

**BUILDING CONTRACTS, A MEANS TO MANAGE THE CONSTRUCTION
PROCESS: A SOUTH AFRICAN PERSPECTIVE**

by

HENDRI BLIGNAUT DU PLESSIS

Submitted in fulfilment of the requirements in respect of the

Master's Degree in Quantity Surveying

in

the Department of Quantity Surveying and Construction Management in

the Faculty of Natural and Agricultural Sciences

at

the University of the Free State

27 January 2017

Supervisor: Mr Pierre Oosthuizen

Co-supervisor: Dr Stephan Ramabodu

CONTENTS

CONTENTS	II
ABSTRACT	VI
OPSOMMING	VII
DECLARATION.....	VIII
FOREWORD	IX
LIST OF TABLES.....	X
LIST OF FIGURES	XI
LIST OF ABBREVIATIONS.....	XIII
CHAPTER 1 FRAMEWORK OF STUDY	
1.1 TITLE	1
1.2 OVERVIEW	1
1.3 RESEARCH PROBLEM	2
1.3.1 <i>Main research problem.....</i>	<i>2</i>
1.3.2 <i>Sub-problems.....</i>	<i>2</i>
1.3.3 <i>Research statement</i>	<i>3</i>
1.4 RESEARCH QUESTION	3
1.4.1 <i>Main research question</i>	<i>3</i>
1.4.2 <i>Secondary research questions</i>	<i>3</i>
1.5 OBJECTIVES	3
1.6 HYPOTHESES	4
1.7 IMPORTANCE AND PURPOSE OF THE STUDY	4
1.8 RESEARCH METHODOLOGY	5
1.8.1 <i>Literature study</i>	<i>5</i>
1.8.2 <i>Empirical study.....</i>	<i>5</i>
1.9 LIMITATIONS	5
1.10 CHAPTER LAYOUT	5
1.10.1 <i>Chapter 2: An introduction to building contracts in South Africa.</i>	<i>5</i>
1.10.2 <i>Chapter 3: Similarities between building contracts and project management</i>	<i>6</i>
1.10.3 <i>Chapter 4: Main clauses of contracts and the management themes.....</i>	<i>6</i>
1.10.4 <i>Chapter 5: Empirical data presentation, interpretation and discussion.....</i>	<i>6</i>
1.10.5 <i>Chapter 6: Conclusion.....</i>	<i>7</i>
1.11 CHAPTER CONCLUSION	7

CHAPTER 2 AN INTRODUCTION TO BUILDING CONTRACTS IN SOUTH AFRICA

2.1	INTRODUCTION	8
2.2	BUILDING CONTRACTS: AN INTRODUCTION	8
2.2.1	<i>Definition</i>	8
2.2.2	<i>South African law</i>	9
2.3	PARTIES INVOLVED IN BUILDING CONTRACTS	10
2.3.1	<i>Employer</i>	11
2.3.2	<i>Consultants/agents</i>	11
2.3.3	<i>Quasi-juridical (dispute consultants)</i>	16
2.3.4	<i>Contractors</i>	18
2.4	TYPES OF CONTRACTS	19
2.4.1	<i>Conventional admeasurement or lump sum contract</i>	21
2.4.2	<i>Target-cost or cost-reimbursable contracts</i>	23
2.4.3	<i>Managing contracting</i>	25
2.4.4	<i>Package, design-and-build and turnkey projects</i>	26
2.4.5	<i>Other contracts</i>	27
2.5	CONSTRUCTION CONTRACTS IN SOUTH AFRICA	28
2.6	CONSTRUCTION INDUSTRY DEVELOPMENT BOARD (CIDB)	29
2.6.1	<i>Recommended contracts – a CIDB perspective</i>	30
2.6.2	<i>CIDB-Indicators</i>	32
2.7	INTRODUCTION TO THE FOUR MAJOR CONTRACTS	32
2.7.1	<i>Federation Internationale des Ingenieurs-Conseils (FIDIC) 1999</i>	33
2.7.2	<i>General Conditions of Contract for Construction Works (GCC)</i>	35
2.7.3	<i>New Engineering Contract (NEC) Suite of Standard Contracts</i>	37
2.7.4	<i>Joint Building Contracts Committee (JBCC)</i>	41
2.8	CHAPTER CONCLUSION	45

CHAPTER 3 SIMILARITIES BETWEEN BUILDING CONTRACTS AND PROJECT MANAGEMENT

3.1	INTRODUCTION	47
3.2	PROCUREMENT	48
3.2.1	<i>General layout</i>	48
3.2.2	<i>South African Bureau of Standards – general procurement documents</i>	50
3.2.3	<i>South African Bureau of Standards – engineering and construction works contracts</i> 50	
3.2.4	<i>Construction Industry Development Board (CIDB)</i>	51
3.3	STRUCTURE OF THE CONTRACT DOCUMENT	53
3.3.1	<i>General</i>	56
3.3.2	<i>Roles and responsibilities</i>	57

3.3.3	<i>Time related items</i>	57
3.3.4	<i>Payment (Cost)</i>	58
3.3.5	<i>Quality</i>	61
3.3.6	<i>Risks or change</i>	62
3.3.7	<i>Termination</i>	67
3.3.8	<i>Claims and disputes</i>	69
3.4	MAIN THEMES OF PROJECT/CONSTRUCTION MANAGEMENT	72
3.4.1	<i>Definition of management</i>	72
3.4.2	<i>Project life cycle (PLC)</i>	73
3.4.3	<i>Main knowledge areas of project management</i>	75
3.4.4	<i>Construction management (CM)</i>	88
3.4.5	<i>Main knowledge areas of construction management (CM)</i>	89
3.5	COMPARISON BETWEEN THE CONTRACTS AND PROJECT MANAGEMENT	94
3.6	CHAPTER CONCLUSION	96
CHAPTER 4 MAIN CLAUSES OF CONTRACTS AND THE MANAGEMENT THEMES		
4.1	INTRODUCTION	97
4.2	NEW ENGINEERING CONTRACT (NEC)	98
4.2.1	<i>Introduction</i>	98
4.2.2	<i>Comparison with the management knowledge areas</i>	107
4.2.3	<i>Conclusion</i>	116
4.3	JBCC CONTRACT	116
4.3.1	<i>Introduction</i>	116
4.3.2	<i>Comparison with the management knowledge areas</i>	119
4.3.3	<i>Conclusion</i>	132
4.4	GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION WORKS	132
4.4.1	<i>Introduction</i>	132
4.4.2	<i>Comparison with the management knowledge areas</i>	136
4.4.3	<i>Conclusion</i>	151
4.5	FEDERATION INTERNATIONALE DES INGENIEURS-CONSEILS (FIDIC) 1999.....	152
4.5.1	<i>Introduction</i>	152
4.5.2	<i>Comparison with the management knowledge areas</i>	154
4.5.3	<i>Conclusion</i>	167
4.6	CHAPTER CONCLUSION	167
CHAPTER 5 EMPIRICAL DATA PRESENTATION, INTERPRETATION AND DISCUSSION		
5.1	INTRODUCTION	169
5.2	PURPOSE AND RESEARCH METHODOLOGY	169
5.3	EMPIRICAL DATA.....	170
5.3.1	<i>Method of analysis of data</i>	170

5.3.2	<i>Data received</i>	170
5.3.3	<i>Profile of the respondents</i>	171
5.3.4	<i>Expertise of the respondents</i>	175
5.3.5	<i>Outcome-based questions and data</i>	179
5.3.6	<i>Open-ended questions</i>	185
5.4	CHAPTER CONCLUSION	188

CHAPTER 6 CONCLUSION

6.1	INTRODUCTION	190
6.2	FINDINGS.....	190
6.2.1	<i>Research questions</i>	190
6.2.2	<i>Hypotheses</i>	192
6.3	RECOMMENDATIONS	193
6.3.1	<i>General recommendations</i>	193
6.3.2	<i>Recommendations for further study</i>	194
6.4	FINAL CONCLUSION.....	194

BIBLIOGRAPHY 196

ANNEXURE A: SUMMARY OF PMBOK AREAS AGAINST CONTRACT CLAUSES

ANNEXURE B: SURVEY QUESTIONS AND DATA

ANNEXURE C: TURN-IT-IN REPORT

ABSTRACT

The construction contract, in particular the building contract, is reviewed in this study. Some view risk management and protection of the parties' interests as being the main objectives of this contract. This research investigates the structure of the building contracts used most often in South Africa, while comparing them with the main project and construction management areas.

Four contract suites are recommended by the Construction Industry Development Board (CIDB) to be used in public projects in South Africa, namely the Joint Building Contracts Committee (JBCC), the New Engineering Contract (NEC), the General Conditions of Contracts for Construction Works (GCC) and the Fédération Internationale des Ingénieurs-Conseils (FIDIC). The research focused on the contracts suitable for building work. The structure of these contracts revealed that they are similar to the structure proposed by the Project Management Body of Knowledge (PMBOK).

The contract is formed between two parties, the employer or client, and the contractor. This agreement takes place early on in the implementation phase of the project life cycle (PLC) and is the result of a procurement process.

The four contracts reviewed vary in the way they address the project management knowledge areas and the study revealed that knowledge and experience are vital to compile a sound procurement document. The goal of the building contract should be to protect the parties who enter into the agreement. The study recommends that the contract should be seen as the project implementation plan (PIP) and that the implementation phase is only a section within the greater PLC. Parties should be familiar with it and know their responsibilities. The employer's agent should take responsibility as the project manager on the project and guide the parties through the processes stipulated in the PIP. The PIP or the contract can, however, only be effectively implemented if the required time, budget, and experience is devoted to its implementation and maintenance.

Keywords: Project Management, Building Contract, Project Life Cycle, Project Implementation Plan.

OPSOMMING

Die konstruksiekontrak, spesifiek van geboue, word in die studie ondersoek. Die bestuur en die beskerming van die partye se belange word as die belangrikste funksies van 'n boukontrak beskou. Hierdie navorsing ondersoek die strukture van die mees algemene boukontrakte in Suid-Afrika. Die kontrakte word met die projek- en konstruksiebestuursareas vergelyk.

Vier stelle of groepe kontrakte word deur die Konstruksie-industrie Ontwikkelingsraad of te wel die "Construction Industry Development Board" (CIDB) voorgestel: die Joint Building Contracts Committee (JBCC), die New Engineering Contract (NEC), die General Conditions of Contract for Construction Works (GCC) en die Fédération Intranationale des Ingénieurs-Conseils (FIDIC). Die studie fokus spesifiek op elkeen van hierdie boukontrakte. By nadere ondersoek is gevind dat die kontrakte se strukture ooreenstem met dié van die "Project Management Body of Knowledge" (PMBOK).

Die toepaslike kontrak word tussen twee partye gesluit, naamlik die werkgewer of die kliënt, en die kontrakteur. Die ooreenkoms vind aan die begin van die implementeringsfase van die projeklewensiklus plaas en is die gevolg van 'n spesifieke aankoopproses.

Die vier kontrakte verskil wel in die manier waarop projekbestuur se kennisafdelings aangespreek word. Die studie het getoon dat ondervinding en kennis nodig is om die aankoopdokument saam te stel. Die doel van die kontrak is om beide partye te beskerm. Die studie stel voor dat die kontrak as die projekimplementeringsplan beskou moet word en dat die implementeringsfase slegs 'n deel is van die groter projeklewensiklus. Partye moet die plan ken en weet wat hulle verantwoordelikhede is. Die kliënt se agent moet verantwoordelikheid as die projekbestuurder aanvaar en moet die partye ten opsigte van die projekimplementeringsplan lei. Die projekimplementeringsplan oftewel die kontrak, kan slegs suksesvol geïmplementeer word indien die nodige tyd, geld, en ondervinding aangewend word om die plan te implementeer en te monitor.

Sleutel woorde: Projekbestuur, Boukontrak, Projeklewensiklus, Projekimplementeringsplan.

DECLARATION

I, Hendri Blignaut du Plessis, declare that the Master's Degree research dissertation or interrelated, publishable manuscripts/published articles, or coursework Master's Degree mini-dissertation that I herewith submit for the Master's Degree qualification in Quantity Surveying at the University of the Free State is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education."

Signed: _____ Date: _____

Hendri Blignaut du Plessis

Student number: 2005108812

Signed: _____ Date: _____

Pierre Oosthuizen

Supervisor, personnel number: 0713586

FOREWORD

I would like to express my gratitude for everything I have received in life; it is indeed a privilege to make use of the talents and opportunities I have received. This study represents the final phase in a two-year research masters' degree course. I would further like to thank my family for their patience and support during this time.

Inspiration for the topic came through my work circumstances, where I had the opportunity of not only assisting in the compilation of the tender documents, but also implementing them. It always felt that more could be done to manage the contractor. Finding the balance between time, cost, quality, and the work horizon seems to be the biggest challenge as a quantity surveyor and/or project manager.

Finding the golden formula for these conflicts proved to be elusive, with experience continuing to keep the proverbial carrot alive, yet still unobtainable. However, the construction industry stays a compelling and alluring industry, as aptly worded by Clough, Sears, Segner and Rounds (2015: 2):

..... construction projects are typified by their complexity and diversity, and by the no standardised nature of their design and construction. Despite the use of prefabricated units in certain applications, it seems unlikely that field construction can ever completely adapt itself to the standardised methods and product uniformity of assembly-line production.

I would further like to thank the following people/organisations for their support and effort:

- My study leaders: Mr P Oosthuizen and Dr S Ramabodu.
- My parents for their support and belief in me.
- Dr T Froise for his advice and guidance.
- Mrs Alna Beukes for her guidance on the references.
- Mrs H Lombard for language and reference editing.
- My colleagues at the Department of Quantity Surveying and Construction Management.
- The University of the Free State and Faculty of Natural and Agricultural Sciences for the study opportunity.

LIST OF TABLES

Table 1: Type of contract used for different project types 2014	32
Table 2: Condensed summary of key features of the four contracts endorsed by the CIDB.	33
Table 3: List of Clauses of the FIDIC “Redbook”	35
Table 4: List of Clauses of the GCC	37
Table 5: Structure of the NEC engineering and construction contract (ECC).....	40
Table 6: Structure of the JBCC Principal Building Agreement 2014	44
Table 7: Basic structure of most building contracts	49
Table 8: Standard headings and sequencing of documents in tender documents	52
Table 9: Content comparison between four main contracts.....	55
Table 10: Comparison between identified contract, project management and construction management themes	95
Table 11: The NEC sections compared against the management fields.....	107
Table 12: The JBCC sections compared against the management fields.....	119
Table 13: The GCC sections compared against the management fields	137
Table 14: The FIDIC (Red Book) sections compared against the management field.....	155
Table 15: Response rate of survey	170
Table 16: Company profile of respondents (stakeholder profile).....	172
Table 17: Years of experience against gender	173
Table 18: Level of education and professional affiliation	174
Table 19: Location of the respondents work.....	177
Table 20: Responsibility of the agent against the contractor	179
Table 21: Agent’s control during the contract	181
Table 22: Ranked contracts most conducive to problem solving	183
Table 23: Open answers	186
Table 24: Respondents’ list of objectives of the main building contract.	187
Table 25: Benefits of managing the construction process during the contract.	188

LIST OF FIGURES

Figure 1: Diagram of Statutory Councils for the Built Environment	17
Figure 2: Characteristics of different types of construction contracts	20
Figure 3: Flow diagram on choosing a suitable contract. Altered and based on figure 2 of CIDB's Best Practice Guideline #2.	31
Figure 4: NEC Organogram of documents	38
Figure 5: The concept of offer and acceptance	53
Figure 6: The changing needs for risk analysis as the project progresses.....	63
Figure 7: Project objectives.....	73
Figure 8: Project Life Cycle	74
Figure 9: Impact of Variable Based on Project Time	75
Figure 10: Project Stakeholder Management overview	76
Figure 11: Project Scope Management overview	77
Figure 12: Project Time Management overview	79
Figure 13: Project Cost Management overview.....	80
Figure 14: Project Quality Management overview	81
Figure 15: Project Human Resource Management overview.....	82
Figure 16: Project Communication Management overview.....	83
Figure 17: Project structure.....	84
Figure 18: Project Risk Management overview	84
Figure 19: The Risk Management dilemma.....	85
Figure 20: Project Procurement Management overview	86
Figure 21: Project Integration Management overview	87
Figure 22: Integration between project phases.....	87
Figure 23: Project life cycle in construction	98
Figure 24: The NEC system – Key players and contractual links	100
Figure 25: Contractual arrangement of stakeholders within the contract	121
Figure 26: Completion stages in the JBCC building agreements.....	123
Figure 27: FIDIC Typical Sequence of Principal Events during contracts for Construction	153

Figure 28: Response rate of respondents	171
Figure 29: Respondents' professions	173
Figure 30: Years of experience against gender	174
Figure 31: Level of education and professional registration.....	175
Figure 32: Type of projects/respondents are exposed to.....	176
Figure 33: Monetary value of respondents' work.....	177
Figure 34: Respondents' exposure to the different contracts.....	178
Figure 35: Respondents' knowledge of the different contracts	178
Figure 36: Daily activities involving contractual matters.....	178
Figure 37: Involvement of the agent against the contractor	180
Figure 38: Opinion towards responsibility of quality.....	180
Figure 39: Agent's control during the contract.	181
Figure 40: Influence of the contract on the ten knowledge areas.....	182
Figure 41: Statements affecting management of projects.....	183
Figure 42: Ranked contracts most conducive to solve problems	184
Figure 43: Ranked contract in terms of the agent's ability to manage the project	184

LIST OF ABBREVIATIONS

ADR	Alternative Dispute Resolution
APM	Association of Project Managers
BCA	Binnington Copeland and Associates
BIM	Building Information Modelling
BoQ	Bills of Quantities
CETA	Construction Education and Training Authority
CIDB	Construction Industry Development Board
CIOB	Chartered Institute of Building
CM	Construction Manager or Construction Management
COLTO	Committee of Land Transport Officials
CPA	Contract Price Adjustment
CPM	Critical Path Method
DAB	Dispute Adjudication Board
EA	Employer's Agent
EAR	Employer's Agent's Representative
ECC	Engineering and Construction Contract
ECS	Engineering and Construction Subcontract
ECSC	Engineering and Construction Short Contract
ECSS	Engineering and Construction Short Subcontract
EM	Environment Management
EPC	Engineering, Procurement and Construction
FC	Framework Contract
FIDIC	The Fédération Internationale des Ingénieurs-Conseils
GCC	General Conditions of Contracts for Construction Works
JBCC	Joint Building Contracts Committee

JCT	Joint Contracts Tribunal
MBSA	Master Builders South Africa
MWA	Minor Works Agreement
N/S	Nominated or Selected
NEC	New Engineering Contract
NEC-FC	New Engineering Contract Flow Charts
NEC-GN	New Engineering Contract Guidance Notes
NHBRC	National Home Builders Registration Council
OHS	Occupational Health and Safety
PA	Principal Agent
PBA	Principal Building Agreement
PBS	Project Breakdown Structure
PIP	Project Implementation Plan
PLC	Project Life Cycle
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PMP	Project Management Plan
PROCSA	Professional Consultants Services Agreement
PSC	Professional Services Contract
QA	Quality Assurance
QC	Quality Control
QS	Quantity Surveyor
SABS	South African Bureau of Standards
SACPCMP	South African Council for the Project and Construction Management Professions
SACQSP	South African Council for the Quantity Surveying Profession
SAICE	South African Institution of Civil Engineering

SANS	South African National Standards
SCC	Schedule of Cost Components
SEIFSA	Steel and Engineering Industries Federation of Southern Africa
SoQ	Schedule of Quantities
TSC	Term Service Contract
TSSC	Term Service Short Contract
UK	United Kingdom
WBS	Work Breakdown Structure

CHAPTER 1 FRAMEWORK OF STUDY

1.1 TITLE

Building contracts, a means to manage the construction process: a South African perspective.

1.2 OVERVIEW

There are different building contracts within the building industry and they are continuously being revised to be relevant in the current built environment. Some building contracts suggest that their contract allows for the best project management principles and practices within the specific project (NEC, 2015: online; JBCC, 2014b: Preface) (NEC and JBCC are the abbreviations for New Engineering Contract and Joint Building Contracts Committee respectively).

Each building/construction project will determine the type of building/construction contract that is needed for the specific project (CIDB, 2005b: 1-2) (CIDB is the abbreviation for Construction Industry Development Board).

