction industry. It clearly defined the research aim and objectives, research questions, brief overview of the research methodology adopted for this study. The research is delimited in scope to the operational aspects of strategic decision making process involved in procuring building and civil engineering projects in the construction industry. The subsequent chapter seeks to extensively review existing literature in the area of construction claims management.

CHAPTER 2

CONSTRUCTION CLAIMS MANAGEMENT IN NIGERIA

2.0 INTRODUCTION

Zimmerman (2011) claims that the global construction industry today is faced with continuous budget cuts on capital project expenditure despite the increased complexity in the nature and scope of these projects. On the other hand, there has been an increasing pressure on contractors to deliver projects within pre-determined time and cost framework.

Claims have become a 'popular' nomenclature and its management an integral part of contract administration in the Nigerian Construction Industry. The global economy is characterised with increasing uncertainties, which has brought about reduction in government spending on public projects in Nigeria. Mohamed et.al. (2011) opine that some contractors explore an opportunity of reducing their profit margins significantly when tendering under the guise of subsequent claims recovery when executing the project in order to compete favourably with other contractors during tendering. They went further to describe this new concept/ "survival strategy" as "Opportunistic Bidding Behaviour (OBB)". This new concept constitutes a huge challenge later in the project life, during execution, when contractors begin to submit numerous claims. The effective management of claims is capable of redeeming the dwindling fortunes suffered by the industry. Jagboro and Alli (1999) ascertained that a lot of unsettled disputes in the industry has led to outright project abandonment, arbitration and prolonged litigation. The effective management of claims offers early warning signal to these problems and is capable of curtailing their occurrence.

We daily hear of accident claim managers, compensation claim managers, insurance claim managers, injury claim managers, and the like, who are responsible for managing accident claims, compensation claims, insurance claims, injury claims, respectively; yet there is neither a set of professionals known as Construction Claim Managers/Experts nor a relevant authority or association charged with the responsibility of regulating the practice of claims management in the Nigerian Construction Industry. Claims Management training is questionably not administered to industry professionals, such as, Architects, Quantity Surveyors, Builders and Engineers in partial

fulfillment of a university/relevant degree in Nigeria. This does not reflect the ideal level of industry knowledge required by professionals, especially in the 21st century where the consciousness of all sorts of claims is at its peak.

A few studies have been carried out in the past in the area of assessing the effect and causes of contractual claims and their impact on the Nigerian Construction Industry. However, till date, there is no standardized approach for dealing with construction contract claims in Nigeria.

2.1 CONSTRUCTION CONTRACT CLAIMS

Ndekugri and Vidogah (1998) suggest that claim is a contractual mechanism for reimbursing the contractor where the actions of the client and/or client's agent result or is likely to result in the contractor incurring additional costs. Cartlidge (2009) defined a claim as a method of paying back the contractor for proven loss and expense that is not recovered in any other way. Barnes and Haidar (2011) argue that loss and expense claims are pursued by a contractor as a result of client induced prolongation and/or disruption of work. According to Ashworth and Hogg (2007), contractual claim arise where contractors request for additional payments over and above what was initially agreed to be paid for work done under the general terms and conditions of the contract.

Turner and Turner (1999) argued that 'claims' should be viewed differently from 'entitlements under provisions of a contract' on the basis that common law views a claim as a breach of contract but in recognition of certain 'events' (i.e. excusable events), relevant entitlements are usually included as part of the contract provisos. They, however, stated that the (mis)interpretation, computation and disagreement over those 'entitlements' can translate into 'claims'. Cartlidge (2011) agreed that once contracting parties come to an agreement and a contract is signed, it cannot be changed. However, due to the complex nature of construction projects, in terms of associated scope, time, risks and uncertainties, most standard form of contracts in use usually include provision for possible changes due to contractual claims. Individuals and organisations are becoming more 'claims' (breach of contract) conscious (Ashworth and Hogg, 2007), 'contractual claims' in construction arise when a party feels entitled to additional payments, over and above what was agreed within the general contract conditions according to Ndekugri and Vidogah

(1998); Cartlidge (2009); Ashworth and Hogg (2007); and Adrian (1993). ICE (2007) asserts that it is the responsibility of the claimant to establish the entitlement in the light of proving that there was an event leading to a loss and/or expense (which is not remote and can be quantified), that the claimant is not directly or indirectly responsible for the cause of the event and that the event impacted the planned course of work with relevant proofs.

In general, a claim can therefore be defined to be a mechanism that allows the contractor to be recompensed for loss(es) or expense(s) (in terms of time and cost incurred), that are caused by the action or inaction of the client/client's representative or any external event (such as weather conditions and force majeure) beyond the contractor's control. The proof then determines whether or not it is an entitlement of the claimant.

2.2 TYPES OF CONSTRUCTION CONTRACT CLAIMS

Owing to the fact that every claim is unique, there are different types of claims. According to Adrian (1993), claims are usually categorised based on the cost of the claim (i.e. small, medium and large claims); based on who initiates the claim (i.e. Owner-related delay claims and uncontrollable event and delay claims); based on public and private claims (i.e. in publicly and/or privately funded projects); based on the type of project (i.e. claims on hospital projects, claims on school buildings); based on geographical area (i.e. flood claims, landslides claims and the like, resulting from geographical location of projects which are susceptible to adverse weather conditions and/or natural disaster or Act of God). However, for the purpose of this research, claims are broadly classified based on the root cause of the antecedent event as all claims including those mentioned above are triggered by the occurrence of an event.

Different types of claims studied in this research are based on their root causes and are illustrated in Figure 2.2 below and subsequently discussed.

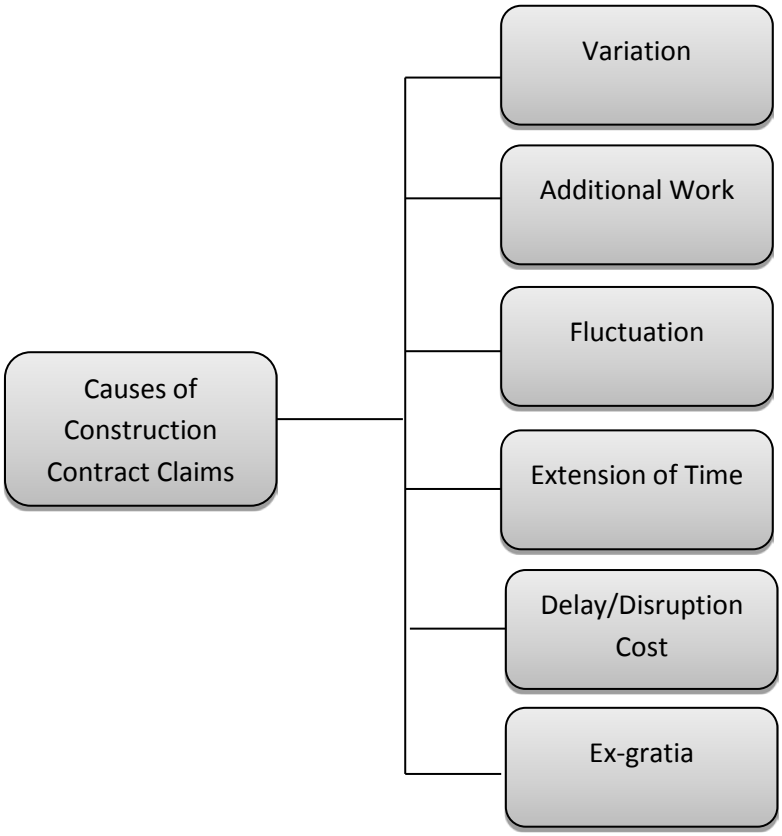


Figure 2.1: Types of Construction Contract Claims based on Root Cause

Contractual claims originate from a variety of sources, however the following definitions have been adopted for the purpose of this research;

2.2.1 Variation

This can simply be defined as a shift or change in the quantity or quality of an item of work which already exist in the contract documentation. Wambeke et. al. (2011) defines variation as the disparity or change in task/time between the planned and the actual. As a result of the complex nature of construction processes, the occurrence/introduction of changes becomes imminent. Variation could be caused by so many factors ranging from changes in working methods, changes in client's requirements, preliminary works, and disparity between working drawings, changes in quality specification, site conditions, changes in weather or external conditions and the like.

Similarly, Sergeant and Wieliczko (2014) affirms that variation may result from a desire to change something different from the original plan. This change could be due to a number of factors which includes: change of mind by employer, construction issues due to build process, technical adjustment and the like.

Most of the above mentioned causes are deemed to be included in contract documents in one way or the other. In other words, the contract documents for a particular project has an underlying assumption (e.g. weather condition, working method, prices of basic materials and so on) in mind and sometimes even as the project progresses, the clients taste with regards to the quality of materials and space requirements, may change, giving rise to variations.

The emergence and management of variations can significantly impact on the project cost as well as the overall project delivery. According to Lee and Li (1998) variations in construction project can result in a substantial alteration to contract duration, total direct and indirect cost or both.

Variation can significantly impact on the cost and time of project. Hence a well drafted variation clause highlighting all necessary variation management processes and the respective management of these processes by stakeholders are major factors to the success of a project (Klee, 2015).

However, it is imperative to note that for the purpose of this study, variation is defined in the light of an establishment of a change in quality and/or quantity of an item of work (time, material, plants or working method) which is contained and specifically indicated in the contract document.

2.2.2 Additional Works

Different from variation, addition works in construction occurs when a completely new task/item of work is introduced into the project processes. Where the task/item introduced has increased in scope or is not originally contained in the contract documentations, it is categorized as an additional work to be carried out.

Additional works can be described as an informal action or inaction of the employer resulting to a new item of work which were not initially acknowledge by the employer to be changed in the scope of work but require an extra work by the contractor (Kelleher et. al., 2014).

In practice, both additional works and variations are decided between the contractor and the client/client's representative (consultant) and are often issued as Architect's Instructions in writing. In the case that the instruction is issued orally, it must be confirmed in writing within a specific time frame, subject to the form of contract in use.

Most of the time additional works are usually accompanied by extra cost which could result in the contractor incurring extra expenses/loss; therefore amounting to a claim. If the additional cost to be incurred outweighs the client's budget, it can constitute a serious issue which sometimes, if not properly handled, may degenerate to disputes.

2.2.3 Fluctuation

In construction the term fluctuation describe changes in market prices of material, plants, labour or equipment. These changes in prices are determined by economic indices which involves the value of money or buying power (currency) per time. Fluctuations can either be positive or negative, i.e. prices can go low in deflationary periods when money losses some value or go high during inflationary periods. According to Ashworth and Hogg (2007), fluctuations give an allowance for the inflation of building cost which may or may not be repaid to the contractor, subject to the conditions of the contract.

In the traditional procurement system which is pre-dominantly used in Nigeria, tender bill of quantities (submitted at the pre-contract stage) are often accompanied by schedule of basic prices. This schedule outlines the basic cost per unit of major building materials to be used in executing the project. These items are termed major because a slight change (increase) in the cost of any is capable of significantly affecting the overall project cost.

The schedule of prices issued by a contractor provides the client/client's representative with information about the basis of cost estimation for different items of work based on the individual cost of major components/materials.

Pin (2016) opines that the risk of increase in price of building components/material may give rise higher tender price. Therefore, the employer may result to material price fluctuation clause to mitigate such risk.

Fluctuation claims in Nigeria, are made subject to the provision and terms of the contract and needs to be supported by relevant documentation, e.g. a publication by Central Bank of Nigeria (CBN) showing inflation index or any other important document to prove inflation, as the case may be.

However, an extensive survey carried out for the purpose of this research shows that fluctuation clauses for many construction projects in Nigeria are often deleted for contracts with less than one year duration. This means that contracts with duration less than one year are mostly termed as non-fluctuating contracts in Nigeria.

2.2.4 Extension of Time

One of the consequences of project time over-run is the payment of liquidated damages to the client by the contractor on an agreed basis, subject to the contract terms and conditions. These payments cover the potential damages due to the late completion/non-completion of the project by the contractor to the client. However, liquidated damages are not in any form considered a penalty to the contractor instead they are mere compensation for alternative accommodation on loss of rent or revenue in the case where the project has been delayed by the contractor.

It is in the fate of the above, that contractors' notify external and excusable events with potential delay implications and also analyse the impact of time-delay in order to seek for extension of time claims. Alkass et al. (1995) asserted that the most probable and costly cause of disputes and claims in construction projects are time-delays. This is so because, a number of potential problems that arise in construction are often liked to delay. Some of these problems include; schedule compression, late completion, loss of productivity, project fast-track, increased cost, and contract termination among others (Arditi and Pattanakitchamroon, 2006).

There are several techniques/methods for appraising extension of time claims (Kumaraswamy and Yogeswaran 2001), the substantiation of the claim however lies in the capacity of the supervising

engineer and contractor to effectively present the claim (Palaneeswaran and Kumaraswamy, 2007). In which case, they must sufficiently;

- Determine the qualification of a delay event
- Appraise or evaluate the impact of time of the delay event of the project
- Choose the appropriate method for quantifying the EOT claim
- Support it with relevant fact and documentation.

All these must be carried out subject to the provisions of the contract.

2.2.5 Delay & Disruption Cost claim

One of the most significant unanticipated cost in most construction projects is the financial claims associated with delay/disruption to the construction works (Keane and Caletka, 2015).

Delay/disruption cost claims are sometimes accompanied extension of time claims. In this case, the contractor aims at re-couping certain cost incurred with reference to external disruption and/or excusable delay events. This is done to establish whether or not a contractor is entitled to additional costs courtesy of the disruption claims and/or delay, essentially the contractor needs to claim that a disruption/delay event occurred, also indicating that occurrence of this event negatively impacted the planned progress of work, and finally that the event wasn't in any form caused by the contractor and that, the contractor responded at the occurrence of the event to best of his ability and accordingly.

Construction delays and disruption claims a major problem for many contractors and designers building in the construction industry. Delay and disruption claims siphon off a significant portion of the available construction fund and project anticipated profit resulting to loss sometimes (Burr, 2016).

The disparity between delay and disruption cost claims lie in the fact that delay cost claims are usually associated with delay events which affects the overall project completion period, whereas disruption cost claims are costs affiliated with the emergence of a disruption event which has effect on the planned progress of work but does not impact the project completion date. That is to say, delay cost claims are linked directly to critical project activities, while disruption cost claims are

linked to non-critical activities. In either case, the contractor is however, required to provide all necessary documents to support the claim. These claims should also be supported with relevant contract clauses based on the conditions of contract signed.

However, it is imperative to state that contrary to the popular believe by most professionals in the construction industry that cost-claims usually must ascend on the wings of time-claims, Haidar and Barnes (2011) opines that claims that are time-related must not always be associated with cost-related recovery claims. It further affirms the fact that a contractor can be allocated an extension of time and still not be qualified for an additional cost recovery and vice-versa. Therefore, cost-related claims and time-related claims are mutually independent. Hence it follows that relevant documentation for disruption and delay cost claims should be kept independently for better contract administration. According to Aibinu and jagboro (2002), delay related client is highly significant in the Nigerian construction industry. Hence, the essence of substantiating and evaluating cost, carefully identifying time-related claims cannot be over-emphasized.

2.2.6 Ex-gratia

An ex-gratia payment is one made to a contractor not due under the contract and usually represents compensation on financial position (Jayalath, 2011). According to Ameer (2015), ex-gratia in Latin means “out of good will”. This implies a sum of money paid when there is no liability or obligation to pay it. However, there are many instances in construction where an employer makes such payment to contractors, e.g. where there is risk of increase in prices of materials due to scarcity that the allocated allowance for such risk at tender stage is not all sufficient, it is fair that the employer considers ex-gratia payments.

Many times, the line of obligation between the client, the contractor and the consultant may not be distinctively stated to the slightest detail. It may be difficult to ascertain the cause of an event due to the action or inaction of either party, which means a claim may have a complex cause/effect chain. Ex-gratia is a sympathetic or compassionate claim. According to Ashworth and Hogg (2007), payments for ex-gratia claims are limited and not based on the implied or express conditions of contract. These types of payments are usually discretionary and are induced mainly by prudence previously exhibited by a contractor and also by previous relationships,. Ex-gratia

payments are often classified sympathetic in the sense that, the contractor is not legally entitled to it but when the client takes a sympathetic look the enormous losses from whatever event being presented and approves same considering several factors.

In many cases, the client at his own discretion grants a certain percentage but on the recommendation of the consultant. Most client (private and public) in Nigeria, are supervised by a nominated board that is usually careful in making such decisions; hence, they rely on recommendations by consultants.

2.3 ASSESSING THE VALIDITY OF A CLAIM

2.3.1 Causes of Claims

Claims can potentially emerge at any stage in a project and are mainly caused by delays (Collin and Retik 1997), disputes and changes. The causes of claims can widely be categorised into three (3) major classes for the purpose of substantiation:

1) Excusable Events
2) Non-Excusable Events
3) External Events

2.3.1.1 Excusable Events:

They are events that are caused mainly by the action or inaction of the client/client's representative. They culminate into a claim as they impose disruption and delay, as well as, loss and expense to be incurred by the contractor. Cartlidge (2009) referred to this kind of event as "relevant matters", Barnes and Haidar (2011) termed it as "non-culpable delay event" and others authors call it "relevant events".

Examples of such events include:

- Variations
- Unforeseen design problems
- Changes to or imposition of site restrictions.
- Postponement of the works.
- Adjustment of provisional sum for undefined works.
- Suspension of works by the contractor for non-payment by the client.

- Execution of works with a provisional sum assigned, which subsequently proves inaccurate and/or inadequate.
- Any impediment caused by the client/client representative.
- Reduction in productivity/efficiency due to circumstances beyond the contractor's control.
- Opening up of work for inspection which subsequently proves to be in accordance with the contract.
- Discrepancy between contract documentation, vis a vis, Bills of Quantities and drawings.

It is imperative at this juncture to note that whether or not these factors constitute a relevant event, ultimately depends upon the form of contract in use.

2.3.1.2 Non-Excusable Events:

These are described as events caused by factors within the contractors control and their occurrences have a probable delay impact on project delivery (Cushman and Carter, 2000). This means that if the cause of an event resulting to disruption /delay can be established to be due to the action or inaction of the contractor, then such event can be termed "non-excusable". A typical example is a situation where delay/disruption occurs in the planned progress of a project due to the contractor's incompetence, revealed by his inability to adequately control the project resources for the actualization of the project. Gibson and Edwards (2015) describes non-excusable events as those events or delays arising from a previously planned contained in the contract clause which the contractor on notice can plan for.

2.3.1.3 External Events:

These include spontaneous occurrence of natural events which have an adverse effect on the planned progress of work. They include, adverse weather condition, flood, earthquake, tornado, and are termed as force majeure or Act of God. Others include communal dispute, civil commotions, labour strikes, strikes and riots, where they are unanticipated. For example, in Nigeria, civil commotions sometimes result due to non- settlement/compensation of owners for lands acquired for public projects. In this case, civil commotion can be seen to be an excusable

event. Odeyinka and Yusif (1997) referred to external events as 'extraneous events'. According to Arditi and Pattanakitchamroon (2005), external events may induce a project delay or contribute to the formation of other delays, however, if these events are referred to as external events because they are neither caused by the contractor nor the client in any case.

Following from the above, it is of importance to state that for the purpose of this paper, the acceptable cause of a claim is the occurrence of an excusable event or an external event. The following diagram summarizes the major causes of claims in construction projects in Nigeria as explained above;

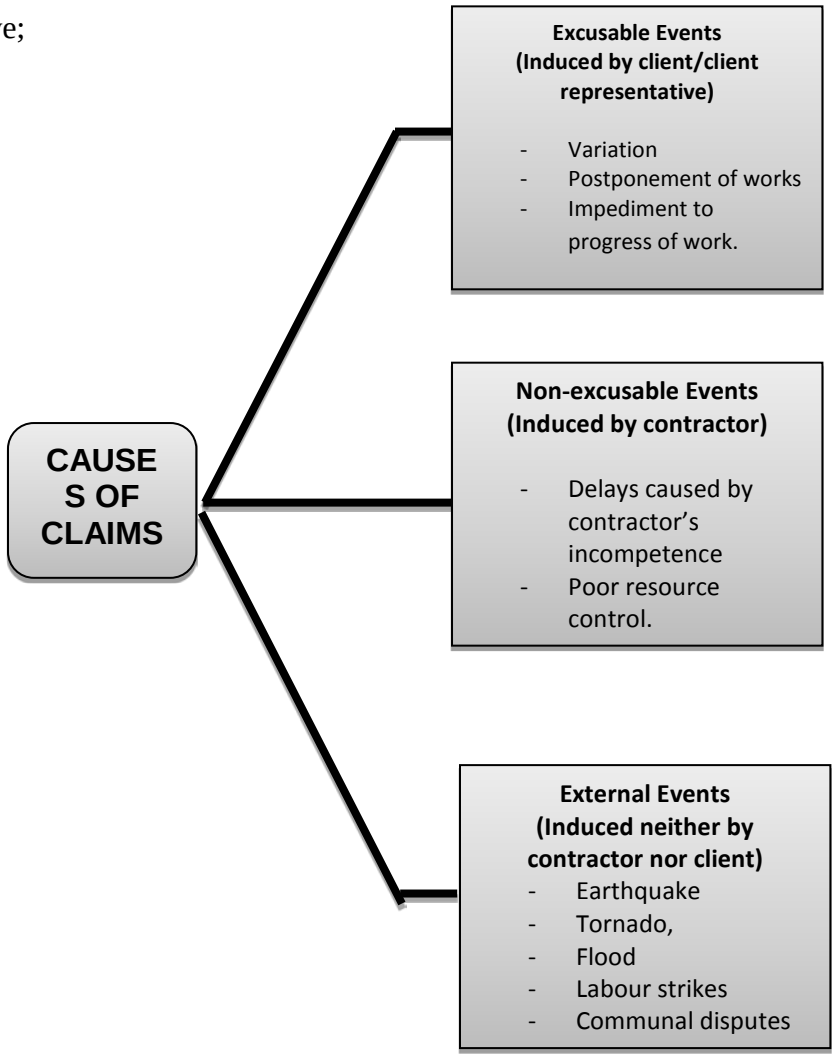


Figure 2.2: Causes of Claims

2.3.2 Pre-requisite for Claims Presentation

For the purpose of substantiating a claim, it is imperative to provide evidence and other forms of acceptable documentations to back up an alleged claim. The following must be convincingly proven:

- That the event leading to the claim actually occurred
- That the event can be classified as either an excusable event or an external event
- That the event actually interfered with the planned progress of the project, causing a delay/disruption.
- That a provision for the claim is contained in the contract.
- That the procedure for making such claims, as outlined in the contract, has been followed to the letter.

Finally, the cost implication or time extension sought by the claim should be stated, accompanied by a break-down and basis of estimation (calculations with adequate references to contract documents and clauses). This will aid perusal and subsequent approval/dismissal (as the case may be) of the proposed claim.

2.4 UNDERLYING PHILOSOPHY OF CLAIMS MANAGEMENT

Client/Consultants, Contractors and Sub-contractors all have different perspectives to the management of claims while administering different projects (Turner and Turner, 1999). The contractors' perspective is explained by Mohamed, et. al. (2009), sub-contractors' perspective from a supply chain perspective set out by Southey, Derek and Wilhelm (2000) and client/consultant's perspective presented by Ashworth and Hogg (2007), Aibinu and Jagboro (2002), Turner and Turner (1999). These are all geared towards the successful delivery of the construction project while each business (Client/Consultant, Contractor and Sub-contractor) tries to remain profitable, illustrated by the figure below and subsequently explained:

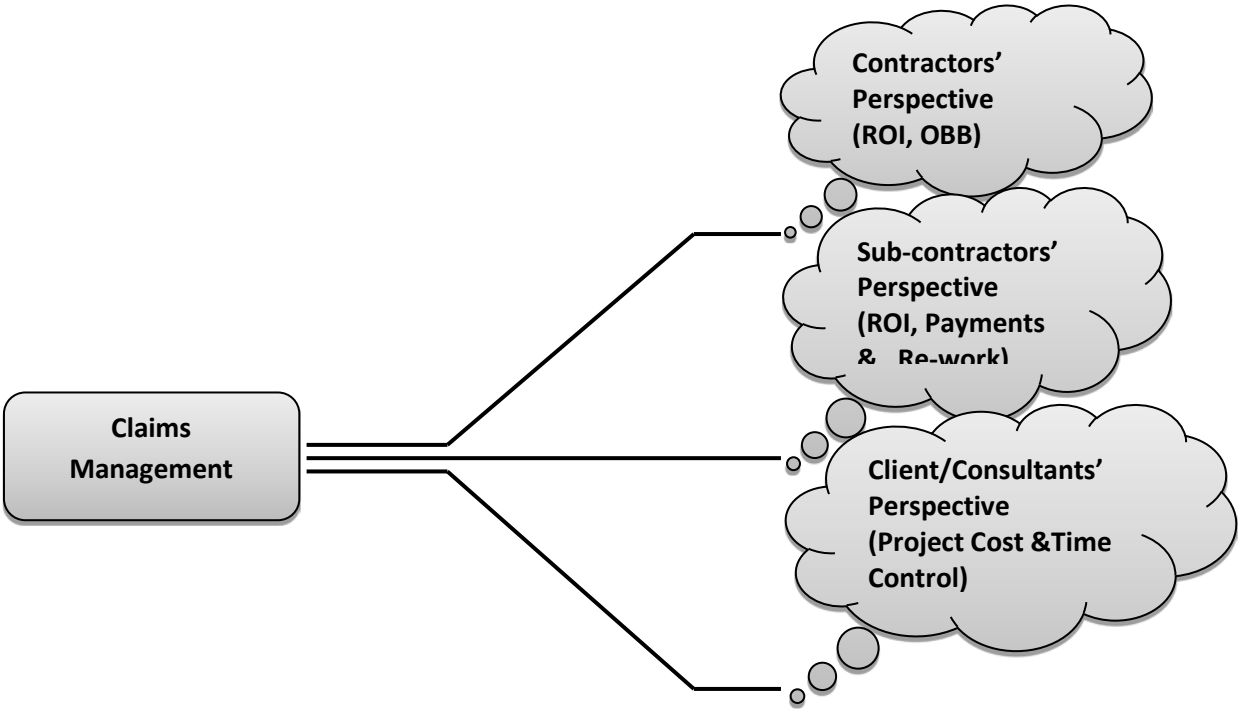


Figure 2.3: Perspectives of Claims Management

2.4.1 Contractors' Perspective

2.4.1.1. Profit Maximization from a supply-chain perspective

Claims management from the main contractor's perspective is chiefly driven by the need to reduce the company's overheads in a bid to maximize profit. From a supply chain perspective, Southey, Derek and Wilhelm (2000) assert that:

Return on Investment (ROI) = Profit / Capital Employed (CE) x 100%

It then follows that achieving an increased return on investment involves increasing the company's profit level and reducing its capital employed, i.e. fixed assets and general overheads.

However, profitability is a function of price per unit and quantity. Prices of goods and services are usually determined by market forces and this is especially competitive in the construction industry where companies hardly enjoy monopoly in service delivery. It therefore follows that little can be done about increasing prices in pursuit of higher profit margins and on the other hand increasing the quantity of items quoted for a construction project above what is actually needed is unethical.

Subject to the form of contract in use, the contractor quotes against fixed quantity of items as provided in the tender documentation. This is prevalent in the traditional procurement system predominantly used in Nigeria.

The only other alternative of increasing the profitability of a construction company in the face of the present fiercely competitive market is to reduce the company's overheads, cost of material, labour, plants and machinery, in other words, effectively undertaking their project activities to the required standard at a cheaper cost. One of the approaches that have proven useful over the years has been managing the scope of work in a bid to prevent scope creep and to ensure that the contractor is reimbursed for every action or inaction of the client that causes the contractor to incur expenses/loss over and above the initial anticipated plan or agreed contract.

Claims management offers a useful tool for contracting organisations to effectively maximize their profit within the confines of the contract.

Furthermore, in developed countries, improving return on investment of construction companies involve outsourcing certain areas of their businesses and concentrating on the core areas with available competencies and capabilities. For example, a company might decide to buy concrete blocks for its on-going project other than produce them, rent plants and equipment rather than buy them. These decisions are usually due to the high initial capital outlay in procuring the associated fixed assets and the high recurrent expenditure involved in maintaining those facilities (such as property related taxes, other taxes and rates made payable to government on a fairly regular basis for the possession and usage of these assets compared to the volume and complexity of the company's projects at hand.

Conversely, in developing countries like Nigeria, construction companies can afford to buy and maintain these fixed assets because of the relatively low rates and taxes required. In addition, the high level of uncertainties associated with outsourcing in most industries make certain companies buy rather than rent, produce in-situ rather than procure precast.

One of the major underpinning philosophies of claims management from the Contractor's perspective is the maximization of return on investment, amongst others.

2.4.1.2 Opportunistic Bidding Behaviour

Competition is a major characteristic of the predominantly used public procurement system in many countries, especially the developing ones like Nigeria. The system is often described by a popular cliché known as "due process". According to Onwusonye (2006), the birth and mandate of "due process" are in line with the International Monetary Fund's (IMF) article IV agreed consultation on Nigeria. This was further concretised by the World Bank Procurement Act (2007) which has now been passed into law. It mainly aims at providing an opportunity/fair play ground for various companies who see themselves as being competent and experienced to compete for the award of public projects, giving some set of guidelines and eligibility criteria. The process is geared towards bringing about the much needed integrity, transparency, accountability into the procurement system in Nigeria.

This procurement system referred to as "due process" stipulates that the project be awarded to the "lowest responsive tender", this has been given so many different interpretations, e.g. the cheapest tender, the most realistic tender, the tender closest to the consultants' estimate.

However, on the other hand, the process is being abused by some tendering contractors who see it as a loop-hole, especially where they can spot potential cost-recovery grey areas in the tender documents obtained from the client. They then lower their tender figures and capitalise on the potential of recovering certain costs later in the life of the project by putting in for claims, if awarded the contract. These contractors decide to reduce their bid profit under the guise of potential claims recovery as a tender winning strategy. Mohamed, et. al. (2009) described this phenomenon as "Opportunistic Bidding Behaviour".

2.4.1.3 Sub-Contractors' Perspective

According to Hussin, et. al. (2010) subcontractors' works constitute majority of construction activities in a given project and the project success depends on this. This assertion is largely dependent on the nature, scope and complexity of a given project, in addition to the form of

contract in use. However, the role of sub-contractors in the success of a construction project cannot be over-emphasized as in some cases; it might solely or jointly (with the main contractor) be accountable for the overall project success.

Subcontractors in construction industry are awarded a portion of an existing contract by a general or principal contractor. Often times subcontractors work under the general contractor rather than the employer who employed the general contractor (Clough et. al., 2015).

Cartlidge (2009) divided sub-contractors into three (3) categories namely;

- Domestic Sub-contractors:
- Named Sub-contractors
- Nominated Sub-contractors**:**

Domestic Sub-contractors

They are employed directly and privately by main contractors. Their work on site is coordinated by the main contractors but they have no contract with the client. They are usually used to complete sections of work, including materials, labour and plants.

Named Sub-contractors

They are invited through a tender process usually led by the main contractor. Their names are included in the project tender documents for carrying out certain aspects of work. However, if a named sub-contractor has not yet been appointed at the completion of the project bill of quantities by the contractor, a provisional sum is usually inserted to cover for works to be executed by a potential named sub-contractor, when appointed. The use of named sub- contractors is usually adopted as an alternative to a nominated sub-contractor, this occurs when the provisos of the form of contract in use does not include nomination of sub-contractors and when the main contractor needs to sub-contract specialist aspect of his work. The main contractor is singly responsible and liable for works carried out by any named contractor.

Nominated Sub-contractors

They are usually employed (nominated) by the architect (consultant) where the architect or client intends to restrict the performance of certain aspects of the project, especially in the case of specialist works. This approach is also adopted in cases where an aspect of the project is yet to be fully detailed and the project needs to proceed to the tender stage. A prime cost sum is usually inserted in the bill of quantities to allow for works to be carried out by the nominated sub-contractor. The main contractor is entitled to a percentage of all sums due to the nominated sub-contractor to cover for administrative costs and the main contractor is also entitled to recover costs of attendance (nominated sub-contractor's supervision & site visits – this varies between projects). These additional costs are in addition the prime cost sum allowance.

Further to the discussion above, for the purpose of this paper, the nominated sub-contractors' perspective will be considered critically as the nominated sub-contractor enters into a formal contractual relationship directly with the main-contractor and indirectly with the client. The nominated sub-contractor enjoys the benefit of a stipulated payment procedure and is paid by the client through the main contractor.

It is imperative to state that the major issue that has generated much heat over the years in the Nigerian construction industry is the issue of timeliness of payment due to the nominated sub-contractor. It is the duty of the main contractor to ensure that sub-contractors schedule of work synchronises with that of the main contractor, such that there is no conflict whatsoever in their timings and that the execution of the main contractor's work doesn't inflict damages on the work already carried out or work to be carried out by the nominated sub-contractor and vice versa. Otherwise, this may result in rework, which is capable of reducing the profit of the nominated sub-contractor or main contractor, as the case may be. It is important for each party involved to know their responsibilities and liabilities under the contract provisos, in other words, a very good understanding of the form of contract in use, especially the payment clauses will help in mitigating the effects of potential problems which may result. Furthermore, the nominated sub-contractor runs a business which is aimed at maximising profit levels, hence the principle of improving returns on investments (as analysed in the preceding section – under the contractors perspective) applies.

2.4.2 Clients'/Consultants' Perspective

1. Project Cost Control

The concept of claims management as seen from the consultant's perspective is anchored on project cost control. According to Ashworth and Hogg (2007), project cost control entails the effective control of costs arising throughout the entire design and construction process, its focuses on the balance between the actual cost being expended and the actual value of works carried out or items provided. This is usually computed arithmetically in project management through Earned Value Analysis. The consultant is appointed by the client to protect the client's interest in terms of ensuring value for money and keeping the project cost within acceptable levels of the pre-determined cost limits and client's budget even in the face of changing client's need.

2. Contingency Allowance

The duties and responsibilities of the consultant in exercising project cost control span from the inception of the project right to its practical completion. One of the best practices of project cost estimation is the allowance of an amount, usually known as contingency, for items of work that are totally unforeseeable at the project inception but that could arise during the project execution. This is for the purpose of ensuring a realistic budget and provision for a project cost control mechanism that ensures the mitigation of a probable risk of increased project cost. However, the quantum of contingency that should be provided for any given project remains debatable and in most cases is left to the discretion of the construction cost estimator and may vary between different countries depending on project risk exposures due to different factors.

According to Aibinu and Jagboro (2002), the common practice in Nigeria is an allowance of between 5-10% of the project cost into the pre-contract estimate for contingency. Their research carried out on 61 completed building projects in Nigeria revealed that the contingency allowances in all cases were not sufficient to offset the cost over-run which occurred when executing the projects. However, the researchers established that a minimum contingency allowance of 17.34% would be adequate.

The performance of a consultant is predominantly appraised based on the extent of successful delivery of the project, in terms of meeting the time, quality and cost targets amongst others, and the general satisfaction of the project stakeholders, which include the client and end users.

However, it is imperative to state that the functions of the consultant isn't only primarily to proffer solutions to emerging issues, but includes the anticipation of the occurrence of probable potential problems, evaluating their implications (in terms of cause and effect), ensuring that adequate structures are put in place to mitigate any adverse effect and providing professional advice to the client accordingly.

2.5 FACTORS AFFECTING THE EFFECTIVE MANAGEMENT OF CLAIMS IN NIGERIA

There are different factors that determine the validity of any claim in a construction project. These include factors that are caused by both internal and external forces. Internal causes included the factors that affect the management of claims, such as claims substantiation, presentation and evaluation; whereas external factors include the prevailing political, economic, socio-cultural, technological, legal and environmental (PESTLE) factors affecting the execution of the project.

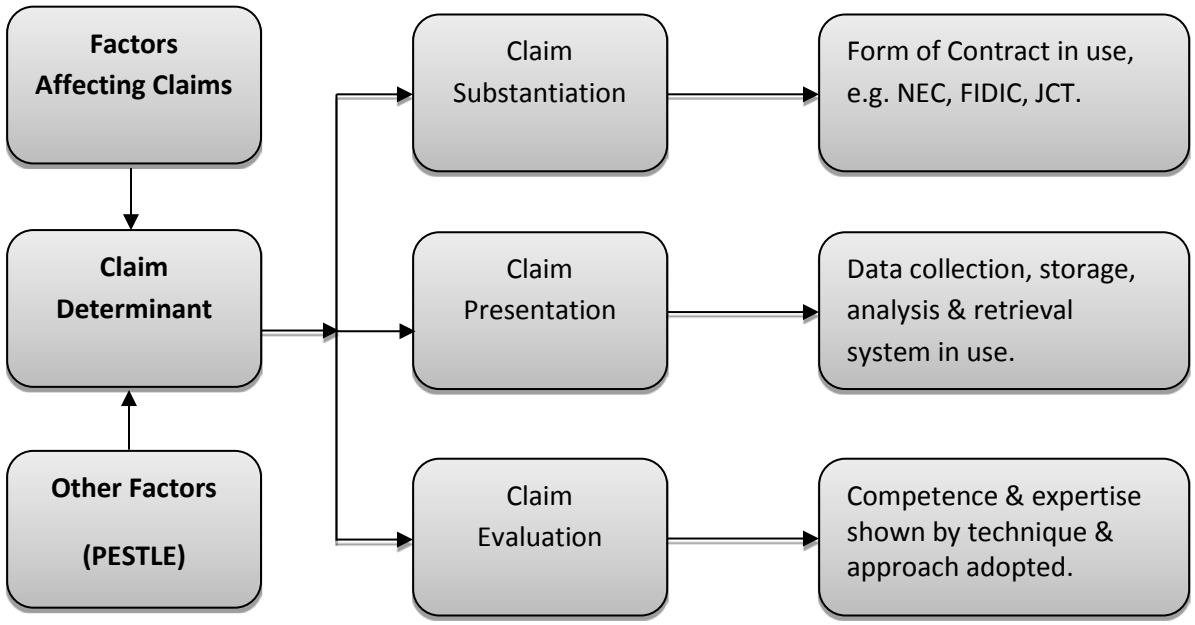


Figure 2.4: Factors affecting Claims Management

2.6 CLAIM DETERMINANT

2.6.1 Claim Substantiation

Type of contract used and conditions specify provisions for contract claims, such as:

(1) What could give rise to a contractual claim?

(2) What notice, if any, should be given, either to the contractor or consultant or vice-versa?

(3) How such claims should be presented and finally

(4) How the claims would be evaluated.

For example, provisions in FIDIC or RIBA, there are great differences in FIDIC – the responsibility of the detailed design rests with the contractor. In which case, the consultant only gives the performance specification. Under such conditions, a contractor cannot claim for delay in providing detailed drawings. Whereas under the Standard Form of Building Contracts in Nigeria, the responsibility of providing the detailed design rests solely on the consultants and any delay in providing such will automatically lead to a contractual claim and an extension of time claim. Therefore the form of contract in use directs each party as to the validity/ permissibility of a proposed claim.

2.6.2 Claim Presentation

Every claim must be adequately backed up with relevant contract clauses and supporting documentations. In which case, it must be seen that the presented claim has been carefully verified and duly authorised by the client/consultant and the relevant supporting document/correspondences are annexed to the presented claim. Contractors are better advised to present their claims in very logical, sequential and simplified manner with details of their computations and assumption(s), properly vetted and clearly stated respectively.

At this juncture, it is imperative to note that a well-structured information technology system for data collection, storage, analysis and retrieval plays a vital role in presenting claims.

Most small and medium sized construction companies in Nigeria possess inadequate information retrieval systems which in turn affect the quality of their claim presentation; hence, justifying their claims becomes difficult.

2.6.3 Claim Evaluation

This requires the highest level of expertise, competence and experience, which in most cases might be lacking or inadequate leading to a knowledge-gap amongst professionals in most third world countries, like Nigeria. Each item of claim must be carefully studied with a backup authorisation, computation of the claims and any lapse(s) or otherwise duly noted. The method of claim evaluation might not be expressly stated in the contract provisos, but in any case, it must be legally claimable from the contract provisos and the quantum being evaluated/ recommended as due, must be seen to be fair, reasonable and equitable to all and sundry, considering the event.

2.6.4 Typical Construction Claim Management Process

Amongst construction professionals, a school of thought argues that subjecting the issue of claim to the management and board of the client organisation's decisions are bureaucratic in nature and their main reason is that the issue of contractual claim is fully covered by the provisos of the contract conditions which are in the arm-pit of the consultant for approval or otherwise.

However, this process has been seen by others to have an effective cost control mechanism on the overall project cost as it offers a check mechanism on some "reckless" consultants. However, if the additional cost to be incurred is above the clients' budget, then the above stated process needs to be followed for necessary approval.

The following diagram illustrates a typical organisational/communication structure of a public sector in Nigeria with respect to the management of claims.