Construction/building contracts are part of daily construction projects. They may take many forms and are interpreted in many ways. When implementing and managing a construction project on behalf of a client, references to the contract become inevitable. There are many fields or areas to keep track of, such as the programme (time), the quality of work, progress payments, and safety, to name but a few. These areas need to be managed, especially in cases that may lead to disagreement between parties (Lester, 2013: 1-2; Bowen, Hall, Edwards, Pearl & Cattell, 2002: online).

It is perceived that the two main parties involved with the construction project have the same objectives, namely to complete the project on time, to specification, and within the cost agreed upon initially. The client's consultant could be viewed as the designated 'compass', guiding the two parties to the final destination and final product. Consultants should capture the needs of their client into a working and executable document. When implementing this document or plan, the consultant has to ensure that the contractor continuously keeps to this document or plan. Consultants should thus get the designation of project manager whether it is their profession or not.

From a multi-disciplinary perspective, capturing the project team's vision into a working document and eventually relaying it to the contractor can become a daunting task. A

certain amount of control is needed over the process and questions may arise on how much control the consultant should have.

1.3 RESEARCH PROBLEM

1.3.1 Main research problem

It was observed that construction projects make use of typical price-in-advance contracts, with specific reference to the standard contract forms generally used in South Africa. These contracts may make the successful execution of construction projects difficult. The standard contract forms referred to include (CIDB, 2005b: 2): the Joint Building Contracts Committee (JBCC), the New Engineering Contract (NEC), the General Conditions of Contract for Construction Works (GCC) and the Fédération Intranationale des Ingénieurs-Conseils (FIDIC). It is generally agreed in the construction environment that a successfully completed construction project would comply with the specified quality, and completed within the allowed time and budget (Baylis, 2006) as agreed upon prior to the commencement of the project. The construction contract is entered into by the client (the party who initiated the construction project) and the contractor (the party responsible for the execution of the construction project) (Finsen, 2005: 1). It was further observed that, in some cases, the professional team may be blamed for not complying with the conditions of the contract with specific reference to the three identified performance indicators (Finsen, 2005: 215; Emmitt & Gorse, 2003: 165). The identified research problem questions the responsibilities of the consultants in terms of the main building contract by determining the extent of their responsibilities and liabilities as stipulated in that contract. This research problem occurs when the contractor, hypothetically, does not comply with the terms and conditions as stipulated in the contract agreement. Should this hypothetical situation occur, does the main building contract empower the consultants to act upon non-performance by the contractor, and to what extent? It is a preliminary observation that, according to the above-mentioned standard contract forms, the client's agents have a managerial responsibility to assist with the execution of the construction contract.

1.3.2 Sub-problems

The first sub-problem involves determining the structure of the contracting process in South Africa. The different types of procurement (quotation process) have to be established as well as the possible outcomes. The identification of the parties, their obligations, and their relationship with regard to the process of design to procurement, play an integral part in the formation of the parameters of the contract.

The second sub-problem involves identifying and critically evaluating the main objective of the building contracts most commonly used in South Africa. The structure of each of the above-mentioned contracts has to be compared with the main managerial areas. In other words, to identify the potential of controlling a construction project using the main contracts being used within South Africa.

The third sub-problem researches the possibility of implementing the building contract as the Project Implementation Plan (PIP).

1.3.3 Research statement

Building contracts enable the employer's agent to properly manage the construction implementation phase.

1.4 RESEARCH QUESTION

1.4.1 Main research question

Does the construction contract and in particular the building contract, equip the employer's agent with the necessary authority to manage the construction processes on site?

1.4.2 Secondary research questions

Can the consultant control the building project through the building contract and to what extent?

What is perceived to be the main objective of the building contracts most commonly used in South Africa?

What are the potential benefits of controlling a construction project through the main contracts in the South African built environment?

If not the status quo, would the South African building industry adapt the practice of managing the construction project through the application of the building contract?

1.5 OBJECTIVES

The following objectives of the research were envisioned:

- Identifying the applicable contracts used in South Africa.
- Researching the background and content of the identified contracts.
- Identifying the main project management areas or themes.

- Comparing the identified project management areas with the applicable contracts identified.
- Evaluating the potential of these contracts to be used as guidelines when managing a construction project.

1.6 HYPOTHESES

The main hypothesis states that some building contracts equip the employer's agent with the necessary power to control or manage the construction project more effectively than others.

The first sub-hypothesis states that the main objective of any building contract is to serve as an agreed guide to deliver each construction project on time, within budget, and to the specified standard.

The second sub-hypothesis states that certain parameters within a building contract can prompt all parties within the contract to deliver certain required responses to assist in the successful completion of the project.

The third sub-hypothesis states that most parties within the South African construction industry do not use the potential of the standard building contracts.

1.7 IMPORTANCE AND PURPOSE OF THE STUDY

The implementation of the project, normally has the largest time, cost and scope implication, with the result of a higher risk factor than the other phases of the project. (Burke, 2010: 88; PMI, 2008: 17) (PMI is the abbreviation for the Project Management Institute). The investigation of the construction contract's ability to assist in the management of the project is there for deemed to be highly valuable and thus important to the construction industry.

The purpose of the study was to investigate the possibility that building contracts can influence the project's budget, time, and quality. Through this study, the practicality of managing a project using a contract was investigated. Different parties' experiences in the field were researched and evaluated to determine whether the contract has an effect on the successful outcome of a construction project.

1.8 RESEARCH METHODOLOGY

The research involved studying the literature and conducting an empirical study. Finally, the literature study is compared against the empirical study to conclude the study. From this conclusion, certain recommendations are made.

1.8.1 Literature study

The literature study mainly involved studying books, contracts, and articles. The study starts with a general overview of contracts, followed by a general overview of the main project management and construction management knowledge areas. The literature review then focuses on comparing the building contract to these management areas.

1.8.2 Empirical study

Empirical data was gathered by distributing questionnaires and reviewing other research. A quantitative approach was used to collect data by using a questionnaire sent to a selected sample group.

1.9 LIMITATIONS

The study had the following limitations:

- It focused on certain applicable clauses within the contracts against the appropriate project management areas. A model was not developed.
- The study's aim was not to rate the contracts against each other.
- It was limited to the building contracts used most often in South Africa and not all the building contracts.
- This study did not focus on the actual construction management of a project but rather the management between the contracting parties to whom the contract refers.

1.10 CHAPTER LAYOUT

1.10.1 Chapter 2: An introduction to building contracts in South Africa.

- In this chapter the basics and the history of building contracts are identified and explained.
- The different parties involved in a building project are identified.

- The major types of contracts as well as the most common building contracts in use in South Africa are identified.
- These contracts are then investigated in detail and an introduction is given to these contracts.

1.10.2 Chapter 3: Similarities between building contracts and project management

- The chapter starts by setting out the three main stages of a construction project, namely: planning, formation of the contract and the execution of the contract.
- The procurement process and structure of the procurement document are explained.
- This is followed by a general overview of the contract and its structure.
- The thesis then focuses on project management and the main themes thereof. The subheading is also incorporated in this section to include construction management.
- Before the chapter concludes, a short comparison is made between the contract structure and the main themes of project management.

1.10.3 Chapter 4: Main clauses of contracts and the management themes

- At first glance, most contracts promote and cover the what, the when, and the how much. Chapter 4 compares four contracts to the main knowledge areas of project management and construction management.
- The timeous, correct and understandable flow of information and communication are discussed.
- Each contract is introduced before an in-depth study of each contract is presented to identify clauses that can promote project management of the construction project.
- The chapter concludes by summarising the findings of the main contracts discussed in the chapter.

1.10.4 Chapter 5: Empirical data presentation, interpretation and discussion

- Chapter 5 presents a survey that was conducted using questionnaires sent to selected respondents. The literature study guided the development of the questionnaire.
- The presentation of the data is made according to the following categories:
 - Questions 1 to 8 established the profile of the respondent e.g. whether he/she is professional etc.

- Questions 9 to 14 established the expertise of the respondents on construction contracts and the industry.
- Questions 15 to 24 established the respondent's opinion on the role the construction contract plays towards managing the project.
- Questions 25 to 27 addressed specific open questions to answer the secondary research questions of the research
- The chapter concludes with a conclusion and interpretation of the data.

1.10.5 Chapter 6: Conclusion

- In this chapter the literature review and the empirical data are compared to construct deductions, leading to findings and conclusions.

1.11 CHAPTER CONCLUSION

From the main problem statement, on the successful completion of building projects, to the secondary problems of decoding and analysing the building contracts, the objectives and structure of building contracts are identified in an effort to capture the meaning for the different parties involved in a building project. Is the contract mainly referred to at the start of a project and when things go wrong or is it a guideline that can be used to manage the building process more effectively?

When was the first building contract agreed upon? When did people start requiring contracts to keep record of what they actually meant with their agreements? A short history and background of building contracts set the stage in Chapter 2 focussing on South Africa. The most popular contracts currently in use were researched and are summarised to attempt to explain the goal of these contracts.

CHAPTER 2 AN INTRODUCTION TO BUILDING CONTRACTS IN SOUTH AFRICA

2.1 INTRODUCTION

Before comparing contracts, one has to establish which building contracts are used in South Africa. The origin of these building contracts has to be determined as well as the advantages and limitations of each. This chapter focuses on the history of the South African built environment and the most commonly used contracts.

In Chapter 1 it is stated that reference will only be made to the most common building contracts in use in South Africa. The chapter starts with the introduction to building contracts and refers to the different parties involved on a building project and the types of contracts. It then focuses on the most often used contracts in South Africa. The chapter closes with a discussion on the most common contracts generally used in South Africa.

Contractual law can briefly be summarised as a collection of legal rules that control contracts, which in turn forms part of the law of obligations. Obligational law in return forms part of the law of property, which is regarded as forming part of private law (Van der Merwe, Van Huyssteen, Reinecke, Lubbe & Lotz, 1993: 1).

2.2 BUILDING CONTRACTS: AN INTRODUCTION

2.2.1 Definition

McKenzie (2014: 1) defines the building contract as a contract between two parties, the contractor (builder), who agrees to perform building or engineering work for the client. He continues to explain that there are two distinct types of construction works, namely engineering and building work. The first usually pertains to construction work of civil/mechanical engineering projects with an engineer as the main consultant. The latter usually pertains to building projects where an architect fulfils the role as main consultant and is classified as either the principal/employer's agent, the engineer or project manager, depending on the contract. McKenzie (2014: 1) reiterates Malherbe and Lipshitz's (1979: 80) stipulation that the following fundamentals should be in place to create a contract. There should be agreement between the two parties to legally bind the contractual relationship, embracing the rights, responsibilities, prerogatives, and privileges; and the parties should be at one with regard to the consequences to the agreement. A legal relationship between the parties flows from the offer to the acceptance. Both the offer and the acceptance should be clear and unambiguous, comprehensive and complete, if reasonably considered.

Finsen (2005:1) defines a building contract as follows:

A building contract is an agreement between two parties, of whom one is the building contractor, who agrees to erect a building and the other, the employer, who agrees to pay for it. Personal rights and obligations are created by the agreement, the right of one party being the obligation of the other. The contractor has the obligation to erect the building and the other has the right to be paid for it, while conversely the employer has the right to have the building erected and has the obligation to pay for it.

A contract comes into existence on the acceptance of an offer:

When a man makes and offers in plain unambiguous language, which is understood in its ordinary sense by the person to whom it is addressed, and accepted by him bona fide in that sense, then there is a concluded contract. The acceptance of an offer implies an agreement between the two or more persons which gives rise to personal rights and corresponding obligations; in other words, it is an agreement which is legally binding on the parties (Hutchison & Wille, cited in Finsen, 2005: 1).

It can be concluded that a building contract is an agreement between two parties for the supply of a product. In this case, a building is supplied in exchange for a monetary refund. It usually takes the form of an offer and acceptance, based on reasonable information available at the time of the tender (procurement) time.

2.2.2 South African law

When considering common law and Roman-Dutch law, the building contract could be categorised as a letting and hiring contract (*location conduction operis*). Building contracts require special consideration because the building endeavour involves many parties with different inputs and requirements. The relationship between parties may become complex, requiring a certain amount of analysis. Building contracts have also evolved over the years to include the clauses necessary to make them work (McKenzie, 2009: 1).

According to Loots (1995: 7), in South African law the “*doctrine of precedence*” is an established part and literally means “*to stand by matters that have already been decided*”. The doctrine means the following:

- A magistrate’s court is bound by the previous decision of a magistrate’s court within the same decision of the supreme court unless it is convinced that the magistrate’s court is wrong.

- A magistrate's court is bound by a similar finding by a supreme court on a similar point, whether it agrees with the finding or not.
- A supreme court is bound by a single judge court's previous decision of the same division of the supreme court, unless the decision is clearly wrong.
- A single judge court is bound by a decision made by a court of the same division sitting with more than one judge and previous decisions made by the appellate division of the supreme court, whether it is believed to be correct or not.

Loots (1995: 7) continues by highlighting that the application of the above has a different set of rules, which means that only the conclusion is necessary for a verdict to be applicable to the *precedent rule*. All other conclusions are considered as "*remarks in passing*". Interestingly, all English, Commonwealth and United States of America decisions on similar rules are only persuasive and not binding to South African law.

McKenzie (2014: 7) lists the following eight rules as the basic essentials before a contract can be regarded as binding:

- The parties should be competent and have the capacity to enter into an agreement.
- There should be consensus between the parties.
- The content of the agreement should be certain.
- It should be acceptable at the time of signing the contract.
- The contract should be legal.
- The contract should not contradict public policy.
- The contract should be entered into voluntarily, seriously, and deliberately for a reasonable cause.
- Formalities, as required by law, should be observed.

It is important to note that any building contract is subject to the applicable country's laws and regulations. The building contract may not overrule the basics of the applicable country's laws. The contract may, for example, not remove the obligation of the implementing parties to adhere to the zoning restrictions of a specific site.

2.3 PARTIES INVOLVED IN BUILDING CONTRACTS

Role players in the construction process may be divided into three basic parties, namely the employer, the contractor, and the consultants. The employer appoints a consultant or consultants to manage the building contract. This may be the case with the contractor, depending on the type and size of the project. The contractor may appoint subcontractor/s as needed and will require appropriate subcontract agreements with each subcontractor

appointed. McKenzie (2009: 1-2) lists the following parties that may be involved in building projects:

- The employer sometimes referred to as the owner or building owner.
- The contractor.
- The architect, quantity surveyor, consulting engineer or principal agent.
- The clerk of works or engineer's representative.
- The resident engineer.
- Various subcontractors.

Because of the complexity of a building contract certain other specialised fields developed over the years. During the planning and implementing stage of the project, there may be other consultants that are not listed above. They may include, but is not limited to, town planners, environmentalists, health and safety consultants, geotechnical teams, etc. The research focused only on the main parties involved in the construction process itself.

New technologies, such as Building Information Modelling (BIM), are also bringing to life new role-players and construction methods (Bennett & Radosavljevic, 2012: 257). The BIM manager is a new emerging term for the project manager specialising in coordinating BIM-driven design and implementation of construction projects (Du Plessis, 2016: 30-31).

2.3.1 Employer

The employer may be divided into those who erect buildings for ownership (private developers) and those who erect buildings for government. Each category may require the services of consultants, depending on the experience and setup of the private developer and the statutory institute (Finsen, 2005: 29).

Bennett and Radosavljevic (2012: 15) refer to the employer as the customer and notes that the customer may be the most committed party to the construction process. They will own and often use the new building or facility and thus have the incentive to have the facility built correctly.

The South African Construction Regulations (South Africa, 2014a: 4) defines the "*client*" as "*any person for whom construction work is being performed*".

2.3.2 Consultants/agents

The agent can be defined as a natural or juristic person or partnership that is not an employee of the employer and that acts on the employer's behalf (SABS, 2004: 4) (SABS

is the abbreviation for South African Bureau of Standards). Finsen (2005: 32) lists the following main categories of consultants:

- architects;
- quantity surveyors;
- engineering consultants;
- project managers;
- health and safety consultants; and
- environmental consultants.

The built environment is regulated under the umbrella of the Council of the Built Environment Act No 43 of 2000. The Built Environment Act defines the built environment professions as the professions regulated by the following professions' acts (McKenzie, 2009: 113, 144; Maritz & Siglé, 2010: 4-5):

- Architectural Profession Act No 44 of 2000
- Project and Construction Management Professions Act No 48 of 2000
- Engineering Professions Act No 46 of 2000
- Landscape Architectural Profession Act No 45 of 2000
- Quantity Surveying Profession Act No 49 of 2000

Some additional acts to take note of, but that are of less importance to the research, are the South African Council for Property Valuers' Profession Act No 47 of 2000 (Maritz & Siglé, 2010: 4) and the Occupational Health and Safety Act No 85 of 1993.

2.3.2.1 Architects

Architects and engineers are responsible for the design aspects of the project (Bowles & Le Roux, 1992: 1). McKenzie (2009: 113) builds on this definition by stating that an architect is a duly qualified professional person whose function is to design and supervise the erection of buildings. The design function usually includes the production of preliminary sketches and subsequent detailed (working) drawings for execution and construction. The architect can also, and usually is appointed to act as the principal agent. Principal agents supervise the erection of a building through the contractor and the main obligation is to ensure that the contractor understands and implements the specifications. A third responsibility of the architect is to obtain approval from authorities on the design.

The profession can be divided further into professionals and candidates of the following (South Africa. Government Gazette, 2000a: 8):

- building, landscape, and interior architects;
- senior architectural technologists;
- architectural technologists; and
- architectural draughtspersons.

Persons may only practice or be named according to the above if registered as such. Very importantly, according to Section 26(3) of the Architectural Act No 44 of 2000 (South Africa. Government Gazette, 2000a: 11), an unregistered person may not:

- perform any kind of work identified for the architectural profession;
- pretend to be or allow him to be perceived as a registered person;
- use the name of any registered person or title listed in sections 18 or 21 of the act;
or
- mislead persons that he/she is registered in terms of the act by any action.

McKenzie (2014: 132) explains the common-law (*ways of appointments*) position of architects by placing them into three categories:

- The **position towards the employers** to design and produce working drawings.
- The **position as principal agent or engineer** during the construction phase of the project. The architect is given either of these titles and authority to act on behalf of the client. An agreement between the employer and the contractor comes to light.
- The position of the architect as an **arbitrator**.

The architect can in many instances be described as the project manager and must have a broad knowledge of the applicable laws and regulations with regard to the design and construction of buildings.

2.3.2.2 Quantity surveyors

As with architects, quantity surveyors have been recognised in South Africa since the Architects and Quantity Surveyors Private Act No 18 of 1927. This has been replaced by the Quantity Surveying Profession Act of 2000. In this act, similar to the architects' act, a person may only use the name quantity surveyor if registered as a professional. The categories listed in the act are (South Africa. Government Gazette, 2000e: 18):

- professional quantity surveyor, and
- candidate quantity surveyor.

McKenzie (2009: 136) defines the quantity surveyor as a qualified professional person whose business consists of the measurement of quantities from drawings by architects

and engineers. The main function of the quantity surveyor (QS) is usually to compile a BoQ from which the contractor can price and compile the cost of the works. In a schedule rate contract the QS may be required to itemise various trades/aspects of the work without detailed quantities. In cost-plus contracts the QS may be required to audit time sheets, delivery notes, and invoices to establish the cost to the client. The QS frequently visits the site to evaluate the value of the work completed for interim and final payment certificates due to the contractor.

Quantity surveying adds value to property development and construction, and cost management. The QS is responsible for advising on all the financial and contractual matters and the management and control thereof (Bowles & Le Roux, 1992: 1). As is the case for any professional, the QS is expected to implement a certain amount of skill and care in the execution of his/her duties and may be held liable if the contrary is found. Past court decisions in England and South Africa suggest that the QS may only be held liable by the party by whom he/she is employed. It is only in certain circumstances that the QS in South Africa may be held liable by a third party e.g. the contractor (McKenzie, 2009: 139).

The QS is the procurement specialist involved with cost analysis, estimates, cost planning, and cost control. The QS usually compiles the procurement document and is in an excellent position to manage the contract.

2.3.2.3 Engineering consultants

With the Professional Engineer's Act No 81 of 1968 (currently the Engineering Profession Act No 46 of 2000), a person may only practice in accordance with their registered fields (South Africa. Government Gazette, 2000c, 14):

- professional engineer;
- professional engineering technologist;
- professional certified engineer;
- professional engineering technologist; and
- candidates for the above mentioned professionals.

At the beginning of the nineteenth century, the engineers were either military or civil engineers. The engineering professional has specialised since then and can be differentiated into the following main categories in building designs. This list includes, but is not limited to, civil, structural, electrical, and mechanical engineers. They can be divided into two main categories, namely those that design the engineering works (consulting engineer) and those that supervise the construction (construction engineer). The

consulting engineer falls into the same category as the architect and the QS, usually referred to as the engineer/principal agent depending on the contract. The latter is sometimes referred to as an engineering contractor and falls under the same category as a building contractor in legal terms (McKenzie, 2009: 142-143).

Structural, mechanical and electrical designs have become too sophisticated and complex for architects to manage. It is therefore undertaken by engineers trained and experienced in their field. The National Building Regulations requires that a registered engineer undertakes designs of this nature. Like the other members of the professional team, the contractual relationship is between the engineer and the employer and his/her liability is usually towards his/her client and not the contractor (Finsen, 2005: 38).

With the complexity of today's building projects, specialised engineers are needed for the various fields. On building projects, the engineer usually fulfils a supporting role to the principal agent or the engineer.

2.3.2.4 Project managers

Traditionally the architect used to manage the building contract. However, with increasingly complex projects, it became apparent that the need to complete a project on time and within budget outweighed the additional cost of a professional project manager. The project manager has to integrate the different professions' programmes and outcomes. The project manager also usually performs additional functions to the other professions, although sometimes forming part of the other professions. The project manager on many occasions fulfils the obligations of the principal agent/engineer (executing) depending on the type of contract (Finsen, 2005: 38).

The Project and Construction Management Professions Act No 48 of 2000 is the regulation governing the profession. A person has to be registered with the South African Construction and Project Managers' Council to practice as a professional project manager (Finsen 2005: 39). The categories in which a person may register in the project and construction management professions are as follows (South Africa. Government Gazette, 2000d: 14):

- professional construction manager;
- professional construction project manager;
- candidate construction manager; and
- candidate construction project manager.

The project manager adds value to a project team through their intimate knowledge of the contract, coordination and communication.

2.3.2.5 Health and safety consultant

The following are all regulated by the Project and Construction Management Professions Act No. 48 of 2000 (South Africa. Construction Regulations, 2014a: 57):

- construction health and safety agent;
- construction health and safety manager; and
- construction health and safety officer.

With the construction regulations of 2014, the health and safety agent has to be appointed from a much earlier stage than in the past. The client has much more responsibility with regard to safe design and the development of a health and safety specification. It further requires the client to ensure that this plan is being implemented (South Africa. Construction Regulations, 2014a: 10-13).

The health and safety agent thus has to be appointed together with the consultant team. He/she becomes part of the team, with the obligation of the initial risk assessment, and identifying potential health and safety risks. He/she prepares the specifications that will form part of the procurement document.

2.3.3 Quasi-judicial (dispute consultants)

A quasi-judicial action is defined by the Free Dictionary as (Farlex, 2015: online):

“The action taken and discretion exercised by public administrative agencies or bodies that are obliged to investigate or ascertain facts and draw conclusions from them as the foundation for official actions.”

The above-mentioned consultants may perform duties of quasi-judicial nature. Apart from determining disputes at first instance or acting as an arbitrator, a registered consultant may be required to act as mediator. The process of mediation is usually less formal than arbitration and the mediator’s opinion is not necessarily final and binding (McKenzie, 2009: 149).

The above-mentioned consultants are governed by their separate constituents and are in a good position to act as mediators or adjudicators. To act as arbitrators, additional accreditation is however needed. Figure 1 summarises the main councils for the built environment.

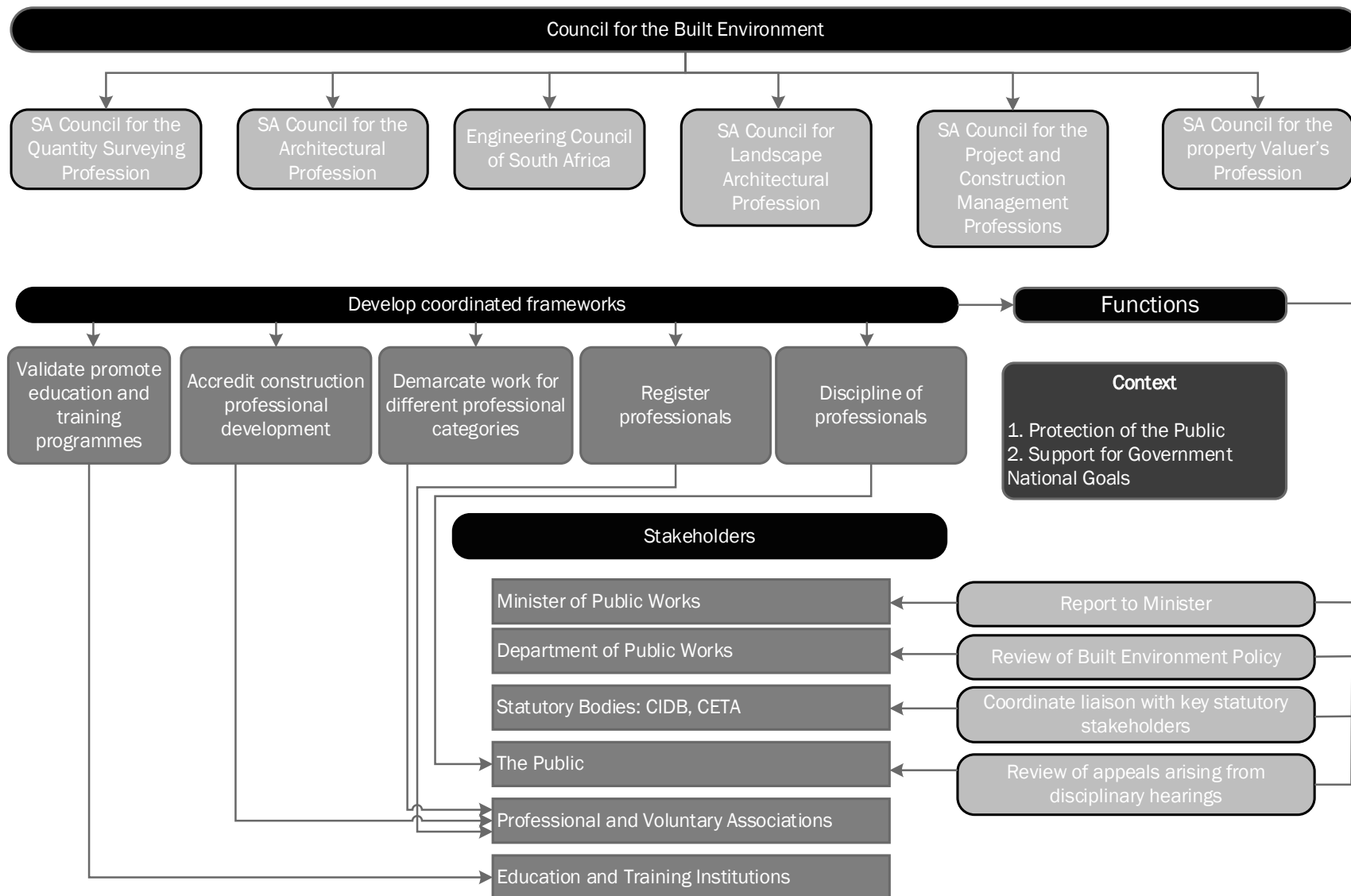


Figure 1: Diagram of Statutory Councils for the Built Environment

Source: (Maritz & Siglé, 2010: 6)

2.3.4 Contractors

In relation to the above, contractors are responsible for the erection of projects designed by the architects and/or engineers (Bowles & Le Roux, 1992: 1). The contractor may further appoint subcontractors to assist in the specialist trades, e.g. air-conditioning installation (Finsen, 2005: 30).

McKenzie (2009: 150-156) categorises the contractor profession into subcontractors, contractors, and home builders. The employer usually employs a main contractor who employs additional specialists (subcontractors) to conduct certain portions of the work. In most building contracts the employer reserves the right of selecting various specialist contractors (nominated subcontractors) through the principal agent. Usually the subcontractor will be paid by the main contractor unless otherwise stated in the contract. The particular clauses affecting this relationship are elaborated on in Chapter 4.

The Construction Industry Development Board (CIDB) Act No 38 of 2000 provides for a construction industry development board to be established and for the integrated strategy for the reconstruction of growth and development of the construction industry. Contractors conducting public sector work has to be registered with the CIDB (McKenzie, 2014: 171).

Section 18 of the Construction Industry Development Board Act enforces that registered contractors (South Africa. Government Gazette, 2000b: 20):

- may not undertake, carry out or complete any construction works or portions thereof for the public sector contracts unless he/she is registered with the CIDB;
- who attempts or carries out such work is guilty of an offence and liable, on conviction, to a fine not exceeding ten per cent of the value of the contract so carried out;
- committing an offence as mentioned above may be instructed to cease all other public sector work; and
- may also be permitted to complete the construction works or portions thereof as determined by the CIDB.

Home builders are regulated under the Housing Consumers Protection Measures Act No 95 of 1998. It makes provision that home builders can register at the National Home Builders Registration Council (NHBC). Section 10(1) provides that no person shall carry on the business of home builders or receive any consideration of any agreement with a housing consumer in respect of the sale or construction of a home unless that person is a registered home builder. Section 10(2) continues that a home builder may not construct a home unless he/she is a registered home builder. A deed of sale concluded between the

housing consumer and a home builder is not necessarily invalid because the builder is not registered with the NHBRC (McKenzie, 2014: 172-173).

From the above can be seen that contractors are also governed by government regulations and ultimately by the construction regulations of 2014.

2.4 TYPES OF CONTRACTS

A few standard types of contracts are in use in South Africa. The type of contract is influenced by the progress of design (availability of information) and the employer's needs.

A sound understanding between the different types of contracts is of fundamental importance to all the parties involved in the construction process. It is also beneficial to devote adequate time and resources to the compilation of proper tender procedures and contract documents which all parties understand and which will reflect the true meaning of the parties. Grey areas usually lead to misinterpretation and can be exploited by one of the parties. The main goal should be the project and not the promotion of individual gain by any party. Identifying the risk properly before construction starts enhances the successful completion of the project. Construction contracts are usually classified according to means of measurement and the method of payment to the contractor by the employer. The different types of contracts offer different degrees of flexibility, levels of incentive, and different levels of risk to the parties (Loots, 1995: 89). Thompson illustrates the characteristics of different types of construction contracts as depicted in the following diagram (Cited: Loots 1995: 90).

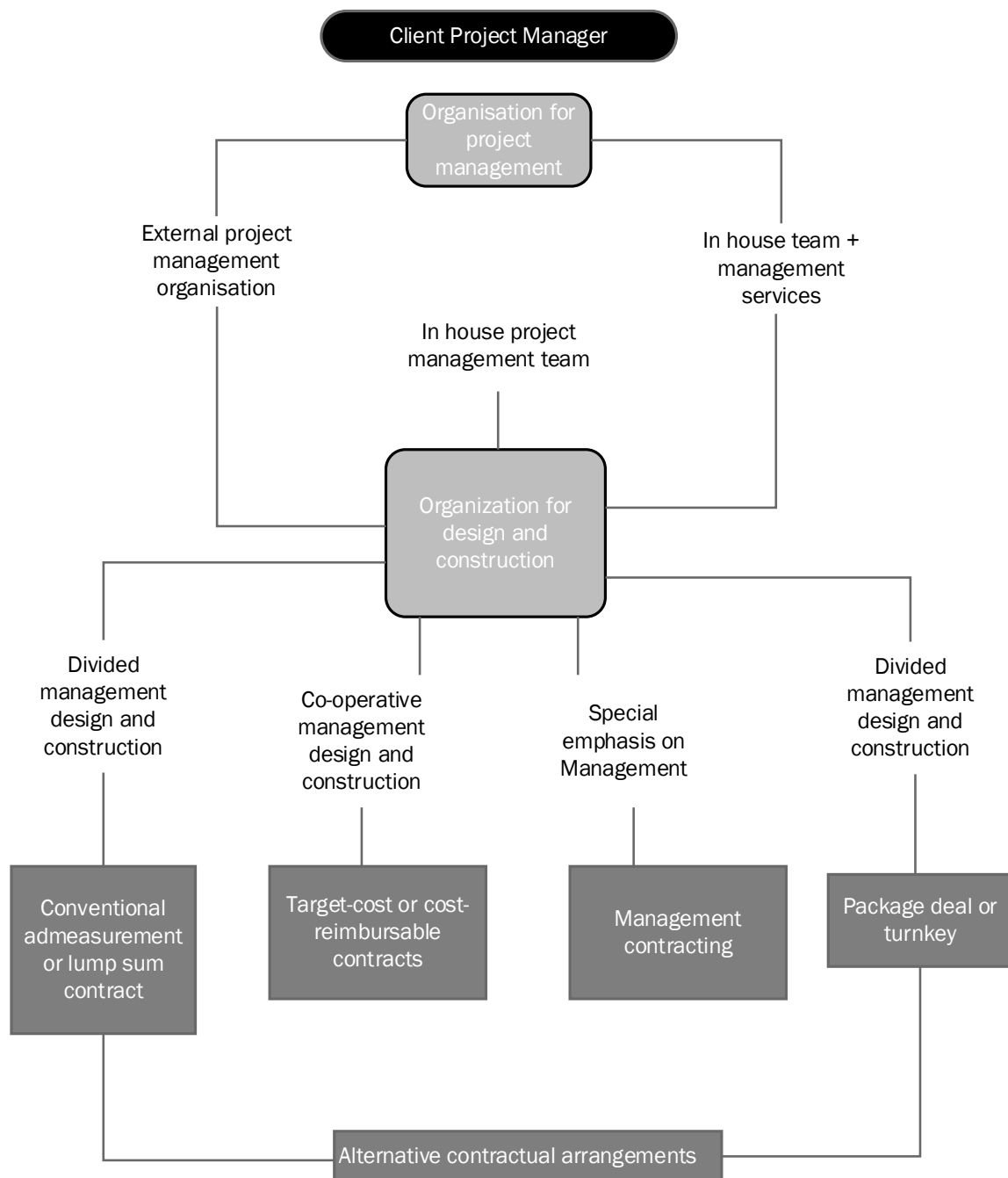


Figure 2: Characteristics of different types of construction contracts

(Cited: Loots 1995: 90)

The contract strategy plays an important part in the choice of the contractual arrangement, taking the project team into account. The project team usually remains responsible for choosing the contract. The main differences between the four main contract categories are listed by Loots (1995: 143) as the following:

- the roles of the parties;
- the emphasis on management;
- the method of payment;

- the allocation of risk; and
- the nature of the work

The type of contract used is influenced by a number of factors as listed above, but can be influenced by the information available, the parties involved, and the applicable country where the work is earmarked to be carried out. The most common types of contracts in use in South Africa are subsequently discussed.

2.4.1 Conventional admeasurement or lump sum contract

With conventional is meant that the consulting engineer or architect is responsible for the design and administration of the construction process. The contractor is usually responsible for the implementation of the construction work (Loots, 1995:144).

A conventional admeasurement contract is the main and well established method of conducting construction contracts and has a certain amount of control over the final cost of the project. These contracts are measurable with a definite scope or works and time limit. It is either measured by the employer through his/her consultant or by the contractor.

2.4.1.1 Admeasure contracts

Loots (1995: 91) categorises these contracts as either with bills of quantities or with schedule of rates. The first usually contains a definite tender sum and the latter rates that are used to calculate the contract sum only at the end of the construction process.

- Contracts with bills of quantities

An accurate document called the bill of quantities (BoQ) is compiled wherein the contractor can price the work. This priced BoQ is used during the construction process for calculating monthly payments to the contractor and/or the subcontractors. From this BoQ the final account is compiled at the end of the project (Maritz & Siglé, 2010: 11).

The priced BoQ or schedule of quantities (SoQ) usually fulfils the following functions (Loots, 1995: 92):

- It forms part of the contract.
- It assists the contractor by indicating with some degree of accuracy, the nature and content of the scope of works.
- It forms a basis on which new rates can be determined if the existing is no longer applicable.
- It forms a platform from which the interim payment certificates can be done.

- It is the exact measure of the work at tender stage and remains so until the final account and the actual quantities are known.
- It can, to a degree, indicate the composition of the tender to persons examining it on behalf of the employer.
- It provides a comparative measurement to evaluate tenders.
- The work programme is compiled on the basis of the BoQ.
- Additional work is determined with reference to the BoQ.

The ultimate quantities can differ from the original contract as a result of unforeseen circumstances, e.g. additional rock excavations, omissions and additions by the employer and/or calculations at the measurement stage. These changes are called variations.

- Contracts with provisional bills of quantities

These are contracts where the BoQs are measured as far as possible to include all the foreseen items that may be needed on the project. However, the quantities are still not finalised because the specifications and drawings are not complete (Maritz & Siglé, 2010: 11).

- Contracts with schedule of rates

Time in these contracts is so critical that a schedule of rates is prepared without quantities. There is not enough information at tender stage to prepare a proper BoQ (Maritz & Siglé, 2010: 11).

Strengths and weaknesses of admeasure contracts

- Strengths (Loots, 1995: 149):
 - widely used and well-known/understood type of contract;
 - flexible for changes in design during design and construction phases;
 - competitive tenders; and
 - good indication of the final costs of the designs and is relatively final.
- Weaknesses (Loots, 1995: 149):
 - resolution of claims can be difficult;
 - limited control is available to the client and the consultant during the construction process;
 - the final price determination of the project may only be finalised long after the project has been finished; and
 - more administration during the construction process by the employer and his/her team.

2.4.1.2 Lump sum contracts (contracts without BoQ)

These types of contracts are usually used on smaller projects with only working drawings and specifications available (Maritz & Siglé, 2010: 11). This is true for most commonwealth contracts as mentioned by Finsen (2005: 20). He elaborates on the matter by mentioning that in some countries where the quantity surveyors are less known (e.g. United States of America), large projects may be performed on these contracts.

It is important for these types of contracts that all the necessary information is available for the contractor to price the work. This usually implies that all design work is complete and final. It is held by the courts that a lump sum price is an undertaking to accomplish a definite result for a fixed sum of money. This contract can supply plant and/or material, particular unit processes and package deals, where the contractor is responsible for the design and the implementation of the design. These contracts can, and usually is paid in stages depending on the size of the project. Any document showing the rates and/or units has no legal effect and is only used as a guide when valuing work progress and to assist in any variations that may occur (Loots, 1995: 91).

Strengths and weaknesses of lump sum contracts

- Strengths (Loots, 1995: 149):
 - there is a high degree of certainty of the final costs;
 - it allows for keen pricing during tender stage; and
 - little administration by employer during construction.
- Weaknesses (Loots, 1995: 149):
 - it does not allow for many changes during the construction process;
 - the lowest tenderer may under quote which may lead to the contractor cutting costs and quality; and
 - the employer and/or design team have limited opportunity for involvement in the management of construction.

2.4.2 Target-cost or cost-reimbursable contracts

Loots (1995: 142) divides this type of contract into three separate contracts, distinguishing between the incentives and cost limitation. The first two contracts listed below, however, are very similar and are discussed as being the same:

- cost-reimbursable or contracts;
- cost-plus contracts; and
- target-cost contracts.

2.4.2.1 **Cost-plus contracts (Cost reimbursed)**

Also known as cost-reimbursement contracts, these contracts are legal agreements that allow a contractor to be paid for his/her expenses plus a mark-up on the costs. The contract may allow for pre-determined cost limits and some variations on these contracts are available, e.g. cost- plus fixed fee or cost-plus with incentives fees. These contracts usually do not provide the contractor with incentives to keep the costs low. If cost is not that important and time and quality is of an essence, these contracts can be useful (Maritz & Siglé, 2010: 11).

The following strengths and weaknesses can be listed:

- Strengths (Loots, 1995: 149-150):
 - it is a flexible method of contracting;
 - fair payment, good control of risks and employer involvement is possible;
 - joint planning is facilitated; and
 - knowledge of actual costs of changes is to the employer's benefit.
- Weaknesses (Loots, 1995: 150):
 - little incentive is provided for the contractor to perform efficiently;
 - an estimate of the final price is unknown at the tender stage; and
 - administration may be unfamiliar to all the parties involved and intense costing procedures may be involved during the construction process.