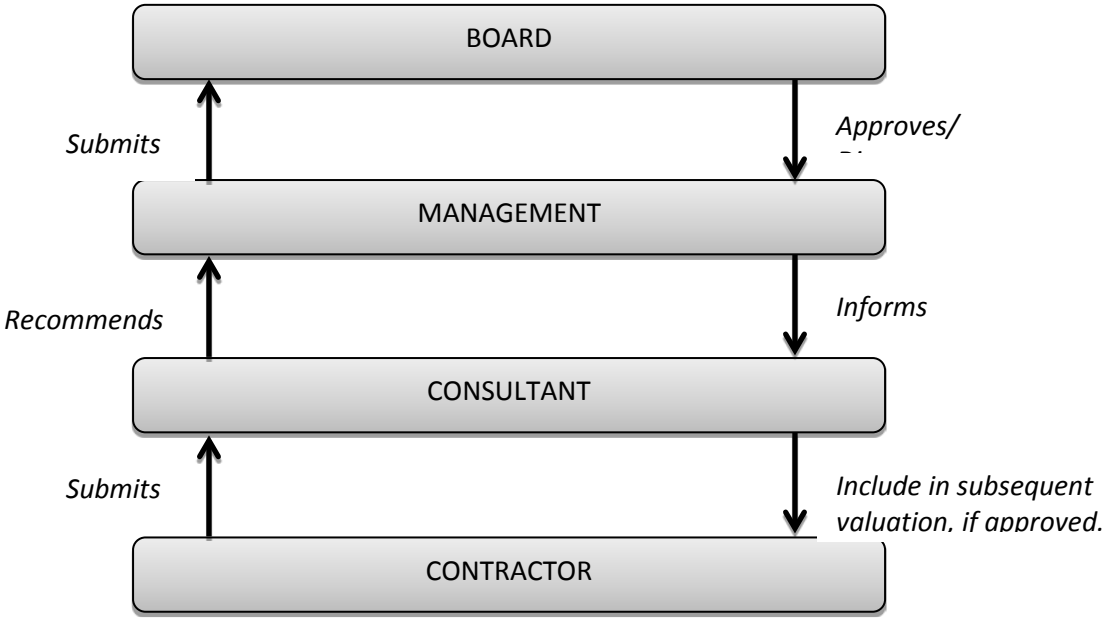


Figure 2.5: Claims Management Organisational Structure in a typical Public Sector in Nigeria

The diagram below is an illustration of a typical claims management process from inception, highlighting the stages involved.

Partly adopted From Mohamed et.al. (2011)

Figure 2.6: Typical Claims Management Process Chart

2.7 OTHER FACTORS AFFECTING CLAIMS

A critical study of claims management from the above diagram illustrating a typical claims management process, it can be deduced that there are other factors, which may be external to the project and internal to the organisations involved, affecting the management of claims in the Nigerian construction industry. These include political, economic, socio-cultural, technological, legal and environmental factors.

- Lack of knowledge/expertise in claims management

This is a claims management problem that exists in the different stages of claims management, and considering the delicate nature of claims, the level of claims expertise of all parties involved in projects are of utmost importance, this is a perspective shared by Bakhary et. al. (2014).

- Poor record keeping and general administration

Poor administrative capabilities of contracting parties is a claims management problem that seems generic to less developed countries, and these problems have an increasingly negative effect as time passes. Poor record keeping is an issue that affects most of the construction industry, but the delicate nature of claims management compounds the effect poor record keeping has on claims management (Ren, et. al. 2003).

- Inefficient monitoring of progress of work:

Monitoring construction work progress is vital to project success (Pogorilich, 1992). The execution is this important process requires a certain amount of personnel skill, unfortunately insufficiently personnel tend to lead to inefficiencies in monitoring progress which generally leads to inefficiencies in claim management. (Levin, 1998).

- Unrealistic/Incomplete work plan.

Work plans are important tools in construction project management, and a lot of times due to a desire for speed by clients and/or contractors, work plans are not given the necessary attention, also client lofty demands and contractors' desires to win projects sometimes lead to unrealistic work plans, which in turn become a source of difficulties when problems arise and claims are made and need to be sorted out (Oyewobi et. al., 2011).

- Inadequate time buffers or contingency allowances

Allowances for contingencies are important in construction management as it serves as good tool to propagate cooperation between parties, (Bakhary et. al., 2014). When these contingencies are absent or insufficient, there is greater room for inter party friction, as milestones tend to be missed leading to an unnecessary high amount of claims being made.

- Absence of dedicated claims management expert

Claims management is important as it tends to affect parties involved in an inversely proportional manner, so when one party gains the other loses. To strike a balance in a necessity to avoid disenchanting parties of the contract, for this reason the need for a claims management expert becomes a necessity (Bakhary et. al., 2014). Owing to how unexplored claims management is in Nigeria, experts in the field are few and therefore this delicate process tends to suffer.

- Inadequate understanding of contract conditions

The Nigerian construction industry is one generally filled with opinions (Ayodele, 2010) and various contract provisos contained in contractual conditions remain ambiguous as they are interpreted differently by contractual parties that even the slightest misinterpretation of contract conditions leave gaps between what is desired and what is achieved. For this reason, when claims are being made for losses incurred, the disparity in understanding becomes an obstacle to a successful claims process (Levin, 1998).

- Insufficient details contained in project documentation

Project documentation serve as guides though the lifespan of projects, in some cases the detailing can be low and terms ambiguous, therefore leaving room for dissatisfaction, more importantly the lack of detailing become obstacles when claims have to made, especially in less developed countries where experience in handling construction projects is not predominantly abundant (Akinsola et. al., 2013)

- Indiscriminate use of provisional sums in Bill of Quantities

Bill of quantities are vital tools, especially in the early stages of contract awards as they enable both parties evaluate the required commitments to the project, when these evaluations are not detailed enough, treated with honesty and/or the utmost professionalism, the foundation for the project is poor and therefore all the subsequent processes suffer especially for lack of

accountability, claims inclusive, and the inappropriate use of provisional sums is common practice in Nigeria, contributing to fraudulence in the construction industry (Ayodele, 2010).

- Incompatible/unfeasible project designs, usually due to non-consideration of environmental issues:

The early stages of a project are important and the efficiency of operations in this stage is an indicator of performance further in the life of projects ((Ren et. al., 2003). Project design requires a lot of cooperation amongst the parties and consideration of various factors, and when some factors are not taken into account the project operations are at risk of being interrupted which gives cause for claims. Considering how avoidable this problem is, the Nigerian construction industry still does not pay sufficient attention to these factors (Oyewobi, 2011).

- Poor communication amongst professionals and general stake-holders

Effective communication is an essential requirement to achieve project success, when there is a breakdown in communication, construction processes suffer and also as a result of poor communication emerging claims are difficult to identify, manage and resolve (Bakhary et. al., 2014).

- Contract award syndrome – poor pre-contract documentation resulting from hastiness to award contracts due to political influence

The sensitive nature of contract prequalification and long term effect on project success Olufemi et. al., (2013), is an indicator that any form of inaccuracy like hastiness means that unnecessary claims issues are a certainty from the onset as documentation is not efficient, and the claims resolution process is hampered by the same documentation inefficiency as contract details will be unclear.

- Economic instability and dwindling inflation rates which lead to fluctuation claims

In developing countries economic stability is a rarity, and therefore material prices tend to vary considerably, there is also a corresponding effect on cost of services provided due to inflation which is common in less developed countries, these variations have a negative effect on managing claims that arise (Akinsola et. al., 2013)

- Conflicting instructions from various client representatives leading to variations – use of political nominees in contract administration rather than representatives from MDAs:

Ayodele et. al. (2011) indicates politicking (paying severance to political godfathers) during contract awarding as one of the major causes and factors of corruptions in the Nigerian construction industry, the fact that external factors get to be involved in the process means that the set framework for construction jobs get to be interrupted as alternating information from various entities serve as obstacles to achieving project goals. Furthermore when claim issues arise, resolution is difficult as the parties involved are not clear cut as necessary.

- Use of inappropriate type of contract – choosing a contract type without taking the uniqueness, complexity, duration, scope and prevailing project circumstances into cognizance: Construction practice is not limited to just the main execution of construction activities, it also involves the "Pre-Contract" and "Post-Construction" stages (Olugbenga, 2011). The pre-contract stage is the foundation for all construction activity, the choice of contract type is vital to how the construction project is executed. Inappropriate contract type choices will lead to disputes, project delay and cost overrun (Fisk, 1997). The choice of contract type needs to take into consideration various factors, and if any of these factors are not properly considered, that could be the root cause of unnecessarily high amounts of claims and claim management issues.

- Non-employment or late employment of relevant project consultants

Construction can be delicate and require high levels of personnel specialization for project success, Bakhary et. al. (2014) indicates that matters concerning ability and skill of staff involved are important and if not handled appropriately can lead to severe problems. Having properly qualified personnel early on in the planning stages is clearly important as they ensure preventative measures are set in place (Zaneldin, 2006), chances are if the relevant project consultants are absent at the beginning of the construction process, claims are almost a certainty and claims issues can be unnecessarily high, especially in a country like Nigeria where uncertainties in the construction industry are common place (Olugbenga, 2011).

- Corruption within the rank and files of stake-holder organisations:

Corruption is a phenomenon that is paid a great amount of lip service in Nigeria, especially as it affects most of the nation's parastatals and institutions (Akinsola, 2013). Falana (2007) expressed his understanding of corruption as the abuse of public office for personal profit, and this aptly describes attitude of personnel involved in the bureaucratic chain of the Nigerian construction industry, as a result of these unprofessional, unruly and unacceptable office practices, claims management suffers unduly in Nigeria.

- Nepotism, tribalism and other socio-cultural ills that cloud moral values and justice.

Nepotism and socio-cultural ills are common with multicultural societies, and Nigeria is an immensely diverse country (Ayodele, 2010). Nepotism by definition disallows for justice to be sort after in negotiations which constitutes a key process in managing construction contract claims (Bakhary et. al., 2014). The high degree of diversity present in the Nigerian society therefore allows for a high amount of discrepancies during the claims process.

However, the size and complexity of contracting organisations usually affect the success of claims. In other words, common sense suggests that large-scale contracting firms may be more successful in their claims recovery than small-medium scale contractors. The reason being that the larger firms are able to deploy more resources to the claims process in terms of personnel, dedicated expert systems and information technology systems, given their overheads, compared to small-medium scale contracting firms usually with limited resources. In Nigeria, large-scale contractors are usually more organised than the small-medium scale ones, hence, their ability to better articulate and justify their claims (Okoli, 2015).

2.8 DECISION SUPPORT SYSTEM

A decision is generally regarded as a chosen strategy for action, or a choice leading to dersired objectives (Nieboer 2011, Simon 1960, 1976, Pomerol & Adam 2003, Power 2008; Rippen 2005).

Nutt (1998) defined a decision in construction-related terms as an episode that begins with the construction company becoming aware of a need for action and concluding with a successful or unsuccessful attempt at executing the desired action, if the case of an unsuccessful execution arises then another attempt at execution is to be consider as a new decision, especially in the case where alternative execution routes are available. Holsapple (1995) regards decision making as the process from learning of the need for action, understanding the various options and consequences of each option, and ending with a final choice of an option.

In literature, researchers who have studied the human decision-making process have discussed the process in terms of a number of phases or as types. Johnson (2006) discussed the decision making process in organisations as mainly one of **four main types**, which are*: Strategic Planning Decisions; Management Control Decisions; Operational Control Decisions; Operational Performance Decisions*. The decision-making process has been discussed and categorised differently by others in literature. Simon (1960) viewed the decision making process as made up of **four phases**: *the Intelligence phase; the Design phase; the Choice phase; and the Review phase*.

Another group of researchers have categorised the decision-making process as one of **three types**, (Chung and Lang 2007; Keen & Scott-Morton 1978; Mallach 1994; Tan & Sheps 1998). Decision support systems have benefited the most from this categorisation style as it is the most helpful in identifying what DSS models will match the users specific problem effectively. This categorisation has the tree types of decisions as: *structured decision; semi- structured decision; and the unstructured decision*. The phase categorisation of Simon (1960) is used in the clarification of which type of decision is been dealt with in this classification system.

- Structured decision; this type of decision has a well-defined decision making procedure. All three decision phases discussed earlier (intelligence, design, and choice) can be specified. DSS easily supports structured decisions. However, the decision maker may not need DSS support

because each phase of the decision is well understood, resulting in little, if any, decision uncertainty.

- Semi- structured decision; this type of decision has both structured and unstructured phases. DSS were designed to assist decision-makers with semi-structured or unstructured decisions. However, all decisions, whether they are structured, semi-structured or unstructured, require human judgement to make the decision Tan & Sheps (1998).
- Unstructured decision; the unstructured decision where all three-decision phases are unknown or unstructured. The decision may be new, infrequent, or have many variables in the decision phases which cause a high level of decision uncertainty. DSS can still support the decision-maker, but only with a low level of support

2.8.1 Definitions of DSS

To better understand a Decision Support System, its applications and characteristics, the different definitions will need to be examined. Different decision support system definitions exist in different disciplines, more specifically Management Information Systems (MIS) and Information Systems (IS).

Scott-Morton (1971) describing the impact computer-based systems on the decision processes and its effectiveness are considered as one of the earliest DSS definitions was in the early 1970s.

Gorry & Scott-Morton (1971) brought together most of the computer-aided decision making used for the development of frameworks for management information systems (MIS) from pre-existing works in literature. The researchers referred to *'structured decision systems'* as systems that have been developed for traditional data handling tasks in the management information system (MIS) context and referred to decision support systems (DSS) as systems intended to aid less or non-routine decision-making activities. The developed framework pointed to the growing recognition that different types of support was required for differing types organisational activities (Amrit 2014). DSS was originally meant to serve as an additional tool for decision-makers, to enhance their decision making capabilities, but not to serve as a replacement for their educated judgement (Garry & Scott-Morton 1971).

Decision support system (DSS) is the use of suitable computer technology to support and improve the effectiveness of managerial decision-making in semi-structured tasks (Rippen R. 2005). While Alter (1980) gave a wider functional description of the DSS concept, the

definition was that DSS is a computer-based system with a specific design to facilitate the decision process and not automate the decision making process and thereby enabling the system to be responsive to the evolving needs of the decision-maker.

2.8.2 Types and Components of Decision Support Systems (DSS)

Decision support systems have different scopes and types and invariably vary in preference to decision makers. There is a considerably wide range of decision support systems (DSSs'), Mallach (1994) indicates that DSSs' vary from simple computer spreadsheets to very complicated and robust setups for mutli-person usage and large databases

Alter (1980) divided decision support systems into a hierarchy of seven levels which are:

- Suggestion Systems; Optimisation Systems; Representational Models; Accounting Models Systems; Analysis Information Systems; Data analysis Systems; and File Drawer Systems.

This hierarchical division is based on the capabilities of decision support systems. This division also takes into cognisance that not all DSSs' can be categorised into one level and that therefore grey areas may exist between hierarchies.

Sprague and Carlson (1982) defined DSS as interactive computer-based systems set-up to enable decision-makers to use data and models to solve unstructured problems. This definition gives DSSs' some characteristics which are that: DSSs' tends to be aimed at the less structured problems often faced by upper-level managers, also that it attempts to combine analytical techniques and/or models with normal data access and retrieval, this definition also characterises DSSs' as possessing features to make it easy for people with low computer literacy to use the systems, and finally that DSSs' emphasise flexibility and adaptability so the decision makers change in approach and environment is accounted for.

Bonczek et al (1980) defined Decision Support Systems as computer-based system consisting of three interacting components:

i. A language system - a mechanism for communication between the user and the components of the DSS,
ii. A knowledge base - the storage of data or procedures.
iii. A problem processor-the link between the language system and knowledge base, this contains one or more general problem manipulation capabilities needed to making a choice.

King (1996) stated that DSS's have these components: Decision models, interactive hardware and software, a database, a database management system, graphical and other sophisticated displays, a user-friendly modelling language.

More recent statements by researchers on DSS's have been in agreement with earlier definitions of the concept. Some of such statements are;

1. A DSS is an interactive flexible and adaptable computer based information system (CBIS) that utilises decision rules and models in corporation with extensive data bases and the decision maker's insight, to enable implementable decisions in solving problems (Turban and Aronson 1998).
2. Williams et al (1987) stated that DSS is a computer-based system created with the objective of enhancing the general effectiveness (by increasing reliability, accuracy and efficiency) of decision makers, more often in their unstructured and semi- structured tasks.
3. DSS is an integrated set of computer tools that enables a decision-maker to communicate with the computer system to obtain information to assist while making unanticipated semi-structured and unstructured decisions (Hicks 1993).

Some basic themes have been gotten from these definitions. Decision support systems can be regarded as basically an information system possessing an internal structure (the DSS) and an external structure (the user of the DSS and the environment in which the DSS is used). Most of the definitions indicate that DSS is used by managers. The final decision to use or not to use DSS and/or incorporate DSS derived information in decision making is that of the DSS user (Tan and Sheps 1998). Finally, however DSS is not decision-making entity, decision support systems are designed to help and not replace people in the decision making process. If there is no human evaluation of the DSS's recommendation then it stops being a DSS.

Sprague and Carlson proposed that the DSS framework is made up of three management subsystems, namely:

- Database Management Subsystem (DBMS),
- Model Based Management Subsystem (MBMS) and
- Dialogue Generation Management Subsystem (DGMS).

Turban and Aronson (1998) stated that DSS's are composed of the following components.

1. Data management; includes the database(s) which contains relevant data for the situation.

2. Model Management; is a software package that contains models of financial, statistical, or other quantitative system to provide the DSS's analytical capabilities.
3. Knowledge management; is a subsystem by which a user can independently or in tandem with other subsystems. This provides the intelligence to support the decision maker.
4. User interface; the subsystem that allows the user to communicate with, and issue commands to the DSS.

2.8.3 DSS for the Purpose of this Study

DSS is an interactive computer-based system which has the objective of enhancing the overall effectiveness of the decision-making process by using the analytical methods, models and knowledge to help decision-makers to define the problems or opportunities, problem solving and solution adoption through exploring, analysing and choosing between various decision alternatives, especially in their unstructured and semi-structured tasks.

The aim of DSS is to support and speed-up the decision-making process. Butters and Eom (1992), and Silver (1990) argue that the integration of computing facilities with decision-making processes is unequally helpful to all phases of the human decision making process.

When a decision support system is connected to an external database, it is expected to be considerably helpful in an efficient and accurate conclusion depending on the current situation considered.

Decision support systems and the execution of the decision making process are restricted to the extent of data in the database.

There are possible limitations the use of a decision support system during the intelligence phase of decision making, especially when databases are not both internal and external. During the design and detailing stages, Decision support systems help provide viable alternate decision scenarios by mathematical or statistical prediction techniques. The application of DSS's is most efficient when evaluating alternatives which is in the evaluation phase of decision making and is the most structured phase (Blios 1980). Bilos (1980) and Silver (1990) state that the high amount of human activity in the early stages (intelligence phase) of the decision making process, makes the use of DSS premature in this phase. But recommend the use of DSS's in the design phase to generate alternatives and facilitate decision outcomes. Power (2003) make the point that the DSS is very helpful because it provides a wide database (wider than the human

brain) to be accessed during decision making, Silver (1980) agreed to the same train of thought and adds that this database allows for efficient representation of situations and enables prediction of future possibilities, and this predictive capability provided by the DSS is regarded as the most beneficial attribute of DSS by Mallach (1994). The final stage of the decision making process (choice phase) is aided by the decision support system as it enables the decision maker select the best of avaialable alternatives.

Understanding that the benefits of using DSS will depend on the decision-maker and the situation, the DSS should possess the following:

1. The DSS should augment the decision-maker's knowledge, experience and management abilities, to amplify the decision-makers' representation and knowledge processing capabilities during decision making.
2. Should be able to access completely and efficient its extensive database, so the DSS can identify and navigate problems the decision maker might overlook, and give feedback.
3. The DSS has to provide the decision the maker with time saving capabilities, as it can handle problems with higher complexities and of higher magnitude.
4. Any decision support system should afford the decision maker a considerable amount of reliability.
5. The DSS should timeless, it should be able to assist the decision maker with future decision in addition to assisting with on-going decision making, the decision-maker should be able to use DSS in exploratory ways to navigate its data repository analyse implications of possible choices. Also the decision-maker should be able to use DSS to analyse already experienced problems by imputing problem characteristics.
6. DSS’s should use its plethora of data to provide compelling evidence to justify a decision, the DSS may be used to check, or confirm results acquired independent of the DSS.

Using DSS in decision making has various advantages, such as: avoiding a case of lost opportunities, avoiding duplicated efforts which waste resources, and protects against the use of incompatible systems. Also senior managers can benefit from DSS that deliver relevant information to with understanding the threats, opportunities, capabilities, and suitable strategies. The efficient use of DSS can provide the decision maker on how internal and external factors are interdependent leading to better consideration during in decision making and actual implementation.

2.8.4 Importance of Claims Management

- It ensures that the client, consultant and contractor are operating within the contract provisions as relates to claims. This thereby allows for maximum transparency and accountability in the contract management and administration.
- It provides an effective cost control and time management mechanism on a project.
- It minimises the occurrence of contractual disputes which in most cases end up in elongated litigations and arbitrations, this has led to the outright abandonment of so many projects in Nigeria.
- Claims management provides a mechanism for reducing the contractors'/nominated sub-contractor's losses, thus optimising their profit levels. It then follows that in pursuit of the above, contractors need to be more organised in terms of their information technology system acquisition and recruitment of competent personnel needed for this purpose.

2.8.5 Why Decision Support System?

According to Lade et. al. (2012), multi-criteria decision analysis methods are deployed in order to aid decision makers in making more informed decisions. The following Responsibility/Behavioural Matrix and Claims Management Resource Availability Table explore the current state of claims management in the Nigerian Construction industry and the role of key industry players, tools and techniques.

2.8.6 Responsibility/ Behavioural Matrix

The following table is developed based on the typical claims management process chart developed in this study and extensive literature review, however, its adoption in any given construction project remains subject to the provisos of the contract condition.

Table 2.1: Responsibility/ Behavioural Matrix

S/N	Responsibility / Behaviour	Client/ Consultant	Main Contractor	Sub-Contractor	Remarks	References
1.	Cause of Claim	✓	✓	✓	Any party	Jagboro and Ali (1999), Barnes and Haidar (2011), Odeyinka and Yusif (1997), Arditi and Pattanakitchra moon (2005)
2.	Claim Substantiation	x	✓	✓	Computation & Documentation	Ndekugri and Vidogah (1998) Ashworth and Hogg (2007) Cartlidge (2009) Cushman and Carter (2011) Olanrewaju and Anavhe (2014)
3.	Claim Preparation & Submission	x	✓	✓	Includes, claim identification, notification, examination & documentation	
4.	Claim Evaluation	✓	x	X	Assessment for Validity	
5.	Claim Negotiation	✓	✓	✓	Involves all parties.	
6.	Claim Decision	✓	x	X	Approval/ Disapproval	
7.	Profit Maximisation	x	✓	✓	Return on Investment (ROI)	Southey, Derek and Wilhelm (2000)
8.	Project Cost, Quality and Time Control	✓	x	X	Supervision	Ashworth and Hogg (2007)
9.	Opportunistic Bidding Behaviour (OBB)	x	✓	✓	Contractors' and Sub-Contractors' Tendency.	Mohamed, Khoury and Hafez (2011)
10.	Value for money spent	✓	x	X	Client's priority and/or consultant's responsibility.	

Please note that the table above is generic in terms of a typical contract and the distribution of responsibility amongst the parties involved, however, its validity at any given time is subject to the contract conditions in use.

2.8.7 Claims Management Resource Availability

The table below summarises the availability of human and non-human resources, including tools and techniques for effectively managing construction contract claims in the Nigerian construction industry.

Table 2.2 Claims Management Resource Availability

S/N	CLAIMS MANAGEMENT RESOURCE	Available	Not Available	Reference
1.	Standard Contract Conditions	✓	x	Olanrewaju and Anavhe (2014)
2.	Operational Framework / Decision Support System	x	✓	
3.	Claims Manager/Expert	x	✓	
4.	Relevant Regulatory Body	x	✓	
5.	Claims Management Education & Training	x	✓	

Please note, in the table above "√" means "YES" whereas "x" means "NO".

The resource availability table above shows deficiency in the current structural approach to claims management in Nigeria. This may largely be due to the existing knowledge gaps that exist as partly captured in Table 2.2.

2.8.9 Need for DSS in managing Construction Contract Claims in Nigeria

From the foregoing, it is therefore imperative to state that the need for a DSS in managing construction contract claims in Nigeria cannot be over-emphasized for the following imminent reasons;

- To bridge the knowledge gap amongst construction professionals.
- To curb cost increases and uncertainties that accompanies construction contract claims.
- To provide an operational framework that will incorporate relevant contractual agreements.
- To ease the applicability and boost the usability of a standard claims management approach within the industry.

- To reduce the probability of the occurrence of contractual disputes, this has the potential of significantly affecting the project completion.
- To provide a basis for cost effective and faster approach to dispute resolution compared to other alternatives, such as, litigation, arbitration, adjudication and mediation.

2.9 CHAPTER SUMMARY

This chapter provides an extensive literature review on claims management with particular interest in the Nigerian construction industry. The concept of claims management is not new but has been lacking in terms of a structured approach to evaluating the effective management of claims (Bakhary, et. al., 2013). This research carefully examines different types of construction claims, their causes, management processes and different perspectives to the management of claims. It further critically reviews issues bothering on claims presentation, substantiation, evaluation, validation and their importance. In addition, this chapter investigates different factors affecting the management of claims in the Nigerian construction industry in order to understand the existing knowledge gaps. It forms the basis for the preliminary survey carried out in Chapter 5 to investigate the main factors influencing the effective and efficient management of construction contract claims. The critical review of Decision Support System covered in this chapter also forms the basis for the development and subsequent proposition of the model in Chapter 7.

CHAPTER 3

CRITICAL REVIEW ON CHOICE OF PROCUREMENT STRATEGY FROM CLAIMS MANAGEMENT PERSPECTIVE

3.0 INTRODUCTION

The concept of claims management is not in any way limited to resolving already existing claims or preventing existing claims from degenerating or escalating with an attendant significant negative impact. A holistic approach to claims management involves all practices and procedures adopted in mitigating the occurrence of potential claims from the project inception right to its practical completion.

In the construction industry, claims are evident in different forms, such as, variation, fluctuation, additional works, and extension of time, delay and disruption. The management of all these goes a long way to determine the fate of every construction project and also to a large extent has accounted for the dwindling fortune of construction projects globally.

The success or failure of construction projects is measured by various performance indices pre-determined by the project stake-holders at the project inception in each case. However, the poor management of these indices results in claims and this, in turn, result in project cost over-runs, time over-runs, scope creeps, and possible disputes. In Nigeria, so many building and civil engineering projects have ended up in prolonged litigations, arbitrations, adjudications, and in extreme situations, some projects have been out rightly abandoned.

This chapter examines the root causes of construction contract claims from a project life-cycle perspective by examining various stages of project management from which majority of potential claims emanate. It further seeks to focus its investigation on the impact of the choice of procurement strategy on the performance of construction projects. The choice of procurement strategy to be adopted for any proposed project is one of the most important decisions taken at the project planning stage. This chapter further attempts to assess the factors which affects/informs this very important decision with a view to developing a decision support system to aid the procurement decision making process whose back-bone will be the claim management philosophy.

3.1 STATEMENT OF THE PROBLEM

The passive adoption of the most convenient rather than the most suitable procurement strategy undermines the performance of any given project (Cartlidge, 2006). This suggests that the suitability of the choice of procurement strategy which in-turn determines the type of contract to be used and the form of contract to be adopted may have a significant impact on the type, frequency, cost implication and time implication, of potential claims that may emanate later in the project.

Over the years, the global construction industry has continuously shown a culture of contractual arrangement which seeks to transfer more risks from the client to other contracting parties even in the face of economic recession, budget cuts. It therefore becomes imperative to adopt sustainable strategies for procuring projects whilst ensuring that pre-determined goals are not compromised.

In addition, a lot of research has been done previously in assessing the factors affecting procurement of construction projects, however, very little has been done in approaching procurement from a claims management perspective. This approach has the advantage of importing the claims management lessons learnt in retrospect from other projects into framing, mitigating risks and executing a proposed project from inception to its practical completion.

Furthermore, the assessment of the suitability and adequacy of procurement strategies is necessitated by the increasing complexity and sizes of construction projects globally. Akintoye and Main (2011) asserts that there is also a need to investigate alternative procurement methods and the possible implications of their adoption on construction project performance.

3.2 PROCUREMENT STRATEGY

Procurement strategy refers to the careful identification and selection of a type of contract arrangement; choice of procurement method and type of competition which is most suitable for adoption in the purchase of goods/services/works (United Nations, 2012). Love, Gunasekaran and Li (1998) argues that the process of procuring construction projects has been repeatedly faulted on the basis of its fragmented approach towards project delivery. This argument is based on a weakened integration, coordination and communication between project participants which in turn affects project performance.

Chueng et.al.(2001) asserts that the selection process of a choice of procurement strategy is rather inherently subjective than objective because it lends itself to the past experience and knowledge of the decision maker. In addition, emphasis is placed on the need for an analytical decision making model which encompasses stakeholders' preferences/criteria and prevailing project circumstances. Furthermore, McDermott (2005) upholds the school of thought which agrees that the choice of adoption of a procurement strategy must be based on the stakeholders' interests and perhaps the whole life-span of the project.

Ojo and Gbadebo (2012) opine that an unstructured approach to selecting an appropriate procurement strategy is capable of increasing project risk and results in project failure. Akintoye and Main (2012) also suggests that the inability of projects to deliver on set goals has received greater attention in recent times and this can be attributed partly to the procurement strategies adopted.

Following from the above, it is therefore evident that the decision of the choice of an appropriate procurement strategy is a very important decision. It is in three (3) folds, namely; ***type of contractual arrangement, choice of procurement method and type of tendering/choice of competition*** to be adopted. These decisions are perhaps the most important decision taken at the project planning stage. This also implies that the planning stage is critical in the project life-cycle, as it determines to a large extent the outcome of subsequent stages.

3.3 TYPES OF CONTRACT

Modern construction contracts are often adopted in commercial environment which has given rise to the development of over the years. However, some of the conditions of contract used in recent time are based on document obtained in the nineteenth century, and most of the construction contract law relied upon are made as a result of cases which occurred in the industrial revolution (Thomas, et. al., 2016).

The type of contract adopted for a project tends to define the sort of relationship between parties to a project. It is also responsible for the distribution of risks amongst stakeholders because it shows the nature and type of risks that the client is willing and able to accept.

The choice of the type of contract adopted primarily suggests the nature / computations of amount accruable to the supplier/service provider as profit/remuneration/fee, expressed in relation to the total project cost (whether known or unknown) for any given construction project. In other words, the type of contract adopted defines the payment arrangement between the contracting parties.

Several factors are considered before adopting a choice of contract type, these include; the type, size, nature and complexity of a project, the certainty of the total project cost, project duration and the assessed project risks.

There are different types of contract; this includes

- Lump sum contract
- Unit price contract and
- Cost reimbursable contracts.

3.3.1 Lump Sum Contract

This is a type of contract where the contractor agrees to perform an agreed and clearly defined scope of work for a fixed sum of money (Hughes, 1978; Clough, 1981; Onwusonye, 2004; Engineering ToolBox, n.d.). The lump sum usually includes the cost of material, labour, plants, as well as, profit margins for the contractor. The scope of work is usually clearly defined alongside the “fixed” or “lump” sum.

This type of contract is usually not flexible with respect to variations, fluctuations and other forms of changes. It is commonly used for non-fluctuating construction contracts which usually last no more than 1year.

3.3.2 Unit Price Contract

This explains a type of contract where a contractor agrees to be paid a certain cost per unit (Nr, m^2, m^3.) of an item supplied or work executed (Gordon 1994). This sort of contract is usually adopted where there is a clear description of the item of work to be carried out or the item to be supplied. The unit cost is usually deemed to include the cost of materials, labour, plants, profit and overhead. The total contract cost is usually a function of the sum of the subtotals of each item. The subtotal is computed in each case by multiplying the estimated quantity by the unit price.

This type of contract is widely used for supply contracts. Onwusonye (2006) also opines that the unit price contract is flexible as it allows for valuations of variations and provides an adequate basis for interim valuations.

3.3.3 Cost Reimbursement Contract

Cost reimbursable contract is one where all the allowable cost associated with producing goods and services as defined in the contract are being charged to the buyer (employer), hence the seller (contractor) is reimbursed (Cox 2013).

This is a type of contract where the contractor agrees to be paid the actual costs (usually labour, plants and materials) associated with the supply or execution of works under the contract plus an additional amount as remuneration to the contractor to cover for profit and overheads. This type of contract is also known as “cost plus” contracts. However, the remuneration paid in addition to the actual cost may vary depending on the type of cost reimbursement contract adopted. This includes:

(i) Cost plus fixed percentage contract:

Remuneration paid to the contractor is computed based on a percentage of the actual cost.

(ii) Cost plus fixed fee contract:

Remuneration paid to the contractor is based on a pre-agreed fee to cover for the contractor's profit and overhead. This fee is fixed and cannot be changed regardless of any subsequent changes that may have been made in the course of any subsequent changes that may have been made in the course of executing the contract.

(iii) Cost plus fixed fee with guaranteed maximum price contract:

This is similar to cost plus fixed fee, however, the remuneration of the contractor is only guaranteed on the basis that the total project cost will not exceed an agreed cost limit. This is used mainly where the client has a certain cost tolerance for the project. It is also used when the client's priority is more of quality and time, rather than cost. In other works the client may be willing to pay a little extra still within its budget to get the required job done within the pre-specified time.

(iv) Cost plus fixed fee with bonus contract:

Similar to cost plus fixed fee, however the remuneration here is based on a reward system which involves a bonus being given to the contractor in addition to the fixed fee if pre-determined project goals, such as, time, quality and/or cost target is/are met.

(v) Cost plus fixed fee with guaranteed maximum price and bonus contract:

A pre-agreed fixed fee remuneration accrues to the contractor which is paid in addition to the actual cost incurred. However, this is based on the fact that the total project cost will not exceed an agreed cost limit and a bonus will also be paid as an incentive, should the project meets one or more of its pre-set goals.

(vi) Cost plus fixed fee with agreement for sharing any cost savings contract:

Fixed fee remuneration is paid to the contractor in addition to the actual cost and additional amount will be paid to the contractor based on an agreed sharing formula should there be any cost savings declared by the contractor. This type of contract is often adopted where the client envisages the possibility of cost savings in the execution of the contract. It is used when there is a forecasted deflationary period that may follow the contract award or other circumstances that may warrant significant cost savings by the contractor during the contract execution. It is also used to encourage more transparency and accountability amongst contractors.

Therefore cost reimbursement contracts involves the payment of the actual cost and an additional payment made to the contractor on the basis of the laid down formula or adjusted formula (as the case may be) set out by the type of cost reimbursement contract in use, subject to the conditions of the contract. The major difference between the types of cost reimbursable contracts exist in the manner and mode of payment made to the contractor.

It becomes imperative to state that the choice of the type of contract to be adopted is a function of the client's priorities and willingness to trade-off between project goals and objectives in each project case.

3.4 TYPE OF COMPETITION / CHOICE OF COMPETITION

The type of tendering and choice of competition to be adopted in each project case depends largely on the level of certainty of the project risks, the complexity of the project and the level of completeness of the project documentation (Tadelis and Bajari, 2006). However, to ensure equality, integrity, transparency, accountability and a free and fair competition, Ashworth and Hogg (2007) suggests some best practices, these include:

- All tenderers should have the same conditions
- All parties should respect confidentiality
- Sufficient time should be allowed for tender preparation, as well as, tender evaluation
- Sufficient information should be given to aid tender preparation
- Contracts should not be subdivided into smaller projects in order to fall within certain thresh-hold values
- Tender evaluation should be based not only on price but also quality
- Activities that encourage collusion should be avoided
- Tender prices should not change indiscriminately
- Approved standard forms of contracts should be used un-amended
- All parties should be committed to compliance and team work.

There are three (3) choices of competition that can be adopted for a given project, namely;

- Open competition,
- Selective competition and
- Negotiated contracts.

3.4.1 Open Competition

This describes a scenario where an Invitation to Tender (ITT) is advertised on a newspaper, magazine, tenders journal or any other publication, calling for interested contractors to tender for the procurement of described goods and services. It is classified as being open because any interested contractor has the right to tender for the procurement, regardless of whether they are new or old, possess the capability to undertake the task or not and/or reputable or not. Subsequently, the received tenders are evaluated. This form of tendering usually attracts a large number of tenders in response, difficult to evaluate, takes longer time to process and usually attract high costs borne by the client due to the usually huge number of submissions made. Therefore, these disadvantages accompanied by the use of open competition makes it difficult to adhere to the best practices highlighted in the previous section of this study.

Also Lember et. al. (2013) opines that open competition has advantage mainly in ensuring transparency but the method is very expensive and inefficient and therefore has no balance in terms efficiency and value for money.

On the other hand, several authors and practitioners have argued that the adoption of competitive tendering offer contractors equal opportunities to compete for projects, encourages transparency, ensures best value for money spent through the selection of the lowest “possible” tender as it guards against extravagances and corruption (Shen and Song, 1998)

In the public sector, the type of competition adopted in the procurement of projects mostly depends on the relevant prevailing statutes or legislative acts governing procurement. In Nigeria today, the Public Procurement Act (2007) passed into law in 2009, popularly referred to as the “Due Process” categorically stipulates that procurement activities must be carried out on an open competitive basis. In the UK, Compulsory Competitive Tendering (CCT) was introduced in the 1980s in an attempt by the conservative government to bring about the much needed reform at the time (Serco, 2012). This approach introduced competition in the local government and health sectors in order to boost their project performances. However, the approach failed as it was focused on lowest tender prices which compromised quality and other performance indices.

In simple and moderate projects which span over a relatively short duration, where the project documentations are significantly completed, project risks are sufficiently known well in

advance and project performance can easily be measured, competitive tendering may most likely be the favourable choice to be adopted (Tadelis and Bajari, 2006). This implies that competitive tendering may not be an appropriate choice in large and complex projects.

From a claims management perspective, open competition has bred Opportunistic Bidding Behaviour (OBB) amongst contractors in the Nigerian construction industry. OBB is a phenomenon described by Khoury and Hafez (2011) where contractors intentionally lower their bidding prices with the aim of winning awards on the basis of lowest tender prices, after which they subsequently make claims later at the project execution stage in order to recoup their previously lowered profit margins. Contractors usually engage in this practice when they identify loop-holes in the contractual arrangement and documentation at the tender stage, these gaps then subsequently become potential sources of claims. This has brought untold hardship to the industry and mostly resorted to conflicts leading to prolonged litigations, arbitrations, mediations or adjudications and outright project abandonment in some cases.

3.4.2 Selective Competition

This describes a scenario where a construction contract is awarded through a process which invites selected reputable contractors to tender within certain outlined procedures (Ashworth and Hogg, 2007). It is selective in that the competition is induced within certain pre-known contractors and the process is not open to all and sundry. It is mostly used where a high level of confidentially is needed, such as in defense projects, and sometimes in highly sophisticated and specialized projects, such as nuclear projects.

It is noteworthy to state that selective competition is based on an underlying ideal philosophical value system of integrity, accountability, trust and transparency. Selective competition would not thrive in a procurement system infiltrated with favouritism, fraud, nepotism, collusion and corruption. Common sense suggests that when there is bias, i.e. when a system is not free and fair, competition becomes illusory.

3.4.3 Negotiated Contract

This type of contract is reached without any form of competition being introduced. It is similar to selective tendering, but in this case only one contractor is involved and consequently appointed. The contractor offers to undertake the project at a cost, based on the tender

documentation. The client/client's representative then subsequently negotiates the tender price with the contractor to arrive at a tender price acceptable to both parties. Ashworth and Hogg (2007) opine that the tender price reached through negotiating a contract is usually higher than that which could have been reached by adopting any other method of choosing a contractor.

However, the high tender prices associated with negotiated contract owes to the absence of competition amongst contractors and its adopting where highly specialized skill is needed, usually in a highly monopolized market. This agrees with the concept of demand and supply pioneered in the 19th century by Alfred Marshall which suggests that in a competitive market, given no change in demand, an increase in the supply of goods and services will result in a lower price, ceteris paribus.

Onwusonye (2006) stated that the rationale for the adoption of negotiated tendering by clients include, existence of business relationship/affiliation between the contracting parties, ideology affinity between the contractor and the client, loyalty of a particular contractor to a locality or the promotion of "local content" – indigenous contractors for the development of the region. The use of negotiated contracts is also common where the project is wholly or partly funded by the contractor. Negotiated tendering provides the benefit of early contractor involvement and reduction in the time associated with the contractor selection process; however, it requires a high level of public accountability. In other words, when negotiated tendering is used in the procurement of public projects, the rationale should be clear and justifiable.

3.5 CONTRACTOR SELECTION / APPOINTMENT PROCESS

The choice of a contractor to whom a project is to be awarded can be arrived at either by selection, where, a form of competition is induced in the tendering process, or by appointment, in other words, appointment is adopted where there is no competition. In an open competitive and selective tendering, the contractor is selected, whereas, in negotiated contract, the contractor is appointed.

The process of selecting/appointing a contractor can be carried out by adopting the one-stage or two-stage tendering process and in some cases, it can be achieved by adopting a serial tendering technique, as explained below.

- One-Stage Tendering
- Two-Stage Tendering

- Serial Tendering/ Progressive Negotiation

3.5.1 One-Stage tendering

This is used pre-dominantly in open competition, where the evaluation of tenders submitted is carried out on one-off basis. The focus is mostly on selecting the contractor with the lowest tender price. Consequently, the competency of the contractor comes as an after-thought and is usually referred to as post-qualification. In post-qualification, the lowest tenderer is evaluated to determine if the contractor is qualified to be awarded the contract (Potts and Ankrah 2013).

A positive determination is a pre-requisite for the award of the contract in which case, the successful tenderer is capable of satisfactorily executing the contract (ERBD, 2012). However, a negative determination implies that the contractor is not qualified and incapable of executing the contract satisfactorily, hence the lowest tender is rejected and then the next lowest tender is evaluated for a similar determination.

3.5.2 Two-Stage tendering

Two-stage tendering is a form of procurement where the employer seeks tenders from contractors based on the initial scope of work which remains to be fully detailed and defined. Once the employer receives initial tenders and has chosen a preferred bidder and the contract awarded to it, it will then engage the chosen bidder to perform certain pre-construction services as a more defined and detailed scope of work and then work up the contractor's full tender (Bailey 2014).

This form of contractor selection is predominantly used in selective competition. Here the first stage is usually referred to as pre-qualification of contractors and then the second stage which is the tendering stage follows. Pre-qualification of contractors refers to a process which begins by inviting contactors to indicate their ability and willingness to tender for a given project, usually by responding to an advert titled "Expression of Interest" (EOI) where the project details and submission procedure, as well as other relevant information are stated. Various submissions from different contractors are subsequently received and evaluated based on a set of competency and capability criteria. The successful contractors, usually referred to as pre-qualified contractors are then shortlisted. Consequently, these are the only contractors who will subsequently be invited to submit tenders for the project to be executed.

The second stage is characterized by the evaluation of tenders submitted by the pre-qualified contractors. At this stage, the focus is usually on cost and consistency in pricing the tenders. It is imperative to state that the Public Procurement Act (2007) stipulated that the contract be awarded, following a competition, to the "lowest responsive tenderer", meaning the lowest reasonable tender, as against the "lowest tender" should receive the award. This is so because, in as much as the primary focus of competition is to achieve the project at the lowest possible cost, quality should in no way be compromised. In other words, the competency and capability of the contractor to satisfactorily deliver the project is as important as delivering the project at the cheapest possible price.

The two-stage tendering process minimizes the risk of poor quality delivery; it provides the benefit of early contractor involvement in the project and gives an opportunity for early project start, subject to the procurement method adopted.

3.5.3 Serial Tendering/Progressive Negotiation

Serial tendering is usually adopted where one-stage or two-stage tendering has previously been used in the first instance. Its adoption is usually based on a clause inserted in the contractor's previous contract with a client. Where a contractor selected in an open competition or selective competition has just satisfactorily delivered a project, serial tendering provides a framework for the contractor to be automatically awarded further similar project on the basis of the tender rated used in the previous project. Serial tendering is a contractual mechanism used for phased projects, prototype projects and/or projects of similar size and complexities carried out within a specific time frame. It is pre-meditated and included in the initial contract conditions (Ofong, 2000). Serial tendering is used where open competitive or selective tendering is used at the first instance, whereas, in the case of negotiated contract, it is referred to as progressive negotiations.

Serial Tendering promotes good working relationship (Ashworth and Hogg, 2007), it eliminates waste associated with repetitive works, such as formwork, precast moulds, and preliminary works. (Omole, 2000). It reduces the cost and time associated with the tendering process, which would have been done all over again.

3.6 PROCUREMENT METHODS

The method of procurement adopted for any construction project determines the mode of interaction, contractual obligations and responsibilities, as well as, powers and mode of communication between project stakeholders, particularly between the client, contractor(s), designer(s), sub-contractor(s) and supplier(s).

The procurement method is an integral part of the investment process. It determines the contract links or relationship between the employer (client), the design organisation, contractors, sub-contractors as well as other professionals involved in the construction process. Each of these contractual relationships will usually have individual form of contract and contract documents.

The contract documents and form of contract will provide the details of the way and manner in which the contracting parties involve each other; whereas the contract type will determine the contractual links between all the most important contracting parties (Powell, 2012).

Different procurement methods exist and revolve around the separation/integration of the following indices:

- Design
- Construction
- Operation
- Project Management
- Maintenance
- Funding/Business Case

Depending on the scope of a project, each of the above responsibility is allocated to one or more parties to the project to carry out. The matrix of combination of these functions describes the procurement method adopted on any given project.

There are different procurement methods, which include:

1. Traditional Method
2. Design & Build
3. Management Contracting
4. Construction Management
5. Framework Agreements

6. Partnering
7. Alliances
8. Joint Ventures
9. Public-Private Partnership (PPP)/ Public Finance Initiative (PFI)

Inherent in all the procurement methods listed above are certain merits and demerits. Traditional procurement approach has been widely used in the past and in a bid to overcome some of its demerits, other different procurement methods have been developed over the years (Alhazmi and McCaffer, 2000).

Love (2002) argued that although the cost of rework is quite significant to the overall project cost growth, there is a direct relationship between the cost of rework and the project type and procurement method used in the 161 Australian construction projects analysed. However, the adoption of the most suitable project method for any given project plays a vital role in ensuring its successful delivery.

The Nigerian construction industry thrives in a developing economy and the prevailing socio-cultural realities should be critically considered alongside the project situations in adopting an appropriate choice of competition in its procurement system. The careful selection of the most suitable type of competition can help mitigate the possibility of the occurrence of Opportunistic Bidding Behaviour (OBB).

3.6.1 Traditional

Figure 3.1: Traditional Procurement

The traditional method has been in existence since the late 1800s and well-known for its separation of design from construction. Due to its long time existence, many standard forms of contract tend to adopt this method and it still represents the default procurement strategy for several construction projects especially in Nigeria.

By numbers traditional strategy is the most commonly employed procurement strategy in the UK, this strategy entails the execution of the project design which is used in the tendering process followed by construction. Traditional procurement method is particularly useful while dealing with inexperienced construction clients. This method is seen to introduce low risks by giving certainties over design, cost and duration of project, but this tends to come with a downside which is relatively longer project duration. (RICS, 1996). In the traditional procurement method the design work will generally be separate from construction, consultants are appointed by the client for design and sometimes project cost management, leaving the contractor only responsible for the actual construction work. This responsibility is inclusive of

all materials supplied and used, workmanship, and also all subcontractor work. 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. (Walker and Hampson, 2003). Undoubtedly, the traditional method has its advantages and disadvantages.

Advantages:

- There is competitive fairness, contractors tend to bid on an equal basis
- The client is able to have a direct influence, therefore facilitating a high levels of acceptable performance and quality in the design
- There tends to be reasonable price certainty at contract award, based upon market forces (subject always to design changes or client-led changes, which will have cost implications)
- This strategy is helpful with accountability, because of the apparent transparency from competition at bidding.
- This is a well-established procurement route and therefore there certain levels of confidence amongst the stakeholders.
- Changes are reasonably easy to arrange and value where the design needs vary due to changes in client demands or technology (though this ease can prove a disadvantage as price certainty may be less secure)
- Project documents are prepared at early stage (tender stage)

Disadvantages:

- If an effort is made to speed up the process by producing tender documents from an incomplete design, this can result in less cost and time certainty and can be the cause of expensive disputes
- The overall project duration may be longer than for other strategies as the strategy is sequential and construction cannot be commenced prior to the completion of design (with no parallel working possible)
- There is no input into the design or planning of the project by the contractor and supplier, who will not be appointed at the design stage
- The strategy is based upon price competition, which can result in adversarial relationships developing
- For certain types of project (for example, in a city-centre refurbishment of an operational retail facility), where it is difficult to accurately define the full scope of the project, the strategy is likely to result in the client paying a high-risk premium; and

- The designers and contractor have little incentive to advise the client on factors that may benefit the operational costs of the completed facility.

3.6.2 Design and Build

Figure 3.2: Design and Build

Source: SC Quantity Surveyors (2007-2015)

Design and Build procurement method is carried out on the basis that the main contractor will bear the responsibility of undertaking both the design and construction work on a project, for an agreed lump-sum price (JCT 2014). Design and build projects may vary depending on the level of the contractor's design responsibility and the measure of the initial project design included in the employer's requirements. However, the level of input from the contractor and the design responsibility is greater on design and build projects than a traditional method.

Also, adequate time is required in this method in order to prepare the employer's requirements (the employer usually appoints consultants to facilitate this), as well as time for the contractor to prepare their proposal and tender price. It is essential that the proposal go in line with all of the employer's requirements before any contract agreement.

Under a 'design and build' strategy, the contractor undertakes the risk and responsibility for designing and construction work, usually in return for a fixed-price lump sum. Because this procurement strategy allows the integration of design and construction work, therefore project

duration is significantly shortened as construction can begin before design is finalised (RICS 1996). With this design and construction procurement route, the contractor is responsible for some amount or all of the project design, an express reference to the amount of responsibility in design is in the contract, and the liability normally warrants fitness for purpose from the contractor (Constructing Excellence, 2014)

Many clients mostly find design and build route appealing because of its single point of responsibility characteristics. However, some clients consider it appropriate only for less complex and simple projects, where the main consideration is not design quality (CIOB, 2014).

The contractor can either be appointed to carry out all of the design work, or if the client wishes to have greater influence over the design, a concept design and outline (or performance) specification can be prepared by consultants employed by the client, and then the contractor is appointed to complete the detailed design and carry out the construction. (CIOB, 2014).

Also the contractor can either appoint a consultant design team , use their own in-house design team or may decide to employ the services of the client degners to complete the design work (either by consultant switch or by novation).

Novation

Novation is a term used to describe the process of contractual rights and obligations being transferred from one party to another. Whilst a contract benefit can be transferred by assignment. If the parties wish to transfer the benefits and the burdens then this must be done by a novation agreement (JCT, 2013).

When consultants are novated, the contractor automatically 'takes over' the contractual agreement between the client and the consultant. Hence the contractual history is re-written to give the impression that the consultant has worked for the contractor from the inception. This requires agreement by all three parties.

Novation is seen to give contractual continuity and preserve design responsibility. However, as the client's requirements from the consultant will be different to the contractor's, it is most probable to require certain changes to the appointment agreement. It is hence sensible if these changes are included in the original agreement between the client and the consultant and if an

undertaking (MOU) can be obtained that they are prepared to enter into a contract on those terms.

Consultant Switch

In Consultant switch, the original agreement between the client and the consultant terminates on appointment of the contractor, and then a new agreement is established between the contractor and the consultant.

This can be seen to present better clarity of the contractual relationships. However, some are of the opinion that there is greater risk of conflict of interest because the consultant's liability to the client for pre-switch services remains.

Design and build is one of the three procurement routes mostly used by the government for large and complex publicly-funded projects, as it allows a fully integrated team to work together on the project from the beginning.

Design and build contracts can be awarded on a fixed-price, lump-sum basis, but price certainty is then dependent on not making any subsequent changes as these could prove to be expensive. It is very important therefore that the client gives a great deal of consideration to the preparation of employer's requirements, and if they have not appointed their own design team, they may wish to appoint independent client advisers to help them do this. Similarly if any designers appointed by the client are novated or switched to work for the contractor, the client may then wish to appoint independent client advisers to review contractor's design proposals, administer the contract and monitor works on site.

Advantages:

The client has only to deal with one firm, giving single point responsibility, and significantly reducing the need to commit resources and time to contracting with designers and contractors separately.

- The strategy enables an integrated constructor contribution to the design and project planning.
- Price certainty is generally obtained before construction starts, provided the client's requirements are adequately specified and changes are not introduced.

- The total project time of a design and construction route may be reduced, because of overlapping activities.

Disadvantages:

Difficulties can be experienced by clients in preparing an adequate and sufficiently comprehensive brief or set of Employer's Requirements, or in defining what they require.

- The client is required to commit to a concept design at an early stage; often before the detailed designs are completed.
- Bids are difficult to compare: each design will be different, and prices and the project programme will vary between designs.
- There is no design evaluation, unless separate consultants are appointed by the client for this purpose.
- Client changes to the scope of the project can be expensive.
- Design liability is limited by the standard contracts available.
- Quality may be compromised as the client relinquishes control to the design and build contractor.
- This route may result in a project having less aesthetic appeal where price and space dictate how the available budget will be spent.

Extra Activities to Improve Performance

- Client should provide sufficiently comprehensive brief or set employer's requirement for each designer, so as to provide basis for bid comparison.
- Evaluate the functional content of the design and build contractor's proposal.
- Engage the services of an Independent Quantity Surveyor / Quantity Surveying firm to keep a check on emanating material quantities and relevant checks on general costs.

3.6.3 Public Private Partnerships

Figure 3.3: Public Private Partnerships

Source: New Zealand Social Infrastructure Fund Limited (2009)

Public Private Partnerships are Procurement strategy arrangements where the private and public sector go into an agreement to deliver a service or project. The most common of such procurement arrangements is the Private Finance Initiative (PFI) RICS (1996).

Public Private Partnerships (PPPs) are one of the more recent methods for delivering infrastructure projects, when structured and executed efficiently PPPs can provide benefits such as: Reducing Public sector financial burden, and also risk. Another benefit of well executed PPPs is value for money spent on infrastructure development and maintenance. (Li B., Akintoye A., Edwards J., and Hardcastle C., 2005). This procurement method has produced some negative results for various reasons such as difference in expectations between public and private entities involved, poor risk management and little competition.

Advantages:

- The infrastructure project can be obtained without placing a capital burden on the public purse.
- There is a transfer of risk to the private sector.
- There is engagement with the skills and efficiencies of the private sector and perhaps, therefore, better value for money.

Disadvantages:

- It is a relatively expensive approach.
- The costs of preparing bids are exceptionally high.
- The government (in effect, the taxpayer) is committed to making payments for the life of the concession (typically 25-30 years), unless the income flow is entirely dependent on cash tolls.

Extra Activities to Improve Performance

- Engage the services of an Independent Quantity Surveyor / Quantity Surveying firm to keep a check on emanating material quantities., and relevant checks on general costs.

3.6.4 Management Contracting

Figure 3.4: Management Contracting

Source: RICS (2013)

In this procurement route, a management contractor is employed by the client to manage the entire building process. The contractor is paid a fee on top of the construction costs for doing so. This fee is based on the cost estimate of the works as prepared by the quantity surveyor - usually adopting a cost plan as the basis for budgeting.

The principle of management contracting route is that the employer appoints the contractor at the early stage where the contractor works more as a partner to the employer in implementing and developing the project as well as serves a liaison and coordinator of the construction work (Powell 2016).

The client appoints an independent professional team, and also a management contractor. Their involvement at pre-construction stages will be as adviser to the team, and during construction they will be responsible for executing the works using direct works contracts. Construction works are executed by firms employed by the management contractor, often known as 'works contractors'. Unlike construction management, the management contractor has direct contractual links with all the works contractors and is responsible for all the construction works. With this type of contract it is possible to make an early start on-site and achieve early completion (RICS iConsult, 2013).

Because of its flexibility, it allows the client to change the design during construction because drawings and matters of detail can be adjusted and finalised as the work proceeds. The management contractor undertakes the work on the basis of a contract cost plan prepared by a quantity surveyor from project drawings, and a project specification. The client accepts most of the risk because there is no certainty about costs and programme. Competitive tenders for works packages follow later and they will usually, though not always, will be lump sum contracts with bills of quantities. It is however prudent, with this procurement route, for the client to have the ability to manage risk adequately.

Advantages

• Management contracting route is a 'fast track' route. The first works contractors can start work before the design work is entirely complete, although the design necessary for those packages must be finished.

• Allows public sector to retain control of design development (other than construction drawings)

• Due to overlapping of design and construction processes, there are programme benefits for the overall project

• This route allows the management contractor and works contractors to contribute to the design and project planning

• This strategy accommodates changes, provided that the affected work packages have not been let and that there is little or no impact on those already let

• Works packages are let competitively at prices that are current at the time the work is let

• Government requirements are in specific designs rather than a functional specification

• Easier for stakeholders to approve specific designs to ensure accommodation of their requirements, whereas designs resulting from a functional brief may require significant amendment to meet stakeholder needs

• Potential for shorter design and construction phase as construction can start during design development

• Managing Contractor can interact with the design team on building issues during the design phase facilitating integrated planning of construction and operations

• Documentation error risk lies with the contractor

Disadvantages:

• Due to fragmented design and work packages, cost certainty is therefore not achieved until all works contractors have been appointed. A high level of cost management is therefore required, with reliance on the services of an experienced quantity surveyor to prepare approximate estimates and a cost plan

• Only one design is developed

• Little potential for innovation based on whole-of life operating conditions

• Fixed lump sum can be expensive: usually negotiated — not a competitive tender

• Time and cost overruns shared by public sector and contractor until end of design development

• If design is not fully documented and agreed prior to construction starting, time and cost overruns can be substantial

• Public sector retains design and 'fit for purpose' risk

• No link between construction payments and infrastructure standards over time

Extra Activities to Improve Performance

- Engage the services of an Independent Quantity Surveyor / Quantity Surveying firm to keep a check on emanating material quantities., and relevant checks on general costs.

3.6.5 Construction Management

Figure 3.5: Construction Management

Source: RICS (2013)

The construction management procurement approach is a method whereby the construction manager (often a contractor or someone with sound project manager skills) undertakes to manage the carrying out of the work through trade contractors. Although the trade contracts are arranged and administered by the construction manager, contractually they are at the client's risk, and the client forms direct contractual relationships with the trade contractors. Obviously for this to be effective, the construction management appointment and the trade contract for each trade contractor must be compatible. The construction manager is paid a fee as though he were any other consultant to cover for his/her staff costs, and overheads. As part of his/her duty, the construction manager is required to co-ordinate the trade contractors.

According to Burr (2016), the difference in construction management route and the management contracting route is the network of the contracting parties. In management contracting the contracting manager has direct link with the works contractors while in construction management the construction manager has no contract with the works contractors.

The construction management procurement method is very similar to the managing contractor procurement method and offers similar advantages and disadvantages. The only difference is the fact that the trade contracts are at the clients' risks.

The construction project manager (CPM) oversees the planning, co-ordination and control of a project from commencement to completion with the aim of meeting a client's requirements in order to produce a financially and functionally viable project that will meet the authorised project time and budget at the required quality standards.

Advantages

- Delayed completion of design elements, such as retail fit-out or fixtures and fittings, which can be finished later without affecting the entire project programme;
- Full control over design as well as incorporation of design by specialist contractor
- Acceleration of the overall project programme;
- Early involvement of the client on the project
- Involvement of specialist trade contractors in design and construction;
- Reinforce ability to incorporate change into the design;
- Produce a less adversarial, problem-solving project culture.

Disadvantages:

- There is increased likelihood of design change and design co-ordination risk
- No cost certainty until all packages are let and no single point lump-sum cost commitment
- Exposure to risk associated with construction manager and team performance
- Increased administration role for the client is more in this route
- The construction manager and professional team owe duty of care liability only
- Client's ownership risks associated is high including risks associated with design such as impacts of incomplete or late and uncoordinated design
- Exposure of client to performance risk and consequential loss associated with trade contractor default.

Extra Activities to Improve Performance

- Engage the services of an Independent Quantity Surveyor / Quantity Surveying firm to keep a check on emanating material quantities., and relevant checks on general costs.

3.6.6 Framework agreement

According to FHWA (2014), the practice of framework program started in the United Kingdom in 1999. The framework agreement is a contractual arrangement that allows a purchaser to

present its procurement requirements in packages or sections and select one or several suppliers to meet specific task(s) or order(s) over a given period of time. The purchaser and suppliers set up terms on which purchases will be made at the initial stage, but do not set precise quantities. Frameworks can be used to supply, works, and professional service activities, but they are best and most appropriate for orders of a similar nature, where demand is regular in programmed manner and likely to materialize over an extended period.

Frameworks agreement also enables purchasers to place orders, or "call-off" services, with or without secondary competition--considerably speeding up procurement.

Framework agreements have been found to offer speedy delivery, flexibility, value for money, quality and reliability of supply or service.

Extra Activities to Improve Performance

- Engage the services of an Independent Quantity Surveyor / Quantity Surveying firm to keep a check on emanating material quantities., and relevant checks on general costs.

3.6.7 Partnering

Partnering is a concept that can be applied to the other procurement methods. Partnering is a procurement method based heavily on a co-operative relationship between the contract parties and is aimed at improving the performance for project delivery. However, Greenhalgh and Squires (2011) opines that partnering is a tool that promotes greater integration of project team and should produce a competitive advantage to all parties in the project.

Partnering is best considered as a set of collaborative processes which emphasise the importance of common goals and raise such questions as how such goals are agreed upon, at what level are they specified and how are they articulated.

Partnering is applied either in project situation known as project partnering or in a long-term relationship known as strategic partnering.

There are two views in the construction industry regarding the role of the contract between the client and the contractor in the partnering process.

The first view is that partnering is all about co-operation, dispute avoidance and self-improvement and that, as such, a successful project partnering agreement can be implemented independently of the contract, even when the contract contains clauses that are not in alignment with the co-operative principles of partnering.

The second (and alternative) view supports the use of the project contract to reinforce the elements of a partnering arrangement. This can be in the form of a traditional standard form of contract amended to enforce a partnering agreement or in the form of partnering-type standard contract.

In the partnering procurement method, the tendering process is normally by negotiation, allowing high levels of risk transparency and opportunity to set common goals at the early stage of the project, also allow the risk sharing to be based on the best capability to handle the risks.

While there are many definitions for partnering, these definitions will tend to change naturally as time progresses with evolvement of project processes.
However, according to Greenhalgh and Squires (2011), there seem to be a general agreement that there are some defining characteristics of a successful partnering. These include:

- Mutually agreed goals and objectives
- Continuous improvement related to benchmarking process
- Mechanism for problem resolution
- Inter-organisational trust

The essentials of any partnering agreement are a duty of good faith, trust and mutual co-operation between the parties of the contract.

Advantages

- Significantly fewer number of disputes;
- Benefits of early supply chain involvement.
- It is an open book method encouraging a win/win culture.
- An integration of the design and construction process.

Disadvantages

Some of the disadvantages of the 'partnering' approach are as follows:

- The partnering process can be abused by one of the parties;
- The partnering process requires more client resource to compensate for the less competitive environment, and the process can collapse when one party becomes disadvantaged;

- Partnering needs to be practiced and learnt over a series of projects to be effective and typically requires an early commitment in terms of management resources and direct costs;
- Direct costs of workshops, of training staff and of the more intensive early involvement of management in establishing the partnering approach.

Extra Activities to Improve Performance

- Make sure no party is disadvantaged
- To be practiced and learnt over a series of project
- Engage the services of an Independent Quantity Surveyor / Quantity Surveying firm to keep a check on emanating material quantities., and relevant checks on general costs.

3.6.8 Procurement Methods (Factor Analysis & Responsibility Matrix)

Table 3.1 Procurement Method (Factor Analysis)

	Traditional	**Design and Build**	**Management Contracting**	**Construction Management**	**Partnering and Framework arrangements**	**Public Private Partnership Private finance Initiatives**
Cost Certainty	High* [1,2,5,6,7,9,13,15]	Medium [1,3,4,5,15]	Low [3, 4,6,7,8, 9,10]	Low to medium [2, 3,4, 5,6, 10]	Low to medium [1, 4,7, 10]	Low to High [1, 11, 12]
Project design complexity	High [3,5,6,7,10,11]	Medium to High [2,3,4,6,9,15]	Medium [3,6,8,9,13]	Medium to High [3,9,10,13]	Medium to High [3,15,16]	Medium to High [3,13,15,16]
Level of Specialist work required	Medium to High [1,2,3,6,9,10, 13]	High [1,3,15]	Medium [2,3,9,13]	High [3,6,9,10,15]	Medium [3,8,15,16]	Medium to High [1,3,13,16]
Need for external funding	Low [4,6,15,]	Low [4,9,15]	Low [2,5,8,10,13,14]	Low [5,6,8,13,14]	Low [1,8,13,15]	High* [1,3,8.16]
Flexibility for Innovation and change	Low to Medium [1,2,3,5,9]	High [1,3,5,9]	Medium to High [3,7,9,13]	Low to Medium [2,3,7,13]	Medium to High [4,8,13]	Medium to high [1,2,3,7,14, 16]
Contract Duration	Long term [1,2,3,9,15]	Short term [1,3,8,9,15]	Medium to Long term [2,7,13]	Medium to Long term [2,7,10,13]	Long term* [10,13]	Long term [4,10,13]
Completeness of project documentation at tender stage	High [2,6,9,13,14]	Low [1,3,4,8,11,15]	Medium to High [2,5,7,10,16]	Medium to High [2,5,7,13,16]	High [3,8,16]	High [3,4,8,10]
Client Control and Input	High [3,5,6,9,13, 14]	Low* [1,2,5,8,15]	Medium * [2,3,5,7,10]	High* [3,5,6,7,16]	Medium to High [3,4,15,16]	Low to Medium [3,4,10]

The shaded boxes represent the pre-requisite (where the pre-requisite consist of two or three essential pre-defined variables) to qualify for each procurement method and "*" specifies the dominant pre-defined variables in each procurement case.

1. Odhigu Festus et al. (2011)
2. Love et al. (2010)
3. Masterman (2001)
4. Patterson (2013)
5. Walker and Hampson (2003)
6. Scottish Government (2015)
7. Constructing excellence (2014)
8. Ekung, Siriwardena and Adeniran (2013)

9. Kumaraswamy and Dissanayaka (2001)
10. Lessard and Lessard (2007)
11. Ratnasabapathy and Rameezdeen (2010)
12. Alhazmi and McCaffer (2000)
13. RICS (2015)
14. Thenbs.com (2015)
15. Hong and David (2013)
16. Kwak, Chih and Ibbs (2009)

Table 3.2: Risk/Responsibility Matrix

	Design	Construct	Manage
Traditional	Client/Consultant	Contractor	Client
Design and Build	Contractor	Contractor	Client
Management Contracting	Client/Consultant	Contractor	Client
Construction Management	Client/Consultant	Contractor	Client/Consultant/Contractor
Partnering/ Framework agreements	Client/Consultant/ Contractor	Contractor	Client/Consultant
Public Private Partnership (PPP) / Private finance Initiatives (PFI)	Client/Consultant/ Contractor	Contractor	Contractor

3.6.9 Factors affecting the choice of Procurement Strategy

Cost certainty: Cost certainty is the probability of completing a project within the set budget agreed between parties before project execution. High certainty in cost is known as one of the main priorities for construction clients and therefore a factor that determines the procurement strategy employed.

Project design complexity: Complexity can be difficult to define as it has a number of different connotations. The Collins English Dictionary defines complexity as "the state or quality of being intricate". Complexity is a term often used when discussing construction projects, the design phase in construction is important as it is an early part of the planning process and affects the overall execution of the project. The degree of complexity in such a delicate stage of the construction process is very important and is a major factor to be considered when choosing a procurement strategy.

Level of Specialist work required: This is referring to the type of work that needs to be executed, the type of work could be common place and of a general nature, in which case executors of such work are readily available meanwhile when work to be executed requires high levels of technical ability, specialist are required, and the level of specialist work required on a project is an important factor in choice of procurement strategy.

Need for external funding: The framework of the contractual parties and the anticipated interaction is vital in the early stages of construction planning, especially the project funding routes. The expected source of funding for the project either internal or external, is a factor that contract parties (mostly contractors) consider properly, and goes a long way in determine what procurement strategy is more efficient.

Flexibility for innovation: The ability to employ creativity and innovation is a factor that is paid attention by all parties on the project because it directly affects job specifications, and therefore the choice of procurement strategy is affected, as different strategies offer different parties different degrees of freedom and flexibility which means an inefficient choice of strategy will cause dissatisfaction to one of more of the parties during the course of the project execution.

Contract duration: the length of a project is an important factor to be considered at the planning stages of the project, the choice of procurement strategy determines how the project is run and some strategies are more efficient over longer periods and therefore contract duration and procurement strategy choice have high levels of interdependence.

Completeness of project documentation: The extent to how clear a project is, normally depends on how much documentation about the project is available, and thereby allowing all parties understand better what needs to be done and permitting more efficient planning. The choice of procurement strategy is affected by completeness of documentation as it informs the parties as to where and when each party is needed and to what extent.

Client control and input: This is the extent to which the client desires to be involved, some client desire to be hands on, especially when they have some technical knowledge or have very specific requirements, this is common in less developed countries for fear of poor construction

execution, the degree of client desire for influence is therefore a big issue to be evaluated while choosing a procurement strategy.

3.7 SUMMARY

This chapter presents an extensive literature review on choice of procurement strategy from claims management perspective. It carefully studies the type of contract, type of competition, contractor selection process and procurement methods adopted in construction projects and their implications on project delivery, from a claims management stand-point. It forms the basis for Survey 2 analyzed in Chapter 6.

CHAPTER 4

RESEARCH METHODOLOGY

4.0 INTRODUCTION

This chapter outlines the theoretical and philosophical stance of this research. It systematically details the implications of the choice of research paradigm and research methodology adopted. The relationship between the research paradigm, methodology and methods of data collection for the purpose of this research are then discussed, especially in the light of meeting the research objectives and addressing the research questions. This chapter further explains the research process undertaken and concludes with a summary of the research design adopted.

According to Walliman (2011), research is a systematic way of finding out things that have previously remained unknown to others. Research methodology provides a systematic framework that is focused on the research process from its theoretical foundation, through data collection and analysis to arriving at results (Collis and Hussey, 2003; Jankowicz, 2004).

Common knowledge suggests that it is impossible to solve every problem in a particular field of study at the same time, this is because, in an attempt to proffer solution or in the process of researching an area, other problems emanate. However, doctoral research seeks to study a particular problem/area per time with the aim of developing or proffering a unique product/outcome/solution which is capable of mitigating or solving the problem.

Change, they say, is constant and as the years go by, a particular seemingly simple phenomenon is capable of metamorphosing into a complex issue, hence, the need for research to aid adaptation and add to already existing knowledge.

This research is aimed at investigating the causes and impact of claims and to develop a decision support system for selecting procurement strategy in order to enhance current claims management practice in the Nigerian construction industry.

4.1 RESEARCH PARADIGM

Research paradigm has received varying levels of attention in different research texts (Mackenzie and Knipe, 2006). This could be possibly linked to the fact that the word 'paradigm' has been frequently used interchangeably with other terms, such as, method, theoretical framework and methodology (Rooke et al., 1997). Bogdan and Bilen (1998) defined paradigm as a collection of logically related concepts, propositions or assumptions that inform thinking and research. According to Mackenzie and Knipe (2006), the choice of paradigm clearly dictates a research intent, motivation and expectations, they also argue that it should be the first decision taken when undertaking a research and should be the basis of subsequent choices of research methodology, methods and research design.

There are various theoretical and philosophical frameworks that underpin a chosen research paradigm (Dainty, 2008). Martens (2005) argues that theoretical framework is distinct from theory and sometimes confused with paradigm, however, it influences the way knowledge is studied and interpreted. Dainty (2008) refers to epistemology (knowledge search) and ontology (reality) as philosophical assumptions which underpin different research paradigms.

Henning (2004) defines epistemology as the philosophy of knowledge. It is a scientific inquiry process in pursuit for knowledge. According to Remenyi, Pather and Klopper (2011), it is imperative to carefully examine the underlying philosophical framework and salient assumptions in an academic research in order to fully understand their implication on the research. On the other hand, the researcher's ontology (reality) is another silent factor that affects the research's philosophical stance (Remenyi, Pather & Klopper, 2011) and epistemological persuasion (Holden and Lynch 2004).

According to Martens (2005), there are various research paradigms, including, positivist (and post-positivist), constructivist, interprevist, transformative, emancipatory, critical, pragmatism and de-constructivist. Mackenzie and Knipe (2006) confirmed that the most common are:

- Positivist (and Post-Positivist) Paradigm
- Interpretivist/Constructivist paradigm
- Transformative Paradigm; and
- Pragmatic Paradigm

4.2 CHOICE OF RESEARCH PARADIGM, METHODOLOGY AND DATA COLLECTION METHODS

Based on the presented objectives and questions of this research, the pragmatic research paradigm was adopted for the study. This research also employed a mixed research methodology, with both qualitative and quantitative methods of data collection for data analysis. The use of structured questionnaires and multiple case studies were also adopted in eliciting knowledge from industry practitioners using a snow-balling technique. Based on the research paradigm model, presented by Mackenzie (2006), the pragmatic research paradigm was adopted for the following reasons:

1. It is focused on consequences of actions:
   The research sets out to determine the main factors affecting the management of construction claims.
2. It is problem oriented:
   The research critically examines the causes and impact of claims on the delivery of construction projects.
3. It is pluralistic in nature:
   The research recognizes that there is more than one factor that affects the management of claims.
4. Real world and practice oriented:
   The aim of the research is to serve as a bridge between theory and practice, in order to improve current industry practice and add to already existing body of knowledge.
5. Focus on the ‘what’ and ‘how’ of the research:
   The research questions seek to know what the main factors affecting claims management are, how these impact the delivery of construction projects and how current claims management practice can be improved.

It is for the above reasons that the pragmatic research paradigm was chosen and adopted as the most suitable paradigm to achieve the research objectives.

Table 4.1: Research Methodology and Research Paradigms

Postitivist/Postpositivist	**Interpretivist/Constructivist**	**Transformative**	**Pragmatic**
Experimental Quasi-experimental Correlation Reductionism Theory verification Causal comparative Determination Normative	Naturalistic Phenomenoligical Hermeneutic Interpretivist Ethnographic Multiple participant meanings Social and historical construction Theory generation Symbolic interaction	Critical theory Neo-marxist Feminist Critical Race Theory Freirean Participatory Emancipatory Advocacy Grand Narrative Empowerment issue oriented Change-oriented Interventionist Queer theory Race specific Political	Consequences of actions Problem-centred Pluralistic Real-world practice oriented Mixed models

Source: Mertens (2005) and Creswell (2003) cited in Mackenzie and Knipe (2006)

Table 4.2: Matching Research Paradigms, Methods and Tools

Paradigm	**Predominant Research Methods (Primarily)**	**Data Collection (Examples)**
Positivist/Postpositivist	Quantitative	Experiments Quasi-experiments Tests Scales
Interpretivist / Constructivist	Qualitative	Interviews Observations Document Reviews Visual Data Analysis
Transformative	Qualitative methods with quantitative and Mixed Methods	Diverse range of tools – particular need to avoid discrimination, e.g. sexism, racism and homophobia
Pragmatic	Qualitative and/or Quantitative Methods – Methods are matched to the specific research questions and research aim.	May include tools from both positivist and interpretivist paradigms, e.g. interviews, observations, testing and experiments.
Source: Mertens (2005) and Creswell (2003) cited in Mackenzie and Knipe (2006)		

The use of mixed research methodology offers an opportunity to use different data sources and methods of analysis which increases the reliability of the research findings. According to Creswell (2003), the use of mixed research methodology will enable the researcher develop the creative ability in research design, data collection and data analysis. This is based on the research knowledge acquired through the use of multiple research technique.

Mixed Research provides complementary strengths and no overlapping weaknesses (Jogulu, 2011). In other words, the strengths of qualitative method suppresses the weaknesses of quantitative method and the strengths of quantitative method super-imposes the weaknesses of qualitative method of data collection. This research follows an inductive path of concept development, which is aimed at developing a decision support system to improve the management of construction claims. The operationalisation of this is hinged on the current contractual and industry framework governing the research area. The choice of mixed research methodology adopted for this research helps to achieve two (2) major goals, namely; theory verification and theory generation (Cresswell, 2003). This is achieved through the use of

triangulation, as well as, deductive and inductive research strategies, respectively. Eisenhardt (1989) emphasizes the need for continual cycling of knowledge, i.e. from theory to data and vice versa. Therefore the adoption of the inductive and deductive research strategies is very important in providing a balanced contribution to knowledge. This is also particularly important in bridging the gap between theory and professional practice; this encapsulates the aim and significance, as well as objectives of this research work. Saunders et.al. (2007) agrees that the integration of inductive and deductive strategies within the same research is perfectly possible and advantageous.

The mixed research methodology was also adopted as the most appropriate methodology to be used in conjunction with the pragmatic paradigm as recommended by Creswell (2003), Martens (2005) and Mackenzie and Knipe (2006).

4.3 RESEARCH METHODOLOGY

A systematic approach involving the use of models, procedures and techniques in finding the result to a research problem is referred to as research methodology (Panneerselvam, 2004). The ultimate goal of a research methodology is to provide a systematic framework that is focused on the research process from its theoretical foundation, through data collection and analysis to arriving at results (Remenyi et.al., 1998; Collis and Hussey, 2003; Jankowicz, 2004). However, Rashid (2011) emphasizes the need for flexibility.

Jogulu and Pansiri (2011) asserts that management research is gradually becoming complex requiring the deployment of various techniques for examining and carefully analysing research problems. Frankfort-Nachmias and Nachmias (1996) argues that methodologies are the bedrock upon which research is based and against which claims for knowledge are evaluated.

Although, there is no consensus in literature on how research methodology should be defined (Amaratunga et.al., 2002), conducting a research should principally be governed by a well-defined methodology based on scientific principles (Eldabi et.al., 2002).

It is however, imperative to note from the foregoing that the choice of research methodology to be adopted for this research goes beyond the passive use of a particular methodology because it is well-known to the researcher or easier/most convenient to adopt. This chapter sets out the choice of research paradigms adopted for the research and a choice of research methodology that is most suitably aligned to achieving the research objectives.

According to Rashid (2011), the use of mixed research approach complies with the concept of triangulation as presented by Yin (1994), Gill and Johnson (1997), Crawford (2002). Researches, such as, Holmberg et.al.(2006), Alvesson and Skoldberg (1994), Amarantunga et.al. (2002), Das (1983), Gorard and Taylor (2004), Johnson and Onwuegbuzie (2004) and Tashakkori and Teddlie (2003) sometimes refer to mixed research approach as the “third option”, “third alternative”, “third path”, “third research paradigm”, third methodological movement”, the “mixed” or “balanced approach”, respectively.

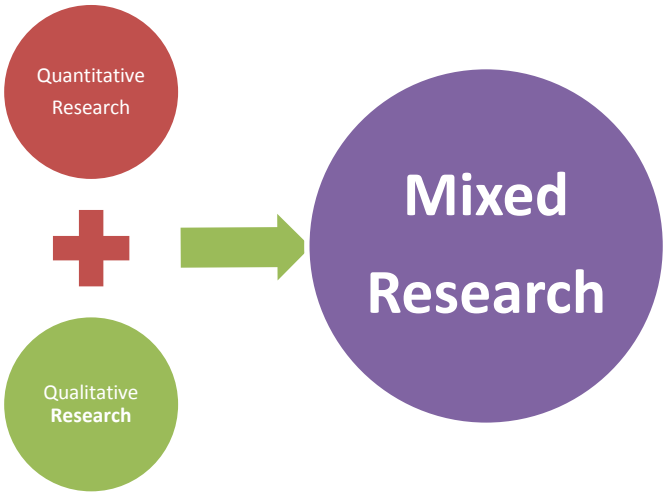


Figure 4.1: Mixed Research Approach

The use of mixed research approach may vary in application based on the procedure adapted by the researcher and the dominance of either qualitative or quantitative approaches in the model adopted. Mixed research approach can either be concurrent or sequential:

1. **Concurrent Mixed Research:**

   Where qualitative and quantitative research methods are adopted simultaneously (Jogulu, 2011), this can be expressed as QUAL (Qualitative)+QUAN(Quantitative). The dominance of either qualitative or quantitative in a single research can be expressed as QUAL+quan or QUAN+qual.

2. **Sequential Mixed Research:**

   Where the researcher conducts either a qualitative test first and then followed by quantitative test afterwards, or vice versa (Tashokkori and Teddlie, 1998). In most cases, the findings of the latter methodology are used to explain that of the former. Sequential mixed research can be expressed as QUAL→QUAN or QUAN→QUAL. The dominance of either model can also be expressed as QUAL→quan, quan→QUAL, QUAN→qual or qual→QUAN.

The above explanation can be illustrated as follows:

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thesis can be found in the
Lancester Library, Coventry
University.

Figure 4.2: Types of Mixed Research

Source: Jogulu (2011)

Note that the words in upper case denote high priority/dominance, whereas the words in lower case denote low priority/dominance. The "+" sign connote "concurrent" while "→" connote "sequential".

4.4 RESEARCH METHODS

There are two (2) broad and distinct types of research methods, namely; quantitative and qualitative research approaches (Amaratunga et. al., 2002; Ojiako and Maguire, 2008; Kothari, 2009).

However, the use of a multi-technique approach which combines the two (2) types of research methods mentioned above, has been proposed to strengthen research findings (Eldabi, et.al., 2002; Jogulu and Pansiri, 2011).

4.4.1 Quantitative Approach

This approach metamorphosed from a powerful academic tradition which places considerable importance to tradition which places considerable importance to represent peoples' opinions

or concepts in numeric form (Amaratunga et.al, 2002). Quantitative approach to research places emphasis on empirical verification of research data and results, as well as, the extent of generalisability of research results in terms of hypothesis testing and theory application.

Data collected for quantitative research are usually in numerical and statistical form using surveys, questionnaires, experimental designs, intervention studies.

Jenkins (2009) asserts that quantitative research is a preferred approach for many researches in that it provides a definite and measurable result, however, Amarantunga (2002) argues that other researchers prefer the qualitative approach which is more subjective and involves more discovery in order to gain understanding. Therefore, quantitative research approach would rather serve as a verification rather than discovery methodology (Eldabi et.al. 2002).

4.4.2 Qualitative Approach

Qualitative research approach is mainly concerned with acquisition of an in-depth understanding of the natural setting of a phenomenon through observation (Weick, 1984; Irani et.al., 1999; Jogulu and Pansiri, 2011). Amaratunga et.al. (2002) opine that qualitative researches concentrate on the use of words and observations to express reality and tend to describe people in natural situations. Qualitative researches places emphasis on real life situations and attempts to reveal complexities inherent in them.

There are no set rules for carrying out qualitative researches (Bryman, 2004), however, there are various approaches to qualitative data analysis (Saunders et.al, 2007). According to Rashid (2011) qualitative data analysis can be carried out using;

1. **High Level Content Analysis** (Scandura and Williams, 2000; Ahuvia, 2001; Harwood and Gary, 2003; Riessman,2008; Meyer, 2009; Ratcliff, 2010) where various techniques are deployed simply to identify general elements present in data collected in a bid to carefully analyse and also understand the context of the data collected.

2. **Hermeneutical Analysis** (Prassad, 2002; Rashid, 2011) implying that in order to analyse qualitative data effectively, the researcher may as well assume the research respondent's perspective.

3. **Combination of 1 and 2 above** can also be adopted and in most situations, this is the case.

4.4.3 Comparison between Quantitative and Qualitative Research Approaches

Both research approaches reviewed above possess certain advantages and disadvantages. However, their suitability depends largely on the uniqueness of the research for which they are to be adopted and their compatibility with the research aim and objectives. In other words, the successful use of a particular research approach is dependent on the extent to which the means (i.e. the research methodology) is able to justify the ends (i.e. research results) in the light of achieving the research goal. The table below summarizes the distinction between qualitative and quantitative research methodologies.