2.4.2.2 **Target-cost contract**

The target-cost contract goes further by adding an incentive mechanism to promote efficient working by the contractor and hence a reduction in the end cost. A preliminary cost is estimated by the contractor at tender stage. The difference between the final cost and the tendered amount is shared between the contractor and the client in the way defined by the incentive mechanism (Loots, 1995: 142):

- Strengths (Loots, 1995: 150):
 - the employer maintains good control over the risks;
 - a high level of flexibility is allowed for design changes;
 - both parties share a common identity of interest in minimizing actual costs;
 - it allows for an active management role by the employer and/or his/her agent;
 - the facility to require full supporting information during the tender process together with proper assessment ensures that resources are adequate and that methods of construction are agreed upon; and

- knowledge of actual costs is beneficial to estimating, and control and design changes.
- Weaknesses (Loots, 1995: 150):
 - employer involvement is essential, but must be adapted from the conventional;
 - increased administration costs with regard to costs during the construction process;
 - no certainty on the final price of the project; and
 - all parties have to develop their own understanding of their own managerial involvement on the project.

In cost plus contracts the end product is fairly unknown and they are usually used on modest projects. The scope of works is still fairly unknown when the work starts. It allows for design work to be done during the construction process, but adds administration to the construction process. This contract is fairly unknown by most consultants and not generally used in South Africa. This type of contract is not considered in this study.

2.4.3 Managing contracting

The management of contracting is an arrangement where the employer appoints an external organisation to manage and co-ordinate the design and construction of a project. The management contractor becomes part of the employer's team as a consultant to the employer on the construction processes. The contractor advises the employer on the construction processes and the employer is therefore more involved through his/her project manager. The three main areas of these types of contracts are (Loots, 1995: 147,148):

- The emphasis is on management which is a separate discipline contractually.
- The payment method is usually a cost-reimbursable plus fee, but the construction contracts led by the management contractor is usually a lump sum or admeasurement. An overall tender price for the complete works is unlikely at the start of construction.
- The risk is between the employer's management contractor and the construction contractor. The management contract is relatively risk free for the client, but may be exposed to a higher construction contract than usual. The overall project risk may however be reduced due to the potential to avoid time overruns, cost claims and the potential to impose a discipline on design.

The following strengths and weaknesses can be listed:

- Strengths (Loots, 1995: 150-151):

- the possibility of saved time by overlapping design and construction processes more than is the norm;
- it can limit the amount of inflation;
- other opportunities of time saving may be experienced due to the experience of the managerial personnel and the prevention of bottle necks;
- flexibility for design change during the construction;
- discipline can be imposed on the employer's decision-making procedures and the management of design;
- improved forecasting of the final cost and completion date; and
- interfaces between trades is improved.
- Weaknesses (Loots, 1995: 151)
 - the employer may be exposed to higher risk from the construction contractor;
 - risk toward the project cost is also higher due to the absence of a tender price;
 - roles and responsibilities have to be clarified properly;
 - an amount of duplication administration and personnel may be experienced during the construction process; and
 - the construction process control by the management contractor may be limited because the responsibility lies with the construction contractor.

In short, this type of contract allows for the above-mentioned contracts to be used. The main difference is that the client now has an extra advisor that guides him/her through the process of appointing a project team. This type of contract is usually used on large and complex projects. Package deal or turnkey projects are discussed next.

2.4.4 Package, design-and-build and turnkey projects

These contracts provide a one stop service to the client. The appointed contractor/consultant is responsible for the design and construction of the project. The term *package* usually refers to commercial projects, design-and-build to the construction/renovation industries, and the turnkey project usually refers to engineering projects (Maritz & Siglé, 2010: 11).

The Federation Internationale des Ingenieurs-Conseils (FIDIC) adds that in the usual arrangements for a turnkey project, the contractor carries out all the engineering, procurement and construction (EPC), providing the client/employer with a ready to operate facility (the turn of a key) (FIDIC, 1999a: foreword).

- Strengths (Loots, 1995: 151):

- a firm price can be obtained at an early stage;
- time can also be shortened through design and construction overlaps;
- the employer deals with only one firm;
- the design is usually more practically implementable;
- less chance of claims; and
- the responsibility for defects is clear.
- Weaknesses (Loots, 1995: 151):
 - the employer's interest may not always be the main priority;
 - the employer should commit himself to the entire package early in the process;
 - the employer is in a weak position to negotiate change;
 - the extent of competition is likely to be reduced;
 - in-house practices of the employer may constrain the design-construct firm; and
 - the employer may lose control over detail.

Managing contracts allows the client to only deal with one appointee. This appointed firm has to make sure that the design and implementation is done according to the client's requirement. The appointed company has to be able to establish exactly what the client's needs and requirements are.

2.4.5 Other contracts

The following contracts are slightly different from the above-mentioned contracts and are discussed separately.

- Labour-only contracts

Finsen (2005: 25) lists an additional contract, the labour only contract. One can categorise this contract under target-cost or cost-reimbursable contracts. This contract does not form part of the 'entire' contract spectrum. The above-mentioned contracts are all contracts in which the contractor undertakes to erect the works in its totality. The main difference to the other contracts is the manner in which the price is determined. These contracts are mostly used in the unsophisticated market, or where the contractor is undercapitalised. The contract is thus mostly based on labour and time. These contracts can be divided further into lump-sum contracts and rate per day, week or month contracts. The main difference is that the lump-sum contracts have the effect that the contractor stays independent from the employer and takes responsibility for his/her workers, insurances, health and safety, etc. The rate contract has the effect that the contractor becomes an employee of the employer. The employer now takes responsibility for the works.

- Building by direct subcontractors

In some cases, the employer embarks on a building project on his/her own by doing away with the main contractor and appointing main tradesmen or sub-contracts directly e.g. carpenters, plumber etc. The aim of the employer is to save money by taking on the administration portion of the work. There is no standard contract for these types of contracts and usually, when altering certain contracts, it might be found to be adequate. These types of arrangements should only be undertaken when the works are very modest and uncomplicated projects. Again, most of the risks and obligations regarding health and safety rest on the employer (Finsen 2005: 26).

It can be seen from the above that there are many arrangements when it comes to building and associated contracts. There are just as many types of contracts between the client and his/her consultants. When using standard forms of contracts in South Africa, there are usually standard contracts for consultants as well. An example of this can be the use of the Professional Consulting Services Agreement Committee's (PROCSA). This contract is usually chosen when using a standard document of the Joint Building Contracts Committee (JBCC) between the client and the contractor.

2.5 CONSTRUCTION CONTRACTS IN SOUTH AFRICA

The following is a list of contracts in use in South Africa. The aim of this list is to identify and understand which contracts are commonly used in South Africa. Each contract listed below provides the country of origin in brackets. The list was adapted from a list given by Putlitz at a JBCC seminar (2013):

- JBCC – Joint Building Contracts Committee (South Africa)
- GCC – General Conditions of contracts (South Africa)
- NEC – New Engineering Contract (United Kingdom)
- FIDIC – The Fédération Internationale des Ingénieurs-Conseils (Europe)
- JCT – Joint Contracts Tribunal (United Kingdom)
- COLTO – Committee of Land Transport Officials (South Africa) – Now incorporated in GCC (SAICE, 2015: online) (SAICE is the abbreviation for South African Institution of Civil Engineering)
- Other standard and bespoke agreements – Ad-hoc contracts and contracts developed by various institutions, e.g. contracts by the Chartered Institute of Building contracts (CIOB) (United Kingdom) (CIOB, 2016: online) or the National Home Builders Registration Council (NHBRC) (South Africa) (NHBRC, 2016: online).

The standard of uniformity published by the CIDB narrows the contracts down to four suites of contracts for construction work (CIDB, 2015a: 3-4):

- General Conditions of Contract for Construction Works (Third Edition 2015) as published by the South African Institution of Civil Engineering.
- International Federation of Consulting Engineers (FIDIC) suite of contracts. In particular Conditions of contract for Construction for Building and Engineering Works designed by the employer (Red Book) (1999)
- JBCC Principal Building Agreement (Edition 6.1: March 2014) as published by the Joint Building Contracts Committee.
- NEC3 Engineering and Construction Short Contract or NEC3 Engineering and Construction Contract (referred to as NEC)

With the main contracts identified, their origin and application may be determined. Contracts are developed from different directions or angles in the construction industry to meet the different needs therein, e.g. engineering, architecture and contractor needs.

2.6 CONSTRUCTION INDUSTRY DEVELOPMENT BOARD (CIDB)

The South African Parliament established the CIDB to provide leadership to stakeholders and to stimulate sustainable growth, reform and improvement of the construction sector for effective delivery and enhancing the industry's role in the country's economy, while maintaining globally competitive standards (CIDB, 2015b: online).

Standardisation is suggested by the CIDB in its *Best Practice Guideline #2* to address many challenges within the South African construction industry. The quest is to educate all the parties involved in construction in South Africa. It mentions that contracts should continue developing through the continual consideration of the industry and its parties. Balance is required, considering the actual needs and use of building contracts in an ever-changing environment.

"Whilst the ideal of standardisation on one system of standard forms of contracts for all engineering and construction works in South Africa is, probably, just as illogical as it is for each client to have its own form of contract; a balance has to be found between these two extremes" (CIDB, 2005b: 1).

The CIDB also promotes the simplification of contract documents, streamlining of payment procedures and surety arrangements as well as the continued review of contract documentation (CIDB, 2005a: 13).

2.6.1 Recommended contracts – a CIDB perspective

As mentioned above, the CIDB recommends four main contracts, namely FIDIC, GCC, JBCC and NEC3 (CIDB, 2005b:2).

According to the Construction Industry Development Board Act, No.38 (South Africa. Government Gazette, 2000b:18), all contractors that want to conduct public sector construction work should be registered with the CIDB. Although this is not needed for the private sector, it does, however, suggest that the CIDB acts as the governing body on which tenders and construction contracts are based. The best practice guidelines published by the CIDB tries to guide contractors and consultants in the way in which documents should be developed.

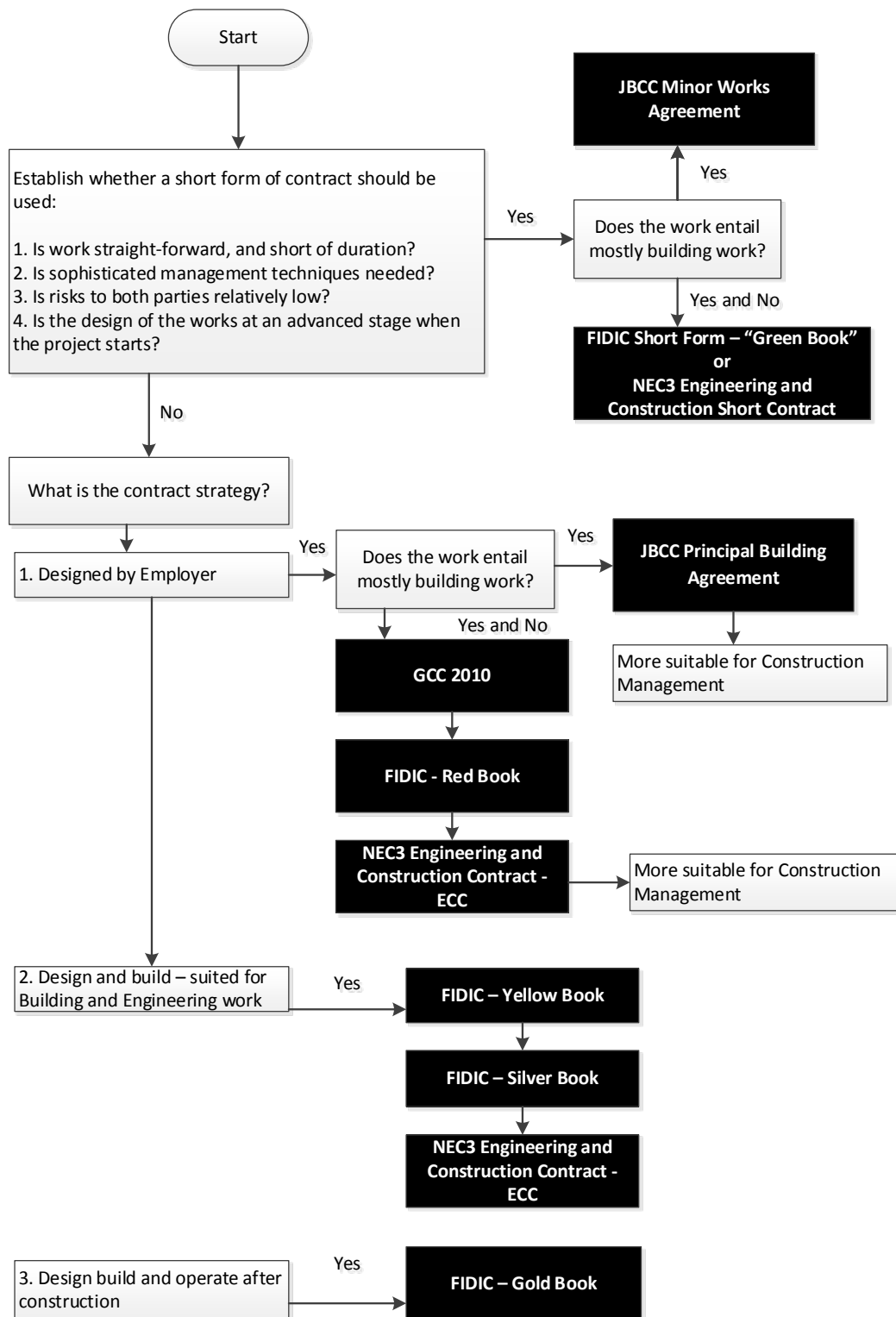


Figure 3: Flow diagram on choosing a suitable contract. Altered and based on figure 2 of CIDB’s Best Practice Guideline #2.

(Source: CIDB, 2005b: 13)

The flowchart starts by establishing the complexity of the work. If the work is simple, minor or repetitive, thoroughly designed, has a low risk factor and consists predominantly of building work, the JBCC Minor Works Agreement is suggested. If the work does not meet the criteria stipulated above, the main agreements of FIDIC, NEC3, GCC and JBCC

contracts are suggested. The JBCC contract is the only dedicated building contract of the above-mentioned contracts.

For larger and more complex projects all four contract families may be used, with the JBCC specialising in building projects (CIDB, 2005b). In South Africa the organs of state generally use the JBCC.

2.6.2 CIDB-Indicators

The following are based on the research done annually by the CIDB on the construction industry. The 2015 results were published in a summary document and are not indicative of the actual use of the applicable contracts, thus the 2014 information was used. The following results from the CIDB construction industry indicators as tabled in Table 1 below:

Table 1: Type of contract used for different project types 2014

Project type	% Contract document type usage for each project type					Total
Residential building	20%	-	68%	8%	4%	100%
Non-residential building	13%	1%	83%	0%	3%	100%
Civil works	76%	4%	6%	10%	4%	100%
Mechanical works	27%	13%	10%	23%	27%	100%
Electrical works	27%	20%	29%	18%	6%	100%
Special works	31%	6%	44%	13%	6%	100%
Contract document type	GCC	NEC	JBCC	FIDIC	OTHER	
% Projects with contract document significantly amended	31%	36%	24%	33%	18%	

(Source: Marx, 2014: 16)

The above results give a broad overview of the use of the standard contracts prescribed by the CIDB. It confirms the relevance of the four main contracts. It also gives an indication of the percentage of the standard documents that were amended to suit the specific requirements of the particular project. The JBCC form of contract was the most popular for residential and non-residential building projects. The GCC was the most popular for civil contracts. The other two contracts listed are the FIDIC and NEC contracts. Interestingly, with the other engineering trades, the percentages are spread relatively evenly between the four main contracts.

2.7 INTRODUCTION TO THE FOUR MAJOR CONTRACTS

As established above, different contracts are used in South Africa and choosing an appropriate one depends on the type of work that has to be done. The research specifically

focused on building contracts and thus the four contracts listed in Table 1 were investigated further.

Table 2: Condensed summary of key features of the four contracts endorsed by the CIDB.

Allowance - Consideration by the contract	FIDIC - Red Book	GCC 2010	NEC - ECC	JBCC - PBA
Contract strategy				
- Construction management	No	No	Yes	No
- Design by employer	Yes	Yes	Yes	Yes
- Management contract	No	No	Yes	No
- Design and build	No	No	Yes	No
- Develop and construct	No	No	Yes	No
Pricing strategy				
- Activity schedule	No	Yes	Yes	Yes
- Conventional admeasurement or lump sum contract	Yes	Yes	Yes	Yes
- Cost reimbursable, target cost	No	No	Yes	No

(Adapted from: CIDB, 2005b: 14).

From Table 2 it can be seen that the NEC Engineering Construction Contract (ECC) is the only contract that incorporates all the contracting and pricing strategies in the contract. As seen above, the other contracts provide for the strategies, but outside the contract itself.

2.7.1 Federation Internationale des Ingenieurs-Conseils (FIDIC) 1999

In 1913, three national engineering associates within Europe founded the FIDIC (French acronym for the International Federation of Consulting Engineers) (FIDIC, 1999a). The number of associated countries has increased to 97 with its main secretariat stationed in Switzerland. South Africa joined the FIDIC community in 1959 (FIDIC, 2015: online).

FIDIC has the following family of standard forms of contracts (CIDB, 2005b: 2):

- Conditions of Contract for Construction (Red Book)
- Conditions of Contract for Plant and Design-Build (Yellow Book)
- Conditions of Contract for EPC/Turnkey Projects (Silver Book)
- Short Form of Contract (Green Book)
- The Design-Build-Operate Contract (Gold Book)

Lacking a subcontract specifically for subcontractors, FIDIC launched a subcontract for construction contracts for works designed by the employer in 2011, namely the Conditions of Subcontract for Construction (FIDIC, 2012: 10).

The above-mentioned documents are structured around 20 main clauses, adapted for each contract. The different books are discussed briefly below (FIDIC, 1999a).

In the context of the CIDB recommendations and comparison purposes of this study, the Conditions of Contract for Construction (Red book) is used as baseline.

- **Conditions of Contract for Construction (Red book)**

Intended to be used for building and civil engineering contracts which the employer (client) designs, it provides certain areas to be designed by the contractor as is specified in the contract. (FIDIC, 1999a: foreword). The CIDB (2005b: 4) states that the employer carries quite a number of risks when using the red book. The parties in the red book are as follows (FIDIC, 1999a:2):

- The employer is the client or end-user of the building.
- The engineer is the employer's representative and does not necessarily have to be an engineer.
- The contractor becomes the implementing agent.

In this research the FIDIC Red book will be considered and compared to the other three contracts. The core clauses of the contract are:

Table 3: List of Clauses of the FIDIC “Redbook”

FIDIC - 20 Main Clauses			
Clause number	Clause heading	Clause number	Clause heading
Clause 1	General provisions	Clause 11	Defects liability
Clause 2	The employer	Clause 12	Measurement and evaluation
Clause 3	The Engineer	Clause 13	Variations and adjustments
Clause 4	The contractor	Clause 14	Contract price and payment
Clause 5	Nominated subcontractors	Clause 15	Termination by employer
Clause 6	Staff and Labour	Clause 16	Suspension and termination by contractor
Clause 7	Plant, materials and workmanship	Clause 17	Risk and responsibility
Clause 8	Commencement, delays and suspension	Clause 18	Insurance
Clause 9	Test on completion	Clause 19	Force majeure
Clause 10	Employer's taking over	Clause 20	Claims, disputes and arbitration

(Source: FIDIC, 1999a: index)

- **Commentary**

Binnington (2005: online), in an article “*FIDIC 1999 - Is this meeting the needs of the construction industry*”, evaluates the application of the FIDIC document in South Africa. Binnington highlights some of the clauses that pose risks for both the contractor and the employer. He concludes that, although the document is lengthy (over 30 000 words), it holds true to core clauses of the original 1999 edition. Importantly, he denotes that several clauses will have to be amended, but that the FIDIC 1999 family of contracts is suitable to be implemented without going through a major learning curve.

2.7.2 General Conditions of Contract for Construction Works (GCC)

Contrary to the FIDIC suite of contracts, only one form of contract is available, which simplifies the search for an appropriate form to use in building projects.

The General Conditions of Contract for Construction Works 2004 replaced the GCC 1990 and COLTO 1998, satisfying the Construction Industry Development Board's requirements for a standard form of contract. The General Conditions of Contract for Construction Works, second edition, 2010 (known as GCC 2010) replaced the 2004 version by clearing up responsibilities and providing for a wider range of construction works. According to the GCC 2010, it is appropriate for civil, mechanical, electrical and building projects or a combination of the above. It continues stating that the contract document should be formatted in accordance with the CIDB prescriptions to the standard uniformity construction procurement method in conjunction with SANS 1921 (SAICE, 2010: iii).

The latest version was published in 2015 and replaced the 2010 version. By clarifying certain contract administration procedures and refining some of the risk appropriation clauses, amongst other things, the new GCC third edition 2015 states that the contractor's time risk allowances must be indicated on the programme of works. The contractor may now also suspend the contract if the client fails to pay due payment certificates. The contract also allows the contractor to claim for delay and cost due to excepted risks as an entitlement to the contractor. A variable performance guarantee is added to the list of securities and it allows for the selection of inflation indices that are appropriate to the type of works to be carried out. Simpler and more concise wording is used with the aim to be relevant in the future and will provide supportive contract administration and the equitable appropriation of risks. The GCC 3rd Edition 2015 is to be used with the tender documentation format as prescribed by the CIDB (SAICE, 2015: online).

- **Conditions of Contract**

The contract focuses on design by the employer and does not cater for design and build contracts. Only one form of contract exists with the provision made for nominated and/or selected subcontractors. The representative/agent of the client/employer is named the engineer. The contractor is responsible for all subcontractors. Provision is however made for the appointment of subcontractors in conjunction with the employer, if needed. The GCC 2010 has strict time frames with regard to claims and it provides for dispute resolution by either a mediator or adjudicator, failing which will result in arbitration or litigation as provided in the contract (CIDB, 2005b: 6). The core clauses of the GCC 2015 are listed in the table below:

Table 4: List of Clauses of the GCC

GCC - 2015	
Clause number	Clause heading
Clause 1	General
Clause 2	Basis of contract
Clause 3	Employer's agent
Clause 4	Contractor's general obligations
Clause 5	Time related matters
Clause 6	Payment and related matters
Clause 7	Quality and related matters
Clause 8	Risks and related matters
Clause 9	Termination of contract
Clause 10	Claims and disputes

(Source: SAICE, 2015: online)

- **Supporting bodies**

SAICE acknowledges the following organisations for their input that also endorses the GCC 2015 (SAICE, 2015: iii):

- Consulting Engineers South Africa
- Electrical Contractors' Association of South Africa
- Institute of Municipal Engineers of Southern Africa
- South African Black Technical and Allied Careers Organisation
- South African Federation of Civil Engineering Contractors
- South African Institute of Electrical Engineers
- South African Institute of Mechanical Engineers

- **Commentary**

The General Conditions of Contract (GCC) has been developed within South Africa for South Africa. Traditionally the contract was only concerned with engineering projects. The 2010 version stated that it is now more equipped than ever to cater for building projects. With eight new clauses and thirteen clauses altered, the 2015 version built on the above statement (SAICE 2015, online).

2.7.3 New Engineering Contract (NEC) Suite of Standard Contracts

The New Engineering Contract (NEC) is a multidisciplinary set of contracts for building as well as engineering projects. It is a suite of contracts that originated in the UK, which may be used in South Africa (CIDB, 2005b: 2).

The NEC was first published in 1993, which consisted of 10 documents with the aim to stimulate rather than frustrate **good management**. In 1995 the second edition, the NEC2

was published. Other documents were added to the suite of contracts during the years. Currently the suite contains 39 documents with the latest published version being that of April 2013. (NEC, 2015: online).

The NEC's objectives and unique characteristics of the contracts are the following (NEC, 2015: online):

- Management of the relationship between the two parties is stimulated.
- It may be used in a wide variety of commercial situations, for a wide variety of types of work and in any location (flexibility).
- They are written in plain English, clear and simple to understand.
- Choosing a contract form.

The NEC developed an organogram to assist in choosing the appropriate contract. It explains how the different documents fit together and which box set should be used for which purpose (NEC, 2015: online).

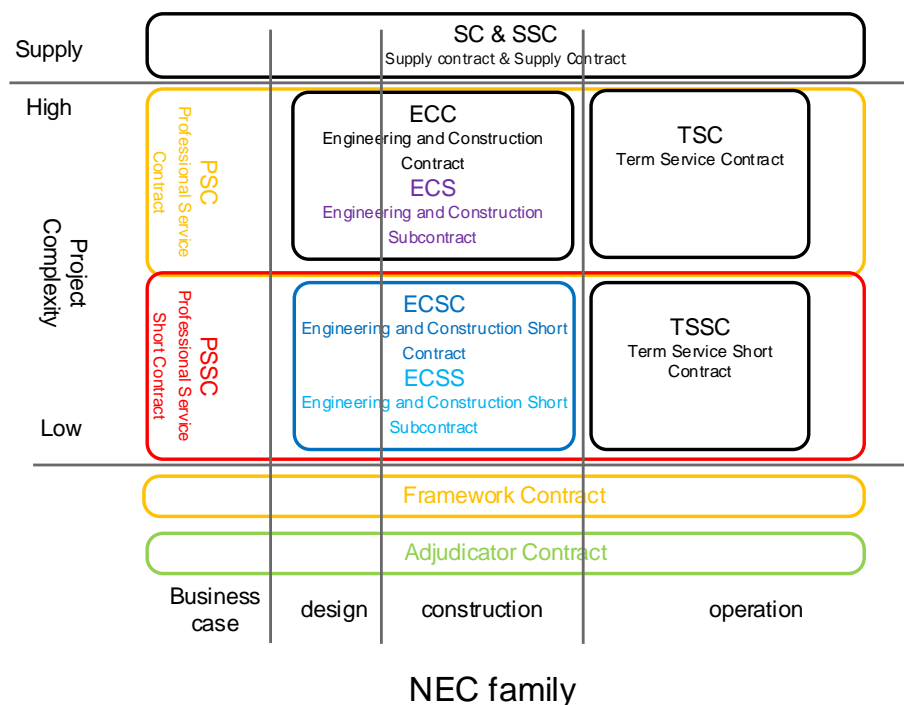


Figure 4: NEC Organogram of documents

(Source: NEC, 2015: online)

The organogram assists the parties when choosing the appropriate contract and it summarises the paragraphs that follows.

The NEC set of contracts may be placed into the following three main categories:

- Delivery of Work (Construction contracts)

- Service Delivery
- Supply of Material and Goods

Because of the bulk of the number of documents in the suite of contracts (39 in total), the research focused on the 'work' contracts. The following may be listed under 'work' contracts:

- NEC3 Engineering and Construction Contract (ECC) – A contract aimed at the appointment of a contractor who will construct the works which was designed either by the contractor or an independent consultant.
- NEC3 Engineering and Construction Short Contract (ECSC) – This contract is aimed at simple low risk work to be done.
- NEC3 Engineering and Construction Subcontract (ECS) – To be used in conjunction with the ECC.
- NEC3 Engineering and Construction Short Subcontract (ECSS) – To be used in conjunction with either the ECC or the ECSC.

Supporting and associated guidance notes for each of the contracts have been provided. These guidance notes contain flow charts detailing exactly what procedures should be followed and by whom throughout the life cycle of the project (NEC, 2015: online). The study focused on the ECC contract.

- **Conditions of contract for ECC**

In narrowing the research scope further, it was assumed that the NEC3 Engineering and Construction Contract (ECC) is the best comparable contract to the other three main contracts identified above. As mentioned above, the ECC has its own set of guidance notes (NEC-GN) and flow charts (NEC-FC). This contract is divided into four schedule items (NEC, 2013a: content):

Table 5: Structure of the NEC engineering and construction contract (ECC)

NEC		
Clause number	Schedule 1 : Core Clauses	Supplementary schedule of option
Clause 1	General	Schedule 2 : Main option Clauses - with six options
Clause 2	The contractor's main responsibilities	- Schedule 3 : Dispute resolution - Two options
Clause 3	Time	- Schedule 4 : Secondary options Clauses with - 17 optional Clause
Clause 4	Testing and defects	
Clause 5	Payment	
Clause 6	Compensation events	
Clause 7	Title – pertaining to material and plant on site (to whom does it belong?)	
Clause 8	Risks and insurance	
Clause 9	Termination	

(Source: NEC, 2013a: index)

Other documents that will form part of the tender and eventually the contract are (NEC, 2013b: 6):

- the schedule of cost components;
- contract data formats;
- the works information;
- site information; and
- documents resulting from choosing secondary options

The design of the ECC is based on flow charts of procedures to be followed by parties named in the contract. As stated earlier, effective management of the works is promoted. Foresight and collaboration to mitigate problems and risks timeously and effectively is promoted. Accountability is promoted through clear division of function and responsibility (NEC, 2013b: 2 - 5).

The ECC has two main differences to conventional contracts (NEC, 2013b: 5):

- subcontractors cannot be nominated; and
- the financial monitoring aid may either be the bill of quantities or an activity of schedule (a list of items with lump sum prices).

- **Commentary**

Binnington (2005: online) mentions four contributors, who in his opinion, contributed to the success of the NEC suite of contracts. The first being the fact that there is a wide range of procurement options; secondly it has a number of innovating aspects which promotes co-operation between the

contracting parties. Thirdly, the approach toward any change in scope must be based on actual market related prices at that stage instead of the tendered prices as probably the most radical of the lot. The forth aspect given is that of the programme being the dominant control feature during the project life cycle. It actively promotes the contractors to show the time risk as they are realised. This promotes fast and efficient problem solving procedures. Binnington continues by stating that the contract is a complex system regulating the obligations and rights of the parties and training on the system is prescribed for prospective contractors and subcontractors. With regard to the employers who are not regularly involved in construction projects with large complex contracts, the NEC suite of contracts may become somewhat daunting (Binnington, 2005: online).

The NEC, specifically the ECC, does not constitute conventional contracts. The NEC's approach is to promote effective management using flow charts. It promotes involvement from all parties at all times, which may lead to higher management costs, which on the other hand may prevent many other uncertainties. At first glance, the ECC with its guidance notes and flow charts can be a bit overwhelming. These three documents exceed 350 pages and only forms one of seven contracts (NEC, 2013a).

2.7.4 Joint Building Contracts Committee (JBCC)

The Joint Building Contracts Committee (JBCC) was founded in 1972 and is supported by the major professional and contracting bodies in the building industry in South Africa. The constituent bodies which form the JBCC are (JBCC, 2014b: preface):

- Association of Construction Project Managers
- Association of South African Quantity Surveyors
- Consulting Engineers South Africa
- Master Builders South Africa
- South African Black Technical and Allied Careers Organisation
- South African Institute of Architects
- South African Property Owners Association
- Specialist Engineering Contractors Committee

As with the FIDIC and the NEC contracts, there are multiple booklets or types of contracts available in the JBCC series. There are also accompanying forms to be used during the construction process. The different contracts listed below have their own particular

contract data document, which together with the agreement document, forms the contract (JBCC, 2015: online):

- Principal Building Agreement (PBA)
- Nominated/Selected Subcontract Agreement (N/S)
- Minor works Agreement (MWA)

The Principal Building Agreement (PBA) is a comparable medium for the research and is discussed further below.

- **Principal Building Agreement (PBA)**

First published in 1991, the contractual documents were replaced by the Series 2000 set of documents in 2000 and again with the latest version published in March 2014. The document comprises 30 clauses in comparison with its 2007 version which comprised 42 clauses.

The PBA is suitable for all building contracts and may be used with a Bill of Quantities, or a Schedule of Rates and drawings. The PBA is synchronized with the N/S Subcontract Agreement to appoint nominated and selected subcontractors binding them to same conditions as the principal contractor. In addition to being a legal document, the content has been structured as a checklist to administer the execution of the works and to minimise potential disagreement (JBCC 2015: online).

The agreement is made up of nine sections (similar to the GCC), which address the information required by the SANS 294:2000 document. Within these sections the different clauses are sorted, in total 30 clauses.

Table 6 illustrates the eight main sections of the contract with its different clauses (JBCC, 2014b: 1).

The contract mainly focuses in building projects, of which the employer/client is responsible for the design. However, the nominated and selected subcontractors can carry design responsibilities, which are ceded by the contractor. With the selected subcontractor, the main contractor is fully responsible. With the nominated subcontractor this responsibility diminishes slightly. Forms for these appointments are available. Provision is made for adjustment of the contract, a value, and completion date. Time frames for these claims have to be met to enable the contractor to be compensated. It provides for dispute resolution by either arbitration or mediation, failing which arbitration or litigation as provided in the contract. In some 'state' contracts litigation is preferred (CIDB, 2005b: 6).

The JBCC comprises the following clauses divided into its eight main categories:

Table 6: Structure of the JBCC Principal Building Agreement 2014

JBCC PBA - Sections and Clauses	
Section	Clause
1. Interpretation	
	Clause 1.0: Interpretation
	Clause 2.0: Law, regulations and notices
	Clause 3.0: Offer and acceptance
	Clause 4.0: Assignment and cession
	Clause 5.0: Contract documents
	Clause 6.0: Employer's agents
	Clause 7.0: Design responsibility
2. Insurance and security	
	Clause 8.0: Works Risk
	Clause 9.0: Indemnities
	Clause 10.0: Insurances
	Clause 11.0: Security
3. Execution	
	Clause 12.0: Duties of the parties
	Clause 13.0 : Setting out
	Clause 14.0 : Appointment of Nominated subcontractors
	Clause 15.0: Appointment of Selected subcontractors
	Clause 16.0: Direct contractors
	Clause 17.0: Contract instructions
4. Completion	
	Clause 18.0: Interim completion = N/S Subcontractors Agreement
	Clause 19.0: Practical Completion
	Clause 20.0: Sectional Completion
	Clause 21.0: Defects Liability Period and Final Completion
	Clause 22.0: Latent Defects Liability Period
	Clause 23.0: Revision of the date of practical completion
	Clause 24.0: Penalty for late or non-completion
5. Payment	
	Clause 25.0: Payment
	Clause 26.0: Adjustment of the contract value and Final Account
	Clause 27.0: Recovery of expense and/or loss
6. Suspension and termination	
	Clause 28.0: Suspension by the contractor
	Clause 29.0: Termination
7. Dispute resolution	
	Clause 30.0: Dispute resolution
8. Agreement	

(Source: JBCC, 2014b: 1)

- **Commentary**

Pulitz (Construction World, 2016: 8-9) indicates that the subcontractor, even if appointed properly, is often abused by the main contractor and only tends to read the contract when things go wrong. He also indicates that even if a substantial number of people deal with the JBCC suite of contracts, many have limited knowledge of contractual procedures as well as the common use thereof.

The JBCC has been developed within South Africa for South Africa, specifically for building contracts. Through this study the latest version of the JBCC PBA was evaluated and the potential management clauses identified.

2.8 CHAPTER CONCLUSION

Contracts are essential tools for organising the relationships between the different parties and risk should be presented to the management of construction companies for consideration (Othman & Harinarain, 2009).

This chapter started by setting some basic rules and characteristics of building contracts. It was concluded that a building contract is an agreement between two parties for the supply of a product; in this case, a building in exchange for a monetary refund.

The main role players were identified and it was learned that building construction requires many specialists that are governed by their different constituents. It was established that only registered professionals may do their allotted work within their described jurisdiction.

It was also established that there are many types of contracts which are influenced by the role players, the information available at the time of signing the contract, and the scope of works.

The Construction Industry Development Board (CIDB) was established by the South African Government to promote growth in the South African construction industry. It promotes standardisation and promotes four main contract suites. They are:

- JBCC – Joint Building Contracts Committee's suite of contracts.
- GCC – General Conditions of contracts
- NEC – New Engineering contract suite of contracts
- FIDIC – The Fédération Internationale des Ingénieurs-Conseils's suite of contracts.

The next chapter focuses on specific clauses found in construction contracts. The basics of project management are linked and discussed trying to identify correlations between the different contractual clauses and the basic rules or areas of project management.

From this chapter it was learnt that the following factors influence the choice of contract and pricing method by different parties:

- the available information at a certain point in time;
- the available funds;
- the proposed costing method;
- familiarity of the parties regarding the contract;
- the complexity of the works; and
- the envisioned outcome.

CHAPTER 3 SIMILARITIES BETWEEN BUILDING CONTRACTS AND PROJECT MANAGEMENT

3.1 INTRODUCTION

In Chapter 2 the contracts used most often in South Africa was established. In this chapter the main structure of building contracts is identified. Similarities and possible managerial themes or topics within the contracts are highlighted and discussed. These are compared against the main project management knowledge areas.

The objective of this chapter is to identify the possible areas within the contracts, specifically conducive to managing the project on a higher level; the higher level being the relationship between the employer, his/her consultants, and the contractor.

The South African Council for the Quantity Surveying Profession (SACQSP, 2014: 22) divides projects into the following skill sets and stages: inception, concept and viability, design development, documentation and procurement, and the construction and close-out phases. McKenzie (2009: 2) goes further by summarising it into three main stages:

- Planning stage

Usually building projects start with a planning stage, which can be divided further into the inception phase, concept and viability (concept design), and design development (SACQSP, 2014).

- Formation of the contract

Usually this is brought about either by direct negotiations or a tender process. Tenders are either publicly advertised or approved contractors are short listed and invited to tender. Those that are interested are given forms and tender documents, which may include drawings, specifications, conditions of contract, and any other relevant documentation. Each 'bidder' or 'tenderer' submits their tender for evaluation. The tender is a legal offer, and when accepted, a legally enforceable contract (McKenzie, 2009: 2).

- Execution of the contract

The contractor usually performs under the supervision of an appointed consultant, usually the architect on behalf of the client, as was explained in Chapter 2 (McKenzie, 2009: 3).

3.2 PROCUREMENT

Contractors are required to transact their business on the basis of a variety of conditions and provisions incorporated in numerous different forms, but all aimed at the achievement of the same result; a complete building (Malherbe & Lipshitz, 1979: 80). Standardisation can go a long way in preventing confusion between parties on a project. Putlitz indicates that employers often make changes to the contract, which is unfair to the contractor (Construction World, 2016: 9).

The contract is a document that spells out the rights and obligations of the parties. It protects the parties against certain risks and is an administrative tool (Verster, 2006: 7). To supplement the above, the meaning of contract is revised. It is an appointment between two legal parties who have the intention to bring about certain obligations on each another. It is a serious and committed endeavour by the parties to fulfil their obligations (Nagel, Boraine, De Villiers, Jacobs, Lombard, Löt, Prozesky-Kuschke, Roestoff, Van Eck & Van Jaarsveld, 2000: 17). Through the research, it was learned that building contracts have evolved over the years and do not only comprise of the actual contract document. There are many components that, together with the contract, form an overall agreement and standard for the work to be undertaken. In order for the parties to be truly informed about the content of the contract a certain structure has evolved.

3.2.1 General layout

There are different alternatives to procure contracts. However, a partnership relationship is more desirable than a two-sided procurement relationship (the contractor on the one side and the employer on the other). The secret of success lies in the organisation of rights, obligations and administration to bring a project to completion (Verster, 2006: 7-8).

Important aspects need to form part of any building contract, be it in South Africa or any other country. These aspects are first listed and then interpreted:

Table 7: Basic structure of most building contracts

Basic requirements and items to be addressed by the Building contract	
Basic Building Time line	Basic aspects of the contract
Preparation of documents for procurement	Preparation of the document
	Who is responsible for the designs
	Employer/client's agents
	Site representation
	Work Risk
	Indemnities
	Insurances
	Securities, guarantees etc.
Objectives of client	An offer by the contractor
	Acceptance of the offer
Execution of the works	Access to the works - who does the site belong to etc.
	Contract instructions and variations
	Setting out of the works
	Assignment
	Subcontractor arrangements
At the completion of the works	Practical, works and final completion - wording dependant on contract
	Defects liability periods
	Sectional completion of the works
	Revision of contract periods/dates
	Final accounts and certification
Payment	Interim payments (payment during project period)
	Adjustments and variation orders
	Recovery of expenses by either parties
	Final Account
Cancelation	By the employer or contractor and the rights related to default and disaster
Disputes	Litigation, arbitration, adjudication, mediation etc.

(Adapted from: Verster, 2006: 7)

Before the contractor becomes the contractor, he/she should be able to price or cost the work. In order to enable him/her to do so, the necessary information is needed. This is usually done through a **tender** process with a tender document highlighting the items listed above (CIDB, 2006: i).

In addition to the above-mentioned items, many other project specific items may also form part of the contract, apart from the drawings and specifications. These items all aid in the execution of the work and may include guarantees, bill/schedule of quantities, preliminaries, and trade preambles (Verster, 2006: 8).