Differences between Qualitative and Quantitative Methods

The table below summarises the differences between qualitative and quantitative research methods.

Table 4.3: Differences between Qualitative and Quantitative Methods

Source: Adopted from McKereghan (1998)

4.4.4 Population Sample and Sampling Method

Snow-balling sampling technique was used in this research to gather data and elicit knowledge from industry practitioners through several referrals by key contacts in the industry. The participants include; Architects, Engineers, Quantity Surveyors, Builders, Estate Surveyors and Valuers. The participants are from different parts of Nigeria with diverse experiences in the construction industry. The participants also work for organisations of different sizes and types in both the private and public sectors.

Data collection for the purpose of this study was carried out in three (3) phases: Preliminary Survey (47 Participants) – Critical Review of Claims Management in the Nigerian Construction Industry; Main Survey (41 Participants) – To Determine the Impact of Pre-construction Decision Making Process, particularly the Choice of Procurement Strategy on Claims Management; and thirdly Evaluation Survey (32 Participants) – To Assess the Reliability and Validity of the developed Decision Support system and its ability to enhance claims management for better project delivery.

4.5 RESEARCH STRATEGY

Inherent in the mixed research methodology is an underlying philosophy which mirrors or encapsulates a research strategy aimed at maximizing both qualitative and quantitative research perspectives in a complementary or more holistic manner. Extensive literature search suggests that the under-pinning research strategies embedded in the mixed research paradigm includes:

1. Triangulation Strategy

Triangulation strengthens research findings through the technique of combining and comparing multiple data sources and analysis (Jack and Raturi, 2006). Gill and Johnson (1997) define triangulation as the use of different research tools and techniques in the same study or collecting the same set of data at different times and places within the same study so as to increase the quality of the data obtained and subsequent findings. The following figure illustrates the import of triangulation in research.

Figure 4.3: Triangulation

Source: Amaratunga (2002)

2. Inductive and Deductive Strategy

Deductive research tends to take its root from theory or relevant applicable laws governing the subject area and then proceeds to data (i.e. theory, method, data, findings), whereas inductive research takes its root from collected data and then proceeds to theory development, i.e. data, method, finding, theory, according to Cummings and Frost (1985) and Pathirage et.al. (2008).

In other words, inductive and deductive research strategies are complimentary and logical approaches owing to the mixed research paradigm. Deductive research studies

a particular phenomenon in details by taking into cog naissance the prevailing situation or circumstances surrounding the subject at the time. This implies that deductive strategy interprets the subject in the light of prevailing operational theories and relevant laws or legislations.

On the other hand, inductive research strategy investigates the problem in the subject area from the perspective of the prevailing situations which gave birth to the problem (i.e. cause-effect perspective). It tends to study behavioural patterns and draw inferences from data collected with a view of later developing an easily generalisable theory in the research area. According to Jogulu (2011), the impact of both inductive (qualitative) and deductive (quantitative) cycle enables researchers to undertake theory generalization and hypothesis testing all at the same time within the same study. The following diagram illustrates the inductive and deductive process.

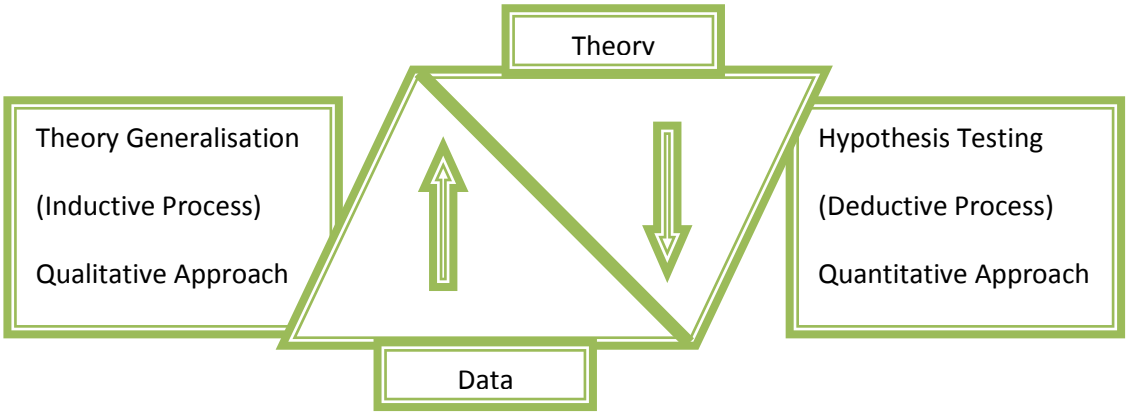


Figure 4.4: Inductive and Deductive Strategy

4.6 RESEARCH TYPE

All researches can be categorized as being exploratory, descriptive and/or explanatory (Richey and Klein, 2007; Singleton and Straits, 2010).

4.6.1 Descriptive/Diagnostic Research

According to Kothari (2009), descriptive/diagnostic researches are those studies which are concerned with specific predictions, narration of facts and describing the characteristics of specific individual or group. Examples of descriptive research include case study, job analysis, observational research, developmental studies, correlation studies and epidemiologic research (Thomas et. al., 2010). The most common descriptive research techniques are questionnaires

and interviews. NYU (2011) argued that the aim of descriptive research is to trigger an answer(s) to the "why?" questions in an explanatory research. Marsh and Elliot (2008) further asserts that descriptive researches provide well-informed descriptions which in-turn has the potential capability of challenging generally accepted belief.

4.6.2 Explanatory/Analytic Research

This involves the in-depth study and evaluation of existing information in a bid to explain relatively complex phenomena (Thomas, Nelson and Silverman 2010). It probes fundamental philosophies and rationale for specifically observed trends or causes of action. McNabb (2012) asserts that the fastest means to produce a stream of knowledge in a field or discipline is explanatory research. This form of research are usually very investigative as Cook, Campbell and Shadish (2001) opine that explanatory researches investigate the type, nature and causes of the relationship that exist between two or more factors (or issues).

4.6.3 Exploratory Research

Exploratory research is a brief, fleeting, preliminary stage in the research process, it is a precursor to the main research work (Stebbins 2001). Exploratory research is used where little is known about a subject area (Richey and Klein, 2007), however, the results obtained may not be a true representation of the whole population, hence its limited generalization (University of Guelph, 2011).

4.6.4 Research Type Adopted

This is an explanatory/ analytic research for the following reasons:

- Very little is known about claims management in the Nigerian construction industry, this is evident in the critical literature review carried out as part of this research which shows a wide knowledge gap amongst professionals in the industry.
- Explanatory researches investigate the type, nature and causes of the relationship that exist between two or more factors.

The research aims to investigate the causes and impact of claims and to develop a decision support system for selecting procurement strategy in order to enhance current claims management practice in the Nigerian construction industry.

4.6.5 Research Ethics

This research was carried out in accordance to Coventry University's core standard based on the principles of integrity, accountability and honesty. Data collected from surveys and information elicited from industry experts for the purpose of this study were in compliance with Coventry University's approved health and safety procedures. Ethical approval was obtained before this study was carried out and this was based on the following good practices outlined in the table below:

Table 4.4: Good Practice Checklist

Source: Adopted from Coventry University (2012)

4.7 Data Collection, Presentation and Analysis

Data collection for the purpose of this research was carried out in three (3) phases, based on three (3) different surveys carried out sequentially as described in section 4.8 of this study.

4.7.1 Preliminary Survey

4.7.1.1 Overview

The preliminary survey was carried out using an online based structured questionnaire via smart survey. It sought to research the opinions of various professionals in the Nigerian construction industry with regards to managing claims.

The preliminary survey sought to appraise the current state and approaches adopted in managing contractual claims in the Nigerian construction industry, the level of knowledge that exist amongst professionals with respect to claims management processes and the factors that affect claims management. The pilot survey is structured to assess the opinions of industry practitioners on whether or not the development and subsequent implementation of a decision support system for managing contractual claims could be of any use in enhancing construction projects and finally to evaluate the impact of claims management (if any) on the delivery of construction projects in Nigeria.

The questionnaire was structured in three sections. The first section includes questions bordering around the participants background – profession, education and experience. The second section contain questions geared at gathering information regarding participants' organisation with respect to managing construction contract claims – claims management responsibility, organisational performance, organisations' claims management processes and approaches, factors affecting the management of claims, the frequency of occurrence and impact of claims. Finally, the third section seeks to critically examine the participants' specific project experiences and recommendations for improvement in managing construction contract claims.

4.7.1.2 Population Sample and Sampling Method

Snow-balling sampling technique was used in this research to gather data and elicit knowledge from industry practitioners through several referrals by key contacts in the industry. The participants include; Architects, Engineers, Quantity Surveyors, Builders, Estate Surveyors and Valuers. The participants are from different parts of the country with diverse experiences in the construction industry. The participants also work for organisations of different sizes and types in both the private and public sectors.

4.7.1.3 Data Collection and Analysis

Based on the sampling method described above, the structured questionnaire was administered online to participants via smart survey. The questionnaire was administered to 47 participants in all, out of which 22 partial responses and 25 complete responses were obtained. For the purpose of this research the partially completed and incomplete responses were discarded, hence the analysis was carried out on the 25 completed questionnaire responses.

Questionnaire Response Summary		
Responses	Number	Percentage
No. of Complete Responses	25	53%
No. of Incomplete Responses	22	47%
Total number	47	100%
No. of Valid Responses	25	

The statistical analysis of the quantitative data gathered and interpretation was carried out using computer-based statistical software known as Statistical Package for Social Sciences (SPSS) version 20. Excerpts from the results of the qualitative data gathered is further presented, interpreted, analysed and discussed in the subsequent chapters. Other software such as Microsoft Word and Excel were also used for word processing as well as graphs and chart development. Content Analysis described in section 4.4.2 of this study was deployed in analysing the qualitative data collected in the survey. Knowledge elicited, as well as, strategic recommendations made by industry experts were carefully analysed based on general constructs and context of the data collected in order to enhance understanding of the research area.

4.7.2 Survey 2

4.7.2.1 Overview

This survey was carried out using an online based structured questionnaire via smart survey. It sought to research the opinions of various professionals in the Nigerian Construction Industry with regards to evaluating the impact of procurement strategy on project performance in Nigeria, from a claims management perspective.

The survey aims to assess the procurement strategies used in the Nigerian construction industry; to critically analyse factors that influence the choice of procurement strategy adopted and their prioritization in terms of importance; to evaluate the potential sources of construction contract claims from a project life-cycle approach; to develop a strategic procurement method decision support model powered by claims management philosophy, to aid the successful delivery of construction projects in Nigeria.

The questionnaire is structured in three sections. The first section contains questions bordering around the participants background – profession, education and experience. The second section contain questions geared at gathering information regarding participants' organisation with respect to different approaches to choosing procurement strategies – type of contract, contractor selection/appointment process, type of tendering/choice of competition adopted and the procurement method used in each project case. Finally, the third section seeks to critically examine the participants' specific project experiences, based on a recently completed project each respondent was involved in, and expert recommendations for reducing the impact of construction claims on construction projects.

4.7.2.2 Population Sample and Sampling Method

Snow-balling sampling technique was used in this research to gather data and elicit knowledge from industry practitioners through several referrals by key contacts in the industry. The participants include; Architects, Engineers, Quantity Surveyors, Builders, Estate Surveyors and Valuers, amongst others. The participants are from different parts of the country with diverse experiences in the construction industry. The participants also work for organisations of different sizes and types in the private and public sectors.

4.7.2.3 Data Collection and Analysis

Based on the sampling method described above, the structured questionnaire was sent out online to participants via smart survey. The questionnaire was administered to 58 participants in all, out of which 18 partial responses and 41 complete responses were obtained. For the purpose of this research the partially completed and incomplete responses will be discarded, hence the analysis will be carried out on the 41 completed questionnaire responses.

Questionnaire Response Summary		
Responses	Number	Percentage
No. of Complete Responses	41	69%
No. of Incomplete Responses	18	31%
Total number	59	100%
No. of Valid Responses	41	

The statistical analysis of the data gathered and interpretation was carried out using computer-based statistical software known as Statistical Package for Social Sciences (SPSS) version 20 and 22. Excerpts from the results of the data gathered is further presented, interpreted, analysed

and discussed in the subsequent chapters. Other software such as Microsoft Word and Excel were also used for word processing as well as graphs and chart development.

Average Index (AI) … LIKERT SCALE

$$\mathbf{AI} = \frac{\sum\{(5X_1) + (4X_2) + (3X_3) + (2X_2) + (1X_1)\}}{\sum(X_1 + X_2 + X_3 + X_4 + X_5)}$$

Where;

X_1 = Number of Participants for Scale 1

X_2 = Number of Participants for Scale 2

X_3 = Number of Participants for Scale 3

X_4 = Number of Participants for Scale 4

X_5 = Number of Participants for Scale 5

Content Analysis described in section 4.4.2 of this study was deployed in analysing the qualitative data collected in the survey. Knowledge elicited, as well as, strategic recommendations made by industry experts were carefully analysed based on general constructs and context of the data collected in order to enhance understanding of the research area.

4.7.3 Evaluation and Validation Survey

4.7.3.1 Overview

An evaluation survey was carried out in order to assess the procurement decisions taken by industry practitioners without the use of any form of decision aid. Subsequently, a comparative analysis was carried out to compare alternative decisions that would have been made, if the developed decision support system was adopted. Each participant's response was viewed as a separate project case study because the information was elicited from each participant based on a recently completed project in their organisation.

4.7.3.2 Population Sample and Sampling Method

Snow-balling sampling technique was used in this validation survey to gather data and elicit knowledge from industry practitioners through several referrals by key contacts in the industry. The participants include; Architects, Engineers, Quantity Surveyors, Builders, Estate Surveyors and Valuers. The participants are from different parts of the country with diverse experiences in the construction industry. The participants also work for organisations of different sizes and types in both the private and public sectors. In total, 32 participants were involved in the survey and all of them fully responded to the questions asked, there were no partial response; hence the survey collated shows 100% valid responses.

4.7.3.3 Scales and Coding

The following scales and coding were adopted in collating and analysing data collected in evaluation and validation survey of the Decision Support System developed (See section 7.5).

Table 4.5: Key to Ratings

S/N	Project Variables
V1	Cost Certainty
V2	Project Design Complexity
V3	Level of Specialist Work required
V4	Need for External Funding
V5	Flexibility for Innovation
V6	Contract Duration
V7	Completeness of Project Documentation at tender stage
V8	Client Control and Input

Table 4.6: Key to Project Variable Rating

S/N	Rating
1	Low
2	Low – Medium
3	Medium
4	Medium – High
5	High

Table 4.7: Key to Overall Cost, Time and Quality Performance Rating

S/N	Rating
1	Poor
2	Fair
3	Good
4	V. Good
5	Excellent

4.8 RESEARCH PROCESS AND DESIGN

4.8.1 Research Flow Chart

The flow chart below is a simple diagrammatic representation which illustrates the processes which was undertaken throughout the research work.

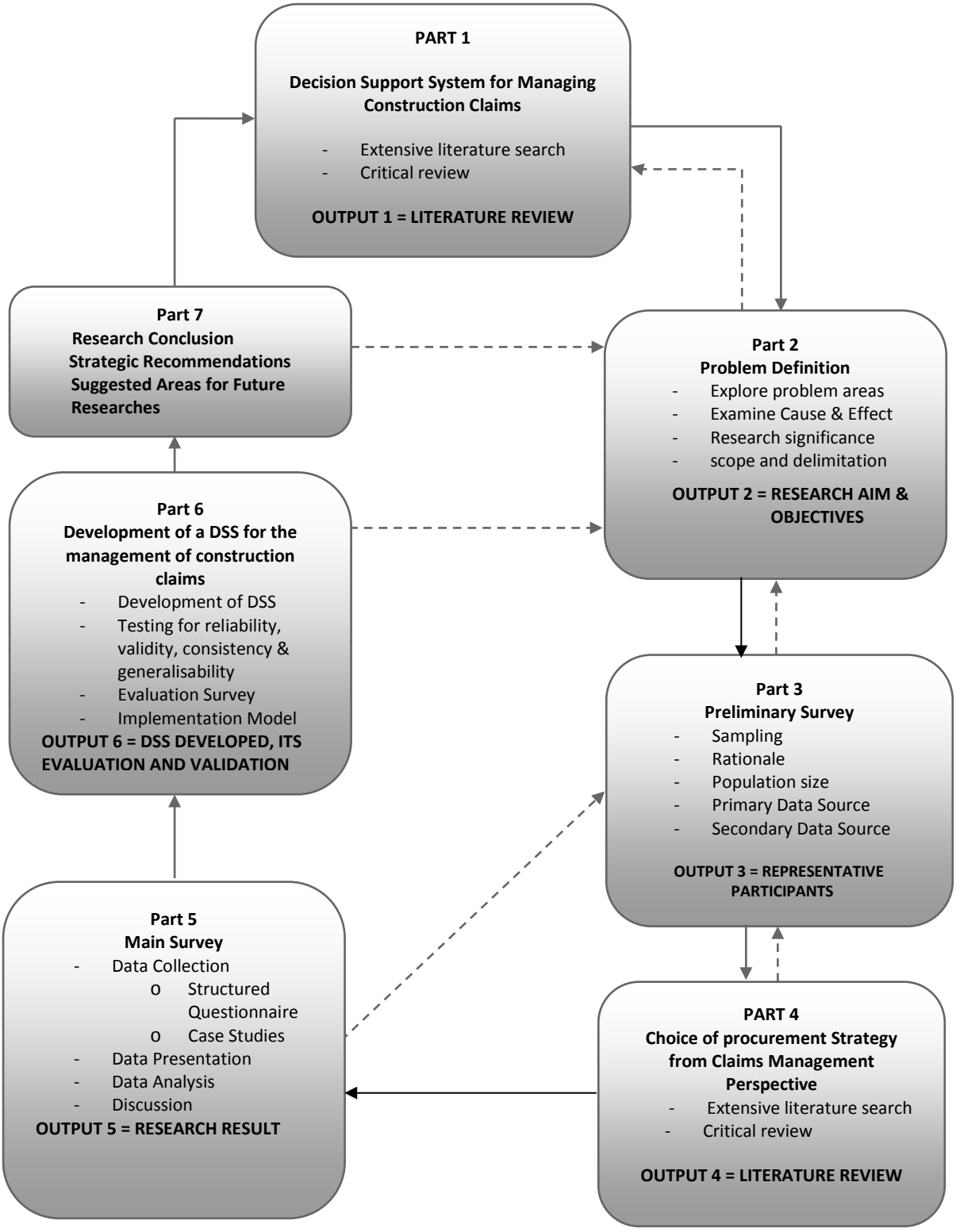


Figure 4.5: Research Process Flow Diagram

4.8.2 Research Onion – Formation of the Research

Figure 4.6: Research Onion – Formation of the Research

The figure above illustrates how the research unfolded. This research started off by critically reviewing claims management in the Nigerian construction industry in its first phase, the research found that the main factors affecting claims management are, existing claims management knowledge deficit amongst industry practitioners, corruption and poor pre-contract administration, respectively. Existing claims management knowledge deficit amongst practitioners can be classed as human resource issue; corruption classified as a socio-cultural problem; poor pre-contract administration is classified as an operational problem. For the purpose of this research, the scope of studies is delimited to decision making that affects the operational aspects of claims management.

The preliminary study revealed a relationship between construction claims management and pre-contract practices. A closer look into pre-contract practices showed that the choice of procurement strategy adopted constitutes one of the most critical decisions taken at the project planning stage (Project Management Stages - Initiation, Planning, Execution, Monitoring & Controlling, and Closing). This affects the probability of a potential claim occurring during the execution stage and potential impact on the project should it occur, as it sets out how the construction contract will be administered. Hence, further studies into how the choice of procurement strategies adopted in the Nigerian construction industry are made. From a management perspective, it isn't enough to proffer solutions or try to mitigate already existing problems, but rather, it is more helpful to anticipate the occurrence of potential problems and develop/implement a structure/mechanism to curtail the probability of their occurrence and possible impact should they occur. In addition, the passive implementation of the most convenient procurement strategy, rather than the most appropriate strategy has been the cause of misfortune suffered by many construction projects (Cartlidge, 2007). Numerous unresolved claims suffered during project execution have led many construction projects to arbitrations, litigations and in some cases outright project abandonment. Having examined the decision making process of industry practitioners through administering structured questionnaires to elicit knowledge, the research developed a decision support system to aid practitioners in choosing the most appropriate procurement strategy to improve the management of claims.

The research paradigm and methodology are captured by in the research process and aligned to the research aim, in order to realise the stated research objectives.

4.8.3 Realisation of Research Objectives

Objective 1 (Stage 1):

Extensive literature on construction claims management covered in Chapter 2, based on the research aim and objectives set out in Chapter 1.

Objective 2 (Stage 2):

Knowledge elicitation on current industry practices (based on Stage 1), through the administration of structured questionnaires and subsequent analysis covered in Chapter 5.

Objective 3 (Stage 3):

The evaluation of current practices covered in Stage 1 and analysis in Stage 2 with a view of improving current industry practice.

Objective 4 (Stage 4):

Synthesis of Stage 1, 2, and 3, as well as, further survey and analysis carried out in Chapter 6 in order to solve one of the main factors (poor pre-contract administration) affecting claims management revealed by the analysis in Chapter 5.

Objective 5 (Stage 5):

The development of a Decision Support System in Chapter 7 based on research stages 1 – 4 in order to improve current practice with conclusion drawn and strategic recommendations made.

Table 4.8: Relationship between Research Aim, Objectives, Questions and Thesis Chapters

	Research Aim					Thesis Chapters
	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5	
	Research Question 1			Research Question 2		
Research Design Stages	Stage 1					1,2
	Stage 2					1,2,5,6
	Stage 3					1,2,3,5,6
	Stage 4					1,2,3,4,5,6,7
	Stage 5					1,2,3,4,5,6,7,8

4.9 SUMMARY OF METHODOLOGICAL FRAMEWORK

The table below summarises the choice of methodological framework adopted for the purpose of this research.

Table 4.9: Methodological Framework Summary

Research Aim	**To investigate the causes and impact of claims and to develop a decision support system for selecting procurement strategy in order to enhance current claims management practice in the Nigerian construction industry.**
Research Objectives	To critically examine and determine the causes and impact of claims in the delivery of construction projects.
	To analyse/determine the main factors affecting the management of claims in the construction industry.
	To empirically examine the extent of application of theoretical claims management concepts in current practice.
	To determine the impact of pre-construction decision making processes such as procurement strategies on claims management.
	Based on the above objectives, develop a decision support system to enhance claims management practice.
Research Questions	What are the main factors affecting the claims management and how does it impact on the delivery of construction projects?
	How can the current claims management practice be improved from pre-construction strategic management decisions?
Research Paradigm	Pragmatic Paradigm ▪ Consequences of actions ▪ Problem-centred ▪ Pluralistic ▪ Real world practice oriented ▪ Focuses on ‘what’ and ‘how’
Research Methodology	Mixed Research Methodology
Research Methods	Quantitative Method
	Qualitative Method
Research Strategy	Triangulation
	Inductive and Deductive
Research Tools	Structured Questionnaires
	Multiple Case Studies

CHAPTER 5

DATA COLLECTION, PRESENTATION AND ANALYSIS

5.0 PRELIMINARY SURVEY

The preliminary survey was carried out using an online based structured questionnaire via smart survey. It sought to research the opinions of various professionals in the Nigerian construction industry with regards to managing claims.

The preliminary survey sought to appraise the current state and approaches adopted in managing contractual claims in the Nigerian construction industry, the level of knowledge that exist amongst professionals with respect to claims management processes and the factors that affect claims management. The pilot survey is structured to assess the opinions of industry practitioners on whether or not the development and subsequent implementation of a decision support system for managing contractual claims could be of any use in enhancing construction projects and finally to evaluate the impact of claims management (if any) on the delivery of construction projects in Nigeria.

The questionnaire was structured in three sections. The first section includes questions bordering on the participants background – profession, education and experience. The second section contain questions geared at gathering information regarding participants' organisation with respect to managing construction contract claims – claims management responsibility, organisational performance, organisations' claims management processes and approaches, factors affecting the management of claims, the frequency of occurrence and impact of claims. Finally, the third section sought to critically examine the participants' specific project experiences and recommendations for improvement in managing construction contract claims.

5.1 SAMPLE FRAME AND SAMPLING METHOD

Snow-balling sampling technique was used in this research to gather data and elicit knowledge from industry practitioners through several referrals by key contacts in the industry. The participants included; Architects, Engineers, Quantity Surveyors, Builders, Estate Surveyors and Valuers. The participants are from different parts of the country with diverse experience in the construction industry. The participants also work for organisations of different sizes and types in both the private and public sectors.

5.2 DATA COLLECTION

Based on the sampling method described above, the structured questionnaire was administered online to participants via smart survey. The questionnaire was administered to 47 participants in all, out of which 22 partial responses and 25 complete responses were obtained. For the purpose of this research the partially completed and incomplete responses will be discarded, hence the analysis will be carried out on the 25 completed questionnaire responses.

Questionnaire Response Summary		
Responses	Number	Percentage
No. of Complete Responses	25	53%
No. of Incomplete Responses	22	47%
Total number	47	100%
No. of Valid Responses	25	

5.3 DATA ANALYSIS

The statistical analysis of the quantitative data gathered and interpretation was carried out using computer-based statistical software known as Statistical Package for Social Sciences (SPSS) version 20. Excerpts from the results of the qualitative data gathered is further presented, interpreted, analysed and discussed in the subsequent chapters. Other software such as Microsoft Word and Excel were also used for word processing as well as graphs and chart development.

5.4 PRESENTATION AND DISCUSSION OF RESULTS

5.4.1 Participants' Background

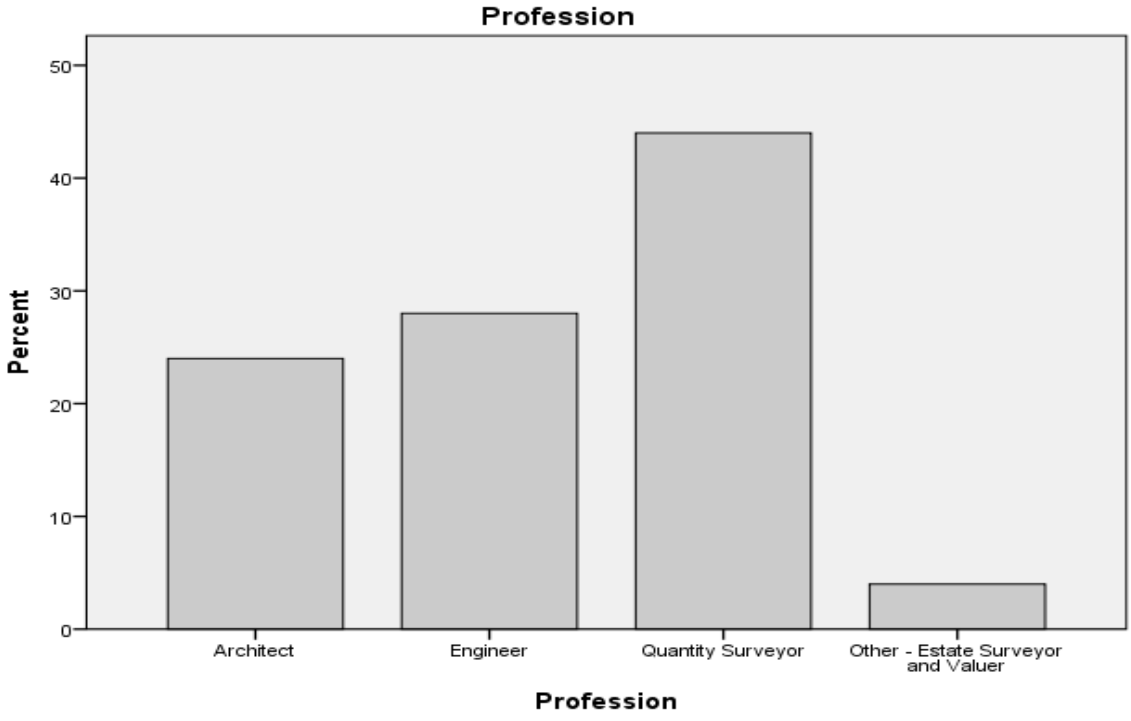
Profession

Table 5.1: Participants' Background

Profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Architect	4	19.0	19.0	19.0
	Engineer	5	23.8	23.8	42.9
	Quantity Surveyor	12	57.1	57.1	100.0
	Total	21	100.0	100.0	

The results obtained from this pilot survey shows that 19% of the participants were architects, 24% were Engineers, and 57% were Quantity Surveyors. There was no estate surveyor or builder at all who responded to the questionnaire.



Justification of Question:

This question sort to determine proportional mix of participants based on their professional background and to critically examine subsequently, if there is a significant difference in their opinions on this basis.

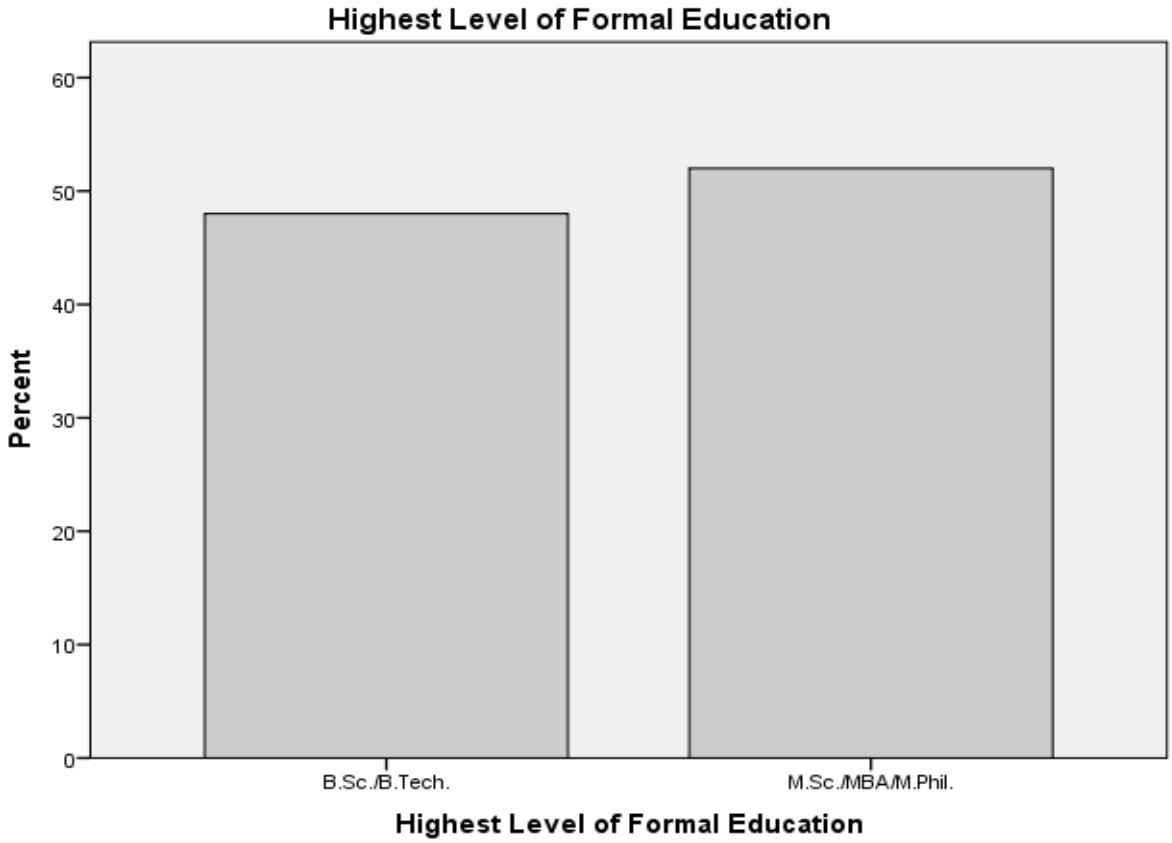
Highest Level of Formal Education of Participants

Table 5.2: Highest Level of Formal Education of Participants

Highest Level of Formal Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	B.Sc./B.Tech.	12	48.0	48.0	48.0
	M.Sc./MBA/M.Phil.	13	52.0	52.0	100.0
	Total	25	100.0	100.0	

The results gathered from the table above shows that 48% of the participants possess bachelors' degree, whereas 52% of the participants have masters' degree. The implication of this in the Nigerian educational system is that all of the participants attended university; however, results gathered shows that no respondent has a polytechnic or college degree, i.e. Ordinary National Diploma (OND) or Higher National Diploma (HND) as their highest level of educational qualification. The results also show that none of these professionals possesses a PhD.



Justification of Question:

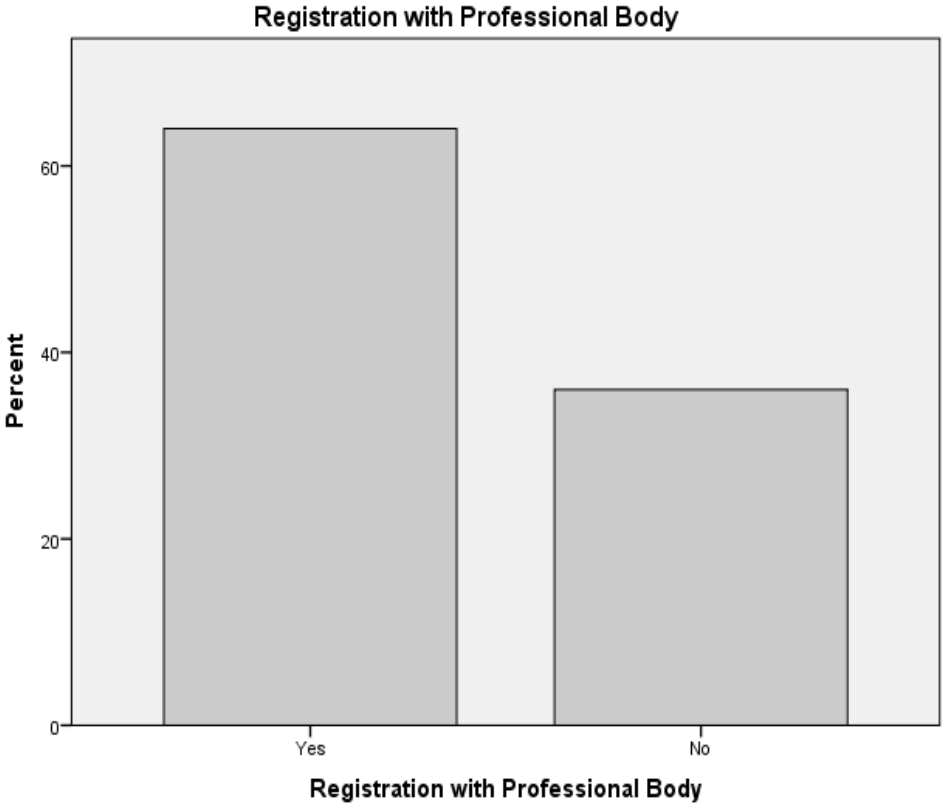
This question was asked in order to know the level of formal education attained by the participants in the survey.

Participants' Registration with Professional Bodies

Table 5.3: Participants' Registration with Professional Bodies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	64.0	64.0	64.0
	No	9	36.0	36.0	100.0
	Total	25	100.0	100.0	

The information gathered from this survey shows that 64% of the participants are registered with relevant professional bodies while 36% are not registered practitioners.



Justification of Question:

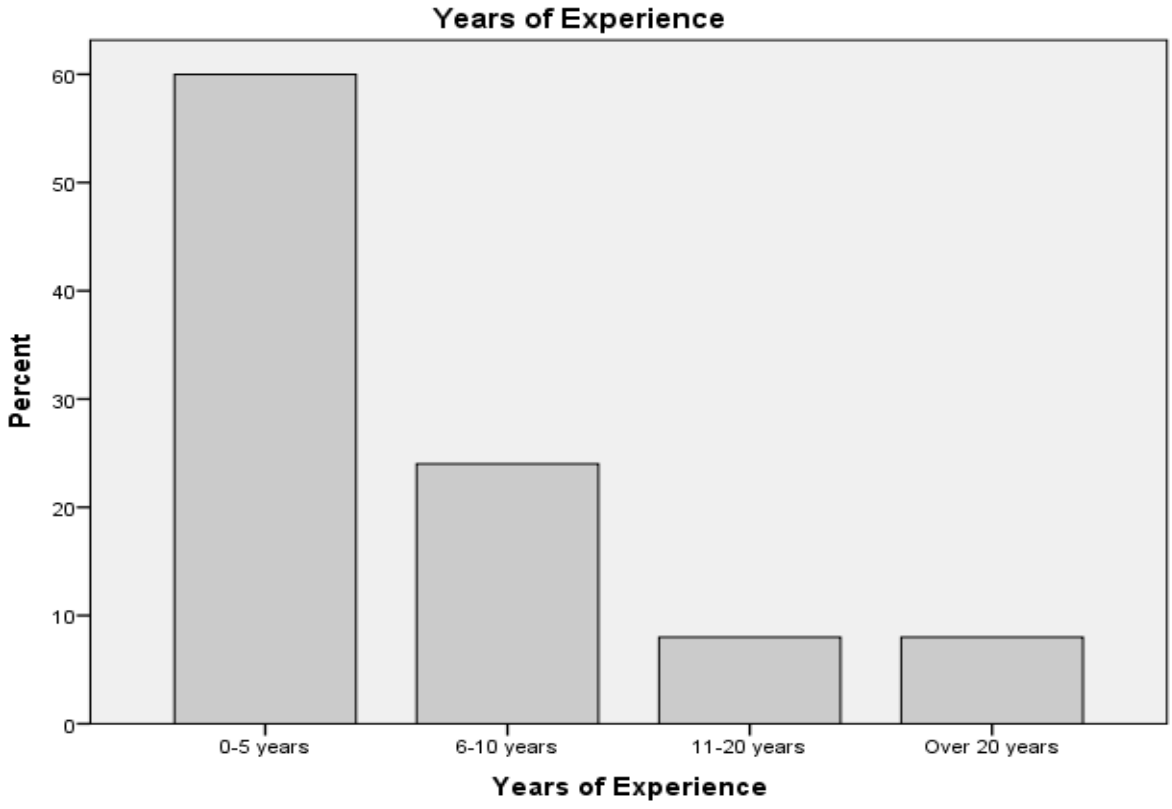
The question was asked in order to know the level of engagement the participants to this survey have with relevant professional regulatory bodies as an indication of their continuous professional development and awareness of the current industry issues.

Participants' Years of Experience

Table 5.4: Participants' Years of Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 years	15	60.0	60.0	60.0
	6-10 years	6	24.0	24.0	84.0
	11-20 years	2	8.0	8.0	92.0
	Over 20 years	2	8.0	8.0	100.0
	Total	25	100.0	100.0	

Data gathered shows that 60% of the participants possess 1-5 years' experience, 24% possess 6-10 years' experience, 8% possess 11-20 years' experience and another 8% possess over 20 years' experience in the Nigerian Construction Industry.



Justification of Question:

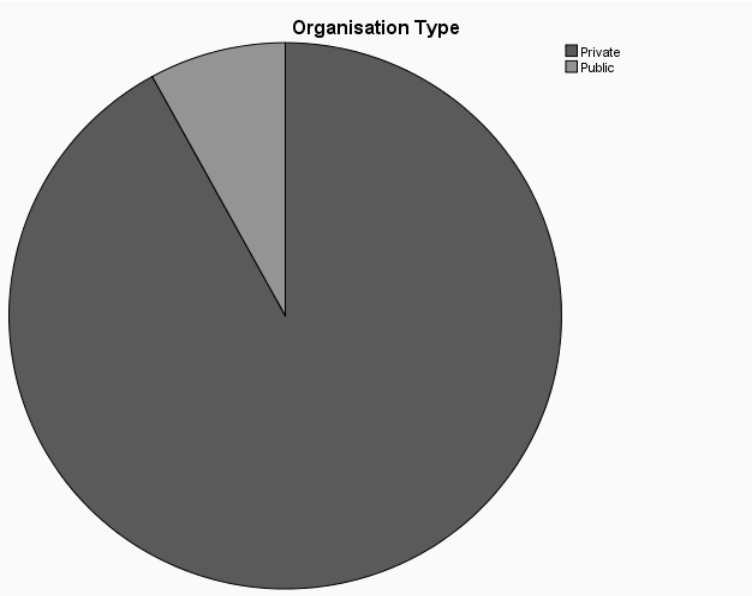
The above question was asked to acknowledge the experience of the participants and their contribution to the industry.

5.4.2 Participants' Organisation

Table 5.5: Organisation Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private	23	92.0	92.0	92.0
	Public	2	8.0	8.0	100.0
	Total	25	100.0	100.0	

Most participants, representing 92% work in the private sector, whereas very few participants, representing 8% work in the public sector.



Justification of Question:

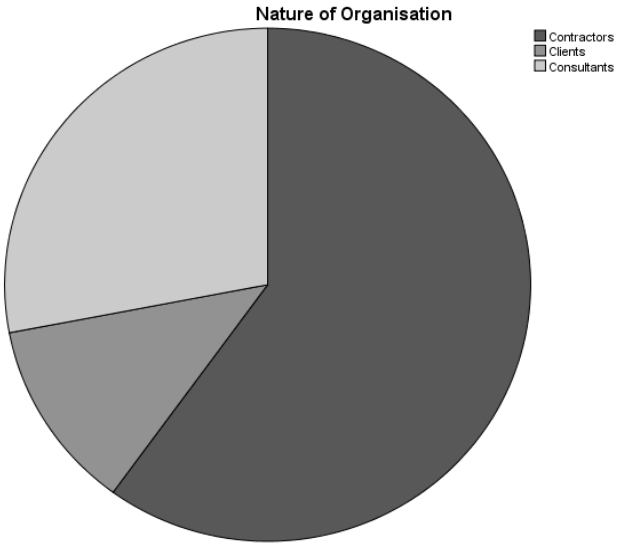
This question was asked to know the distribution of participants in the private and public sectors across the industry.