There should be an **offer and acceptance** stipulating exactly what the objectives of each party is. Usually there should be an **offer** by the contractor for the proposed work and an **acceptance** by the employer for the contractor's offer (CIDB, 2006: i). It should be

stipulated **who is responsible** for what documentation or designs, who will be the representing parties, what regulations will apply, and who will be responsible for insurances, indemnities, and work risks (SABS, 2004: 48). With the execution of the work, it should be clearly stated by whom and how **the site** will be run and who will have access to the site (SABS, 2004: 86). It should be clear when work will be deemed **complete**, whether work will be completed in stages, how the liability period will apply, if there are penalties, and how and if extension of time is applicable (SABS, 2004: 50). The method and procedure of **payment** and **disputes** should be clear and the method of dispute resolution concise (SABS, 2004: 51).

3.2.2 South African Bureau of Standards – general procurement documents

The South African Bureau of Standards (SABS) sets the standard on procurement processes in its SANS 294:2000 publication. When selecting a form of contract, the following aspects should be considered when selecting and drafting a procurement document (SABS, 2004: 47):

- The complexity of the work.
- Management capacity, capabilities, and expectation of the parties and their agents.
- Contracting and pricing strategies.
- Requirements relating to
 - the assignment and management of risk;
 - contracts for the engagement of all types of subcontractors; and
 - the management of cost and time overruns.
- The ability and capacity of skilled people and resources within the organisation to handle different administrative procedures for different categories and subcategories of contracts.
- Training requirements.

3.2.3 South African Bureau of Standards – engineering and construction works contracts

The SABS also sets the parameters on what should and should not be contained in the engineering and construction works contracts. Firstly, there should be no unreasonable provisions and the conditions of tender should be separate from the conditions of contract. Contracts should permit the use of standard formats and not be tailor-made to suit particular technical specifications or methods of measurement and evaluation. Contracts should provide for an interrelated management system, which clearly defines the roles and duties of all persons involved. The employer's representative identified in the contract should be fully empowered to act on the employer's behalf. The contract should permit the

appropriate allocation of risks for individual projects, with each risk being allocated to the party best able to manage, estimate, and carry it out. Contracts should clearly set out the period within which interim payments shall be made to all participants, failing which the entitled party will have the automatic right to compensation by the payment of interest at a sufficiently high rate to deter slow payment. The contract should further provide reasonable flexibility to accommodate both public body and private industry administrative practices. Such flexibility would permit, within limits, the selection of different periods allowed for payment, levels of surety, retention percentages, penalties, defects' correction periods, limitations of liability for latent defects, and contract insurance provisions. Formal contractual relationships between the contractor and all subcontractors, whether nominated, selected or domestic, which provide for fair and equitable conditions of subcontracts, should be stipulated. The role players should be encouraged to take all possible steps to avoid conflict, while providing for speedy dispute resolution by a pre-determined impartial dispute resolution procedure, should conflict arise. Lastly, provisions, which are not prejudicial to either party, for both interim or final dispute resolution by an independent person should be made and allowed for (SABS, 2004: 50).

3.2.4 Construction Industry Development Board (CIDB)

In its goal to standardise procurement documentation, the CIDB published the *Best Practice Guideline # C1 - Preparing procurement documents* (2005: September). In this guideline a standard is set on how a procurement document should be structured. This structure is based on the South African National Standards, which recommends a three volume approach, but states that this basic layout can be amended to suit a one volume document. Volume one: Tendering procedures; Volume two: Returnable documents; Volume 3: The contract (SABS, 2003: 6-7). The guideline recognises that these volumes can be combined to form one volume. It further indicates that there are two basic procedures during the procurement processes, namely (SABS, 2003: 9-11):

- the tender; and
- the contract.

Each of the two processes is divided further into parts and is shown in Table 8 below. The CIDB have conveniently compiled a table for a single volume document and describes the broad functions of each part of the document.

Table 8: Standard headings and sequencing of documents in tender documents

Contents		Function and broad outline of contents
Number	Heading	
The Tender		
Part T1: Tendering procedures		
T1.1	Tender Notice and Invitation to Tender	Alerts tenderers to the nature of the engineering and construction works required by the employer and should contain sufficient information to enable them to respond appropriately.
T1.2	Tender data	States what the applicable conditions of tender are and where they may be found. Tender data also provides the variables for standardised conditions of tender.
Part T2: Returnable documents		
T2.1	List of Returnable Documents	Ensures that everything the employer requires a tenderer to submit with his tender is included in, or returned with, his tender submission.
T2.2	Returnable Schedules	Contains documents that the tenderer is required to complete for the purpose of evaluating tenders and other schedules which upon acceptance become part of the subsequent contract.
The contract		
Part C1: Agreement and contract data		
C1.1	Form of offer and acceptance	Formalises the legal process of offer and acceptance
C1.2	Contract data	States the applicable conditions of contract and associated contract specific data that collectively describe the risks, liabilities and obligations of the contracting parties and the procedures for the administration of the contract.
Part C2: Pricing data		
C2.1	Pricing instructions	Provides the criteria and assumptions which it will be assumed (in the contract) that the tenderer has taken into account when developing his prices, or target in the case of target and cost reimbursable contracts.
C2.2	Activity schedule or bills of quantities	Records the contractor's prices for providing supplies / services / engineering and construction works which are described elsewhere in a specification within the Scope of Work section of the contract.
Part C3: Scope of Work		
C3	Scope of work	Specifies and describes the supplies, services, or engineering and construction works which are to be provided and any other requirements and constraints relating to the manner in which the contract work is to be performed
Part C4: Site information		
C4	Site information	Describes the site as at the time of tender to enable the tenderer to price his tender and to decide upon his method of working and programming and risks.

(Source: CIDB, 2005b: 2-3)

The following flow chart illustrates the process when appointing a contractor for a tender. The modern procurement process clearly entails two definite legs, the procurement of a contractor and the actual appointment or signing of the contract.

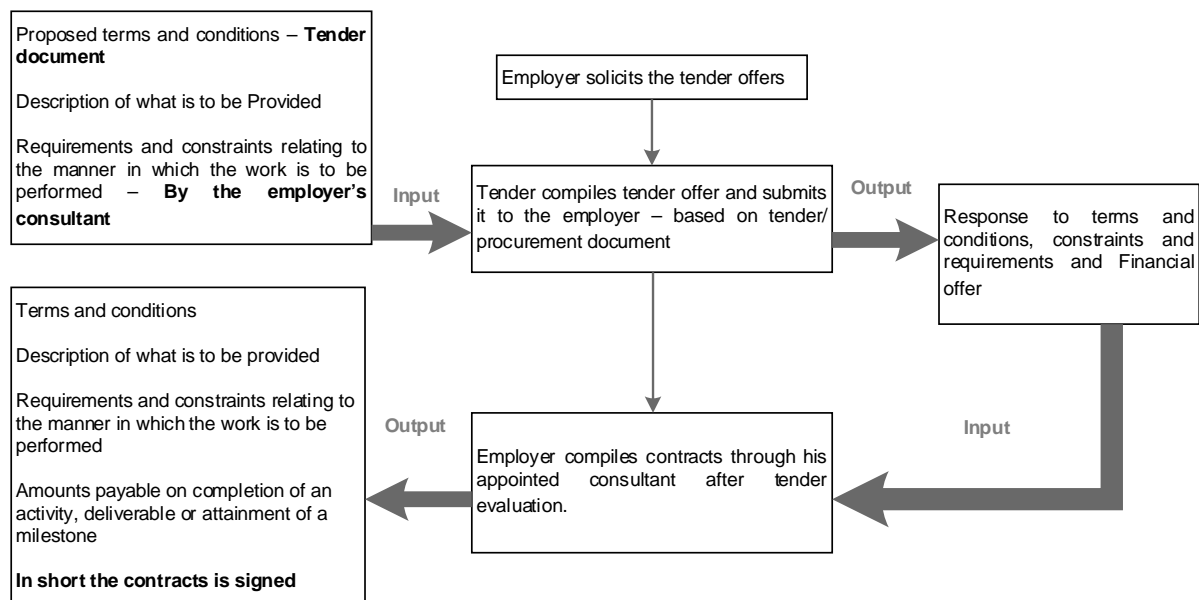


Figure 5: The concept of offer and acceptance

Source: (CIDB, 2009: 1)

From the figure above it is clear that the procurement/tender process cannot be separated from the contract into which the successful bidder/tenderer enters into. From the onset the information should be clear and concise to best describe the scope of works to the contracting parties at that stage. In Chapter 2 the different types of contracts were highlighted. It was shown that the type of contract is influenced by the time and cost constraints of the employer together with the available information at the time of compilation of the documentation. The contractor bases his offer on the information provided and in return the employer either accept or reject the offer. Thus the procurement document becomes part of the contract.

3.3 STRUCTURE OF THE CONTRACT DOCUMENT

The main objectives of a project are to produce a project on time, within the budget, and to the required standard. The objective of a contract is to give the parties the necessary information to complete the project within these perimeters (Lester, 2013: 3).

Davison (2003: 237) condenses the prevention of differences and disputes to the adoption of a procurement route and contract terms that properly reflect the status of the project. This includes the time at which the contract is procured, the terms of the design, available information, and the known risks. Secondly, he gives a reasoned definition of the scope if works should be given at the start of the procurement process.

Once the tender process is complete and the successful bidder/tenderer has been identified, the contract document is signed. McKenzie (2014: 175) highlights the following topics that normally form part of a building contract:

- **time** of completion, the extension of such time and the penalty for delay;
- **extras and variations**;
- **payments**, how and when they are made;
- **rectifications** of defects;
- prime costs and **provisional sums** items;
- the right of either the employer or the contractor to **terminate** the contract;
- **adjustment** of contract price because of changes outside the control of the parties;
and
- the resolution of **disputes**.

In Chapter 2, four important contracts were identified with their particular clauses listed. These lists are now summarised and listed in the following table. The objective is to identify the main themes of a contract. Once these themes have been identified, they can be compared against general project management objectives and guidelines.

Table 9: Content comparison between four main contracts

FIDIC	GCC	NEC	JBCC PBA
20 Main Clauses	10 Main themes	Core Clauses	7 Main themes
Clause 1: General provisions	1. General	- General	- Interpretation (Clauses 1-7)
Clause 2: The employer	2. Basis of contract	- The contractor's main responsibilities	- Insurance and security - Risks (Clauses 8-11)
Clause 3: The engineer	3. Engineer	- Time	- Execution - Roles and responsibilities (Clauses 12-17)
Clause 4: The contractor	4. Contractor's general obligations	- Testing and defects	- Completion (Clauses 18-24)
Clause 5: Nominated subcontractors	5. Time related matters	- Payment	- Payment (Clause 25-27)
Clause 6: Staff and Labour	6. Payment and related matters	- Compensation events	- Suspension and termination (Clause 28-29)
Clause 7: Plant, materials and workmanship	7. Quality and related matters	- Title – pertaining to material and plant on site (to whom does it belong?)	- Dispute resolution (Clause 30)
Clause 8: Commencement, delays and suspension	8. Risks and related matters	- Risks and insurance	
Clause 9: Test on completion	9. Termination of contract	- Termination	
Clause 10: Employer's taking over	10. Claims and disputes		
Clause 11: Defects Liability		Supplementary schedule of option	
Clause 12: Measurement and evaluation		o Main option Clauses, with six options	
Clause 13: Variations and adjustments		o Dispute resolution	
Clause 14: contract price and payment		o Secondary options Clauses	
Clause 15: Termination by employer			
Clause 16: Suspension and termination by contractor			
Clause 17: Risk and responsibility			
Clause 18: Insurance			
Clause 19: Force Majeure			
Clause 20: Claims, disputes and arbitration			
(FIDIC, 1999a)	(SAICE, 2015)	(NEC, 2013a)	(JBCC, 2014b)

From the table above and topics listed by Mackenzie, the following main themes are derived:

- general;
- roles and responsibilities;
- time related items;
- payment (costs);
- quality;
- risks or change;
- termination; and
- claims and disputes.

These themes are now elaborated on and discussed further without focusing too much on the individual contracts. The four different contracts are discussed in more detail in Chapter 4.

3.3.1 General

All four of the standard contracts start their documents by means of an introduction, followed by general clauses. The general section of these contracts sets out how the contract should be read and interpreted, usually followed by a list of definitions.

In all the contracts the roles and responsibilities of the parties are interwoven with the general theme. Loots (1995: 341) states that all contracts should generally define their terms by analysing the conditions of the contract. He continues by listing and elaborating on some of the definitions that may be listed and elaborated on in construction contracts in general. These items are similar to the structure of the contract and briefly introduce the parties to the stage on which the rest of the contract should be interpreted.

The foundation of the contract is set out in the general section. For instance, the JBCC starts its general section (called interpretation) by defining particular words and phrases (terms) that are used in the contract and defining how the contract should be interpreted. It continues by highlighting how laws, regulations, and notices should be interpreted, followed by an explanation of the offer and acceptance provisions (formation of the contract). Time is spent on explaining rules around assignment and cession of responsibilities of the parties. It then explains the contract documentation and the completion and signing of the contract by the parties. The 'interpretation' section of the JBCC closes by defining employer's agents and defining who is responsible for the designs on the project (JBCC, 2014b: 4-8).

3.3.2 Roles and responsibilities

By its nature a contract can only be concluded by two people, one on each side of the obligation. More than one person may however represent either side or parties. Representation is a legal phenomenon but not a contractual one. It occurs when one representative concludes a juristic act in such a manner that the legal consequences of the act belong to the principal (person being represented in the case of a construction contract, the employer, or the client). The basic requirement for representation is that the parties must disclose that they are representing the principal. Representation only occurs when the person or party has the authority to do so (Van der Merwe et al., 1993: 168-178).

It is important to note that the employer must specifically give the principal agent the authority to act on his/her behalf before the principal agent may issue contract instructions that may influence the contract period. Where no such power has been given to the employer's representative, the employer cannot extend the time if he/she has been the cause of the delay. Where such powers have been agreed upon, it is important that the designated person sticks to the contract. It is important to note that when the circumstances are outside the control of the contractor, it is in the employer's interest to extend the works. Where no such extension is granted, a reasonable time will apply, which is difficult to prove (McKenzie, 2009: 163).

Three main role players are mentioned in the FIDIC red book: the employer, the contractor, and the engineer. The contract states the obligations of the employer, e.g. that he/she shall give the contractor possession of the site. The document further states that the employer shall appoint the engineer who shall carry out duties assigned by him/her in the contract. It continues to state that the engineer will use suitably qualified and competent staff. The contract also lists the obligations of the contractor from his/her performance guarantee to interpretation of the site data (FIDIC, 1999a: 8-20).

The engineer or the agent usually represents and manages the design team as identified in Chapter 2. Roles and responsibilities are important in allocating risk, which is discussed later on.

3.3.3 Time related items

If a party wants to cancel a contract because the other party is not performing, he/she must first be proven to be in breach of performing timeously, provided it is possible to do so. If time constraint is not expressly specified within the contract, the party owed must demand performance by a date which is reasonable in all circumstances. If the notified party fails to

perform within the stipulated time, he/she is deemed to be in default (BCA, 2014: 117) (BCA is the abbreviation for Binnington, Copeland & Associates).

According to the terms of most building contracts, it is the duty of the contractor to complete the building by a specified date. Where no such time has been specified, a reasonable time shall prevail. If the employer wants to claim damages, he/she will first have to place the contractor *in mora* (in delay or default) by means of a contract instruction, stipulating his/her default. The necessity for extension of time on the works can be brought about by contractor's default, the client's default, or through factors outside the control of the two contracting parties. The employer's consultant/representative can also cause delays e.g. the late issue of drawings, etc. The following outcomes of a claim for extension of time by the contractor can be listed (McKenzie, 2009: 161-168):

- extension of time without costs to the contractor;
- extension of time with costs to the contractor;
- the implementation of penalties; and
- termination of the contract.

Failure to give timeous possession of the site is a good example for grounds on which the contractor can claim for an extension of time and/or to terminate the contract. The contractor must have possession of the site to enable him/her to continue with the works (Loots, 1995: 390).

Additional expenses due to the extension of time should be considered. The contract usually stipulates under what circumstances the contractor can claim additional expenses. It also gives time lines on how and when this claim should be submitted (McKenzie, 2009:165).

Penalty clauses are usually included in building contracts, which stipulate that if the contractor does not complete the works at a certain time, the employer can claim damages in accordance with the contract. The Conventional Penalties Act No 15 of 1962 governs the penalty clauses in South Africa. It states that the person must be in breach of the contract before the occurrence can qualify for the implementation of penalties submitted (McKenzie 2009: 166-167).

3.3.4 Payment (Cost)

McKenzie (2009: 201) notes that a building contract in its purest form is an 'entire contract'. This means that only through a contract is the contractor entitled for interim payments. However, the reversed implication of this is that in the absence of special provisions, payment

is due immediately after the work has been completed by the contractor. In like manner payment for extras is due when completed. In certain circumstance the contractor may claim for a reduced contract price. The term *quantum meruit* can be defined as: “*In the law of contracts, a doctrine by which the law infers a promise to pay a reasonable amount for labour and materials furnished, even in the absence of a specific legally enforceable agreement between the parties*” (The Free Dictionary, 2015: Online). It is on this basis that interim payments are due to the contractor, even though it is not specified in the contract.

3.3.4.1 Variations

The contract sum is seldom the final cost to the client due to changes, either leading to savings or to additional expenses. The quantity surveyor usually tries to minimize the risk to the client by allowing for these changes. The contract sum may change due to the following reasons (Maritz & Siglé, 2010: 34):

- variations issued by agents;
- requests from clients or tenants;
- provisional sums adjustments (tenders accepted for specialist subcontractors);
- prime cost adjustments;
- market conditions of supply and demand (CPAP when applicable);
- design development;
- re-measurement of work provisionally allowed for;
- delays and extension of time; and
- other contractor claims (e.g. interests on late payment).

The principal (or delegated) agent is the only authority that can issue variations during the construction period. It is usually done through contract instructions, which the contractor cannot refuse to execute. Wherever such a contract instruction causes an increase or decrease in the contract amount, the existing rates provided at tender stage should be used. Sometimes it is possible to calculate rates using similar items already priced on a *pro rata* basis. Day work can also be allowed for, which is calculated by using basic rates for labour and material and applying a percentage mark-up on this rate for overheads and profit (Maritz & Siglé, 2010: 42-44).

Contracts usually make provision for valuation of extras and the method of adjustment of rates for these and for adverse physical conditions and artificial obstructions (McKenzie, 2009: 176-177).

Variations do take place and when the work cannot be measured or priced through the above methods, a fair valuation would apply. Quantity surveyors can contribute greatly in assisting the principal agent in determining a fair rate and negotiating with the contractor (Maritz & Siglé, 2010: 44-45).

3.3.4.2 Allowances

Building contracts usually allow for work that is still unclear at tender stage and is included in the pricing data either as a prime cost or a provisional sum. These amounts allow for the installation of specialist work and unforeseen expenses. These items usually allow for the contractor's attendance and profit if a specialist subcontractor is used (McKenzie, 2009: 178-179).

The provisional amount can either be executed by the contractor or subcontractors. In the first case the contractor is remunerated for it, after the value of work has been established. If work is executed by a subcontractor, the contractor will be remunerated the cost of the subcontractor plus commission as a percentage as stated in the pricing data (SAICE 2010: 34). Some forms of contract allow for the adjustment of the contractor's profit in the event of the provisional amount being lowered more than a certain amount (Maritz & Siglé, 2010: 45).

The prime cost items allow the cost price of certain goods, services or materials to be supplied under the contract. The amount payable to the contractor is the actual price payable by him/her together with any charge included by the contractor in the pricing data for labour, profit, carriage, storage establishment, and other costs related to such services (SAICE, 2010: 34).

3.3.4.3 Contract price adjustments

It may be found that projects run over a long period with prices of material fluctuating (escalating or depreciating). Contract price adjustment provision (CPAP) is a formula that is applied to escalate the contract price arising from fluctuations on an average basis, albeit upwards or downwards. In South Africa different sectors have their own formulae, e.g. the Baxter (transport), Steel and Engineering Industries Federation of Southern Africa (SEIFSA), and the Haylett/JBCC (construction) formulae. The information used in each of the formulae is obtained from indices published by Statistics South Africa and applied to each of the defined work groups, e.g. alterations, earthwork, etc. (Maritz & Siglé, 2010: 45-46). The objective of price adjustment is to allow for fair adjustment because of increased costs due to factors beyond the control of the parties. Standard formulae exist to calculate these changes and are in most cases based on individual and proportioned elements being evaluated and adjusted.