Nature of Participants' Organisations

Table 5.6: Nature of Organisation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Contractors	15	60.0	60.0	60.0
	Clients	3	12.0	12.0	72.0
	Consultants	7	28.0	28.0	100.0
	Total	25	100.0	100.0	

The results of the survey shows that 60% of the participants are contractors, 12% are clients and 28% are consultants.



Justification of Question:

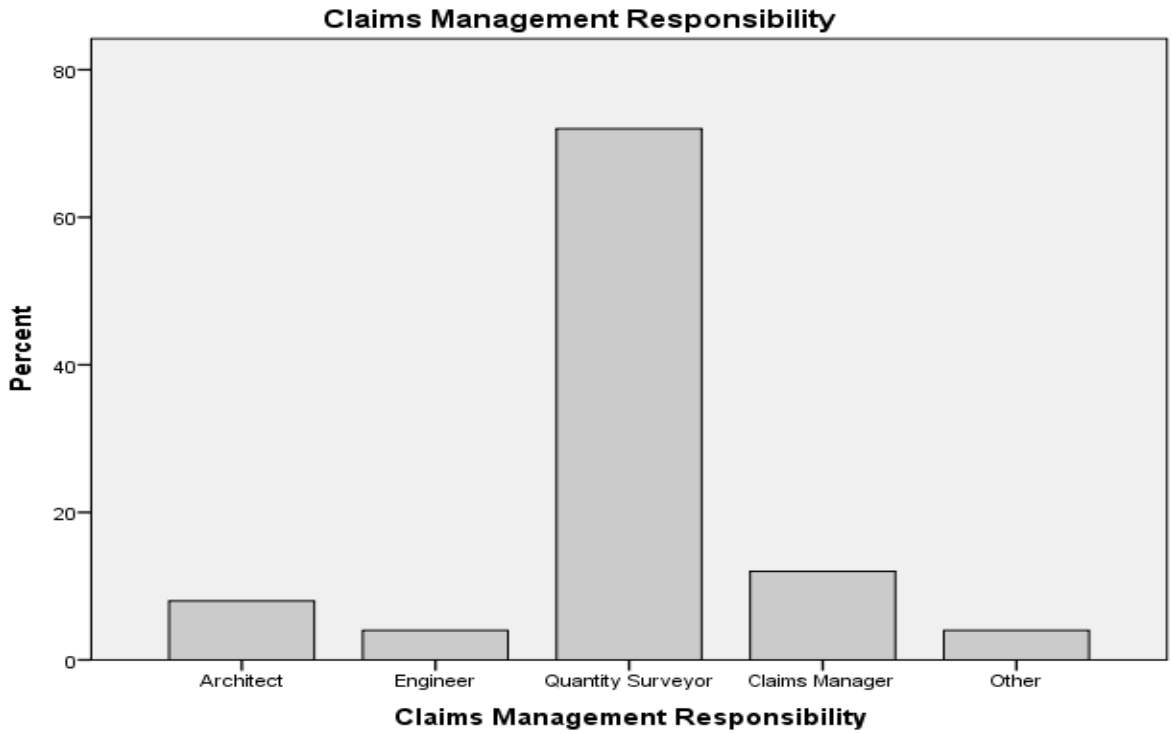
This question was geared towards categorising the participants according to the nature of their organisation and critically examining if this has a bearing on their views and approaches towards claims management.

Claims Management Responsibility

Table 5.7: Claims Management Responsibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Architect	2	8.0	8.0	8.0
	Engineer	1	4.0	4.0	12.0
	Quantity Surveyor	18	72.0	72.0	84.0
	Claims Manager	3	12.0	12.0	96.0
	Other	1	4.0	4.0	100.0
	Total	25	100.0	100.0	

The response to this question showed that 72% of the participants suggest that Quantity Surveyors have pre-dominantly been responsible for managing contract claims, 12% assert that claims management has been a responsibility of claims managers, 8% suggest Architect, 4% suggest Engineers as being responsible for this function and the last 4% of participants suggest that the issue of claims management in the Nigerian Construction Industry has pre-dominantly been the responsibility of the Project Manager (Other).



Justification of Question:

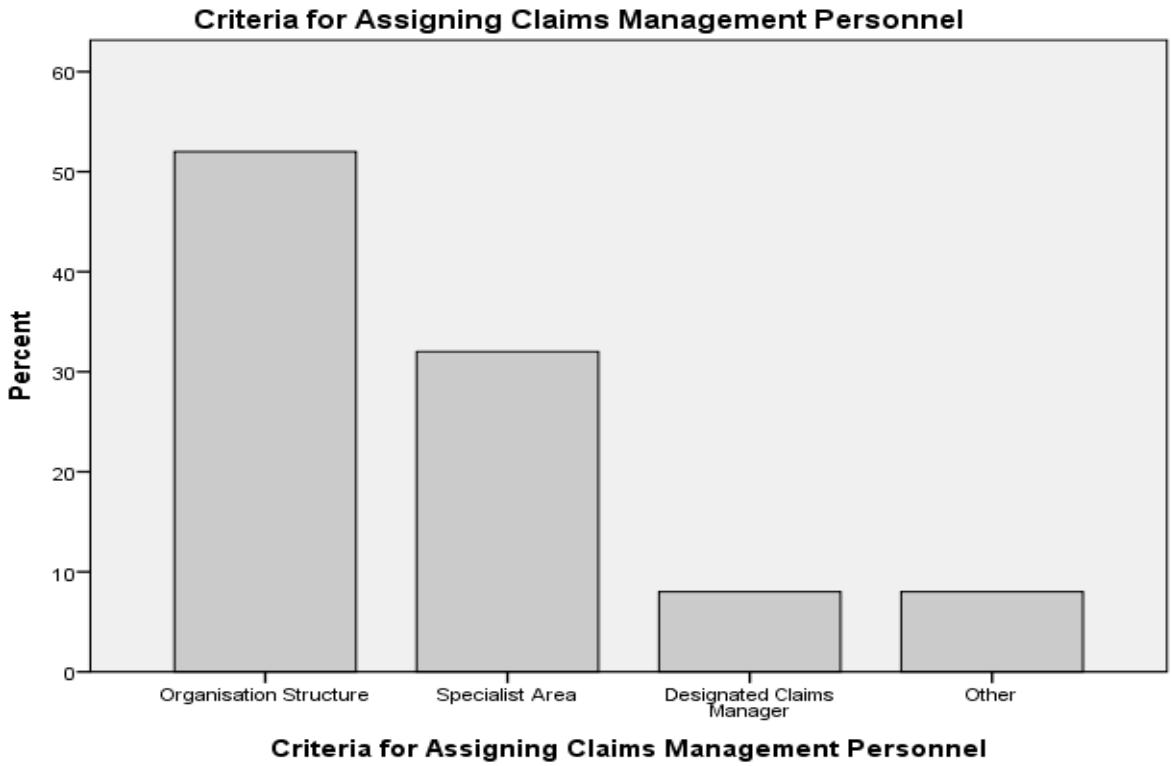
Here, the research seeks to point out whose responsibility it has been pre-dominantly to manage construction claims in the industry.

Choice of Personnel Appointed to Manage claims

Table 5.8: Criteria for Assigning Claims Management Personnel

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Organisation Structure	13	52.0	52.0	52.0
	Specialist Area	8	32.0	32.0	84.0
	Designated Claims Manager	2	8.0	8.0	92.0
	Other	2	8.0	8.0	100.0
	Total	25	100.0	100.0	

In response to the question of what criteria should be used as a yard-stick to appoint who will be responsible for managing contract claims, 92% of the participants are of the opinion that there should be a designated claims manager, 84% are of the opinion that assignment of the management of claims should be on the basis of specialty in each case, 52% of the participants are of the opinion that claims management responsibility should be determined by the organisational structure, 4% are of the opinion that it should be based on the Company Director's opinion and the last 4% are of the opinion that it should be a quantity surveyors' responsibility.

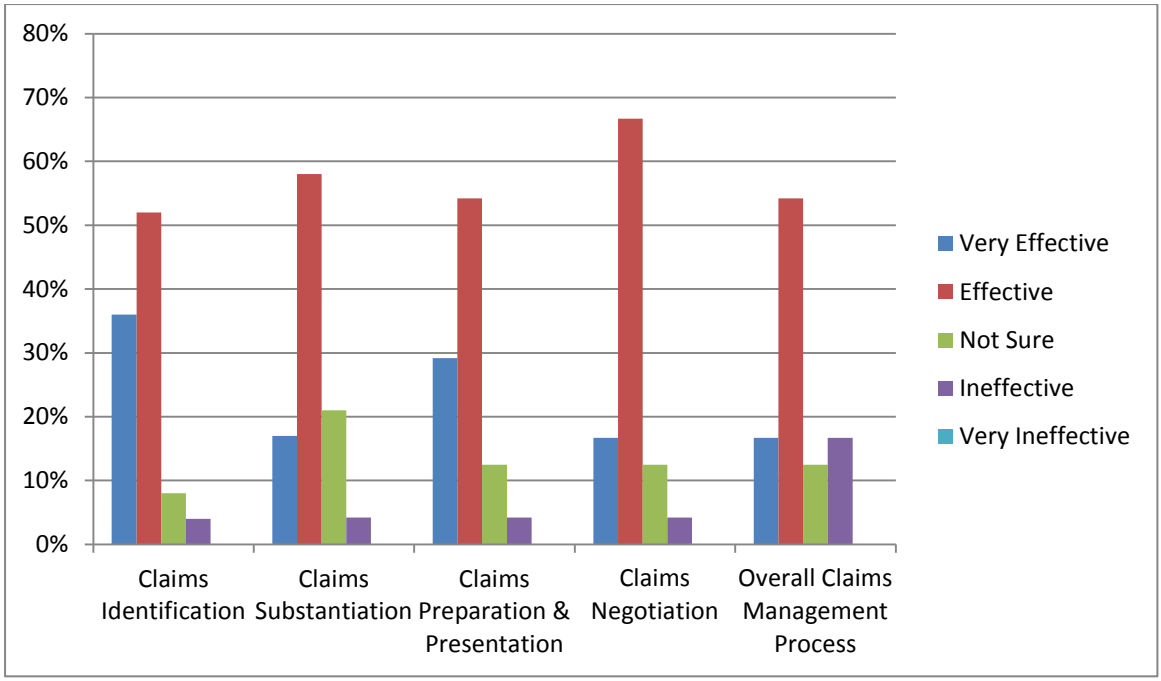


Justification of Question:

To ascertain how choices and decisions are taken with regards to whose responsibility it is to manage claims in different construction organisations.

Table 5.9: Organisation's Ability to manage different Aspects of Claims

How would you rate your organisation's ability to manage the following aspects of claims?						
	Very Effective	**Effective**	**Not Sure**	**Ineffective**	**Very Ineffective**	**Response Total**
Identify claims	36.0% (9)	52.0% (13)	8.0% (2)	4.0% (1)	0.0% (0)	25
Substantiate claims	16.7% (4)	58.3% (14)	20.8% (5)	4.2% (1)	0.0% (0)	24
Prepare & present claims	29.2% (7)	54.2% (13)	12.5% (3)	4.2% (1)	0.0% (0)	24
Negotiate claims	16.7% (4)	66.7% (16)	12.5% (3)	4.2% (1)	0.0% (0)	24
Overall claims management process	16.7% (4)	54.2% (13)	12.5% (3)	16.7% (4)	0.0% (0)	24
					answered	25
					skipped	1



Information gathered from participants shows that over 50% of the participants in each case assert that their organisations' claims management process of identifying, substantiating, preparing and presenting claims negotiation and overall claims management process is effective.

Table 5.10: Statistics

		Rating of Organisation's ability to IDENTIFY CLAIMS	Rating of Organisation's ability to SUBSTANTIATE CLAIMS	Rating of Organisation's ability to PREPARE AND PRESENT CLAIMS	Rating of Organisation's ability to NEGOTIATE CLAIMS	Rating of Organisation's Overall Claims Management Process
N	Valid	25	24	24	24	22
	Missing	0	1	1	1	3
Mean		4.2000	3.8750	4.0833	3.9583	3.8182
Mode		4.00	4.00	4.00	4.00	4.00
Sum		105.00	93.00	98.00	95.00	84.00

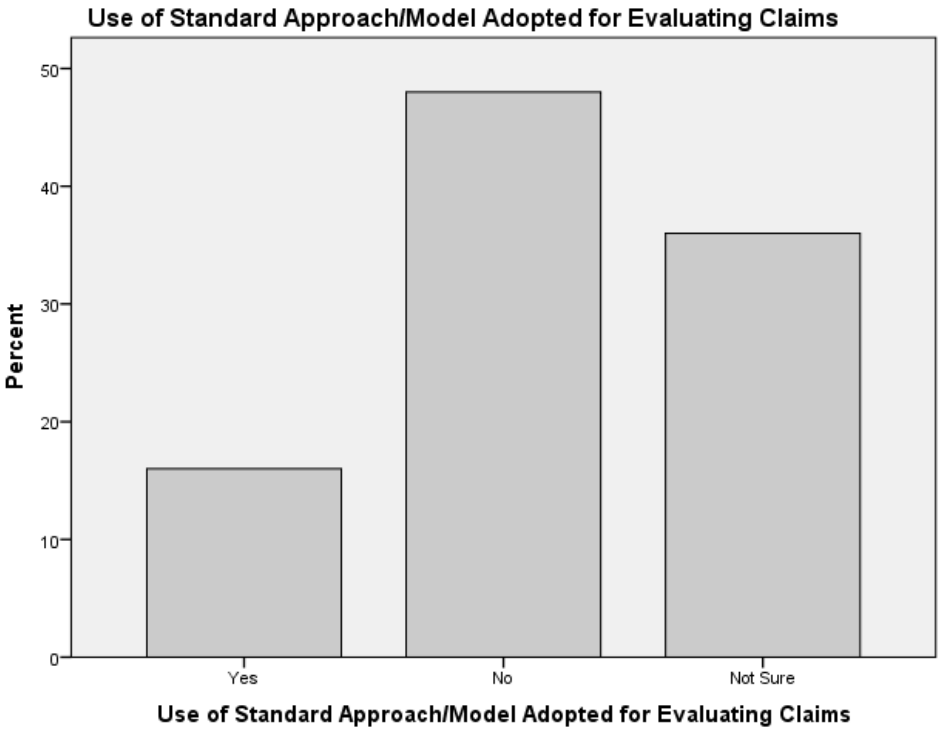
Adopting a 5-point Likert Scale System in analysing the data obtained from the foregoing section, the table above shows the mean and mode values of the data set obtained.

Standard Approach/Model Adopted in Evaluating Claims

Table 5.11: Use of Standard Approach/Model Adopted for Evaluating Claims

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	16.0	16.0	16.0
	No	12	48.0	48.0	64.0
	Not Sure	9	36.0	36.0	100.0
	Total	25	100.0	100.0	

The results show that only 16% of the participants admit that their organisations adopt a standard approach to evaluating construction contract claims. 48% confirms that their organisations has no standard approach while 36% are not sure if there is a standard approach adopted by their company.

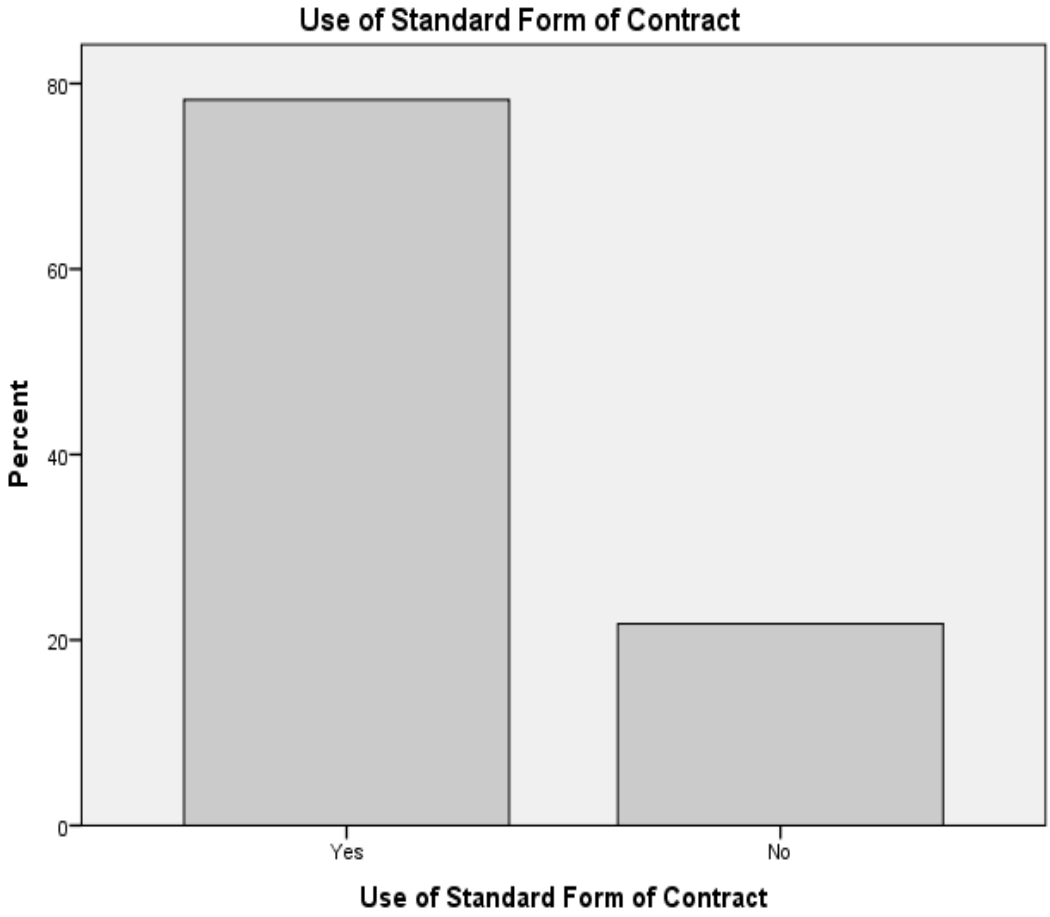


Use of standard form of contracts/contract conditions in administering projects

Table 5.12: Use of Standard Form of Contract

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	72.0	78.3	78.3
	No	5	20.0	21.7	100.0
	Total	23	92.0	100.0	
Missing	99.00	2	8.0		
Total		25	100.0		

The results show that a total of 78% of the participants' organisations use a standardized form of contract in administering projects. However, 22% of the participants attest to the fact that their organisations do not use a standard form of contract/contract condition in administering construction projects.



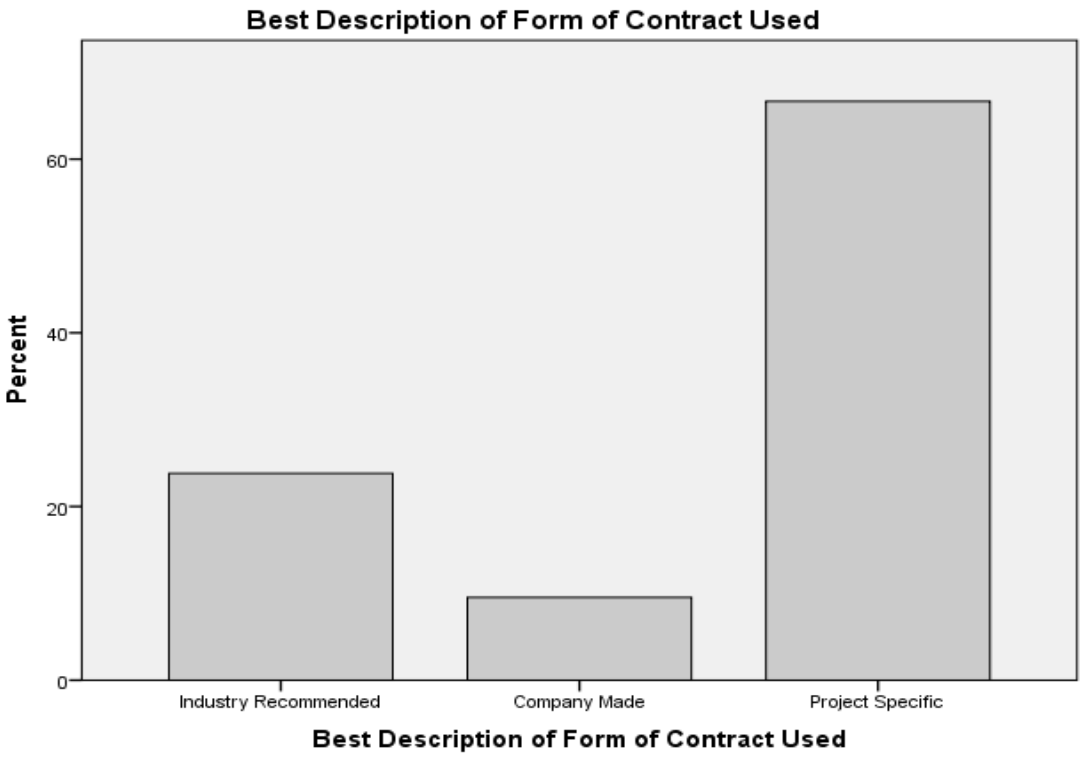
Best Description of Form of Contract Used

Table 5.13: Best Description of Form of Contract Used

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Industry Recommended	5	20.0	23.8	23.8
	Company Made	2	8.0	9.5	33.3
	Project Specific	14	56.0	66.7	100.0
	Total	21	84.0	100.0	
Missing	99.00	4	16.0		
Total		25	100.0		

Following from the previous question 67% of the participants assert that the form of contract used by their organisation is tailored to suit the specific project at hand, 24% maintains that the industry recommended form of contract is strictly adhered to by their organisation, whereas

10% of the participants agree to using a standardized form of contract which has been put together by their company.



5.4.3 Main Source of Practitioners' Claims Management Knowledge

Table 5.14: Main Source of Participants' Claims Management Knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Courses/modules offered in school	6	24.0	24.0	24.0
	Project experience in the industry	12	48.0	48.0	72.0
	Training/seminars attended, including self-study	6	24.0	24.0	96.0
	Other	1	4.0	4.0	100.0
	Total	25	100.0	100.0	

The data gathered from this survey revealed that 48% of the participants' had hands-on project experience in the industry as their main source of claims management knowledge, followed by

courses/modules offered in school and training/seminars attended including self-study with 24% each, respectively. The remaining 4% represent the participants who gained their knowledge from none of the above sources.

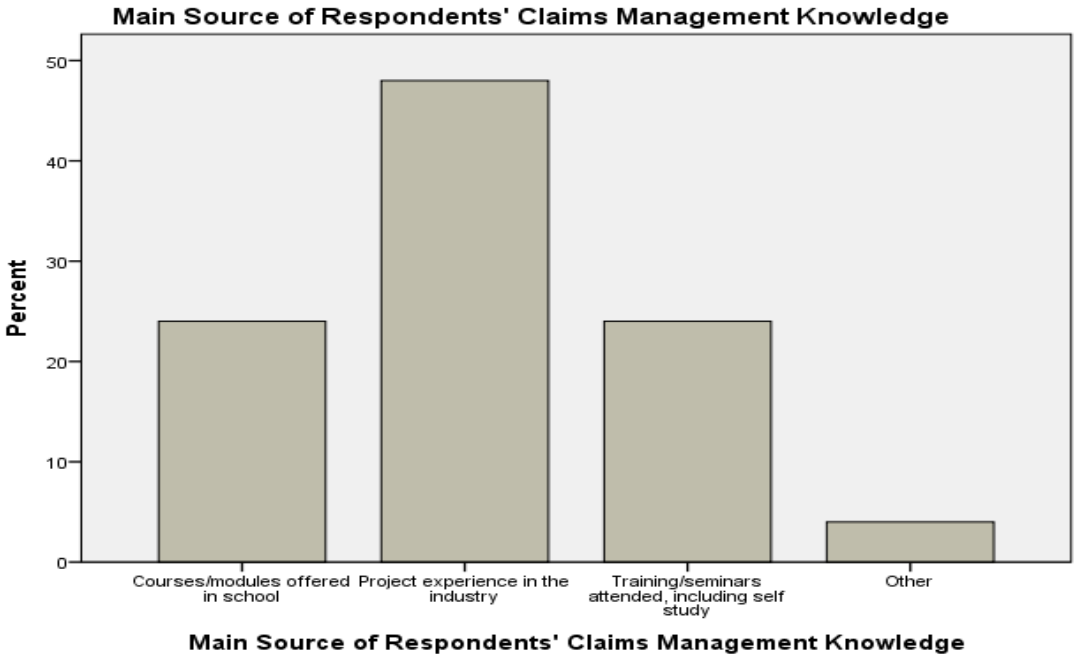


Table 5.15: Summary of the main source of Claims Management knowledge

Cross Tabulation	**What/where is the main source of Claims Management knowledge**					
Which of the following best describes your profession?		Courses/modules offered in school	Project experience in the industry	Training/seminars attended, including self-study	Other (please specify):	Row Totals
	Architect	1 16.7%	2 16.7%	3 50%	0 0%	6 24.0%
	Engineer	1 16.7%	4 33.3%	1 16.7%	1 100%	7 28.0%
	Quantity Surveyor	4 66.7%	6 50%	1 16.7%	0 0%	11 44.0%
	Builder	0 0%	0 0%	0 0%	0 0%	0 0%
	Other (please specify):	0 0%	0 0%	1 16.7%	0 0%	1 4.0%
	Column Total	6 24.0%	12 48.0%	6 24.0%	1 4.0%	25 100%

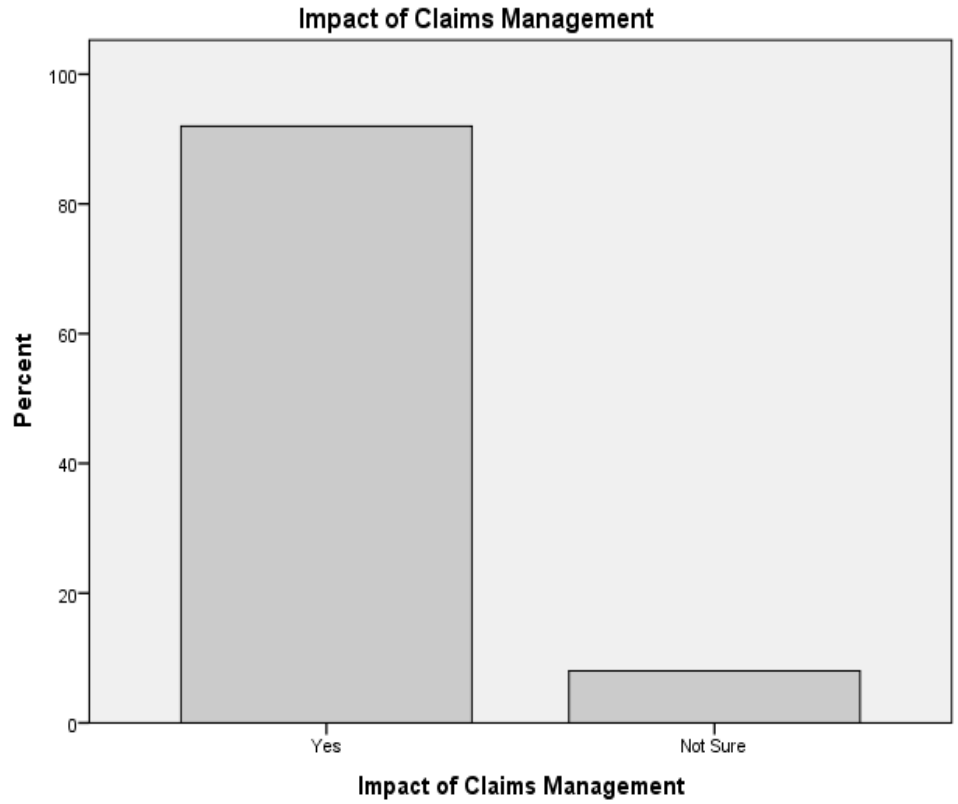
Further analysis using cross-tabulation as shown in the table above suggests quantity surveyors are pre-dominantly responsible for managing contract claims in the Nigerian construction industry because they are taught claims management as a module or course offered while in school.

5.4.4 Impact of Claims Management on Project Delivery

Table 5.16: Impact of Claims Management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	92.0	92.0	92.0
	Not Sure	2	8.0	8.0	100.0
	Total	25	100.0	100.0	

The results gathered shows that 92% of the respondent are of the opinion that the management of contractual claims does have an impact on the delivery of construction projects in Nigeria. 8% of the participants are not sure if claims management has an impact, whilst none of the participants is of the opinion that claims management has no impact at all on the delivery of construction projects in Nigeria.



Cross Tabulation	Do you think the management of contractual claims have an impact on the delivery of construction projects?				
1. Which of the following best your profession?		Yes	No	Not sure	Row Totals
	Architect	6 26.1%	0 0%	0 0%	6 24.0%
	Engineer	5 21.7%	0 0%	2 100%	7 28.0%
	Quantity Surveyor	11 47.8%	0 0%	0 0%	11 44.0%
	Builder	0 0%	0 0%	0 0%	0 0%
	Other (please specify):	1 4.3%	0 0%	0 0%	1 4.0%
	Column Total	23 92.0%	0 0%	2 8.0%	25 100%

The table above shows the different opinions of participants based on their profession. 92% of these participants think that the management of contractual claims does have an impact on the delivery of construction projects; hence there is no significant difference between the opinions of the participants based on their profession.

Cross Tabulation	How would you rate your organisations' Overall claims management process?						
1. Which of the following best describes your profession?		Very Effective	Effective	Not Sure	Ineffective	Very Ineffective	Row Totals
	Architect	0 0%	3 23.1%	1 33.3%	1 25%	0 0%	5 20.8%
	Engineer	1 25%	3 23.1%	2 66.7%	2 50%	0 0%	8 33.3%
	Quantity Surveyor	3 75%	6 46.2%	0 0%	1 25%	0 0%	10 41.7%
	Builder	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
	Other (please specify):	0 0%	1 7.7%	0 0%	0 0%	0 0%	1 4.2%
	Column Total	4 16.7%	13 54.2%	3 12.5%	4 16.7%	0 0%	24 100%

Discounting the quantity surveyors view (in order to eliminate optimism bias) because most of them were taught claims management as a course/module in school and are pre-dominantly responsible for managing claims in the industry, 47% of the other professionals are either not sure of how effective their organisations' claims management process is or rate their organisations' claims management process as being ineffective. On the other hand 53% of the professionals rate their organisations' claims management process as either being very effective or effective.

Justification of Question:

This question sought to know the opinion of practitioners in the industry on whether or not they think there is a relationship between claims management and the delivery of construction projects.

5.4.5 Factors affecting Claims Management in the Nigerian Construction Industry

From your experience, please describe the frequency of occurrence of the following issues on projects you have been involved in?

	Very Often	Often	Sometimes	Not Often	Never	Response Total
Lack of knowledge/expertise in claims management	29.2% (7)	29.2% (7)	33.3% (8)	8.3% (2)	0.0% (0)	24
Very good record keeping and general administration	25.0% (6)	37.5% (9)	29.2% (7)	8.3% (2)	0.0% (0)	24
Inefficient monitoring of progress of work	16.7% (4)	29.2% (7)	16.7% (4)	37.5% (9)	0.0% (0)	24
Unrealistic/Incomplete project plan	16.7% (4)	29.2% (7)	8.3% (2)	45.8% (11)	0.0% (0)	24
Adequate time buffers or contingency allowances	26.1% (6)	34.8% (8)	21.7% (5)	17.4% (4)	0.0% (0)	23
Absence of dedicated claims management expert	39.1% (9)	39.1% (9)	4.3% (1)	17.4% (4)	0.0% (0)	23
Inadequate understanding of contract conditions	21.7% (5)	17.4% (4)	26.1% (6)	30.4% (7)	4.3% (1)	23
Insufficient details contained in project documentation	13.0% (3)	30.4% (7)	30.4% (7)	26.1% (6)	0.0% (0)	23
Indiscriminate use of provisional sums in Bill of Quantities	25.0% (6)	25.0% (6)	29.2% (7)	12.5% (3)	8.3% (2)	24
Incompatible/unfeasible project designs, usually due to non-consideration of environmental issues	20.8% (5)	16.7% (4)	45.8% (11)	16.7% (4)	0.0% (0)	24
Poor communication amongst stake-holders	16.7% (4)	16.7% (4)	45.8% (11)	20.8% (5)	0.0% (0)	24
Contract award syndrome – poor pre-contract documentation resulting from hastiness to award contracts due to political influence	32.0% (8)	28.0% (7)	28.0% (7)	12.0% (3)	0.0% (0)	25

From your experience, please describe the frequency of occurrence of the following issues on projects you have been involved in?

	Very Often	Often	Sometimes	Not Often	Never	Response Total
Economic instability and dwindling inflation rates which lead to fluctuation claims	29.2% (7)	16.7% (4)	33.3% (8)	20.8% (5)	0.0% (0)	24
Conflicting instructions from various client representatives leading to variations.	12.5% (3)	45.8% (11)	37.5% (9)	4.2% (1)	0.0% (0)	24
Use of appropriate type of contract	25.0% (6)	16.7% (4)	41.7% (10)	12.5% (3)	4.2% (1)	24
Non-employment or late employment of relevant project consultants	13.0% (3)	26.1% (6)	34.8% (8)	21.7% (5)	4.3% (1)	23
Corruption within the rank and files of stake-holder organisations, nepotism & tribalism.	45.8% (11)	20.8% (5)	12.5% (3)	20.8% (5)	0.0% (0)	24
					answered	25
					skipped	1

Answers for: Other (please specify): *0 answers*

No answers found.

The foregoing result shows the frequency of occurrence of different factors affecting the effective management of construction contract claims in the Nigerian construction industry. It is a reflection of the participants' experiences and the current state of the industry with regards to managing claims.

Justification of Question:

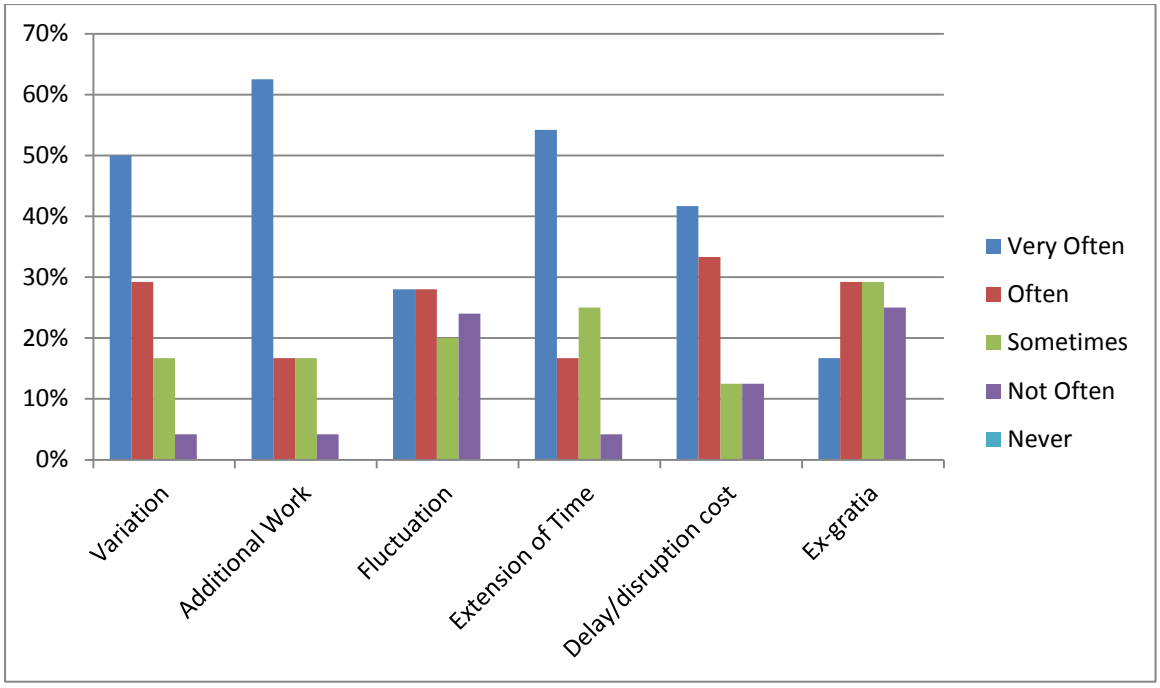
This question was asked in order to unravel the factors militating against effect claims management practice in the industry. This is with a view of fully understanding the problems and knowledge gaps that exist in the research area.

5.4.6 Frequency of Occurrence of different Types of Claims

From your personal project experience in the past five (5) years, how would you describe the frequency of occurrence of the following claims in construction projects in Nigeria?

	Very Often	Often	Sometimes	Not Often	Never	Response Total
Variation	50.0% (12)	29.2% (7)	16.7% (4)	4.2% (1)	0.0% (0)	24
Additional work	62.5% (15)	16.7% (4)	16.7% (4)	4.2% (1)	0.0% (0)	24
Fluctuation	28.0% (7)	28.0% (7)	20.0% (5)	24.0% (6)	0.0% (0)	25
Extension of time	54.2% (13)	16.7% (4)	25.0% (6)	4.2% (1)	0.0% (0)	24
Delay/disruption cost	41.7% (10)	33.3% (8)	12.5% (3)	12.5% (3)	0.0% (0)	24
Ex-gratia	16.7% (4)	29.2% (7)	29.2% (7)	25.0% (6)	0.0% (0)	24
					answered	25
					skipped	1

The table above presents the results of data gathered on the frequency at which different claims occur from the participants' experiences in the Nigerian construction industry.



Justification of Question:

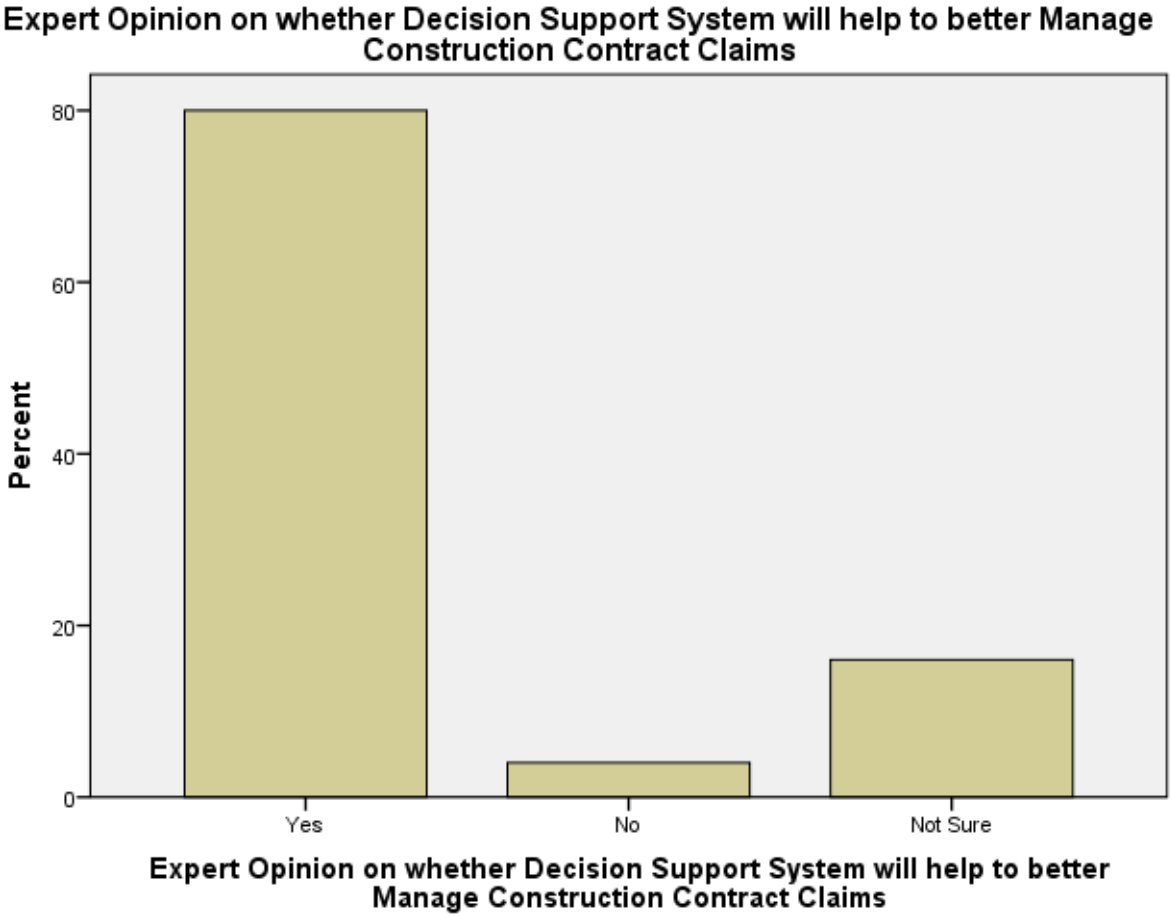
This question seeks to identify the type of claim that occurs most frequently with a view to further research into possible mitigation strategies to reduce the occurrence and potential impact.

5.4.7 Expert opinion on the development of a Decision Support System

Table 5.17: Expert Opinion on whether Decision Support System will help to better Manage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	80.0	80.0	80.0
	No	1	4.0	4.0	84.0
	Not Sure	4	16.0	16.0	100.0
	Total	25	100.0	100.0	

The result show 80% of the participants agree that a development and subsequent implementation of a decision support system will help to better manage construction contract claims in the Nigerian construction industry.



Cross Tabulation	Do you think having a standard decision support system will help better manage contractual claims?				
1. Which of the following best describes your profession?		Yes	No	Not Sure	Row Totals
	Architect	5 25%	0 0%	1 25%	6 24.0%
	Engineer	7 35%	0 0%	0 0%	7 28.0%
	Quantity Surveyor	7 35%	1 100%	3 75%	11 44.0%
	Builder	0 0%	0 0%	0 0%	0 0%
	Other (please specify):	1 5%	0 0%	0 0%	1 4.0%
	Column Total	20 80.0%	1 4.0%	4 16.0%	25 100%

The above cross tabulation shows that there is no significant difference in opinions across different professions as to whether a standard decision support system will help to better manage contractual claims. This is because 80% of the participants are of the opinion that it will help.

Justification of Question:

This question was asked to seek expert advice from participants on whether or not the study will be worthwhile, as the ultimate aim of the study is to bridge the gap between theory and practice. In order words, the research seeks to develop a unique framework (from extensive literature search and interface with experienced industry practitioners) which can be implemented by professionals in the industry in order to improve the quality of service and success of project delivery.

5.4.8 Recommended Improvements to enhance Construction Contract Claims

What improvements would you suggest to enhance the management of construction contract claims in Nigeria?

		Response Percent	Response Total
1	Open-Ended Question	100.00%	18

1	Contractual claims can be enhance through policies in contract aquisition.
2	Government should ensure that monies meant for project is readily available before embarking on the projects.
3	To have a standard procedure or body that will link all claims with a legal framework. Similarly the use of IT would be vital to the improvement of management of CC claims.
4	total overhaul of construction procedure from inception, execution & post completion period...in Nigeria. Making sure that no stage is by passed.
5	war against corruption and indiscipline
6	Consultants should be more educated in claim evaluation and management.
7	Pre-tender activities such as clear conceptualisation of design and construction goals ahead of contracts formation can greatly reduce changes which could result in claims. Also. different procurement strategies have different ability to manage claims and as such a careful selection of the type best suited to the project is crucial.
8	Continous training on modules / courses on or relating to claim management.
9	1. Make available detail drawings 2. the bill of quantities should be detail and comply with by both parties 3. avoid the of provisional sum as much as possible. 4. Client need should fully established and put on drawings and bill format before contract commence.
10	All the consultants should submit detailed specifications on time.
11	Integration and support from professionals and professional bodies in practice.
12	Proper survey
13	effective adherence of the basic rules
14	Proper contractual agreements.
15	The best kind.

What improvements would you suggest to enhance the management of construction contract claims in Nigeria?			
		Response Percent	Response Total
16	PROPER PROJECT PLANNING,PROPER RECORD KEEPING,STANDARD CONTRACT PROCESSES WITH CONTRACTORS.QUICK RESPONSES LITIGATION UNIT IN PLACE TO SETTLE ALL CLAIMS THAT MAY ARISE		
17	There should be proper contract documentation and follow up.		
18	Proper and efficient training on staff		
		answered	18
		skipped	8

Justification of Question:

Taking a lead from the experiences of professionals in the industry, to assess the current state of the industry with regards to the management of contractual claims, and the needs of professionals in the research area will help to provide an indication of the yearnings of practitioners in the industry. These will in-turn help in the development of a framework which is capable of redeeming the dwindling fortune of the Nigerian construction industry.

5.4.9 Qualitative Analysis of Recommendations

A content analysis of recommendations given by industry practitioners on how to improve the management of claims in the industry is carried out below based on the construct of each practitioner's recommendation.

Table 5.18: Analysis of Recommendations

Respondent	Pre-contract administration	Availability of funds	Standard claims procedure	Implementation of legal framework	Claims Management Regulatory Body	Fight against corruption & professional indiscipline	Claims Management Education/ Knowledge	Emphasis
1.	**X**							Policies & Contract Conditions
2.		**X**						Funding
3.			**X**	**X**	**X**			Standard procedure, Legal Framework, Use of Information Technology
4.	**X**							Project Management Stages: Initiative, Planning, Execution, Monitoring & Controlling and Closing
5.						**X**		Fight against corruption & indiscipline
6.							**X**	Consultants' education/knowledge on claims management
7.	**X**							Design conceptualisation, contract formulation and procurement strategy.
8.							**X**	Continuous professional development, modules/courses in claims management
9.	**X**							Availability of detailed drawings and bill of quantities, avoidance of the use of provisional sums
10.	**X**							Timely preparation and submission of detailed contract documentation
11.					**X**			Support from practitioners and professional bodies
12.	**X**							Pre-contract survey
13.			**X**					Adherence to procedures
14.	**X**							
15.								Invalid response
16.	**X**							Proper planning, record keeping, contract administration and defective litigation processes
17.	**X**							Contract documentation
18.							**X**	Staff Training

The table above summarises the recommendations made by the participants when asked what they think could be done to possibly improve the management of construction contract claims in the Nigerian construction industry. Their responses are summarised in the tabular matrix above based on specific emphasis made by each responses.

From the foregoing table, the recommendations show a strong relationship between claims management and pre-contract administration, claims management education and knowledge gap amongst professionals, standard claims management procedure, existence of and support from relevant professional bodies, legal framework and lastly, corruption and professional indiscipline. A majority of about 50% of participants when asked, suggested that an improvement in pre-contract administration will go a long way in improving the management of construction claims.

5.5 CHAPTER SUMMARY

This chapter critically analysed the impact of claims on the delivery of projects and the main factors affecting the management of claims in the Nigerian construction industry. Knowledge elicited from industry practitioners showed that the main factors affecting claims management are; corruption, lack of dedicated claims management experts and poor pre-contract administration. Corruption can be classed as a socio-cultural issue and lack of dedicated claims management experts can be classed as a human resource issue. However, poor pre-contract administration is classed a construction management issue. This research sought to add to the body of knowledge in construction management and therefore, socio-cultural issues and human resource issues are beyond the scope of the study. Procurement strategy constitutes one of the core decisions made at the pre-contract stage which is capable of determining the fate of the project delivery. Finally, 80% of participants asserted that a development and subsequent implementation of a decision support system will help improve the management of construction claims in the industry. Extensive literature was reviewed in Chapter 3 and subsequent survey was carried out and analysed in Chapter 6, in order to further understand how current claims management practice can be improved from pre-construction strategic management stand point.

CHAPTER 6

DATA COLLECTION, PRESENTATION AND ANALYSIS

6.0 SURVEY 2

This survey was carried out using an online based structured questionnaire via smart survey. It sought to research the opinions of various professionals in the Nigerian Construction Industry with regards to evaluating the impact of procurement strategy on project performance in Nigeria, from a claims management perspective.

The survey aimed to assess the procurement strategies used in the Nigerian construction industry; to critically analyse factors that influence the choice of procurement strategy adopted and their prioritization in terms of importance; evaluate the potential sources of construction contract claims from a project life-cycle approach; develop a strategic procurement method decision support model powered by claims management philosophy, to aid the successful delivery of construction projects in Nigeria.

The questionnaire is structured in three sections. The first section contains questions bordering around the participants background – profession, education and experience. The second section contain questions geared at gathering information regarding participants' organisation with respect to different approaches to choosing procurement strategies – type of contract, contractor selection/appointment process, type of tendering/choice of competition adopted and the procurement method used in each project case. Finally, the third section seeks to critically examine the participants' specific project experiences, based on a recently completed project each respondent was involved in, and expert recommendations for reducing the impact of construction claims on construction projects.

6.1 SAMPLE FRAME AND SAMPLING METHOD

Snow-balling sampling technique was used in this research to gather data and elicit knowledge from industry practitioners through several referrals by key contacts in the industry. The participants include; Architects, Engineers, Quantity Surveyors, Builders, Estate Surveyors and

Valuers, amongst others. The participants are from different parts of the country with diverse experiences in the construction industry. The participants also work for organisations of different sizes and types in the private and public sectors.

6.2 DATA COLLECTION

Based on the sampling method described above, the structured questionnaire was sent out online to participants via smart survey. The questionnaire was administered to 59 participants in all, out of which 18 partial responses and 41 complete responses were obtained. For the purpose of this research the partially completed and incomplete responses will be discarded, hence the analysis will be carried out on the 41 completed questionnaire responses.

Questionnaire Response Summary		
Responses	Number	Percentage
No. of Complete Responses	41	69%
No. of Incomplete Responses	18	31%
Total number	59	100%
No. of Valid Responses	41	

6.3 DATA ANALYSIS

The statistical analysis of the data gathered and interpretation was carried out using computer-based statistical software known as Statistical Package for Social Sciences (SPSS) version 20. Excerpts from the results of the data gathered is further presented, interpreted, analysed and discussed in the subsequent chapters. Other software such as Microsoft Word and Excel were also used for word processing as well as graphs and chart development.

Average Index (AI) … LIKERT SCALE

$$\mathbf{AI} = \frac{\sum\{(5X_1) + (4X_2) + (3X_3) + (2X_2) + (1X_1)\}}{\sum(X_1 + X_2 + X_3 + X_4 + X_5)}$$

Where;

X_1 = Number of Participants for Scale 1

X_2 = Number of Participants for Scale 2

X_3 = Number of Participants for Scale 3

X_4 = Number of Participants for Scale 4

X_5 = Number of Participants for Scale 5

6.4 PRESENTATION AND DISCUSSION OF RESULTS

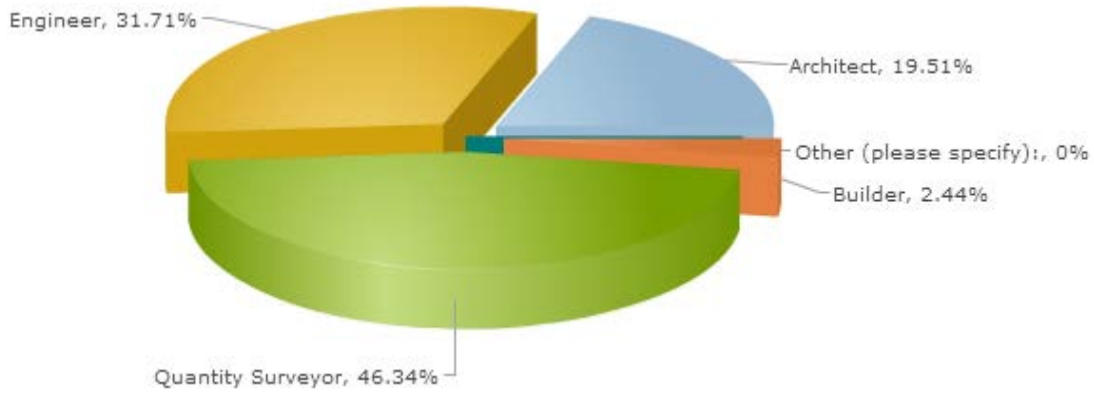
6.4.1 Participants' Background

Profession

Profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Architect	8	19.5	19.5	19.5
	Engineer	13	31.7	31.7	51.2
	Quantity Surveyor	19	46.3	46.3	97.6
	Builder	1	2.4	2.4	100.0
	Total	41	100.0	100.0	

The results obtained from this survey shows that approximately 46% were Quantity Surveyors, 32% were Engineers, 20% of the participants were architects, and 2% were Builders.



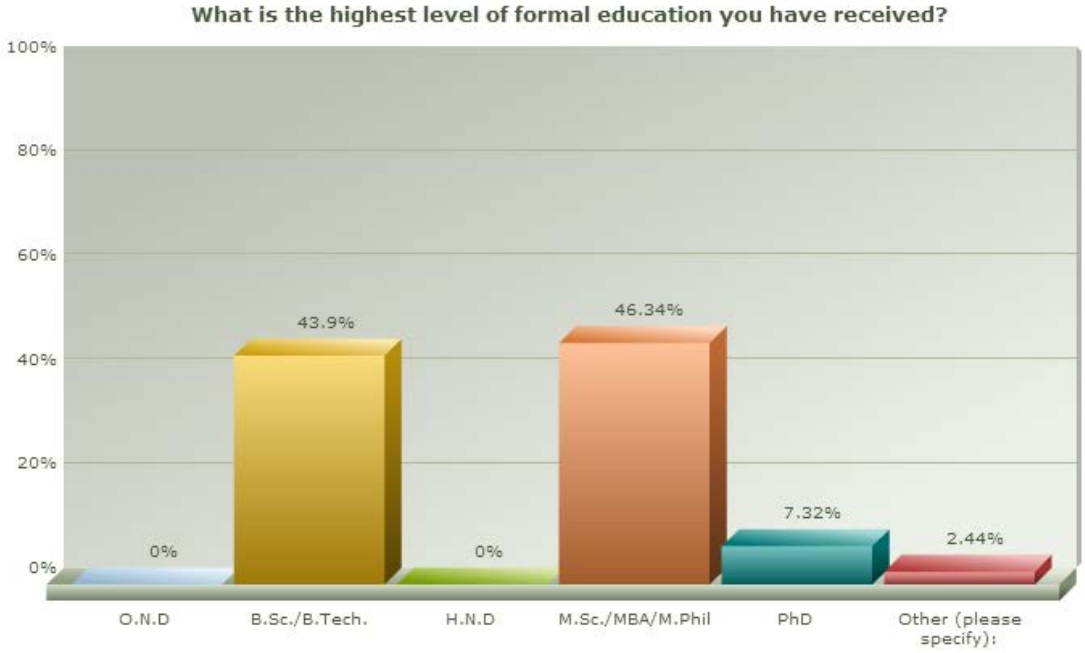
Justification of Question:

This question sought to determine proportional mix of participants based on their professional background and to critically examine subsequently, if there is a significant difference in their opinions on this basis.

Highest Level of Formal Education of Participants

Highest Level of Formal Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	B.Sc./B.Tech.	18	43.9	43.9	43.9
	M.Sc./MBA/M.Phil	19	46.3	46.3	90.2
	PhD	3	7.3	7.3	97.6
	Other	1	2.4	2.4	100.0
	Total	41	100.0	100.0	



The results gathered from the table above shows that approximately 44% of the participants possess bachelors' degree, 46% of the participants have masters' degree and 7% possess a doctorate degree. A further 2% of the respondent specified others – i.e. that they hold a Bachelor's in Engineering (B.Eng) as stated in the questionnaire. However, results gathered shows that no

respondent has a polytechnic or college degree, i.e. Ordinary National Diploma (OND) or Higher National Diploma (HND) as their highest level of educational qualification.

Justification of Question:

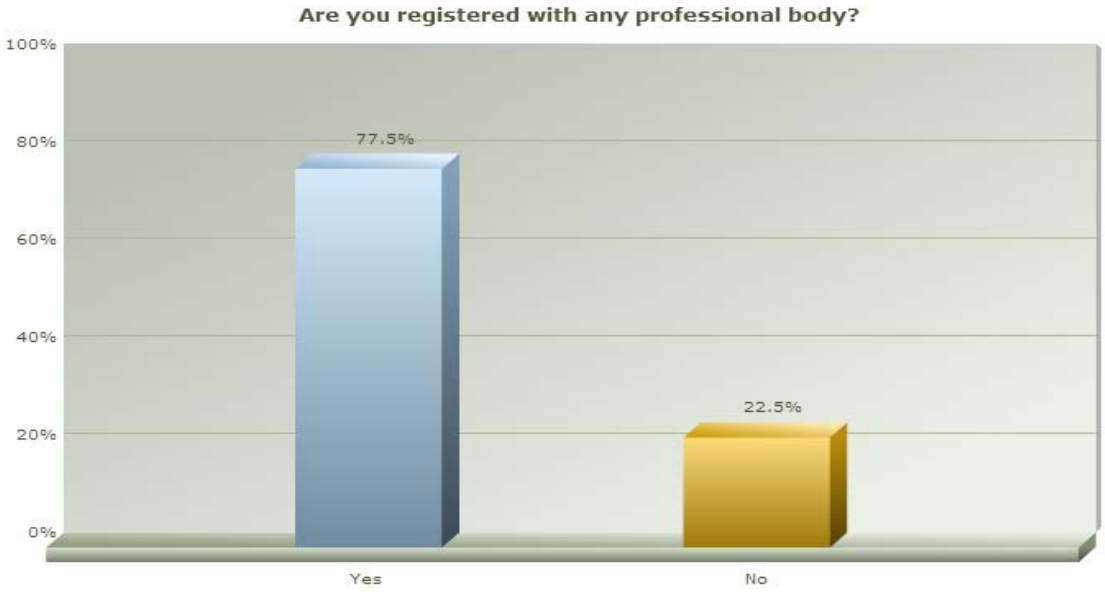
This question was asked in order to know the level of formal education attained by the participants in the survey.

Participants' Registration with Professional Bodies

Registration with Professional Body

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	31	75.6	77.5	77.5
	No	9	22.0	22.5	100.0
	Total	40	97.6	100.0	
Missing	99.00	1	2.4		
Total		41	100.0		

The information gathered from this survey shows that approximately 78% of the participants are registered with relevant professional bodies while 22% are not registered practitioners.



Justification of Question:

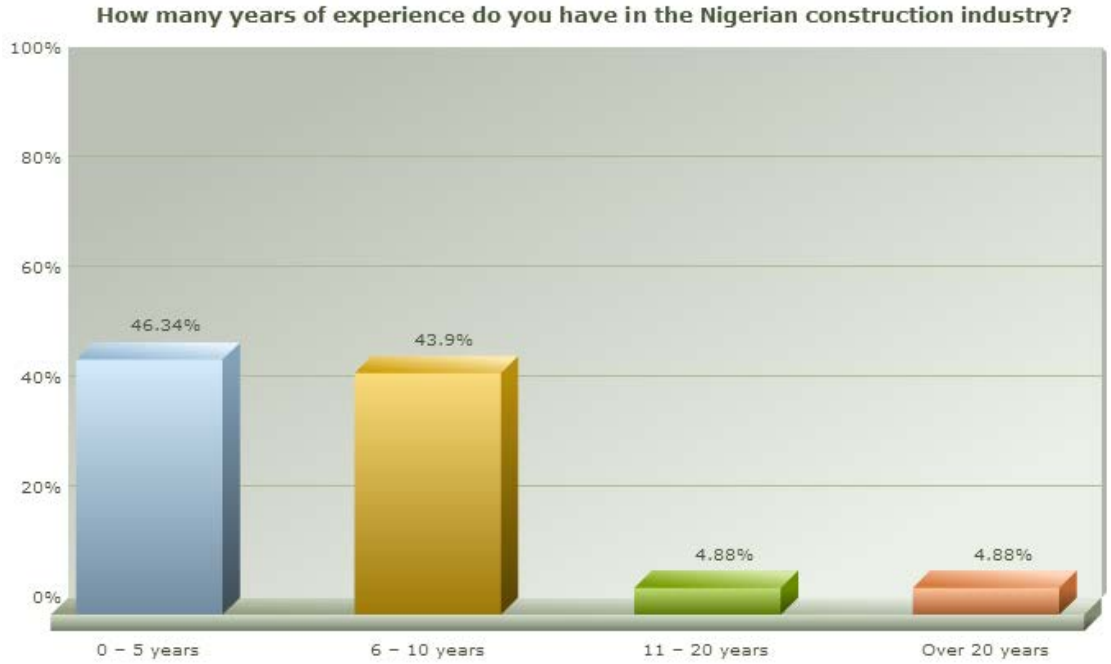
The question was asked in order to know the level of engagement the participants to this survey have with relevant professional regulatory bodies as an indication of their continuous professional development and awareness of the current industry issues.

Participants' Years of Experience

Years of Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5 years	19	46.3	46.3	46.3
	6-10 years	18	43.9	43.9	90.2
	11-20 years	2	4.9	4.9	95.1
	Over 20 years	2	4.9	4.9	100.0
	Total	41	100.0	100.0	

Data gathered shows that 60% of the participants possess 1-5 years' experience, 24% possess 6-10 years' experience, 8% possess 11-20 years' experience and another 8% possess over 20 years' experience in the Nigerian Construction Industry.



Justification of Question:

The above question was asked to acknowledge the experience of the participants and their contribution to the industry.

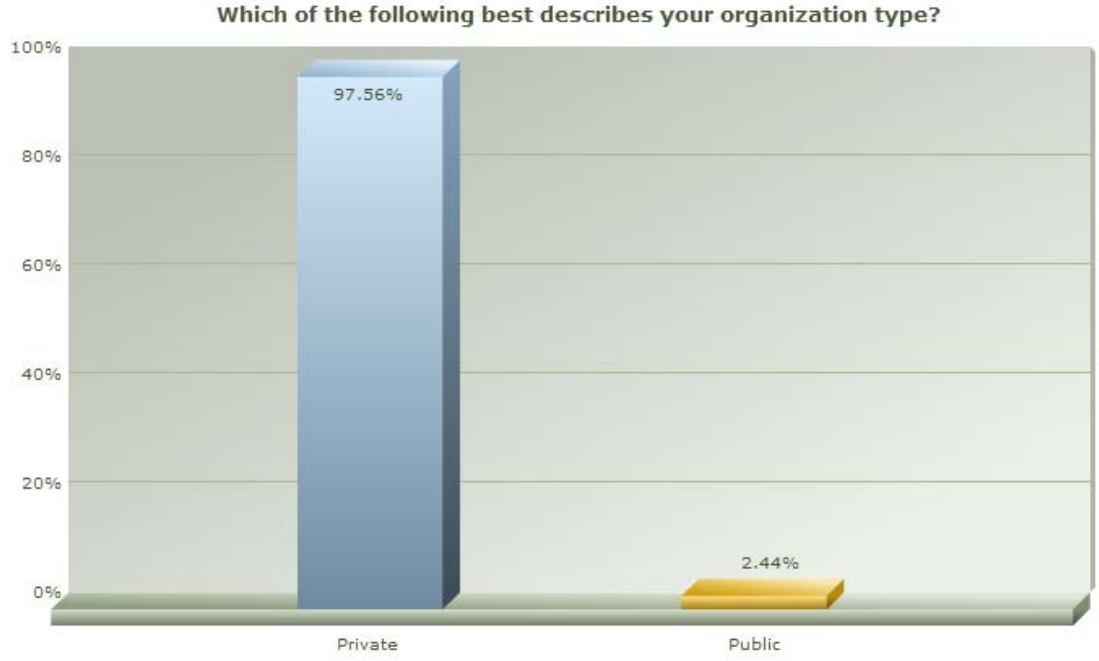
6.4.2 Nature and Type of Participants' Organisations

Organisation Type

Organisation Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private	40	97.6	97.6	97.6
	Public	1	2.4	2.4	100.0
	Total	41	100.0	100.0	

Most participants, representing approximately 98% work in the private sector, whereas very few participants, representing 2% work in the public sector.



Justification of Question:

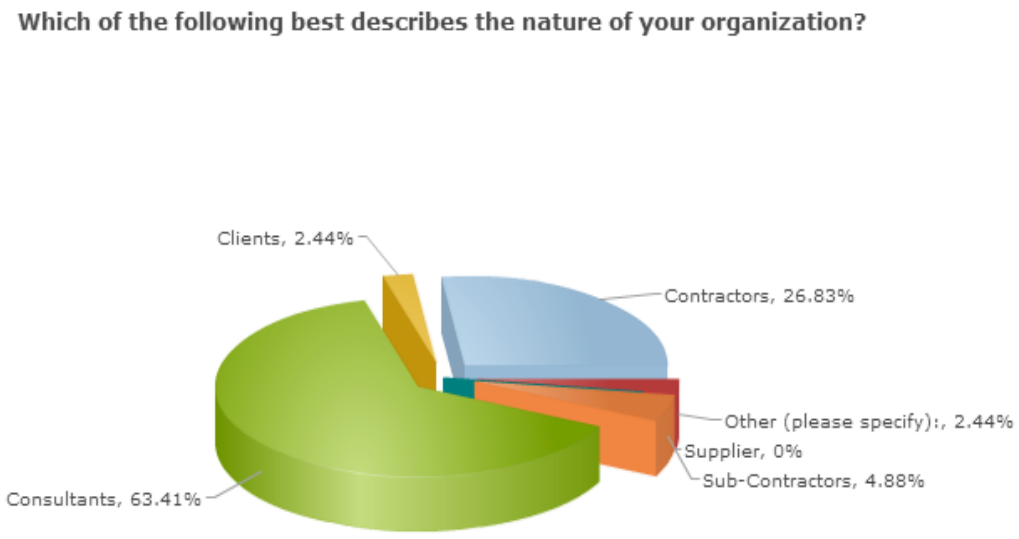
This question was asked to know the distribution of participants in the private and public sectors across the industry.

Nature of Organisation

Nature of Organisation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Contractors	11	26.8	27.5	27.5
	Clients	1	2.4	2.5	30.0
	Consultants	26	63.4	65.0	95.0
	Subcontractors	2	4.9	5.0	100.0
	Total	40	97.6	100.0	
Missing	99.00	1	2.4		
Total		41	100.0		

The results of the survey shows that 63% of the participants are consultants, 27% work are contractors, 5% are sub-contractors and only 2% of the participants work with client organisation. 2% of the participants stated that the work with other unspecified organisation.



Justification of Question:

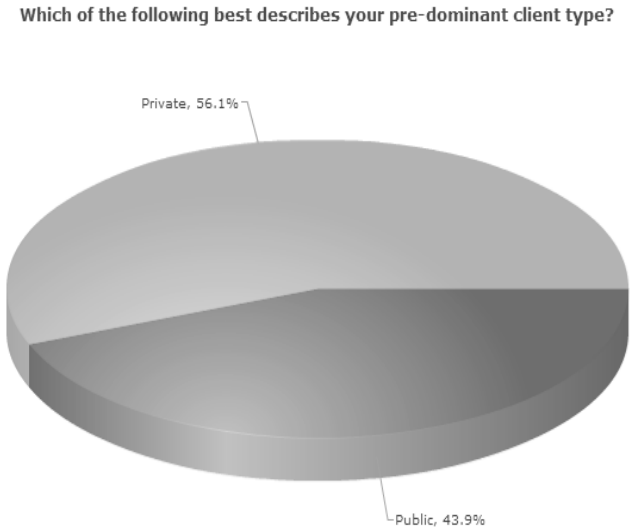
This question is geared towards categorising the participants according to the nature of their organisation and critically examining if this has a bearing on their views and approaches towards claims management.

Predominant Client Type

Pre-dominant client type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private	23	56.1	56.1	56.1
	Public	18	43.9	43.9	100.0
	Total	41	100.0	100.0	

The results of the survey shows that 56% of the participants pre-dominantly work on private projects whereas 44% of the participants assert that majority of their work are on public projects.



Justification of Question:

This question is geared towards categorising the participants according to the nature of the sector in which they predominantly work for.

6.4.3 Participants' Organisations' Procurement Approach

Predominant Procurement Method Used

PREDOMINANT PROCUREMENT METHOD USED								
	Very Often	**Often**	**Sometimes**	**Rarely**	**Never**	**TOTAL**	**Average Index (AI)**	**RANK**
Traditional	17	9	11	2	2	41	3.90	1
Design and Build	9	6	17	6	1	39	3.41	2
Partnering	6	8	11	9	5	39	3.03	4
Construction Management	8	14	6	10	2	40	3.40	3
Framework Agreement	2	8	10	12	8	40	2.60	6
Management Contracting	9	5	7	7	9	37	2.95	5
Public Private Partnership (PPP) / Public Finance Initiative (PFI)	4	5	8	14	9	40	2.53	7

$$\mathbf{AI} = \frac{\sum\{(5X_1) + (4X_2) + (3X_3) + (2X_2) + (1X_1)\}}{\sum(X_1 + X_2 + X_3 + X_4 + X_5)}$$

Where;

X_1 = Number of Participants for Scale 1

X_2 = Number of Participants for Scale 2

X_3 = Number of Participants for Scale 3

X_4 = Number of Participants for Scale 4

X_5 = Number of Participants for Scale 5

From the table above reveals that the most predominantly used procurement method is the Traditional Method with an Average Index (AI) value of 3.90 followed by Design and Build Method with an AI value of 3.41 and the least used procurement method is PPP/PFI and

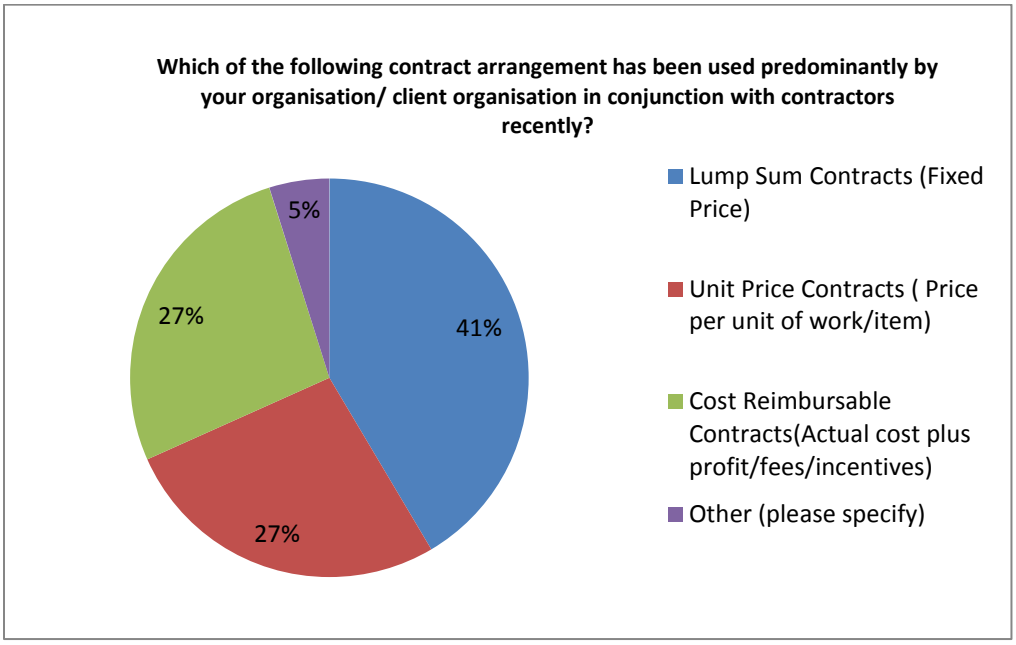
Framework Agreement ranking 7th and 6th respectively. Others include Construction Management, Partnering, and Management Contracting, ranking 3rd, 4th and 5th respectively.

6.4.4 Predominant Type of Contract Used

Pre-dominant Contract Type in Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lump Sum Contracts (Fixed Price)	17	41.5	41.5	41.5
	Unit Price Contracts (Price per unit of work/item)	11	26.8	26.8	68.3
	Cost Reimbursable Contracts(Actual cost plus profit/fees/incentives)	11	26.8	26.8	95.1
	Other (please specify)	2	4.9	4.9	100.0
	Total	41	100.0	100.0	

The survey shows that the most predominantly used type of contract in the Nigerian construction industry is Lump Sum Contracts. It also reveals that about 5% of the participants asserted that their organisations use direct labour as their predominant type of contract.

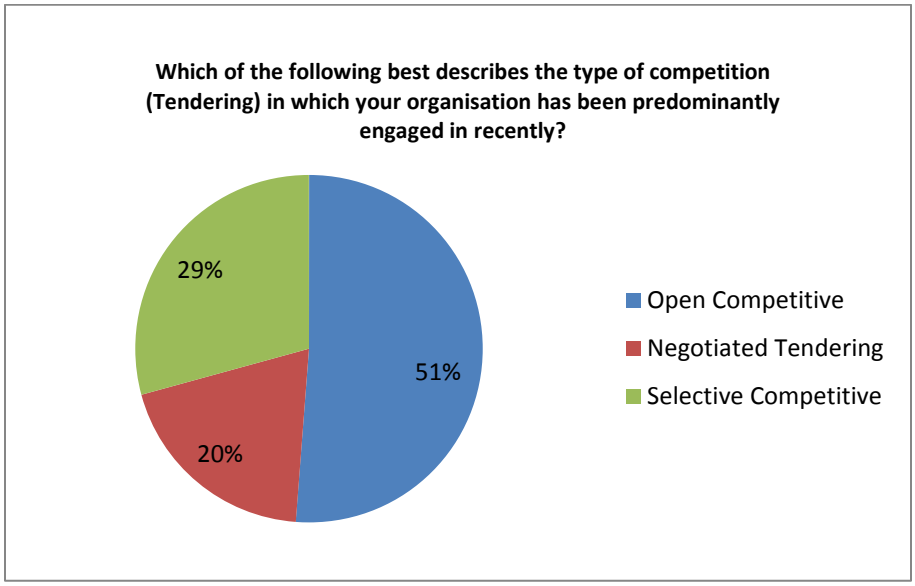


6.4.5 Predominant Type of Tendering Used

Pre-dominant Type of Tendering

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Open Competitive	21	51.2	51.2	51.2
	Negotiated Tendering	8	19.5	19.5	70.7
	Selective Competitive	12	29.3	29.3	100.0
	Total	41	100.0	100.0	

The result gathered by the table above shows that the most predominantly used type of tendering in the industry is Open Competitive Tendering, followed by Selective and Negotiated Tendering, respectively.



6.4.6 Procurement Functions

Pre-dominant Procurement Functions of Client Organisations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	In-house (Procurement Department)	26	63.4	63.4	63.4
	Outsource (Consultancy Firm)	14	34.1	34.1	97.6
	Missing	1	2.4	2.4	100.0
	Total	41	100.0	100.0	

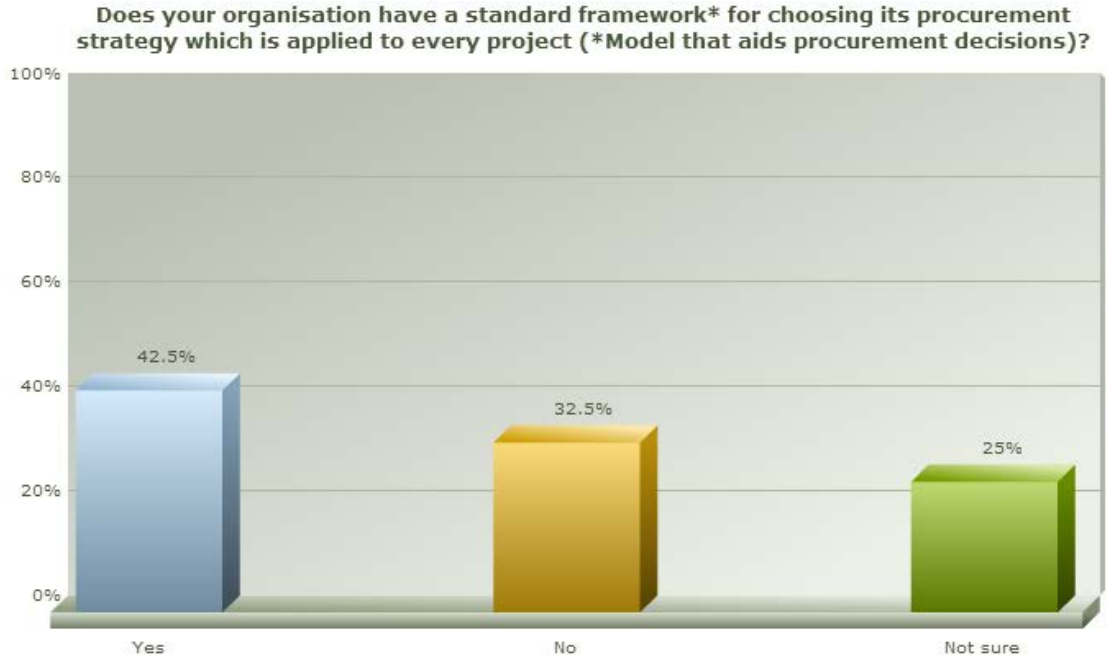
Data collected from this survey shows that about 63% of the participants' client organisations carry out their procurement functions in-house whereas about 34% of them outsource these functions to other external consultancy firms.

6.4.7 Standard Framework for Choosing Procurement Strategy

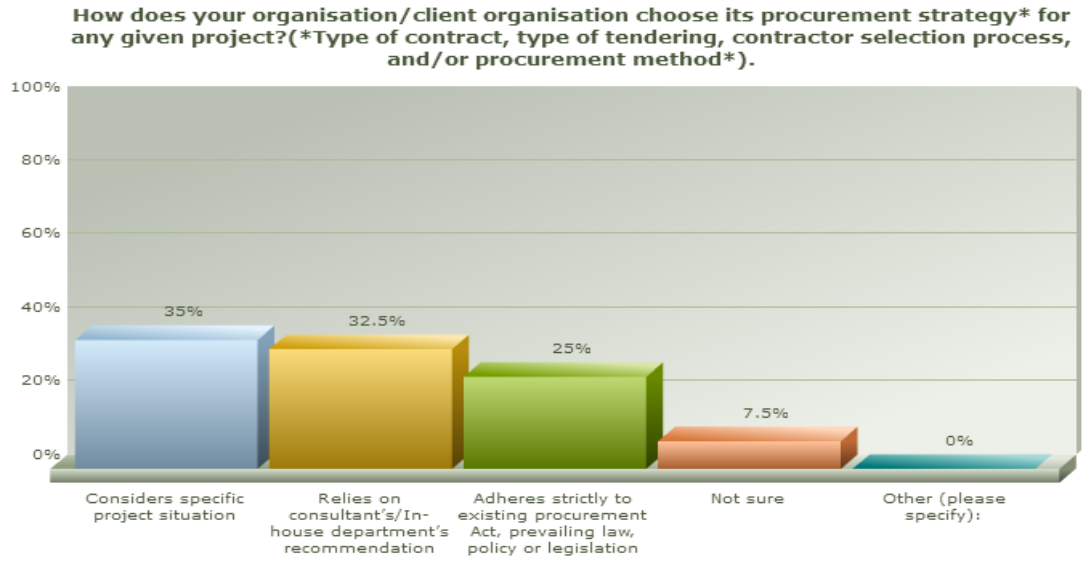
Use of Standard procurement framework in choosing procurement strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	41.5	42.5	42.5
	No	13	31.7	32.5	75.0
	Not Sure	10	24.4	25.0	100.0
	Total	40	97.6	100.0	
Missing	99.00	1	2.4		
Total		41	100.0		

In response to the above question, about 43% of the participants assert that their organisation does have a standard framework for choosing the procurement strategy to be adopted for every project, 33% states that there is no standardization in their organisations' approach to choosing the procurement strategy to be adopted for their projects, whereas 25% are unsure as to whether or not their organisations have a standard approach.

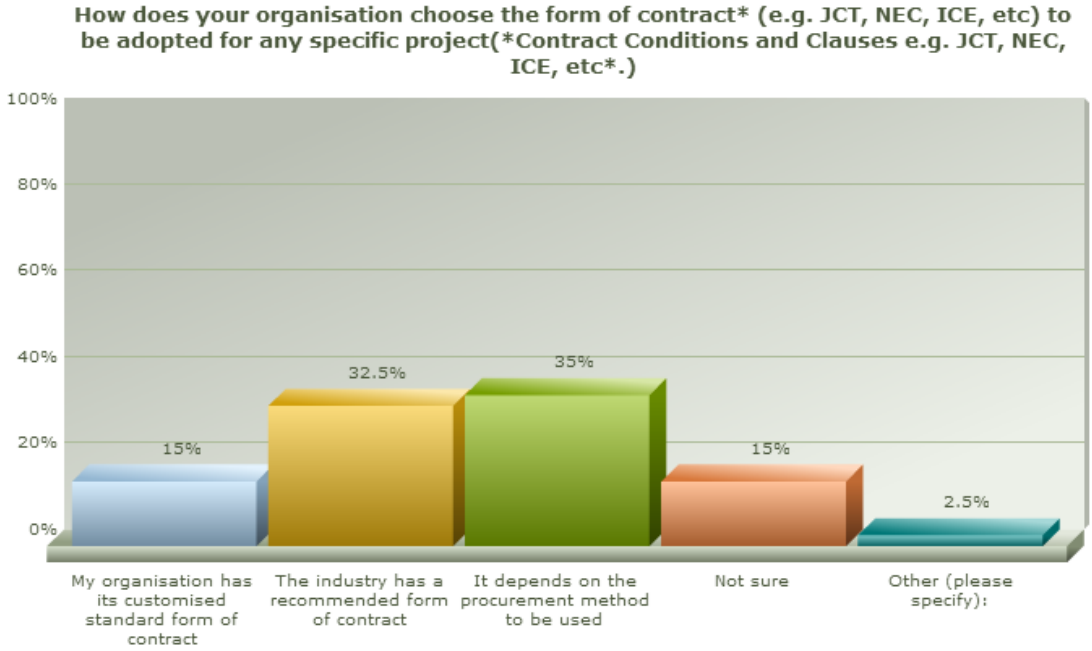


6.4.8 Choice of Procurement Strategy to be adopted



The results show that majority (35%) of the participants considers the uniqueness of the project before choosing the procurement strategy to be adopted in each project case, 32.5% of the participants rely on their consultants'/dedicated in-house team's recommendation, 25% strictly adopt procurement strategy stipulated by the prevailing act, law and/or legislation and 7.5% of the participants are not sure as to how their organisations make strategic procurement decisions.

6.4.9 Choice of Form of Contract to be adopted



Information gathered from the participants show that 15% of the participants' organisations have a customised form of contract which they use in administering their projects, 32.5% assert that the simply follow the industry's recommended form of contract, 35% majority of the participants stated that the form of contract to be used by their organisations depends on the chosen procurement method, whilst 15% of the participants are not sure as to how their organisations choose the appropriate form of contract to be adopted in each project case. A further 2.5% of the participants clearly stated that their organisations do not adopt any specific form of contract in administering its projects.

6.5 CHAPTER SUMMARY

This chapter collected and analysed data on construction procurement practices in the industry. It revealed that the most pre-dominantly used procurement methods are: Traditional; Design and Build; and Construction Management. The predominant contract type (42%) in use is Lump Sum Contracts. The predominant type (51%) of tendering in use is Open Competitive Tendering. The survey revealed majority (63%) of client organisations carries out their procurement functions in-house rather than outsource it to consultancy firms. Only 43% of organisations agree that they have a standard approach to choosing the procurement strategy to be adopted in executing their projects, the remaining total of 57% either do not have a standard approach or are unsure as to whether they have one or not. The Nigerian construction industry thrives in a developing economy and the prevailing socio-cultural realities should be critically considered alongside the project situations in adopting an appropriate choice of competition in its procurement system. The careful selection of the most suitable type of competition can help mitigate the possibility of the occurrence of claims. Based on the analysis in Chapter 5 (See Section 6.5) and the survey carried out in this chapter, a procurement decision support system is further developed by the research in other to improve the management of claims.