3.3.4.4 Payment certificates

Approval certification can be issued for work done on the interim, e.g. allocated section of work, or for work at practical completion stage (to use the terms of the JBCC or GCC 2010 contracts). Payment certificates, when signed by the authorised person, become a liquid document. This means that the contractor is entitled to his/her payment and can be explained in the sense that it has the same liquid value as when a cheque has been signed. Certificates can further be invalidated due to the agent exceeding his/her authority or when fraud, collusion, and undue influence are proven. In such cases the contractor runs the risk of losing his/her protection that would have been effected if such a certificate has been issued. Where a contract provides for the supply of goods (works) to be subject to the approval of the employer or his/her agent, the defects clause will only apply once the work has been approved and accepted. Once approved the contractor is relieved of any liability for defects. Approval of payments through payment certificates does not necessarily approve the work. It is dependent on the contract and its conditions whether approval of the work is precedent for payment, in which case a payment certificate constitutes work as having been approved (McKenzie, 2009: 190-197).

The final account is compiled at the end of the project to reflect all the additions and omissions that were incurred during the construction process. It takes into account all variations, savings, extra work, adjustment of provisional sums, and the costs agreed upon between the contractor's quantity surveyor (representative) and the employer's quantity surveyor (representative). It is recommended that the process starts as early as possible. The draft final account is sent to the principal agent for comment or approval prior to the finalisation thereof. The contractor can dispute the correctness of the final account. If the principal agent cannot resolve the disagreement, the matter can be referred to the dispute resolution processes stated in the applicable contract (Maritz & Siglé, 2010: 46).

3.3.5 Quality

Building quality is attributed to three principle components, namely design, materials, and workmanship (Malherbe & Lipshitz, 1979: 102). Design responsibility is defined in the contract and there may be areas where the subcontractor has to design certain specialist portions of the works. The source and supply are the responsibility of the contractor, except where it is supplied by the employer. Workmanship, however, always remains the responsibility of the contractor (Malherbe & Lipshitz, 1979: 106-120).

Building contracts may provide that work must be done to a certain standard prior to the approval by the employer or his/her agent. The specifics surrounding the standard may be specified and/or implied. The law implies that where documents are silent about the quality, the materials and workmanship shall be of a reasonable quality for their purposes. Normally the manner of execution will be indirectly referred to standards opposed to detailed instructions. Specific test tolerances may also be referred to for specific items, e.g. concrete strength tests, as prescribed (Loots, 1995: 385-387).

McKenzie states that interpretation plays a key role in determining the standard required for approval. He notes that the contract should be specific about the standard prior to approval of a certain portion of the work. Where a clause states that the issue of a certificate is subject to the approval of the employer, it may be interpreted as being biased and one sided. McKenzie (2009: 185) refers to two basic rules that have been applied in court where such judgements have been made:

- Wherever possible such a clause is not regarded as a condition precedent to payment.
- The employer's approval should be reasonable.

Approval by an employer should thus be honest and genuine. Some contracts allow for the appointment of an impartial third party in the attempt to prevent disagreements on this matter. Distinction is made between approval certificates and payment certificates (McKenzie, 2009: 185). Apart from the final certificate, no prior approvals, tests, payment or certificate can assist the contractor if work is subsequently found to be defective. The engineer has the power, if agreed to by the employer, to allow small defects to remain and to certify a reasonable deduction from the contract process deemed compensatory for such grant (Loots, 1995: 387).

3.3.6 Risks or change

Construction has many risks and listing them can become a daunting task. One should consider that there are risks for all the parties involved (as per Chapter 2) at various stages of the project life cycle. The other consideration is that the final product can sometimes only materialise after many months or years into the future. Risk is a separate study on its own and for this study the focus was on the risks addressed in the four major contracts. The Construction Regulations (South Africa, 2014a), emphasize risk identification during the design stage of the project even though it mainly focuses on health and safety. The first portion of the subheading focuses on the risk and insurances listed in the four main contracts.

Loots (1995: 261-269) looks at risk under the headings of time, cost, resources, and environmental management. Risks have to be identified, quantified, and managed. The following diagram summarises the change in need for risk analysis as a project progresses.

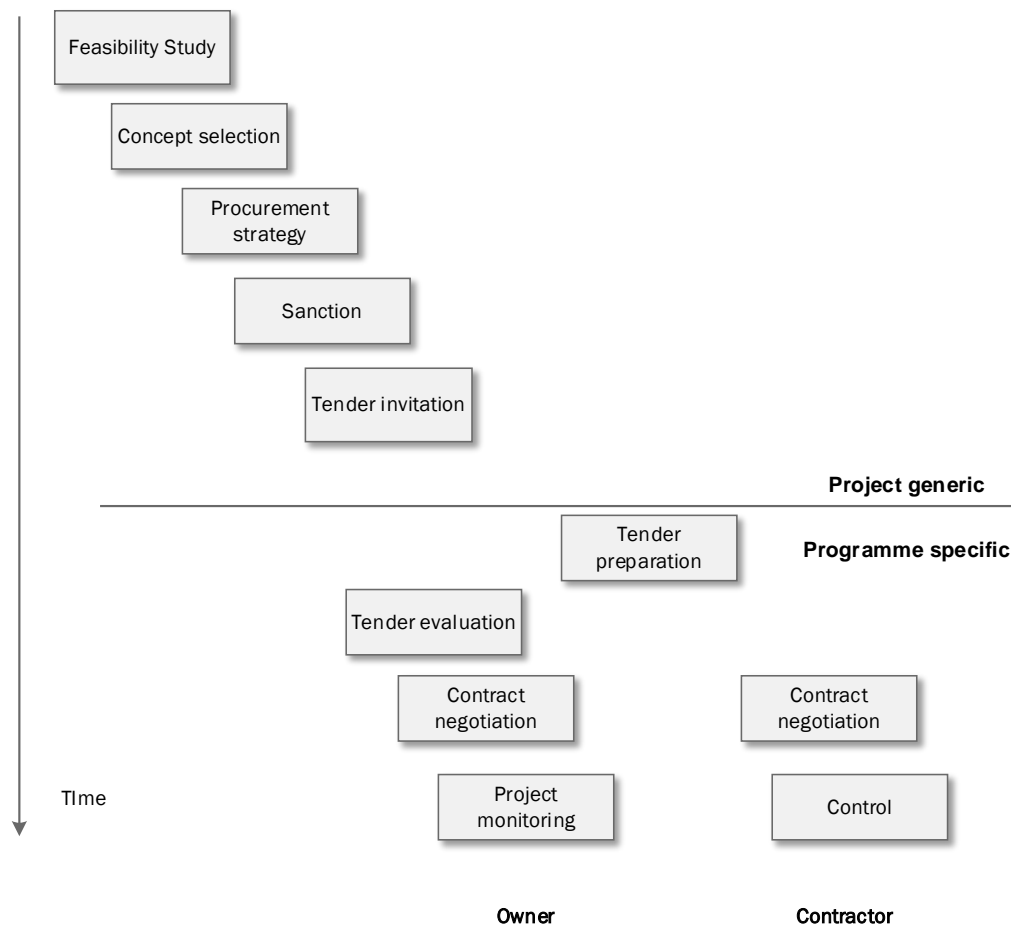


Figure 6: The changing needs for risk analysis as the project progresses

(Source: Loots 1995: 272)

3.3.6.1 Risks, excluding financial risks

The NEC distinguishes between risks that are insurable, such as loss or physical damage to property or personal injury, and general, legal, and financial risks. It notes that the section in the contract allocated to risks and insurance mostly pertains to general, legal, and insurable risks. Financial risk is addressed in other parts of the contract (NEC, 2013b: 84). This is similar in the other suites of contracts. In its section on risk, the JBCC PBA mainly focuses on the works risks, indemnities, insurances, and securities (JBCC, 2014b: 9-11). The conclusion made is that a contract mainly focuses on allocating the risks between the two parties that are not addressed under the standard risks of time, cost, resources, and environmental risks.

3.3.6.2 Risk of loss or damage to the works

The contractor is responsible to maintain the works in good repair until practical completion. This is implied by two distinct legal principles apart from the building agreement. The contractor, who is in possession of the site, is obliged to maintain and return the site in at least the same state as it was received. This is according to common law. Subsequent to this, the contract requires additional improvements, etc. Any damage caused by storms, fires, etc. remains the contractor's responsibility to rectify. The obligated works protection by the contractor starts from the day that the site is handed over to the day of practical completion, when the site is handed over to the client. Nominated and/or selected subcontractors are under the same obligation to make good any physical loss or damage incurred by them. The subcontractors' responsibilities are towards the main contractor and the main contractor's obligation is towards the employer (Finsen, 2005: 83-85).

The contractors' risk is not unlimited though; it is limited to the amount specified in the contract and excludes uninsurable risks, and risk due to the employer or his/her agent, e.g. design. With regard to alterations to existing buildings, the obligation lies with the owner to take out the necessary insurance for any fiscal loss. It can however be specified that the contractor will remain responsible for the portion that he/she is in process of altering. This is sometimes the case with state contracts (Finsen, 2010: 86-87).

- Liabilities of third parties

Common law places an obligation on every person not to act negligently towards another person. The contract usually places the obligation on the contractor to take out the necessary insurances towards public liability. The contractor is usually not responsible for bodily or physical loss by others brought about by the owner or one of his/her workforces. The contractor is also usually indemnified from sections which are occupied and separate from where the construction is taking place. Other liabilities that can be taken into account are lateral support of adjacent buildings and works proceeding on site (e.g. health and safety procedures). The applicable party is obliged to provide proof of the mentioned insurance and to renew it timeously as required during the construction process (Finsen, 2005: 88-96).

3.3.6.3 Monitory risks

This type of risk is closely related to Section 3.3.4 [Payment (Cost)]. In addition to the items discussed under this point the following is highlighted.

Most building projects have unforeseen circumstances and design changes that take place during the construction period. McKenzie (2009: 169) categorises extras in three main categories, namely items

- expressly or deemed to be included in the contract;
- as extras; and
- outside the contract.

When considering Chapter 2 and the different forms of contracts, it becomes clear that the type of contract will influence the items listed above. It is especially applicable to the last two items. The extent of the planning and provisions made during the planning phase and the contract information now become evident. The scope in contracts with detailed BoQ is easier to amend, because rates are provided for most items. Where no BoQ is available, it can be difficult to prove what the actual cost of the additional items or omissions are (Loots, 1995: 149).

In the event of additional work carried out by a contractor, the liability lies with the contractor to prove that he/she was authorised to do the work. If the additional work was ordered by the agent, again his/her authority also has to be proven. It should also be noted that contracts may have certain conditions to which the contractor should comply before any claim for extra work can be paid. Usually the contract stipulates that the additional work orders should be in writing. Extras done on verbal instructions can be very difficult for contractors to prove. However, items that have been deemed extra can be included in the final certificate. These items, whether given as verbal instruction or in writing, and if the certificate is signed off by the employers (notwithstanding fraud or collusion), are deemed to be authorised and the employer is obliged to pay the certified amount. Any omissions should also be genuine and cannot be omitted and then given to another contractor. This will be deemed breach of contract (McKenzie, 2009: 173-175).

3.3.6.4 Defects and retention money (Quality Risk)

Defects are normally confined to the contractor's own default. Considering common law in South Africa, the employer has the right to reduce the contract price by the amount it would cost to remedy any defective work of the contractor, albeit due to materials or poor workmanship. An implied warranty of the workmanship and supplied material goes hand in hand with the thinking. In addition to common law, building contracts elaborate on this item by adding specific clauses surrounding the specifics of the matter. An example is stipulating the period within which defects are categorised – in some cases called the *defects liability period*.

Such clauses are not the same as maintaining and/or upholding clauses that refer to keeping the works in a certain state for certification. Where such a period is set, it does not detract from the common law, which allows the employer to claim for any defects that are reasonable. However, it is increasingly difficult to probe default by the contractor after the *latent defects period*. The question that should be asked is: have the work been approved and was such an approval necessary and reasonable? In modern contracts, *latent defects* (period after the so called *defects liability period*) are defined as defects that could not be identified during a reasonable examination at the conclusion of the works (McKenzie, 2009: 195-196).

One way in which the client can lower the chance of overpaying the contractor on work that may prove defective is by implementing retention on the interim payments. This retention is usually in the form of a percentage of the payment certificate up to a specified maximum amount. This retained amount is usually paid into a separate account and is due with interest to the contractor at the end of the specified period. The employer may replace the retention fund as a guarantee for the specified retention amount. A guarantee may however prove more difficult to manage and claim from than simply retaining payment until defects have been rectified (McKenzie, 2009: 198-200).

3.3.6.5 Health and safety risks

The Construction Regulations of 2014 emphasise health and safety, describing the client more explicitly. A baseline risk assessment is required before or early in the design stage. The designer is also listed as a competent person and must incorporate safe design. A site specific health and safety specification is developed from which the contractor can plan and price for the relevant requirements. When appointed, the contractor should conduct a proper risk assessment prior to construction, identifying the risks and hazards that can be expected on the specific project. A health and safety plan is developed from this which includes a monitoring plan and review plan. The contractor should insure that all the parties, personnel, subcontractors, and any other person that may visit the site are fully aware of the identified risks. The contractor is furthermore responsible for ensuring that the requirements are implemented and enforced (South Africa. Construction Regulations, 2014a: 10-21).

A competent person is defined as a person that (South Africa. Construction Regulations, 2014a: 4):

(a) has in respect of the work or task to be performed the required knowledge, training and experience and, where applicable, qualifications, specific to that work or task: Provided that where appropriate qualifications and training are

registered in terms of the provisions of the National Qualification Framework Act, 2000 (Act No.67 of 2000), those qualifications and that training must be regarded as the required qualifications and training; and

(b) is familiar with the Act and with the applicable regulations made under the Act

3.3.6.6 Conclusion

From the above it can be seen that the risks are identified and spread throughout the structure of contracts. Specific allocation of the risks and indemnities are listed and identified in the section specific to risk. Mitigation of risks and the necessary insurances are stipulated and allocated in this section of the contract.

3.3.7 Termination

South African law strongly supports the authority of a contract and will only permit a party or parties to cancel a contract when the default is of such a nature that it goes to the very root of the contract. Agreements usually stipulate under which circumstances a contract can be cancelled or terminated. Whenever a party wants to cancel the contract because of the default of the other contracting party, he/she must make sure that he/she is not in default him-/herself. When building contracts are terminated or cancelled, the contractor usually ceases work and leaves the site. The employer repossesses the site and the risk of loss and damages returns to the employer. A financial account is drafted of any moneys that may be owed by either party. Cancellation or termination can be caused by the default of one of the parties or by 'no default' (Finsen, 2005: 195-210).

Van der Merwe et al. (1993: 359-395) distinguish between three types of termination of obligations of the parties within a contract, namely

- discharge by performance;
- determination by agreement; and
- termination by operation law.

3.3.7.1 Discharge by performance

When a specific obligation of both of the contracting parties has been fulfilled in accordance with the contract, the agreement has reached fulfilment. It is important to note that the contract is usually specific regarding the performance of the parties. The debtor cannot elect to pay

damages instead of the required specification. The creditor may refuse to accept the performance of the debtor where it is deemed not to be according to specification. Where incomplete performance is accepted it is accepted that the contract is discharged and the debtor remunerated according to the value of the work done (Van der Merwe et al., 1993: 360). A third party may be allowed to complete the obligation of the contracting party where possible (Van der Merwe et al., 1993: 367).

3.3.7.2 Termination by agreement

A creditor and debtor may determine that some or all of the obligations of the contract are waived (released) from one another. A release must comply with the general law and the contract agreement to have juridical substance. Termination by agreement can further be divided into navigation and compromise. Navigation is an agreement whereby one obligation or more is replaced by a new obligatory relationship. It may take the form of delegation, where a certain party in the contract is replaced with a new one. Compromise is a method where an uncertainty may lead the parties to create a new set of rules to try and avoid inconvenience and risk that may occur when resolving a dispute (Van der Merwe et al., 1993: 371-381).

3.3.7.3 Termination by operation law

Impossibility to perform, set-off, merger, and extinctive prescription are four reasons that termination by 'no fault' can take place. It may become impossible for one or both of the contracting parties to perform his/her duties during the existence of a contract. Ordinarily the consequences of impossibility are borne by the directly affected party. In certain circumstances the responsibility may fall on the other contracting party to honour. Termination by set-off usually entails that both parties are mutually indebted to each other and by mutual agreement it is deemed beneficial to terminate the contract as the status quo of contract at that moment. Where applicable the smaller debt extinguishes the larger. The concept of merger is similar to set-off and takes place when debtor and creditor become the same entity or person. For instance, a contracting company may be bought by the employer. Extinction prescription occurs when duties or obligations are rendered unenforceable by the passage of time and does relate to impossibility to perform in certain ways (Van der Merwe et al., 1993: 383-381).

3.3.7.4 Conclusion

Termination is not as easy as it may seem and must be seen as a last resort. South African law requires the parties to honour their agreement as far as possible. Termination of

cancelation can be brought about by default of either party or by mutual agreement of the parties.

3.3.8 Claims and disputes

3.3.8.1 Claims

Claims can be defined as “*to demand, ask for, or take as one's own or one's due*” (Free Dictionary, 2015: Online). Construction contracts and its interpretation often lead to misinterpretation by one or both of the parties. This leads to potential disagreements concerning the rights and obligations of the parties and have been the cause of many claims and disputes. Loots (1995: 731-732) lists the most frequent causes of claims as follows:

- inadequate site and soil investigation prior to design;
- late start of designs and/or limited cost expenditure on design;
- calling for bids with incomplete drawings and specifications;
- trying to complete designs by reviewing the shop drawings;
- untimely design changes during construction without allowing for reasonable time extensions;
- interference in sequence and timing of construction; and
- introducing changes under the guise of correcting deficiencies.

Finsen (2005: 214-215) mentions that claims in the construction industry have increased in recent years. He blames this on the pressure that have been put on the construction industry to build more and more for less in less time. The result of tight programmes is mistakes. Contractors have also started employing skilful consultants who specialise in claims and disputes.

3.3.8.2 Disputes

When two parties have a dispute they can bring it before a court to assist. This occurs when a party considers that he/she has a claim against another. Through the appropriate jurisdictional court, he/she may summon the other party to court. The claim from the first party is then considered and a decision is made, whether the claim has merit or not. If so, the court orders the party against whom the claim has been made to honour such claim. Once a judgement has been made in favour of the claim, it may not be brought in front of the court again – finality has been reached (Finsen, 2005: 215).

3.3.8.3 Alternative dispute resolution

Alternative dispute resolution (ADR) can be very attractive when the objective is to resolve disputes affordably, amicably, and quickly.

Gould defines what the spectrum of dispute resolution techniques are by quoting Schapiro on the ideal court prototype involves (cited in Gould, 2004: 1):

“(1) an independent judge applying (2) pre-existing legal norms after (3) adversarial proceedings in order to achieve (4) a dichotomous decision in which one of the parties was assigned the legal right and the other found wrong.”

Gould goes on to establish that there are two poles in dispute resolution. The first is the formal/conventional law binding procedures and on the other side of the spectrum you find an informal, non-binding approach. The success of the latter approach depends on the mutual agreement of the parties involved.

To be able to discuss and comprehend what is meant with alternative dispute resolution methods, one has to understand what the non-alternatives are. According to the definition given above the legislative and arbitrational methods are seen as formal dispute resolution methods. Litigation and arbitration require the parties to submit their dispute to another who will impose a legally binding decision (Gould, King & Britton, 2010: 5).

When considering the introduction of the CIDB's Best Practice Guideline #C3, one can derive that the focus is currently shifting toward ADR methods. The following is an extract from this guideline (CIDB, 2005b: 1):

The white paper on Creating an Environment for Reconstruction Growth and Development in the Construction Industry (1999) argues that the conventional mechanisms and procedures for final dispute resolution currently in use, normally arbitration or litigation, are both costly and time consuming. It further argues that small and emerging contractors are disadvantaged – and even imperilled - in the event of a major dispute arising. The paper advocates the use of Alternative Dispute Resolution (ADR) mechanisms on contracts and recommends that the Latham report should be used as the point of departure in this regard.

According to Gould (2004: 3) some of the ADR methods are:

- negotiation;
- mediation;

- conciliation;
- adjudication; and
- expert determination.