CHAPTER 7

PROPOSED PROCUREMENT DECISION SUPPORT SYSTEM

DECISION SUPPORT SYSTEM FOR CHOOSING CONSTRUCTION PROJECT PROCUREMENT STRATEGY

7.0 Introduction

According to Kumaraswamy and Dissanayaka (2001), decisions on the adoption of any procurement strategy, amongst the alternatives available, are often subjective. Luu et.al. (2005) confirmed that decisions made in procurement selection are usually derived from intuition and past experiences of industry practitioners.

Analysis of data gathered for the purpose of this research revealed that asides, corruption and lack of claims management expertise, poor pre-contract administration is mainly responsible for cost over-run and time over-run in the Nigerian construction industry. One of the key decisions taken at the project planning (pre-contract stage) is the choice of procurement strategy to be adopted in each project case. The decision on the choice of procurement strategy to be adopted goes a long way in determining the fate of the construction project and its successful delivery.

Despite the importance of choosing the most appropriate procurement strategy for construction projects, there is no decision support system/advisory system to aid practitioners in making more informed procurement decisions in the Nigerian construction industry. Hence the need to develop an advisory system to aid practitioners in their procurement decision making process.

7.1 Outline of System Development Methodology

Merits and demerits of various procurement strategies were closely studied as well as knowledge elicited from industry practitioners based on their procurement experiences. Extensive literature was searched, results of which were subsequently collated and categorised. Expert assertions and perceptions were also analysed as being the bedrock for best procurement practice in the industry. Different procurement strategies were compared and contrasted based on eight (8) specific variables which helped to identify and justify the unique selling point of each potential procurement strategy distinct from another, given any project circumstance.

The potential value, viability and validity of the proposed decision and model was further tested, using case-study of recently completed construction projects that industry practitioners were involved in.

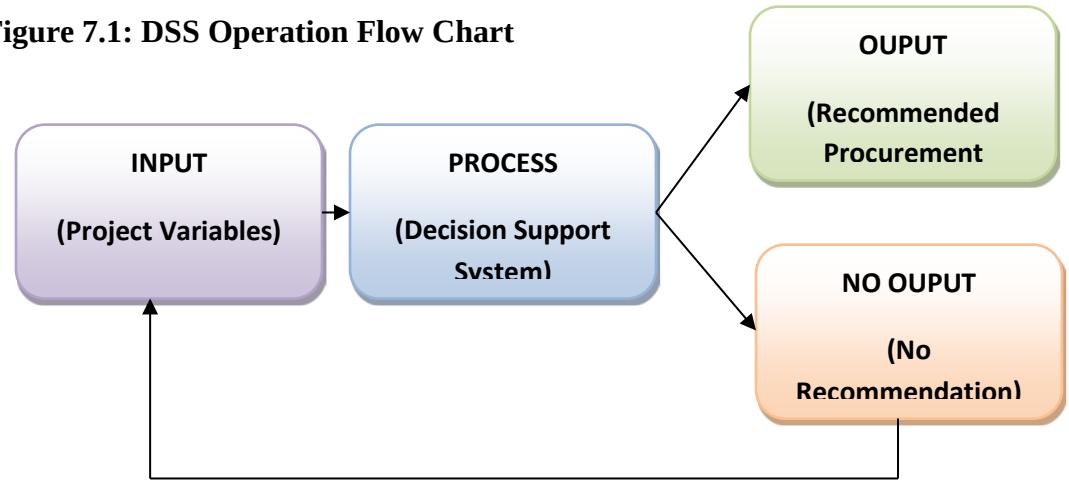
7.2 Development Process

This decision advisory system is designed to help practitioners make more informed decision in choosing the most appropriate procurement strategy to be adopted given the prevailing circumstances in each project case.

Project variables were elicited from experienced industry experts and extensive literature search. The variables cut across pre-requisite for adopting various procurement strategies taking into consideration the uniqueness of each strategy.

The system is designed to aid procurement managers to make more informed procurement decisions based on project specific parameters at the project planning stage.

Figure 7.1: DSS Operation Flow Chart



The input being the practitioner's expert assessment of the project at hand based on certain modelled parameters (e.g. cost certainty, project complexity and level of specialist work required). The response set in each project case is then collected and processed using a similarity retrieval approach that compares the response collected in each case to the pre-modelled expert system in order to recommend the most suitable procurement strategy to be adopted. The recommended procurement strategy then becomes the output. In cases where there are no recommendations, the input variables will need to be re-defined, as this shows that the information provided are inadequate to make a suitable decision. This is illustrated in the flow chart in Figure 7.1 above. Table 7.1 presents an example of the decision support system architecture of how the data inputs

(variables) presented in Section 7.5.4 translate to outputs (recommended procurement strategy) through the weighting regimes.

7.3 Application Scope and Delimitation

This decision support system is designed to be used by procurement officers and its recommendation is not a substitute for legal and professional advice. The use of this advisory system must be within the bounds of organisational procedures and prevailing government policies. Whenever necessary due consultation should be made with relevant legal and professional consultants.

It is based on the synchronisation of extensive literature search and knowledge elicited from industry experts. Its scope of application is delimited to the operational aspect of strategic decision making process involved in procuring building and civil engineering projects in the Nigerian construction industry.

It is imperative to note that the output of this advisory system being a recommended procurement strategy is based on the response provided to each project variable hence a guide to practitioners to enable them make a more informed procurement decision.

7.4 Decision Support System Modelling

The procedure to be followed in developing the decision support system follows the work of Ng (2008) and Yu and Skibniewski (1999). This combines the neuro-fuzzy knowledge-based system and a multi-criteria decision method. As stated in Yu and Skibniewski (1999), the Fussy Logic Decision System (FLDS) presents its knowledge in IF-THEN fuzzy rules. The Fuzzy IF-THEN rules are 'IF x is A, THEN y is B'. The construction of the weights w_{ij} follow the methods in Ng (2008) who proposed a weighted linear model for a selection problem in the presence of multiple criteria. Following this, we consider a set of I decisions which are based on J criteria. Decision i (i = 1,2,3, . . . , I) is made by converting multiple measures under all criteria into a single 'score' S_i. The decision i under criteria j is denoted as x_{ij} (i = 1,2,3,…,I, j = 1,2,3,…,J).

A critical assumption has to be made here as the decision development does not indicate any negative relation that has to hold for any decision; hence we assume all measures (criteria) are positively related to decision. However, for simplicity, if there is a negative criterion, the reciprocal (transformation of negativity) can be applied. If this process is applied without normalising the measures, the tendency for a singular measure to dominate the score will be high, hence we follow Ng (2008) and propose normalising all measures x_{ij} into a 0-1 scale. y_{it} denotes the transformed measure. Commonly used linear transformation can be adopted; such as $y_{it} = \frac{x_{ij} - min_{i=1,2,..,I}\{x_{ij}\}}{max_{i=1,2,..,I}\{x_{ij}\} - min_{i=1,2,..,I}\{x_{ij}\}}$

A decision score is expressed as the weighted sum of transformed measures, $s_i = \sum_{j-1}^{J} w_{ij} y_{ij}$, where w_{ij} (j = 1,2,3,…,J) is the weight of criteria j for decision i. The practitioner will be allowed to incorporate the ranking of different criteria depending on their importance for the decision making process. Unlike the analytical hierarchical process (AHP) (See Bhutta and Huq (2002) and Lee, Ha and Kin (2001)), this is a far simpler requirement, although somewhat subjective. The user is thus, required to rank the importance of each criteria in a sequence instead of attaching specific weights or exact degree of relative preference. Following this we assume a descending order of importance for the criteria (i.e. $w_{i1} \geq w_{i2} \geq w_{i3} \geq \cdots \geq w_{iJ}$). As stated earlier, the weights are assumed to be non-negative and are normalized such that the sum of all the weights equals one, ($\sum_{j=1}^{J} w_{ij}$ = 1). Hence the proportion of contribution of a criterion becomes its weight relative to the total contribution of all criteria.

The mathematical models that underpin the multi-criteria decision support system are,

$$\text{Max } S_i = \sum_{j=1}^{J} w_{ij} y_{ij} \quad (1)$$

$$w_{ij} - w_{i(j+1)} \geq 0 \quad j = 1,2,3,\ldots,(J-1), \quad (2)$$

$$\sum_{j=1}^{J} w_{ij} = 1, \quad (3)$$

$$w_{i(j)} \geq 0 \quad j = 1,2,3,\ldots,J. \quad (4)$$

Following these constraints each decision will be modelled, however the ‘decision’ outcomes within this support system will be identified, along with the criteria.

The procurement methods which will form the decisions are: Traditional (Trad), Design and build (D&B), Management Constructing (MC), Construction Management (CM), Partnering and Framework arrangements (P&F) and Public Private Partnership (PPP).

The criteria (measures) are:

Cost certainty, denoted as cc_h when the practitioner identifies it as high, cc_m when medium, cc_l when low, $cc_{l\to m}$ when low-medium, $cc_{m\to h}$ when medium-to-high.

Project design complexity is denoted as dc_h, dc_m, dc_l and $dc_{m\to h}$ when high, medium, low and medium-to-high respectively.

Level of specialist work required is denoted as sw_h, sw_m, sw_l and $sw_{m\to h}$when high, medium, low and medium-to-high respectively.

Need for external funding is denoted as ef_h, ef_m and ef_l when high, medium and low respectively.

Flexibility for innovation and change is denoted as ic_h, ic_m, ic_l, $ic_{l\to m}$, and $ic_{m\to h}$ when high, medium, low, low-to-medium and medium-to-high respectively.

Construction duration is denoted as cd_s, cd_m, cd_l and $cd_{m\to l}$ when the duration is short, medium, long and medium-to-long.

Completeness of project documentation at tender stage is denoted as pd_h, pd_m, pd_l and $pd_{m\to h}$ when high, medium, low and medium-to-high respectively.

Client control and input is denoted as ci_h, ci_m, ci_l and $ci_{m\to h}$ when high, medium, low and medium-to-high respectively.

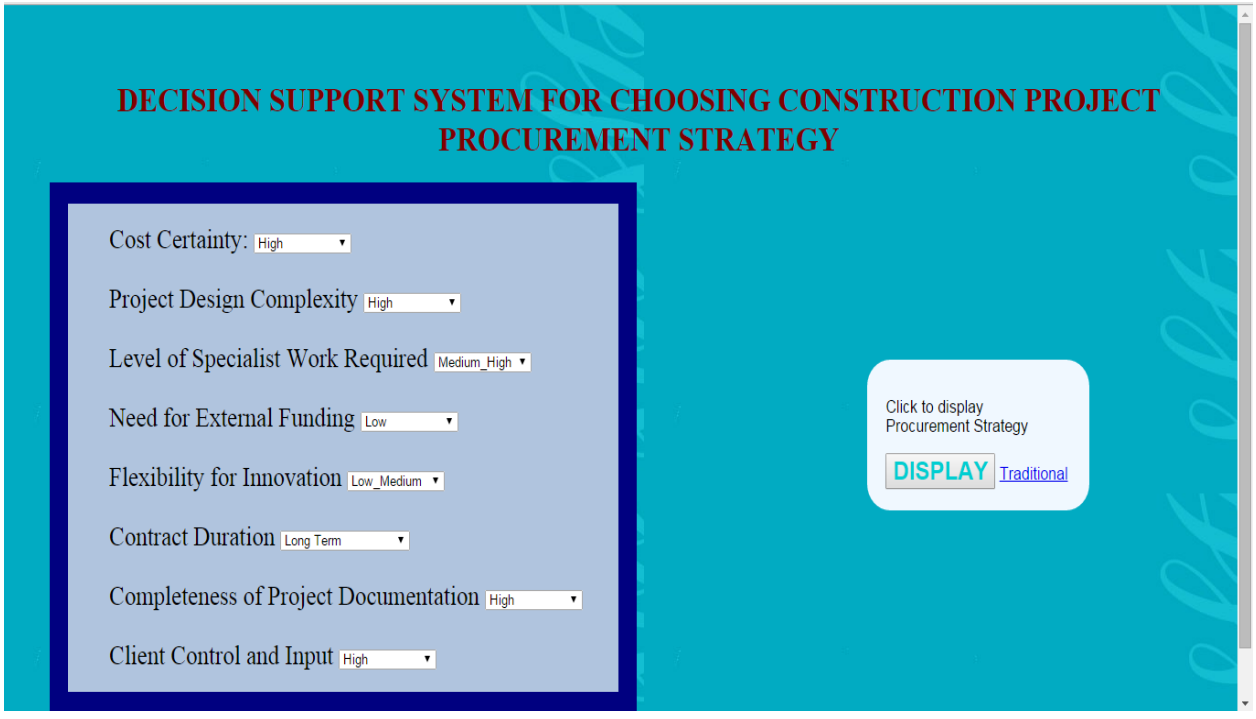
Notes: The procurement method to be recommended will follow two Rules.

Rule 1: The selection of a procurement strategy will be based on a pre-requisite (where the pre-requisite consists of at least two essential pre-defined variables). Hence w_{ij} for these criteria will be $\frac{1}{n}$, where n is the number of essential pre-defined variables.

Rule 2: When Rule 1 does not hold, the DSS recommends an alternative procurement strategy based on a single dominant pre-defined variable.

Models for procurement methods

7.4.1 Traditional Method – ($Trad$)



Rule 1

$Trad$ IF, Max $S_i = \sum_{j=1}^{J} w_{ij} y_{ij}$

$w_{ij} = \frac{1}{n}$

n = 2, hence w_{ij} = 0.5

The criterion (measure), y_{ij} will have a value of 1 if the criterion is a pre-requisite and 0 if it is not.

The pre-requisite for $Trad$ is any combination of cc_h, cd_l and pd_h

Hence; $Trad$ IF,

MAX S_i = 0.5(cc_h) + 0.5(cd_l) (5)

Or

MAX S_i = 0.5(cc_h) + 0.5(pd_h) (6)

Or

MAX S_i = 0.5(cd_l) + 0.5(pd_h) (7)

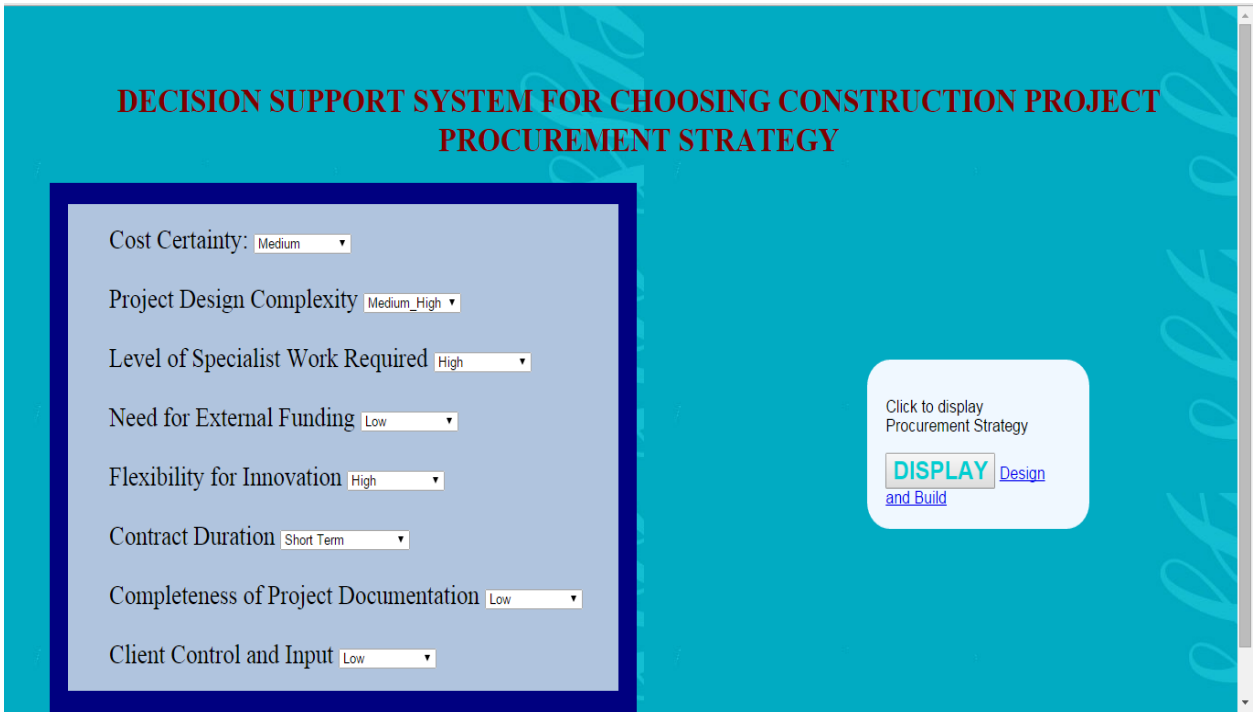
Rule 2

Alternatively, recommend $Trad$ as an option IF

MAX S_i = 0.5(cc_h) (8)

Given that CC_h is a dominant pre-defined variable for *Trad*.

7.4.2 Design and Build – ($D\&B$)



Rule 1

$D\&B$ IF Max $S_i = \sum_{j=1}^{J} w_{ij} y_{ij}$

$w_{ij} = \frac{1}{n}$

n = 2, hence w_{ij} = 0.5

The criterion (measure), y_{ij} will have a value of 1 if the criterion is a pre-requisite and 0 if it is not.

The pre-requisite for $D\&B$ is any combination of sw_h, ic_h and ci_l

Hence; $D\&B$ IF,

MAX S_i = 0.5(sw_h) + 0.5(ic_h) (9)

Or

MAX S_i = 0.5(sw_h) + 0.5(ci_l) (10)

Or

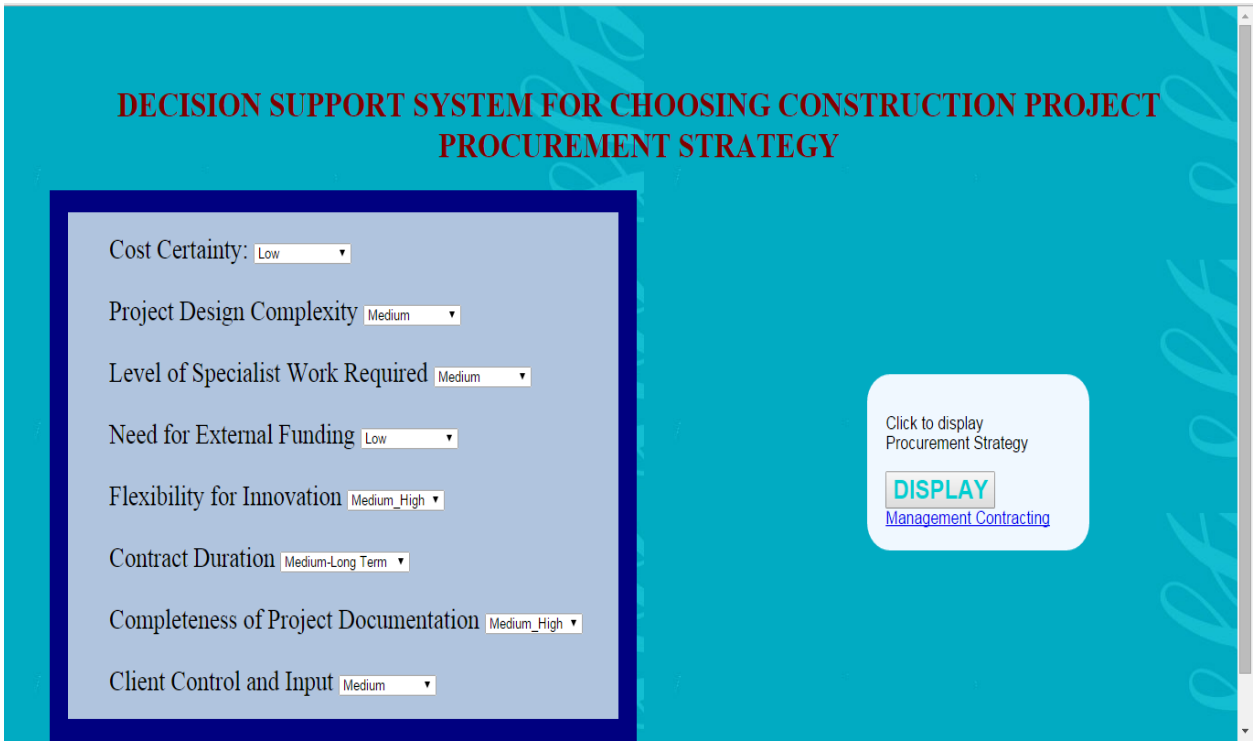
MAX S_i = 0.5(ic_h) + 0.5(ci_l) (11)

Rule 2

Alternatively, recommend $D\&B$ as an option IF

MAX S_i = 0.5(ci_l) (12)

7.4.3 Management Contracting – (MC)



Rule 1

MC IF Max $S_i = \sum_{j=1}^{J} w_{ij} y_{ij}$

$w_{ij} = \frac{1}{n}$

n = 2, hence w_{ij} = 0.5

The criterion (measure), y_{ij} will have a value of 1 if the criterion is a pre-requisite and 0 if it is not.

The pre-requisite for MC is any combination of cc_l, dc_m and ci_m

Hence; MC IF,

MAX S_i = 0.5(cc_l) + 0.5(dc_m) (13)

Or

MAX S_i = 0.5(cc_l) + 0.5(ci_m) (14)

Or

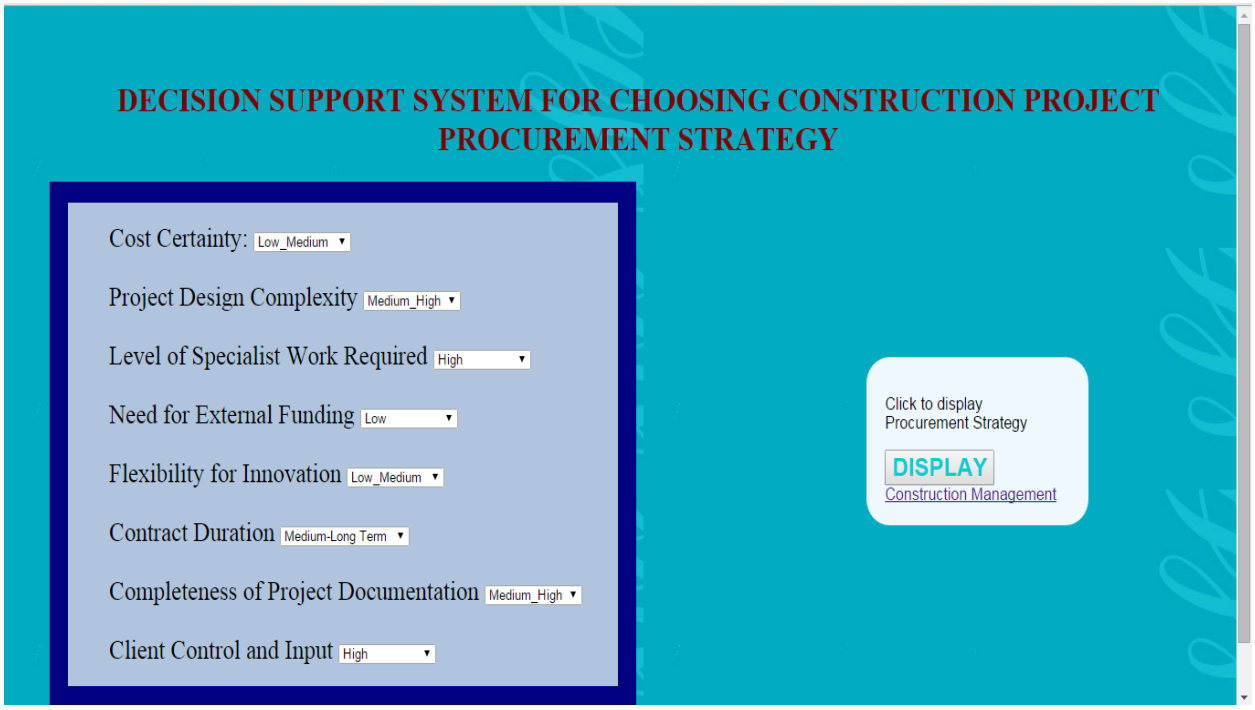
MAX S_i = 0.5(dc_m) + 0.5(ci_m) (15)

Rule 2

Alternatively, recommend MC as an option IF

MAX S_i = 0.5(ci_m) (16)

7.4.4 Construction Management – (CM)



Rule 1

MC IF Max $S_i = \sum_{j=1}^{J} w_{ij} y_{ij}$

$w_{ij} = \frac{1}{n}$

n = 2, hence w_{ij} = 0.5

The criterion (measure), y_{ij} will have a value of 1 if the criterion is a pre-requisite and 0 if it is not.

The pre-requisite for CM is any combination of $cc_{l\rightarrow m}$, $dc_{m\rightarrow h}$ and ci_h

Hence; CM IF,

MAX S_i = 0.5($cc_{l\rightarrow m}$) + 0.5($dc_{m\rightarrow h}$) (17)

Or

MAX S_i = 0.5($cc_{l\rightarrow m}$) + 0.5(ci_h) (18)

Or

MAX S_i = 0.5($dc_{m\rightarrow h}$) + 0.5(ci_h) (19)

Rule 2

Alternatively, recommend MC as an option IF

MAX S_i = 0.5(ci_h) (20)

7.4.5 Partnering and Framework Arrangements – (P&F)

Rule 1

P&F IF Max $S_i = \sum_{j=1}^{J} w_{ij} y_{ij}$

$w_{ij} = \frac{1}{n}$

n = 2, hence w_{ij} = 0.5

The criterion (measure), y_{ij} will have a value of 1 if the criterion is a pre-requisite and 0 if it is not.

The pre-requisite for P&F is a combination of sw_m and cd_l

Hence; P&F IF,

MAX S_i = 0.5(sw_m) + 0.5(cd_l) (21)

Rule 2

Alternatively, recommend $P\&F$ as an option IF

MAX S_i = 0.5(cd_l) (22)

7.4.6 Public Private Partnership (PPP)

PPP IF Max $S_i = \sum_{j=1}^{J} w_{ij} y_{ij}$

$w_{ij} = \frac{1}{n}$

n = 2, hence w_{ij} = 0.5

The criterion (measure), y_{ij} will have a value of 1 if the criterion is a pre-requisite and 0 if it is not.

The pre-requisite for PPP is a combination of ef_h and cd_l

Hence; PPP IF,

MAX S_i = 0.5(ef_h) + 0.5(cd_l) (23)

Rule 2

Alternatively, recommend PPP as a second option IF

MAX S_i = 0.5(cd_l) (24)

7.5 Decision Support System Evaluation and Validation

7.5.1 Evaluation Survey

An evaluation survey was carried out in order to assess the procurement decisions taken by industry practitioners without the use of any form of decision aid. Subsequently, a comparative analysis was carried out to compare alternative decisions that would have been made, if the developed decision support system was adopted. Each participant's response was viewed as a separate project case study because the information was elicited from each participant based on a recently completed project in their organisation. Further validation of the Decision Support System was carried out through statistical analysis using mean value and standard deviation.

7.5.2 Justification for Questions Asked

The following three (3) questions were asked:

Question 1:

Based on a recently completed project in your organisation, how would you rate the following project variables in your organisation: Cost Certainty; Project Design Complexity; Level of Specialist Work Required; Need for External Funding; Flexibility for Innovation; Contract Duration; Completeness of Project Documentation at Tender Stage; and Client Control and Input?

Justification

This question was asked based on the project variables discussed in Section 3.6.8 , which forms the basis for the development of the DSS in Section 7.4. It was asked in order to enable a subsequent comparative analysis between decisions taken without a form of decision aid (See Question 2) and the decisions taken with the proposed decision support system developed by this research.

Question 2:

What procurement Strategy was adopted in the project described above (in Question 1)?

Justification

The basis for this question is to compare the procurement decision taken based on the prevailing circumstances (variables) outlined in Question 1 and subsequently compare this to the procurement decision that would have been recommended by the DSS, given the same parameters.

Question 3:

How would you rate the project performance level, in terms of meeting costs, time and quality objectives?

Justification:

The purpose of this question is to enable subsequent comparative analysis between project performance level achieved by the adoption of an appropriate procurement strategy (based on the DSS' recommendation) and the performance level achieved by the adoption of an inappropriate procurement strategy.

7.5.3 Sampling and Population

Snow-balling sampling technique was used in this validation survey to gather data and elicit knowledge from industry practitioners through several referrals by key contacts in the industry. The participants include; Architects, Engineers, Quantity Surveyors, Builders, Estate Surveyors and Valuers. The participants are from different parts of the country with diverse experiences in the construction industry. The participants also work for organisations of different sizes and types in both the private and public sectors. In total, 32 participants were involved in the survey and all of them fully responded to the questions asked, there were no partial response; hence the survey collated shows 100% valid responses.

7.5.4 Data Presentation

The following tables show data collected online via Smart Survey:

1. Based on a recently completed construction project in your organisation, how would you rate the following variables at the project tender stage?

Create Chart

	Low	Low-Medium	Medium	Medium-High	High	Response Total
Cost Certainty	3.1% (1)	6.3% (2)	65.6% (21)	18.8% (6)	6.3% (2)	32
Project Design Complexity	6.3% (2)	25.0% (8)	18.8% (6)	43.8% (14)	6.3% (2)	32
Level of Specialist Work required	3.1% (1)	3.1% (1)	40.6% (13)	31.3% (10)	21.9% (7)	32
Need for External Funding	40.6% (13)	15.6% (5)	15.6% (5)	12.5% (4)	15.6% (5)	32
Flexibility for Innovation	18.8% (6)	31.3% (10)	25.0% (8)	15.6% (5)	9.4% (3)	32
Contract Duration	3.1% (1)	9.4% (3)	56.3% (18)	25.0% (8)	6.3% (2)	32
Completeness of Project Documentation at tender stage	12.5% (4)	18.8% (6)	21.9% (7)	31.3% (10)	15.6% (5)	32
Client Control and Input	9.4% (3)	15.6% (5)	21.9% (7)	9.4% (3)	43.8% (14)	32
View Matrix Charts					answered	32
					skipped	0

2. What procurement method was adopted in the project above?

		Response Percent	Response Total
1	Traditional	46.88%	15
2	Design and Build	21.88%	7
3	Construction Management	18.75%	6
4	Management Contracting	9.38%	3
5	Partnering / Framework Arrangement	0.00%	0
6	Public Private Partnership (PPP) / Public Finance Initiative (PFI)	3.13%	1
		answered	32
		skipped	0

3. How would you rate the project performance level, in terms of meeting cost, time and quality objectives?

		Response Percent	Response Total
1	Excellent	3.13%	1
2	Very Good	28.13%	9
3	Good	40.63%	13
4	Fair	21.88%	7
5	Poor	6.25%	2
		answered	32
		skipped	0

7.5.5 Comparative Analysis

The following table shows a comparative analysis between procurement method adopted in each project scenario and the corresponding procurement method recommended by the proposed decision support system developed, given the same project variables. It explains the decision support system architecture of how the data inputs (variables) presented in Section 7.5.4 translate to outputs (recommended procurement strategy) through the weighting regimes for the purpose of the validation survey.

Table 7.1: Comparative Analysis of Validation Survey

RESPONDENT	V1	V2	V3	V4	V5	V6	V7	V8	Procurement Method Adopted in Case Study	Procurement Method Recommended by DSS	MATCH	Overall Cost, Time and Quality Performance
1	3	4	4	1	2	3	3	5	Design and Build	Construction Management	NO	2
2	3	1	3	3	1	3	1	5	Traditional	Construction Management	NO	2
3	3	4	4	5	2	3	4	5	Construction Management	Construction Management	YES	3
4	3	4	4	5	2	3	4	5	Construction Management	Construction Management	YES	3
5	3	5	5	2	5	3	5	1	Design and Build	Design and Build	YES	4
6	4	5	3	1	2	4	1	5	Design and Build	Construction Management	NO	2
7	3	4	5	2	4	5	3	3	Construction Management	Management Contracting	NO	3
8	3	2	3	1	1	4	4	5	Traditional	Construction Management	NO	2
9	4	2	4	1	1	1	2	5	Design and Build	Construction Management	NO	3
10	1	1	3	3	1	3	1	1	Construction Management	Design and Build	NO	1
11	3	4	5	2	1	3	3	3	Design and Build	Management Contracting	NO	4

12	2	2	3	1	2	3	2	3	Traditional	Management Contracting	NO	4
13	4	3	3	1	3	3	4	5	Traditional	Construction Management	NO	4
14	3	2	5	5	3	3	4	4	Traditional	PPP/PFI	NO	4
15	3	4	4	5	5	4	4	5	Traditional	Construction Management	NO	3
16	3	4	4	5	5	4	4	5	Traditional	Construction Management	NO	3
17	4	3	3	3	2	2	3	3	Traditional	Management Contracting	NO	3
18	3	2	3	1	1	3	2	1	Management Contracting	Design and Build	NO	2
19	2	4	3	1	2	5	1	3	Design and Build	Construction Management	NO	2
20	3	4	5	1	3	3	3	5	Traditional	Construction Management	NO	4
21	4	3	4	2	3	4	3	5	Traditional	Construction Management	NO	4
22	5	4	3	1	2	3	5	2	Traditional	Traditional	YES	4
23	5	4	3	3	4	3	5	5	Management Contracting	Traditional	NO	5
24	3	4	4	3	4	4	2	2	PPP/PFI	-	NO	3
25	3	2	3	4	4	3	2	4	Construction Management	-	NO	3
26	3	3	4	1	2	3	3	4	Traditional	Management Contracting	NO	3
27	3	4	5	2	4	4	5	5	Design and Build	Construction Management	NO	4
28	4	3	1	4	3	2	4	2	Traditional	-	NO	3
29	3	2	3	1	2	2	4	2	Traditional	-	NO	1
30	3	4	4	1	3	3	5	5	Traditional	Construction Management	NO	4
31	3	2	5	4	3	4	2	2	Construction Management	-	NO	3
32	3	3	2	4	3	3	4	3	Management Contracting	Management Contracting	YES	3

7.2: Key to Ratings

S/N	Project Variables
V1	Cost Certainty
V2	Project Design Complexity
V3	Level of Specialist Work required
V4	Need for External Funding
V5	Flexibility for Innovation
V6	Contract Duration
V7	Completeness of Project Documentation at tender stage
V8	Client Control and Input

7.3: Key to Project Variable Rating

S/N	Rating
1	Low
2	Low – Medium
3	Medium
4	Medium – High
5	High

7.4: Key to Overall Cost, Time and Quality Performance Rating

S/N	Rating
1	Poor
2	Fair
3	Good
4	V. Good
5	Excellent

7.5.6 Discussion of Results

Out of 32 No. (100%) of responses collated, only 5 No. (15.6%) of the project cases adopted a procurement method that coincides with that recommended by the proposed DSS recommended (i.e. adoption of the most suitable procurement method). 27 No. (84.4%) of the project cases adopted an inappropriate procurement method, out of which 5 No. produced "No Recommendation" when analysed using the DSS. The implication being that the project variables needed to be re-defined in order for the DSS to produce a recommendation (See Section 7.2). This also implies that in those 5 No. project cases, the practitioners did not have enough information to make a good decision as to the most suitable procurement method to be adopted.

In other words, a comparative analysis between procurement decisions adopted without DSS and decisions arrived at through the use of the DSS:

- 5 No. Participants chose the same decision as those proposed be the DSS
- 22 No. Participants' decisions differ from decisions proposed by the DSS
- 5 No. Participants had inadequate information to make a decision; hence their input into the DSS provided no recommendation.

Further validation of the survey was carried out using statistical tools.

7.5.7 Decision Support System Validation

Statistical analysis using mean value and standard deviation was deployed in order to further validate the results of the survey. Results obtained are summarised as follows:

	Inappropriate Decisions (User Performance Rating)	**Appropriate Decisions (User Performance Rating)**
Mean	3.04	3.40
Standard Deviation	1.00	0.55
Coefficient of Variation	0.33	0.16

$$\mu = \frac{\sum x}{N} \quad (1)$$

$$\sigma = \frac{\sqrt{\sum(x-\mu)^2}}{N} \quad (2)$$

$$\text{CV} = {}^{\sigma}/_{\mu} \quad (3)$$

Where:

$\mu =$ Population Mean

$\sigma =$ Population Standard Deviation

CV = Coefficient of Variation

$x =$ Variables (Performance Rating)

N = Frequency (Number of Occurrence)

An analysis of the performance rating by the participants show that on average those projects who adopted procurement method coincided with those recommended by the DSS experienced a more successful project delivery, in terms of, costs, time and quality objectives by comparing the mean value of 3.40 to a mean value of 3.04. The lower standard deviation of 0.55 calculated based on the user performance rating of those whose made appropriate decisions based on the DSS, implies that their decisions are more consistent than those who made inappropriate decisions based on the DSS.

A higher mean of 3.40 shows that the use of the proposed DSS will more likely increase the probability of a better outcome and a corresponding lower standard deviation of 0.55 shows a higher consistency in possible outcome. On the other hand, a lower mean of 3.04 shows a likely lower probability of a successful project delivery and the standard deviation of 1.00 implies that more data point are farther from the mean, meaning that there is higher probability of having extreme outcomes (negative and/or positive) in terms of successful project delivery. This is further reflected in the coefficient of variation calculated as a ratio of the standard deviation to the mean, showing the extent of variability in relation to the mean.

CHAPTER 8

CONCLUSION AND STRATEGIC RECOMMENDATIONS

8.0 INTRODUCTION

This chapter summarises the entire study based on the research aim and objectives presented in Chapter 1, extensive literature search carried out in Chapter 2 and 3, the discussion of results of the surveys carried out Chapter 5 and 6, the subsequent development of a proposed Decision Support System, its evaluation and validation covered in Chapter 7 of this study. This chapter also sets out proposed strategic recommendations based on the research findings and suggested research areas for further studies.

8.1 CONCLUSION

8.1.1 An appraisal of the current state and approaches adopted in managing construction contract claims in the Nigerian construction industry.

The results obtained from this survey suggest that Quantity Surveyors are pre-dominantly responsible for managing construction contract claims because most of them confirmed they were taught claims management as a course/module in school. Also, designated claims managers are hardly appointed in the Nigerian construction industry. In most cases, what informs the choice of personnel appointed to manage contractual claims is based on the organisational structure and specialist area.

Majority of the participants hold the opinion that the management of contractual claims does have an impact on the delivery of construction contract claims. In addition, from the cross tabulation analysis, there is no significant difference between the opinions held by the participants on the basis of their profession, as 92% of them provided the same response.

Judging from the results of the analysis in Chapter 5, most quantity surveyors acquired formal claims management knowledge from taught courses/modules in school and hence giving an explanation for their dominance in being responsible for managing claims in the Nigerian construction industry. Following from this fact and discounting the opinions of

the quantity surveyors (in order to eliminate optimism bias) in a critical review of the effectiveness of the overall claims management process, it then becomes apparent from the statistics that about 47% of the other professionals are either not sure about how effective their organisations' overall claims management is or rate their organisations' overall claims management process as being ineffective. In other words, about 53% rate their organisations' claims management processes as being either very effective or effective.

8.1.2 The main causes and impact of claims that currently plaques the industry.

Results of this research revealed that the most pre-dominant causes of claims with the highest frequency of occurrence in the Nigerian construction industry is additional work, extension of time and variation claims, respectively.

8.1.3 The main factors affecting the management of construction claims in the Nigerian construction industry.

A critical analysis on the factors affecting the management of construction claims in Nigeria shows the following as three (3) main factors, amongst others, in order of ranking, from the highest to the lowest:

1. Corruption within the ranks and files of stake-holder organisations, nepotism and tribalism.
2. Absence of dedicated claims management experts in the industry.
3. Contract award syndrome – poor pre-contract documentation resulting from hastiness to award contracts.

This shows the existence of a relationship between claims management and socio-cultural issues (such as corruption); availability of claims management experts (lack of man-power); and pre-contract documentation and planning (such as poor project procurement). The scope of this research is however delimited to the operational aspect of strategic decision making process involved in procuring building and civil engineering projects in the Nigerian construction industry. Hence the basis for further research into procurement strategy, as corruption and inadequate man-power are beyond the scope of this study.

8.1.4 An examination of the extent of application of theoretical claims management concepts in current practice in the construction industry.

This research reveals that most participants acquired the bulk of claims management knowledge they have from project experiences in the industry, while others acquired theirs from courses/modules offered in school and trainings/seminars attended including self-study. A more critical examination showed that quantity surveyors are pre-dominantly responsible for managing construction contract claims because out of the other professions, most of them are taught claims management as a course/module in school.

The results obtained from this research show that most of the participants' organisations are most effective in the areas of identifying and presenting claims, and least effective in the areas of substantiating and negotiating claims. The highest number of participants who are not sure of their organisations capability with regards to the claims management processes fall under the area of substantiating claims. In order words, about a fifth of the participants are not sure about their organisations capability with regards to substantiating claims.

The analysis shows that most of the participants' organisations do not have a structured approach to managing construction contract claims. However, most of them have a standard form of contract/contract conditions adopted in administering projects which is usually tailored to suit specific projects.

8.1.5 Development and subsequent implementation of a decision support system for managing claims.

Majority (80%) of the participants opine that the development and subsequent implementation of a decision support system will help to better manage construction contract claims in the industry. In addition, the subsequent cross tabulation carried out reveal that there is no significant difference between the opinions across different professions, as majority of them are optimistic that the development and subsequent implementation of a decision support system will enhance successful project delivery.

8.1.6 Research finding on the impact of procurement strategies on claims management.

Extensive literature search and synthesis of data gathered for the purpose of this research shows that the most dominant procurement method adopted in the Nigerian construction industry is the Traditional method; the most dominant type of contract is Lump Sum Contract; the most dominant tendering approach is the open competitive type of tendering. Combinations of the aforementioned approaches constitute the current default procurement strategy adopted in most construction projects in Nigeria. Other project strategies have been introduced sparingly over the years in order to overcome the limitations of the pre-dominant strategy. Finally the analysis of the participants' recommendations as presented in Chapter 5 shows a very strong relationship between claims management and pre-contract administration and planning (project procurement).

8.1.7 Development and subsequent implementation of a decision support system to enhance claims management practice in the construction industry.

Extensive literature search in Chapters 2, Chapter 3 and knowledge elicited from industry experts in Chapter 5 (Preliminary Survey) suggested that the development of a DSS could help improve claims management. The survey carried out in Chapter 5, also revealed that procurement strategy is the main operational factor affecting the management of claims. In addition, the analyses of procurement strategy decision making process in Chapter 6 confirmed the absence of a robust DSS, which led to the development of a DSS in Chapter 7. Further evaluation and validation of the developed DSS in Chapter 7, confirmed the application of a structured approach to the careful selection of procurement strategy to be adopted for any given project reduces the probability of the occurrence of claims and enhances successful project delivery.

The Nigerian construction industry thrives in a developing economy and the prevailing socio-cultural realities should be critically considered alongside the project situations in adopting an appropriate choice of competition in its procurement system. The choice of the most suitable procurement strategy has the capability to enhance claims management practice in the construction industry.

8.2 STRATEGIC RECOMMENDATIONS

A lot researches have been carried out in the area of construction claims management, however, its relationship with construction project procurement has arguably remained unexplored. This research contributes to the body of knowledge in construction management by empirically investigating the key factors affecting the management of claims in the Nigerian construction industry and developing a decision support system to aid practitioners make more informed strategic procurement decisions for successful project delivery. Based on the results of the research, the following recommendations can be made to enhance the successful implementation of DSS developed:

1. Policies should be made to ensure strict adherence to pre-contract and general contract administration procedures.
2. Clients and project sponsors should ensure the availability of funds before the award of any given project.
3. Claims management regulatory body should be formulated with the primary function of educating professionals in the area of claims management and providing necessary support when and where needed.
4. Practitioners in the industry should perform their functions and carry out their responsibilities with due diligence and combat corruption and professional indiscipline of any form.
5. The indiscriminate use of provisional sums in contract documentation should be discouraged and emphasis should be place on proper pre-contract documentation and planning.
6. Professional bodies should educate their members on claims management through continuous professional development schemes.
7. Claims management should be included in the curriculum of courses offered in the built environment (such as Architects, Engineers and Builders.) in order to prepare students/future practitioners on claims management issues they will be confronted with later in their professional careers.
8. Design conceptualisation, contract formulation and procurement strategies adopted for construction projects should embrace the claims management philosophy.
9. The developed decision support system should be implemented in industry to enhance the management of construction contract claims.
10. The use of information technology should be encouraged in the area of project planning and record keeping.

8.3 AREAS FOR FURTHER STUDIES

The results obtained from this research generated the following potential research areas which were beyond the research scope but can be considered for future researches:

1. An evaluation of the impact of information management system on claims management practice.
   The results obtained from the preliminary survey show that most of the participants' organisations are most effective in the areas of identifying and presenting claims, and least effective in the areas of substantiating and negotiating claims. Extensive literature search in Chapter 2 and knowledge elicited form industry practitioners revealed that information management system (comprising method of data recording, collection, processing and retrieval) plays an important role in claims management practice.

2. The impact of corruption and other sharp practices on the delivery of construction projects.
   Results obtained from the preliminary survey shows that corruption is a major factor affecting the management of claims in the construction industry. It is therefore imperative to carry out an in-depth research on its impact on the delivery of construction project. Corruption is classified as a socio-cultural issue, thus it is beyond the scope of this research.

3. An evaluation of the impact of claims management experts in the construction industry.

   According to results obtained from this study, absence of dedicated claims management experts in the construction industry is ranked the second (2^{nd}) major factor affecting the management of claims in the industry. Hence, the need to research more in-depth into the availability, training and competence of claims experts, and how their services could help improve the delivery of construction projects.

REFERENCES

Abdul-Malak, M. A. U., El-saadi, M. M. H., and Abou-Zeid, M. G. (2002) 'Process Model for Administrating Construction Claims'. *Journal of Management in Engineering* 18 (2), 84-94

Adrian, J.J. (1993) *Construction Claims - A Quantitative Approach.* Illinois: Stipes Publishing L.L.C.

Agyekum-Mensah, G. (2013) 'The development of an innovative sustainable Total Planning and Control system for construction projects'. PhD, Nottingham Trent University.

Ahuvia, A. C. (2001) 'Traditional, Interpretive and Reception Based Content Analyses: Improving the Ability of Content Analysis to Address Issues of Pragmatic and Theoretical Concern'. *Social Indicators Research* 54 (2), 139-172

Aibinu, A. A., and Jagboro, G. O. (2002) 'The effects of construction delays on project delivery in Nigerian construction industry'. *International Journal of Project Management* 20 593-599

Ajanlekoko, J. O. (1987) 'Controlling cost in the construction industry'. *Lagos QS Digest* 1 (1), 8-12

Akinsola O. E., and Omolayo O. H. (2013) Corruption and Fraud in the Nigerian Construction Sector: A paper presented at the Transformation of the Building Industry – Possibilities and Realities. *43rd Annual General Meeting and Conference of Nigerian Institute of Building held at International Conference Centre, Lagos on 26th-30th August*

Akintoye, A. and Main, J. (2012) 'Innovation through Collaborative Procurement Strategy and Practices' in *Construction Innovation and Process Improvement*. ed. by Akintoye, A., Goulding, J. and Zawdie, G. Oxford: Blackwell Publishing Ltd., 251-275

Alhazmi, T., and McCaffer, R. (2000) 'Project Procurement System Selection Model'. *Journal of Construction Engineering and Management* 126 (3), 176-184

Alkass, S., Mazerolle, M., Tribaldos, E., and Harris, F. (1995) 'Computer aided construction delay analysis and claims preparation.' *Construction Management and Economics* 13 335-352

Amaratunga, D., Baldry, D., Sarshar, M. and Newton, R. (2002) 'Quantitative and Qualitative Research in Built Environment: Application of "Mixed" Research Approach'. *Work Study* 51 (1), 17-31

Ameer, A. L. M. (2015) *Handbook for Technical Auditors of the Construction Industry*. India: Notion Press.

Arditi, D., and Pattanakitchamroon, T. (2006) 'Selecting a delay analysis method in resolving construction claims'. *International Journal of Project Management* 24 145-155

Ashworth, A., and Hogg, K. (2007) 12th edn. *Willis's Practice and Procedure for the Quantity Surveyor*. Oxford: Blackwell Publishing Ltd.

Ayodele, E. O., Ogunbode, A. B., Ariyo, I. E., and Alabi, O. M. (2011) 'Corruption in the Construction industry in Nigeria' *Journal of Emerging trends in economics and Management Sciences,(JETEMS)* 2(3) 156-159

Bailey, J. (2014) *Construction Law*. London: Informa Law from Routledge.

Bakhary, N. A., Adnan, H., and Ibrahim, A. (2015) 'A Study of Construction Claim Management Problems in Malaysia'. *Procedia Economics and Finance* 23 63-70

Bakhary, N. A., Adnan, H., Ibrahim, A., and Ismail, N. A. A. (2013) 'Critical Review on Improving the Claim Management Process in Malaysia'. *Journal of Education and Vocational Research* 4 (7), 214-218

Banwo, O., Parker, K., and Sagoo, A. (2015), 'Principles of contract claims management - A review of the Nigerian construction industry', in *Proceedings of the IEEE International Conference on Industrial Engineering and Operations Management (IEOM 2015)*, United Arab Emirates, 3-5 March 2015, pp. 1-9.

Barker, S., and Cole, R. (2009) Brilliant *Project Management.* Hants: Ashford Colour Press Ltd

Bhutta K. S., and Huq F. (2002) 'Supplier Selection Problem: A Comparison of the Total Cost of Ownership and Analytic Hierarchy Process Approaches'. *Supply Chain Management* 7 (3) 126–135.

Blios M. S. (1980): *Clinical Judgement and Computers*. New England Journal of Medicine 303: 192-197.

Bonczek R. H., Holsapple C. W., and Whinston A. B. (1980) *Design implementation an information base for decision makers.Proceedings of the Natxona Computer Conference,Vol.4b,*Montvale,NJ:APIP S Press,1980a .Pp.855-863.

Bryman, A. (2004) 2nd edn. *Social Research Methods*. Oxford: Oxford University Press

Bunni, N. G. (2005) 3rd edn. *The FIDIC Forms of Contract.* Oxford: Blackwell Publishing Ltd.

Burr, A. (2016) 5th edn. *Delay and Disruption in Construction Contracts*. London: Informa law from Routledge.

Burrell, G., and Morgan, G. (1979) *Sociological Paradigms in Organisational Analysis*. Hanks: Ashgate

Butters S., and Eom S. (1992) *Decision Support Systems in the Health Care Industry*. Journal of Systems Management 43: 28-31.

Cartlidge, D. (2006) 2nd edn. *New Aspects of Quantity Surveying Practice.* Oxford: Elsevier Butterworth-Heinemann

Cartlidge, D. (2009) *Quantity Surveyor's Pocket Book.* Oxford: Elsevier Ltd

Cheung, S., Lam, T., Wan, Y., and Lam, K. (2001) 'Improving Objectivity in Procurement Selection'. *Journal of Management in Engineering* 17 (3), 132-139

Chung C. H., and Lang JR (2007) *An Approach for Developing Support Systems for Strategic Decision Making in Business*. OMEGA International Journal of Management Science 17(2): 135-146.

Clough, R. H., Sears, G. A., Sears, S. K., Segner, R. O., and Rounds, J. L. (2015) 8th edn. *Construction Contracting: A Practical Guide to Company Management.* Oxford: John Wiley and Sons Ltd.

Clough, R.H. (1981) 4th edn. *Construction Contracting.* New York: John Wiley & Sons

Collin, J., and Retik, A. (1997) 'The applicability of project management software and advanced information technology techniques in construction delays mitigation'. *International Journal of Project Management* 15 (2), 107-120

Collis, J., and Hussey, R. (2003) 2nd edn. Business Research: *A Practical Guide for Undergraduate and Postgraduate Students*. London: Palgrave Macmillan

Cook, T. D., Campbell, D. T., and Shadish W.R. (2001) *Experimental and Quasi-experimental Designs for Generalised Causal Inference.* California: Wadsworth Publishing

Coventry University (1 September 2010) Principles and Standards of Conduct on the Governance of Applied Research [online] available from <https://ethics.coventry.ac.uk/documents/content/about/codeconductgov092010.pdf> [8 April 2016]

Cox, D. M. T. (2013) *Project Management at Work: Practical, Relevant, Results*. Bloomington: iUniverse.

Crawford, R. (2002) 'Triangulating Research Methods in Case Studies - An Emperical Presentation'. in *European Conference on Research Methodology for Business and Management Studies Proceedings*. ed. by Remenyi, D. Reading: MCIL Reading University, 79-91

Creswell, J. W. (2003) *Research Design: Qualitative, Quantitative and Mixed Methods Approaches.* (2ed.) Thousand Oaks: Sage

Creswell, J. W., Trout, S., and Barbuto, J.E.J. (n. d.) A Decade of Mixed Methods Writing: A Retrospective [online] available from <http://www.aom.pace.edu/rmd/2002forum.html> [12 March, 2013]

Cummings, L. L., and Frost, P.J. (1985) *Publishing in the Organisational Sciences.* Homewood: Richard D. Irwin

Currie, S. and Hancock's (2014) fifth edn. by Kelleher, T. J. Jr., Mastin, J. M. Jr., and Robey, R. G. *Common Sense Construction Law: A Practical guide for the Construction Professional.* London: John Wiley and Sons Ltd.

Cushman, R. F., and Carter, J. D. (2000) 3rd edn. *Proving and Pricing Construction Claims*. New York: Aspen Publishers

Dainty, A. (2008) 'Methodological Pluralism in Construction Management Research' *Advanced Research Methods in the Built Environment* 1 1-13

Delmon, J. (2011) *Public-Private Partnership Projects in Infrastructure.* New York: Cambridge University Press

Eisenhardt, K. M. (1989) 'Building Theories from Case Study Research'. *Academy of Management Review* 14 (4), 532-550

Ekung, S., Siriwardena, M. and Adeniran, L. (2013) 'Optimised Selection and use of Project Procurement Strategy in Nigeria: A Case from Practise'. *Ethiopian Journal for Environmental Studies and Management* 6 (6), 661-669

Eldabi, T., Irani, Z., Paul, R.J. and Love, P.E.D. (2002) 'Quantitative and Qualitative Decision-Making Methods in Simulation Modelling'. *Management Decision* 40 (1), 64-73

Engineering ToolBox (n. d.) Common engineering and construction contracts [online] available from <http://www.engineeringtoolbox.com/contract-types-d_925.html> [13 June 2013]

European Bank for Reconstruction and Development (12 March 2012) Opening and Evaluation of Tenders [online] available from <http://www.ebrd.com/downloads/procurement/evalguid.pdf> [03 July 2013]

Federal Highway Administration (2012) 'Administration: Technology and Practice in Europe'. *Office of International Programs* 3 1-5

Frankfort-Nachmias, C. and Nachmias, D. (1996) 5th edn. *Research Methods in the Social Sciences*. Santa Cruz: Arnold Publishing Co.

Gibson, R. and Edwards, A. (2015) *A Practical Guide to Disruption and Productivity Loss on Construction and Engineering Projects*. Oxford: John Wiley and Sons Ltd.

Gill, J., and Johnson, P. (1997) 2nd edn. *Research Methods for Managers.* London: Paul Chapman Publishing Ltd.

Gorard, S. and Taylor, C. (2004) *Combining Methods in Educational and Social Research*. Buckingham: Open University Press

Gordon, C.M. (1994) 'Choosing Appropriate Construction Contracting Method'. *Journal of Construction Engineering Management* 120 196-210

Greenhalgh, B. and Squires, G. (2011) *Introduction to Building Procurement*. Oxon: Spon Press

Harwood, T., and Garry, T. (2003) 'An Overview of Content Analysis'. *The Marketing Review* 3 (4), 479-498

Henning, E. (2004) *Finding your way in qualitative research*. Pretoria: Van Schaik

Hicks J (1993): *Management Information Systems: a User Perspective*. Minneapolis/St. Paul, West Publishing Company.

Holmberg, M., Backman, P., and Tonnby, D. (n. d.) Key Factors for Successful Offshore Outsourcing Projects [online] available from <http://gupea.ub.gu.se/bitstream/2077/3321/1/06-07--8M.pdf> [02 March, 2013]

Holsapple CW (1995): *Knowledge Management in Decision Making and Decision Support*. Knowledge & Policy 8: 5-23

Hughes, G.A. (1978) *The Anatomy of Quantity Surveying*. London: The Construction Press

Hussin, A. A., Omran, A., and Hoe, O. S. (2010) 'Claims in Construction Industry: From Nominated Sub-Contractor's Perspective'. *Journal of Academic Research in Economics* 2 159-179

Institute of Civil Engineers (ICE) (2007) *Construction Law Handbook*. London: Thomas Telford Publishing

Institution of Civil Engineers (ICE) (2012) NEC3 *Engineering and Construction Contract.* London: Thomas Telford Ltd.

Irani, Z., Ezingeard, J.N., Grieve, R.J. and Race, P. (1999) 'A Case Study Strategy as part of an Information Systems Research Methodology: A Critique'. *The International Journal of Computer Applications in Technology* 12 (2), 190-198

Jack, E.P. and Raturi, A.S. (2006) 'Lessons Learned from Methodological Triangulation in Management Research'. *Management Research News* 29 (6), 345-357

Jankowicz, A.D. (2004) 4th edn. *Business Research Projects*. London: International Thomson Business Press

Jayalath, C. (2011) *Contractual Dimensions in Construction: A commentary in a Nutshell.* Bloomington: iUniverse

JCT (n. d.) The Joint Contract Tribunal [online] available from <http://www.jctltd.co.uk> [7 February 2015]

Jenkowicz, D. (2004) *The easy guide to Repertory Grids.* Chichester: John Wiley & Sons Ltd.

Jogulu, U.D. and Pansiri, J. (2011) 'Mixed Methods: A Research Design for Management Doctoral Dissertations'. *Management Research Review* 34 (6), 687-701

Johnson M. (2006): *Decision Models for Affordable Housing and Sustainable Community Development.* Heinz Research

Johnson,R. B., and Onwuegbuzie, A. J. (2004) 'Mixed Method Research: A Research Paradigm whose time has come'. *Educational Researcher* 33 (7), 14-26

Joint Contract Tribunal (JCT) Ltd. (2011) SBX/XQ - 2011 *Standard Building Contract*. London: Sweet and Maxwell Ltd.

Kasimu A. M., and Usman M. D. (2013) 'Delay in Nigerian Construction Industry'. *Journal of Environmental Sciences and Resources Management* 5 (2) 120-129

Keane, P. J. and Caletka, A. F. (2015) 2nd edn. *Delay Analysis in Construction Contract*: New Jersey: Wiley Blackwell.

King W. R. (1996): *Strategic Issues in Groupware*. Information Systems Management 13: 73-76.

Klanac, G. P., and Nelson, E. L. (2004) 'Trends in Construction Lost Productivity'. *Journal of Professional Issues in Engineering Education and Practice* 130 (3), 226-236

Klee, L. (2015) *International Construction Contract Law*. London: John Wiley and Sons Ltd.

Kothari, C. R. (2009) 2nd edn. *Research Methodology: Methods and Techniques.* New Delhi: New Age International Publishers

Kumaraswamy, M. M., and Chan, D.W.M. (1999) 'Factors facilitating faster construction'. *Journal of Construction Procurement* 5 (2), 88-98

Kumaraswamy, M. M., and Yogeswaran, K. (2003) 'Substantiation and assessment of claims for extensions of time'. *International Journal of Project Management* 21 27-38

Kumaraswamy, M., and Dissanayaka, S. (2001) 'Developing a decision support system for building project procurement'. *Building and Environment* 36 (3), 337-349

Lade O., Oloke D., Chinyio E, and Fullen, M. (2012) 'Use of Multi-criteria Decision Analysis Methods for Water Supply Problems: A Framework for Improved Rainwater Harvesting' *Journal of Environmental Science and Engineering* A (1) 909-917

Lee E. Y., Ha S., and Kim S. K. (2001) 'Supplier Selection and Management System considering Relationships in Supply Chain Management' *IEEE Transactions on Engineering Management* 48 (3) 307–318.

Lee, S., Trench, W., and Willis, A. (2005) 10th edn. *Willis's Elements of Quantity Surveying*. Oxford: Blackwell Publishing Ltd.

Lember, V., Kattel, R. and Kalvet, T. (2014) *Public Procurement Innovation and Policy: International Perspective.* Berlin: Springer-Verlag.

Lessard, C., and Lessard, J. (2007) *Project management for engineering design*. Calif: Morgan & Claypool Publishers

Levin P. (1998) 2nd edn. *Construction Contract Claims, Changes & Dispute Resolution*. Boston: American Society of Civil Engineers (ASCE) Press

Li, B., Akintoye A., Edwards, P. J., and Hardcastle, C. (2005) 'Perceptions of Positive and Negative Factors Influencing the Attractiveness of PPP/PFI Procurement for Construction Projects in the UK'. *Engineering, Construction and Architectural Management* 12 (2), 125-148

Love, P. (2002) 'Influence of Project Type and Procurement Method on Rework Costs in Building Construction Projects'. Journal of Construction Engineering and Management 128 (1), 18-29

Love, P., Skitmore, M., and Earl, G. (1998) 'Selecting a suitable procurement method for a building project'. Construction Management and Economics 16 (2), 221-233

Love, P.E.D., Gunasekaran, A. and Li H. (1998) 'Concurrent Engineering: A Strategy for Procuring Construction Projects'. *International Journal of Project Management* 16 (6), 375-383

Mackenzie, N., and Knipe, S. (2006) 'Research Dilemmas: Paradigms, Methods and Methodology' *Issues in Educational Research* 16 (2) 193-205

MaCmillanSlovic P., and Fischoff B. (1977): 'Behavioural Decision Theory'. *Annual Review of Psychology* 28, 1-39.

Mallach EG (1994): *Understanding decision support systems and expert systems*. Chicago, IL, Irwin

Marsh, C., and Elliot, J. (2008) 2nd edn. *Exploring Data*. Cambridge: Polity Press

Marshall, A. (1890) 8th edn. *Principles of Economics*. London: Macmillan and Co., Ltd.

Masterman, J. (2001) *Introduction to Building Procurement Systems*. London: Spon Press

McDermott, P. (2005) 'Strategic and Emergent Issues in Construction Procurement' in *Procurement Systems: A Guide to Best Practice in Construction*. ed. by Rowlinson S. and McDermott, P. London: E &FN Spon, 2-21

McKereghan, D. L. (11 February, 1998) Differences between Qualitative and Quantitative Research [online] available from <http://www.docstoc.com/docs/122814223/Differences-Between-Qualitative-and-Quantitative-Research-Mdocx> [10 February, 2013]

McNabb, D. E. (2012) 3rd edn. *Research Methods in Public Administration and Non-profit Management - Qualitative and Quantitative Approaches*. New York: M.E. Sharpe Inc.

Mendenhall, M., Beaty, D. and Oddou, G. (1993) 'Where have all the theorist gone? An Archival Review of the International Management Literature.' *International Journal of Management* 10 (2), 146-153

Mertens, D. M. (2005) 'Integrating diversity with Quantitative and Qualitative Approaches'. *Research Methods in Education and Psychology* (2nd ed.) Thousand Oaks: Sage

Mohamed, K. A., Khoury, S. S., and Hafez, S. M. (2011) 'Contractor's decision for bid profit reduction within opportunistic bidding behaviour of claims recovery.' *International Journal of Project Management*. 29, 93-107

Morledge, R., and Smith, A. (2013) 2nd edn. *Building Procurement*. Chichester: Wiley-Blackwell National Building Specification (n. d.) Which procurement method? [Online] available from <http://www.thenbs.com/topics/ContractsLaw/articles/whichProcurementMethod.asp > [13 January, 2015]

Nieboer N (2011): *Strategic planning process models: a step further. Property Management,* 29 (4), 371 - 382

Nigerian Institute of Quantity Surveyors (2000) *Open and Competitive Tendering in Procurement of Public and Private Sector Projects.* Lagos: Irede Printers Ltd

Nutt P. C. (1998): *Evaluating Alternatives to Make Strategic Choices*. Omega_International Journal of Management Science 26(3), 333-354.

Odeyinka, H. A., and Yusif, A. (1997) 'The causes and effects of construction delays on completion cost of housing projects in Nigeria'. *Journal of Financial Management of Property and Construction* 2 (3), 31-44

Odhigu Festus, O., Azhar, Y., Nazatul, A. and Junaid, S. (2011) 'Cost Benefit Analysis of Procurement Systems and the Performance of Construction Projects in east malaysia'. *Information Management and Business Review* 2 (5), 181-192

Ojiako, U., and Maguire, S. (2008) 'Success Criteria for Systems Lead Transformation: Managerial Implications for Global Operations Management'. *Industrial Management & Data Systems* 108 (7), 887-908

Ojo, A.E. and Gbadebo, M.A. (2012) 'Critical selection criteria for appropriate procurement strategy for project delivery in Nigeria'. *Journal of Emerging Trends in Economics and Management Sciences* 3 (5), 422-428

Okoli, C. (2015) *Nigerian Promising Era: Unlocking the Hidden Treasure.* Texas: Good Faith Publishing Company.

Olanrewaju A. A. and Anavhe P. J. (2014) 'Perceived Claim Sources in the Nigerian Construction Industry' *Built Environment Project and Asset Management* 4 (3) 281-295

Onwusonye, S.I.J. (2004) 21st edn. *Achieving Public Procurement Economy in Nigeria - The Role of Quantity Surveyor*. Bade: Nigerian Institute of Quantity Surveyors (NIQS)

Onwusonye, S.I.J. (2006) *Tendering, Estimating and Contractual Arrangements in Building Projects (Principles and Practice).* Owerri: Good-Davis Associates

Onwusonye, S.I.J. (2006) *Tendering, Estimating and Contractual Arrangements in Building Projects (Principles & Practice).* Owerri: Inter Continental Education Books and Publishers

Osipova, E. and Eriksson, P. (2011) 'How procurement options influence risk management in construction projects'. *Construction Management and Economics* 29 (11), 1149-1158

Oyewobi, L. O., Ganiyu, B. O., Oke, A . A., Ola-Awo, A . W., and Shittu, A . A. (2011) 'Determinants of Unethical Performance in Nigerian Construction Industry'. *Journal of Sustainable Development* 4 (4), 175-182

Palaneeswaran, E., and Kumaraswamy, M. M. (2008) 'An integrated decision support system for dealing with time extension entitlements'. *Automation in Construction* 17, 425-438

Panneerselvam, R. (2004) *Research Methodology*. New Delhi: Prentice Hall

Paris, J. (1983) *Arbitration Principles and Practice*. Herts: Granada Publishing Ltd

Pathirage, C. P., Amaratunga,R.D.G. and Haigh, R.P. (2008) 'The Role of Philosophical Context in the Development of Theory: Towards Methodological Pluralism'. *The Built & Human Environment Review* 1, 1-10

Patterson, R. (2013) 'Early Contractor Involvement in Building Procurement – Contract, Partnering and Project Management'. *Proceedings of the ICE - Management, Procurement and Law* 166 (4), 215-216

Pin, L. (2016) *Contract Administration and Procurement in the Singapore Construction Industry.* Singapore: World Scientific Publishing Co. Ltd.

Pogorilich, D. A., (1992). ‘The Daily Report as a Job Management Tool’ *Cost Engineering* 34(2) 23-25

Pomerol J-Ch and Adam F. (2003) *From Human decision making to DMSS Architecture*, cited in Mora M., Forgionne, G. A., and Gupta, J.N.D. *Decision Making Support Systems*, Hershey PA: Idea Group, IAC.

Potts, K. and Ankrah, N. (2013) 2nd edn. *Construction Cost Management: Learning from Case Studies.* Oxfordshire: Routledge.

Powell, G. (2012) *Construction Contract Preparation and Management.* Hampshire: Palgrave Macmillan

Powell, G. (2016) 2nd edn. *Construction Contract Preparation and Management: From Concept to Completion.* London: Palgrave.

Power J. D. (2003) *Defining Decision Support Constructs, in DSS in the uncertainty of the internet age* cited in Bui T., Sroka, H., Stanek, S., and Goluchowski J. (Eds.), Katowice: Karol Adamiecki University of Economics Press.

Prasad, A. (2002) 'The Contest over Meaning: Hermeneutics as an Interpretive Methodology for Understanding Texts'. *Organisational Research Methods* 5 (1), 12-33

Rann, R. H. B. and Ranns, E. J. M. (2016) *Practical Construction Management*. London: Routledge Taylor and Francis Group.

Rashid, A. G. (2011) 'The Journey to a Methodological and Analytical Framework'. *Interdisciplinary Journal of Contemporary Research in Business* 3 (6), 70-84

Ratcliff, D. (n. d.) 15 Methods of Data Analysis in Qualitative Research [online] available from <http://qualitativeresearch.ratcliffs.net/15methods.pdf> [02 March, 2013]

Remenyi, D., Pather, S., and Klopper, R. (2011) 'Some Philosophical Assumptions Underpinning Academic Research'. *Alternation Journal* 18 (1), 354-373

Remenyi, D., Williams, B., Money, A. and Swartz, E. (1998) *Doing Research in Business and Management.* London: Sage Publications

Ren, Z., Anumba, C. J., and Ugwu, O. O. (2003). Multiagent System for Construction Claims Negotiation. *Journal of Computing in Civil Engineering* 17 (3), 180-188

Richey, R. C., and Klein, J. D. (2007) *Design and Development Research: Methods, Strategies and Issues.* New Jersey: Lawrence Erlbaum Associates, Inc.

RICS (n. d.) RICS draft guidance note - Comparative construction and engineering contracts [online] available from <https://consultations.rics.org/consult.ti/comparative.construction/view?objectId=2425236> [15 January, 2015]

Riessman, C. K. (2008) *Narrative Methods for the Human Sciences*. London: Sage Publications Ltd.

Rippen, R. (2005) Decision support system. *http://www.tessella.com/literature/supplements/PDF/ DecisionSupportSystems.pdf*. Accessed September 2012.

Roe, A. (1951) 43 edn. Genetic *Psychology Monographs.* Los Angeles: Price/ Stern/ Sloan Publishers Inc.

Rooke, J., Seymour, D., and Crook, D. (1997) 'Preserving Methodological Consistency: A Reply to Raftery, McGeorge and Walters' *Construction Management and Economics* 15 491-494

Royal Institute of Chartered Surveyors (2013) 'Developing a building procurement strategy and selecting an appropriate procurement route'. *RICS iConsult* 5 2-6

Sagoo, A. (2014) 'Decision Support System in Social Housing' in Unpublished Thesis

Saunders, M., Lewis, P., and Thornhill, A. (2007) 4th edn. *Research Methods for Business Students.* London: Prentice Hall

Scandura, T. A., and Williams, E.A. (2000) 'Research Methodology in Management: Current Practices, Trends and Implications for Future Research'. *Academy of Management Journal* 43 (6), 1248-1264

Scott Morton M. S. (1971) *Management decision systems: computer-based support for decision taking*. Cambridge, Mass, Division of Research, Harvard University.

Scottish Government (n. d.) Construction Procurement Manual [online] available from <http://www.scotland.gov.uk/Publications/2005/11/28100404/04095> [3 February, 2015]

Serco Group Plc (23 September 2012) Development of UK Market [online] available from <http://www.serco.com/instituteresource/subjects/ukmkt/cct/> [17 June 2013]

Sergeant, M. and Wieliczko, M. (2014) *Construction Contract Variation.* London: Informa UK Ltd.

Shen, L. and Song, W. (1998) 'Competitive Tendering Practice in Chinese Construction'. *Journal of Construction Engineering and Management* 124 (2), 155-161

Silver M. S. (1990) *Decision Support Systems: directed and non-directed change*. Information Systems Research 1(1): 47-70.

Simon H. A. (1960) *The New Science of Management Decision.* New York: Harper and Brothers

Simon H. A. (1976) *Administrative Behavior.* New York: Free Press

Singleton, R. A., Singleton, R., and Straits, B.C. (2010) 5th edn. *Approaches to Social Research.* Oxford: Oxford University Press

Southey, P., Derek, S., and Wilhelm, M. (2000) 'Closing the Continuous Improvement Loop'. *Buyer-Supplier Co-Development in UK Automotive Manufacturing*: 1-23

Sprague R. H. J., and Carleson ED (1982) *Building effective decision surer systems*. Englewood Cliffs, N. J., Prentice-Hall.

Stebbins, R. A. (2001) 48th edn. *Exploratory Research in the Social Sciences*. London: Sage Publication Ltd.

Tadelis, S. and Bajari, P. (2006) 'Incentives and Award Procedures: Competitive Tendering vs. Negotiations in Procurement'. in *Handbook of Procurement*. Cambridge: Cambridge University Press, 1-18

Tan J. K., and Sheps S (1998) *Health Decision Support Systems*. Gathersburg, Maryland, Aspen Publishers, Inc.

Tashakkori, A., and Teddlie, C. (1998) *Mixed Methodology: Combining Qualitative and Quantitative Approaches.* Thousand Oaks: Sage Publications

The International Bank for Reconstruction and Development (2009) *Attracting Investors to African Public-Private Partnerships.* Washington: The World Bank

Thomas, J. R., Nelson, J. K., and Silverman S. J. (2010) 6th edn. *Research Methods in Physical Activity.* Leeds: Human Kinetics

Thomas, R. W. and Wright, M. (2016) 4th edn. *Construction Contracts and Case Law*. London: Palgrave UK Ltd.

Turban E and Aronson JE (1998) *Decision Support Systems and Intelligent.* London: Prentice-Hall International (UK) Limited.

Turner, D. F. (1983) 3rd edn. Quantity *Surveying Practice and Administration.* New York: Longman Inc.

Turner, D. F., and Turner, A. (1999) 2nd edn. *Building Contract Claims and Disputes.* Essex: Addison Wesley Longman Ltd.

Turner, D.F. (1985) 3rd edn. *Quantity Surveying Practice and Administration*. New York: Longman Inc

Turner, D.F. (1995) 2nd edn. *Design and Build Contract Practice*. Essex: Longman Group Ltd.

Turner, D.F., and Turner, A. (1999) 2nd edn. *Building Contract Claims and Disputes.* Essex: Addison Wesley Longman Ltd.

United Nations (September, 2012) UN Procurement Practitioner's Handbook [online] available from <https://www.ungm.org/pph/ch03s04.html> [5 May, 2013]

University of Guelph (n. d.) Exploratory Research [online] available from <http://www.uoguelph.ca/htm/MJResearch/ResearchProcess/Exploratory Research.htm> [04 February 2013]

Vidogah, W., and Ndekugri, I. (1998) 'A review of the role of information technology in Construction Claims Management'. *Computers in Industry* 35 77-85

Walker, D., and Hampson, K. (2003) *Procurement Strategies*. Oxford: Blakwell Publishers

Walliman, N. (2011) *Research Methods.* Oxon: Routledge

Weick, K..E. (1984) "Theoretical Assumptions and Research Methodology Selection", in McFarlan, F. W., *The information Systems Research Challenge.* Boston: Harvard Business School

Williams, T. (2003) 'Assessing Extension of Time delays on Major Projects'. *International Journal of Project Management* 21 19-26

Yin, K. (1994) *Case Study Research: Design and Methods.* Newbury Park: Sage Publications

Zaneldin, E. K. (2006) 'Construction Claims in the United Arab Emirates: Types, Causes, and Frequency'. *International Journal of Project Management* 24 453-459

Zimmerman, G. (January, 2011) Construction Projects Move Forward despite Budget Cuts, Delays [online] available from <http://www.facilitiesnet.com> [7 November 2012]

APPENDICES

STUDENT RESEARCH PROJECT RISK ASSESSMENT

Person(s) undertaking project:	OLATUNDE O. BANWO
Project supervisor:	DR. GEORGE AGYEKUM-MENSAH

Brief outline of project: *Outline the types of activities that will take place or items fabricated i.e. face to face interviews, public surveys, water sampling, machining vehicle parts, brazing etc.*	This project involves the administration of structured questionnaires, via online survey, to practitioners in the Nigerian Construction Industry in order to elicit knowledge on the research area and current industry practices.

Dates of study (from – to)	APRIL, 2012 - MAY, 2016
Location(s) of activity: *Country and specific area.*	NIGERIA

Will the project involve laboratory work? *If yes, you will be required to complete separate risk assessment(s) prior to carrying out any laboratory work.*	Yes / No
Will the project involve workshop work? *If yes, you will be required to complete an induction and may carry out a separate risk assessment(s) prior to carrying out any workshop work.*	Yes / No

Will the project involve travel? *(If yes, complete this section as fully as possible. The form may require review prior to travel to add missing details)*	Yes / No
Contact details at destination(s): Contact details of next of kin in case of emergency:	Not applicable
Approximate dates of travel: *Your supervisor must have details of travel plans once confirmed.*	Not applicable
Arrangements to maintain contact with the University:	Contact will be maintained at least once in every 2weeks via email, progress meetings or skype/phone calls (if necessary).
Emergency contact information:	School/Faculty contact (Daytime): 02476888084 24hr University contact (Protection Service): 02476 888 555 Local healthcare/emergency services:
Has suitable travel insurance has been obtained? (*Please attach a copy of certificate*)	Yes / No
If EU travel, has EH1C card been obtained?	Yes / No
Has advice/vaccinations from GP been sought (*where appropriate*)?	Yes / No
Are medical kits required (*i.e. in countries with poor healthcare facilities*)?	Yes / No
Are there any warnings issued by the FCO* against travel to the area?	Yes / No
Have you registered with the FCO* service LOCATE? *(British nationals only)*	Yes / No

*FCO = http://www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/

PLEASE USE THE HAZARD CHECKLIST AS A GUIDE WHEN COMPLETING THIS SECTION.

Hazard	Precautions to be used
Work factors: *E.g.: dealing with the public, interviewing on sensitive issues, lone working, driving, working on boats, laboratory work; biological, chemical hazards etc*	Not applicable

Site specific factors (in the field): *E.g.: remote area, construction site, local endemic diseases, political unrest, terrorism risk etc* *If travel abroad see FCO* website – list any risks greater than there would be for the UK*	Not applicable

Environmental factors (in the field): *E.g.: extremes of temperature, altitude, weather conditions, tidal conditions, cliffs, bogs, caves, mountains etc*	Not applicable

Equipment: *E.g.: operation of machinery, use of specialist equipment, manual handling/transportation, compressed gases, etc*	Not applicable

Other: *Detail any special arrangements required, i.e. permissions required, accommodation, travel, catering etc*	Not applicable

This assessment must be reviewed before any significant project changes are made.	
Assessment carried out by: Signature: Position: Date:	Authorisation to proceed: Signature: Position: Date:

THE DEVELOPMENT OF A PROCUREMENT DECISION SUPPORT SYSTEM TO ENHANCE CONSTRUCTION CLAIMS MANAGEMENT PRACTICE

INFORMED CONSENT FORM TO PARTICIPATE IN RESEARCH

Institution: **Coventry University**

Primary Researcher: Olatunde O. Banwo

Contact: **banwoo@coventry.ac.uk**

Director of Studies: **Amrit Sagoo** [BSc, MSc, MBEng, MRICS]

Contact: **aa4415@coventry.ac.uk**

I am requesting for your voluntary participation in my PhD research project with the above title. I am asking you to participate because you are a key player in the Nigerian Construction Industry and your wealth of experience is highly coveted. Your participation in this research is entirely voluntary. Kindly read the information below, ask any questions about whatever you do not understand, before deciding whether to participate or not. If you do decide to participate, then please sign in the appropriate box at the end.

PURPOSE OF THE RESEARCH

This research aims to develop a decision support system for managing construction contract claims in Nigeria. Its seeks to critically review the causes and impact of construction claims in the industry, the approaches adopted in managing these claims, the theoretical and operational framework and principles of claims management, the factors affecting claims management in Nigeria and finally to develop a model to aid the management of claims by professionals in the industry.

PROCEDURE

Your understanding and approval of the procedure is required if you do agree to participate in this research. An individual interview will be conducted with you, which would last for about 45 minutes to 1hour. You would be asked question regarding your occupational background, organisation, personal experience and questions bordering on the purpose of the research. These questions will be asked with the view of eliciting from your wealth of knowledge and specialist industry experience. Under no circumstance would you be asked to answer a question you are not

comfortable with. Finally, if you do agree to participate in this research, an audio tape of the interview will be recorded for the purpose of this research.

RISKS

No foreseeable risk or discomfort is involved in this interview.

ANTICIPATED BENEFITS

Information and knowledge elucidated from this research will provide an insight to the dynamics of construction claims management system in Nigeria. It will also help in developing a decision support system with the potential of assisting industry professionals to effectively manage claims, if put to use in the nearest future.

CONFIDENTIALITY

All data collected from this research will be used only for the purpose of this study and be kept safely and confidentially and subsequently discarded after the research. Your identity will in no way be used or mentioned in any report or publications resulting from this research.

If you have any question or reservation about this research, please don't hesitate to contact:

Director of Studies: Amrit Sagoo [BSc, MSc, MBEng, MRICS]

Email: aa4415@coventry.ac.uk

Phone: +44(0)2476887688

PARTICIPATION AND WITHDRAWAL

Your participation in this research is entirely VOLUNTARY. You reserve the right to choose not to participate without any legal obligation and if you do agree to participate, you are free to withdraw or discontinue participation at any time without any prejudice. The researcher also reserve the right to withdraw your participation in the research at any time, if circumstances arise which warrant doing so.

SIGNATURE OF RESEARCH PARTICIPANT

I have read and understand the information provided above, I have been given an opportunity to ask questions and all my questions have been answered to my satisfaction. I have been given a copy of this consent form to keep and I freely give my consent and assent to participate.

Name of Participant: _____

Signature: _____

Date: _____

SIGNATURE OF PRIMARY RESEARCHER

I have explained the research to the participant and answered all his/her questions. I believe that he/she understands the information described in this document and freely consents to participate.

Name of Researcher: Olatunde O. Banwo

Signature: _____

Date: _____

Th

ACADEMIC PUBLICATIONS

Banwo, O., Parker, K., and Sagoo, A. (2015), 'Principles of contract claims management - A review of the Nigerian construction industry', in *Proceedings of the IEEE International Conference on Industrial Engineering and Operations Management (IEOM 2015)*, United Arab Emirates, 3-5 March 2015, pp. 1-9.

Banwo, O., Agyekum-Mensah, G., Arewa, A., and Saidani, M. (2016), 'Development of a procurement decision support system to enhance construction project delivery – From Claims Management Perspective' *International Journal of Industrial Engineering and Operations Management.* Accepted

Banwo, O., Agyekum-Mensah, G., Arewa, A., and Saidani, M. (2016), 'The impact of corruption and other sharp practices on the delivery of construction projects'. Unpublished

RESEARCH PRESENTATIONS

Banwo., O. (2016) 'The development of a Decision Support System for choosing construction project procurement strategy – from claims management perspective' in *Coventry University Faculty of Engineering and Computing Research Symposium* 14 February, 2016

Banwo, O. (2015) 'The development of a Decision Support System for managing construction contract claims' *Coventry University Faculty of Engineering and Computing Research Symposium* 7 May, 2015