3.3.8.4 Arbitration

McKenzie (2009: 211) identifies arbitration as the main means of dispute resolution on building projects. He notes that most building contracts incorporate arbitration clauses and that the main reason for implementing arbitration as a means to resolve a dispute is to avoid the costly litigation process.

Loots (1995: 603) highlights that the parties can only enter into arbitration if the procedure, as laid down in the contract, is followed. Finsen (2005: 216) explains arbitration as follows:

It is a procedure, freely and voluntarily adopted by the parties, in which they agree to submit any dispute they may have, now or in the future, to the impartial judgement of some third party of their choice rather than to take such dispute to litigation in the courts, and they agree that his judgement shall be final and binding on them. It is essentially a consensual arrangement and a reluctant party cannot be compelled to enter into an agreement to arbitrate.

Arbitration has been around since the Roman times and in South Africa since the time Van Riebeeck arrived in South Africa. The South African law makes provision in the Arbitration Act No 42 of 1965 for the courts to support and assist in the process of arbitration (Finsen, 2005: 217).

3.3.8.5 Conclusion

Putlitz indicates that in his experience, when it comes to construction contracts, people are mostly interested in what the contract states their rights are and how do to deal with claims for additional time and money (Construction World, 2016: 9). Disagreements are inevitable; the magnitude and the implications of disagreements are however the main topic when the contract has to be consulted. As far as possible it is in everyone's best interest to resolve any disagreement as quickly and as effectively as possible. Experience and judgement of the parties are key to prevent and/or resolve claims and disputes.

3.4 MAIN THEMES OF PROJECT/CONSTRUCTION MANAGEMENT

The basic structure of construction contracts was discussed above. The main themes of project management and construction management are highlighted below. The goal is firstly to understand the structure of project/construction management. The research further compared the possibility of any correlation between the construction contract's structure and the structure of project/ construction management.

3.4.1 Definition of management

The Project Management Institute (PMI, 2008: 5) defines a project as a temporary undertaking to create a unique product, service or result. There is a definite beginning and end, but the impact may last much longer. Every project creates a unique service or result and can create:

- a product that can be either a component of another item or an end in itself – e.g. a building;
- a capability to perform a service – e.g. a business function to support productivity; or
- a result such as an outcome or document – e.g. a research project.

The *Guide to project management* (cited Lester, 2013: 1) defines project management as: “A *unique process, consisting of a set of co-ordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirement, including constraints of time and resources.*”

Lester expands on the definition by defining the purpose and the main differentiating factor to any other business or enterprise. Project management is concerned with the management of change instead of managing a continuum or business as usual. The main objectives of a project are to complete it on time, within budget, and to the required standard or quality (Lester, 2013: 1, 2).

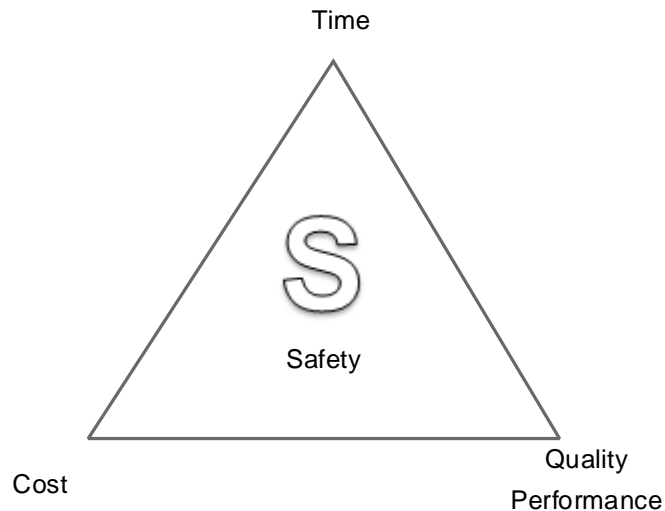


Figure 7: Project objectives

(Source: Lester, 2013: 3)

The main objectives may in their own right be the main drivers or motivation for a project. However, all of the criteria are always present. The relationship of the criteria is adequately summarised by Lester (2013: 5, 6) through the following:

If the project is not safe, it can cost lives and/or destroy the constructor and other stakeholders. If the performance is not acceptable, the project will have been a waste of time and money. If the project is not on time, it can still be a success, but may have caused a financial loss. Even if it exceeds the budget, the project can still be viable, as extra money can usually be found. (The most famous example is the Sydney Opera House, which was so much over budget that the extra money had to be raised via a New South Wales State lottery but is now celebrated as a great Sydney landmark).

3.4.2 Project life cycle (PLC)

With each new project, a new team is put together. The experience of the team plays a major part in the success of the project. Burke (2003: 28) divides projects into four basic phases, known as the project life cycle:

- concept ;
- design;
- implementation; and
- closing.

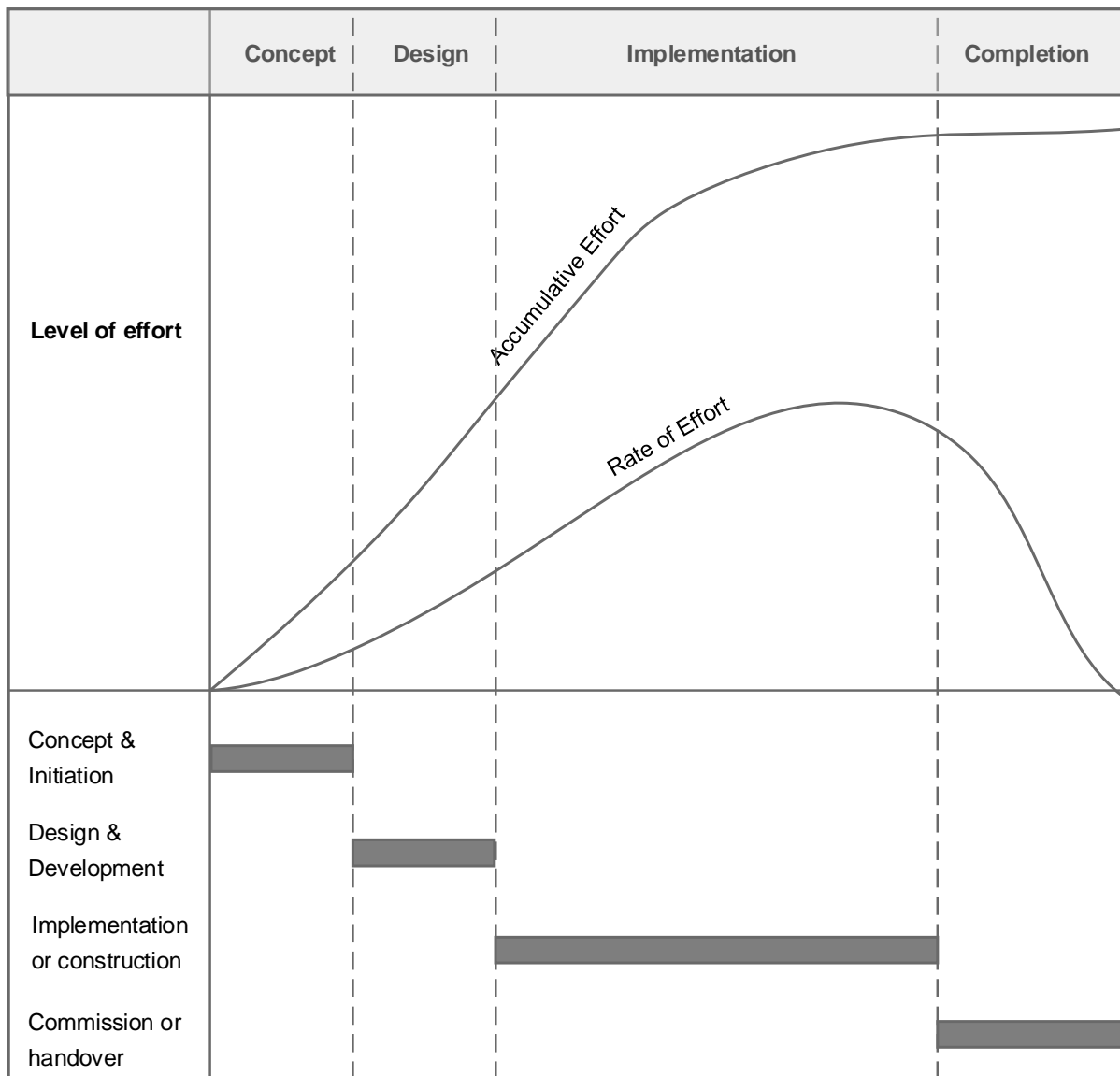


Figure 8: Project Life Cycle

(Source: Burke, 2010: 88)

Figure 8 illustrates that the most effort is experienced during the implementation phase of a project. Effort gradually increases as the design of the project starts and continues to increase steadily until tapering downwards as the projects nears completion.

The project and the management thereof usually take place in an environment larger than the project itself. The PLC is a collection of sequential and sometimes overlapping phases. The allocation and naming is given by the organization or field that the project takes place. The PLC can be captured in a methodology with a definite start and end. The items in between can however vary considerably (PMI 2008:15).

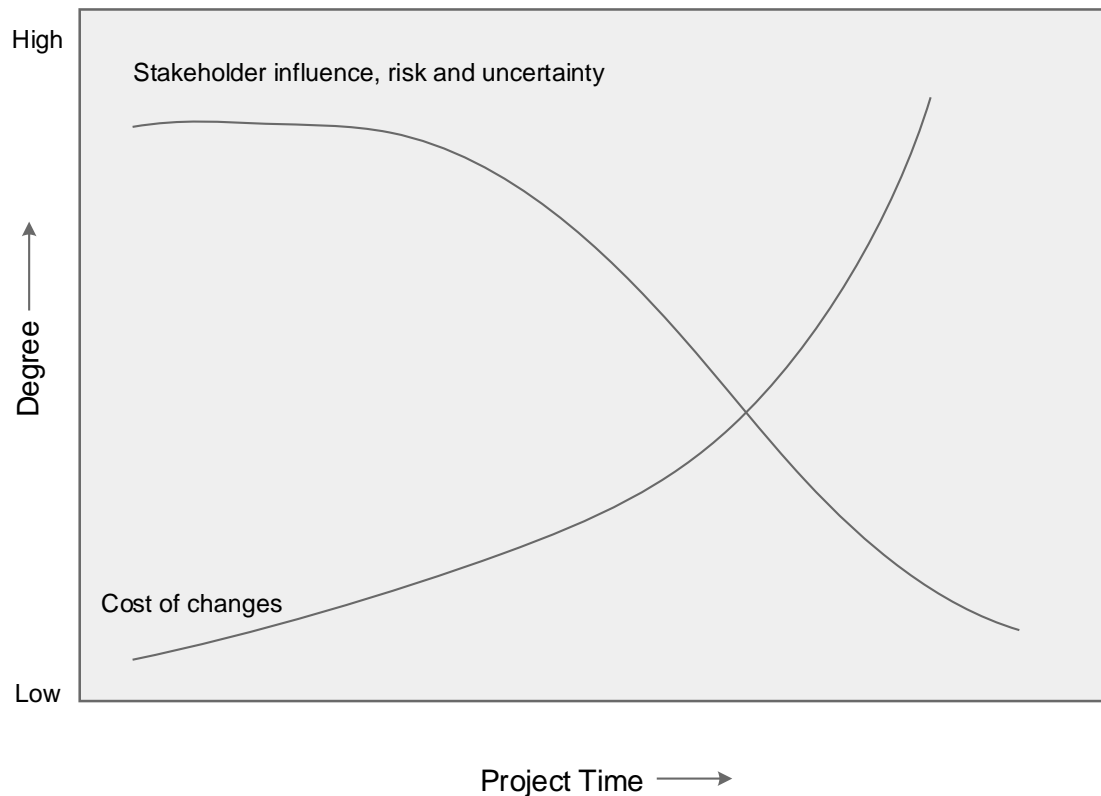


Figure 9: Impact of Variable Based on Project Time

(Source: PMI, 2008: 17)

The implementation phase takes up the largest part of the time and cost of the project. The cost of any change has a smaller impact the earlier it is made in the PLC as illustrated in Figure 9.

It is clear that the basic stage of a construction project set out earlier under Section 3.3, can be sorted into the project life cycle tendencies listed. It is safe to conclude that a construction 'job' can be categorised as a project because it fulfils the definition and fits into the basic life cycle as per the above graph.

3.4.3 Main knowledge areas of project management

Knipe, Van der Waladt, Van Niekerk, Burger and Nell list nine fields in project management (2002: 19-20; PMI, 2000:7-8). A further knowledge area was added in December 2012 by the Project Management Body of Knowledge (PMBOK), namely project stakeholder management. Previously this area was included in the project communication management field, which included some aspects of stakeholder engagement (Van der Waladt & Fox, 2015: 147). The knowledge areas are listed below:

- project stakeholder management;
- scope management;
- time management;
- cost management;
- quality control;
- human resources;
- communication management;
- risk management;
- procurement management; and
- integration management.

3.4.3.1 Project stakeholder management

“Stakeholders management is the systematic identification, analysis and planning of actions to communicate with, negotiate with and influence stakeholders. Stakeholders are all those who have an interest or role in the project or are impacted by the project.” (APM, 2006: 34)
(APM is the abbreviation for Association of Project Managers)

Stakeholder management involves engaging, influencing and involving the stakeholders or interested parties in the decision making process. Projects involve a wide range of people with a wide range of requirements. PMBOK (2012) defines stakeholders as an individual, group, or organisation who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project (cited: Burke, 2013: 69).

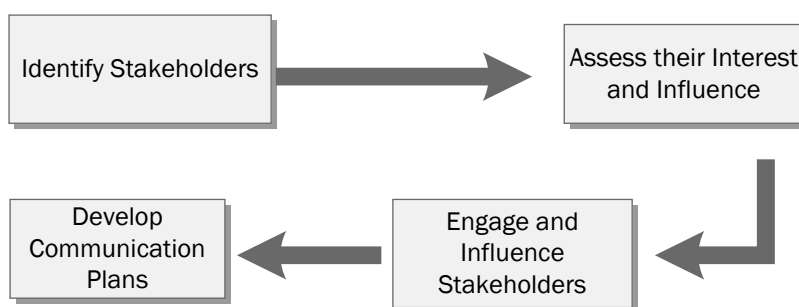


Figure 10: Project Stakeholder Management overview

(Source: Own chart developed from Burke, 2013: 69)

The main objective of stakeholder management is to prepare a proper stakeholder analysis and preparing a stakeholders' map. The stakeholders map should state the stakeholder's interest against their potential project impact and influence. This map may also prove invaluable when preventing or resolving disputes. This management function should produce

a stakeholder register, which records the perception, prejudices, power, authority, and influence of the respective stakeholders. The second output is the management strategy, which identifies possible positive and negative influences that each stakeholder may have on the project. Such a strategy should outline actions to facilitate positive contributions to the project and to minimise potential negative consequences (Van der Waldt & Fox, 2015: 147-148).

Considering the definitions above, it can be established that stakeholder management is applied throughout the project life cycle. The employer, the contractor and the employer's agent are all stakeholders captured in a contract at a specific point of the project life cycle.

3.4.3.2 Project scope management

“Scope management is the process by which the deliverables and the work to produce them are identified and defined. Indemnification and definition of the scope must describe what the project will include and what it will not include “(APM, 2006: 34).

Project scope management includes the processes and activities that enable the project manager to achieve the project objectives. This management area is one of the key requirements for a successful project. Failure to accurately interpret the client's requirements will produce a misleading definition of the scope of works. The scope of works underpins the whole project and is a parameter in all the other knowledge areas (Burke, 2013: 151).

In other words, **project scope management** describes the processes required to ensure that the project includes all the work required and only the work required and only the relevant work. It consists of initiation, scope planning, scope definition, scope verification and scope change control (PMI, 2000: 7). These applicable activities are summarised in the following flow chart:

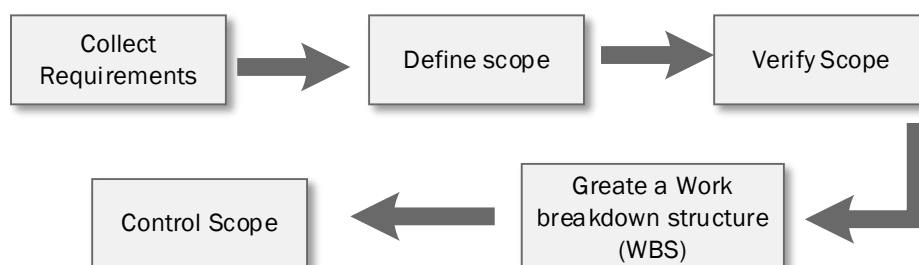


Figure 11: Project Scope Management overview

(Source: Own chart developed from PMI, 2008: 103)

In order to ensure that scope variations are not too significant, signposts or objectives should be established. The project team should be guided by the stakeholders and ultimately by the sponsor. The project manager should ascertain the what, when, and who, as well as other considerations. All stakeholders should be present at the project definition meeting to clarify all uncertainties on a project (Van der Waldt & Fox, 2015: 149-150).

The scope comprises the project deliverables and the work associated with producing these deliverables. It is important to also define what is excluded from the scope. A high level statement of the scope will provide the breadth of the scope. The depth however is described in different levels as the project progresses. The scope is defined in a project management plan (PMP) and refined through the project breakdown structure (PBS) and work breakdown structure (WBS). The PBS breaks down the end product into smaller products while the WBS defines the work required to produce these deliverables. Through this process the scope can be controlled easier (APM, 2006: 34).

From the above it can be derived that the scope of works that is included in the tender data should be as accurate as possible. This is a possible area through which the project can be controlled by the engineer/ principal agent, etc.

3.4.3.3 Project time management

Project time management involves determining the time needed to complete the project and scheduling the various activities to bring the project to completion on time. It is a complex co-ordination of the project to ensure that critical deliverables are met. This aspect of project management is crucial to the success of a project. Poor scheduling and planning increases the risk and the chance of failure of a project (Knipe et al., 2002: 139).

The Association for Project Management Body of Knowledge (APM, 2006:36) defines scheduling as follows:

“Scheduling is the process used to determine the overall project duration and when activities and events are planned to happen. This includes identification of activities and their logical dependencies, and estimation of activity duration, taking into account requirements and availability of resources.”

Project **time management** describes the processes necessary for timely completion of a project. It includes activity definition, activity sequencing, activity duration estimating, schedule development, and schedule control (PMI, 2000: 7). The following flow chart summarises the activities when applying time management:

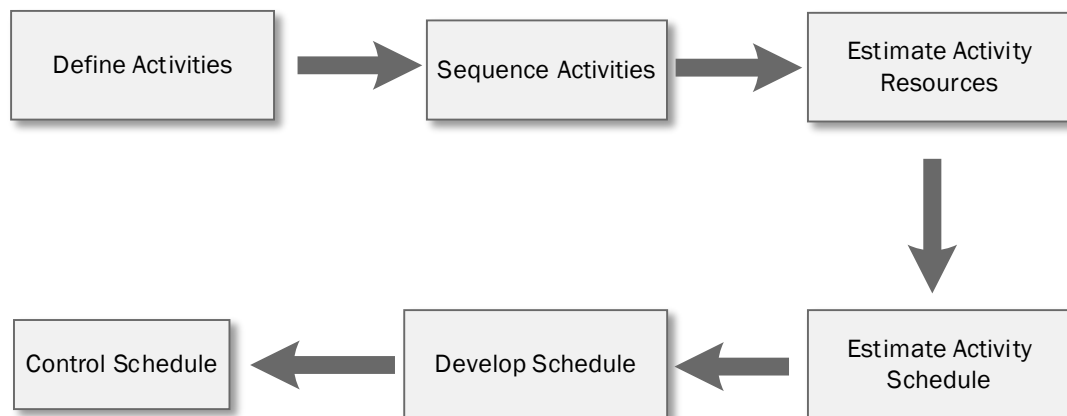


Figure 12: Project Time Management overview

(Source: Own chart developed from PMI, 2008: 129)

A large amount of information needs to be processed by the project manager in order to make sense of a complex situation. The work breakdown structure (WBS) in conjunction with time management techniques such as Gantt Charts and the Critical Path Method (CPM) assist in this sense-making process. The WBS gives a structured breakdown of the scope of works in a list of activities. This list is then linked with a time schedule and a relationship established between activities. Time control is important to the success of the project and is only effective when continuous measurement of the planned schedule is done against the actual progress. This enables the project manager to establish the importance of an event against the planned schedule (Van der Waldt & Fox, 2015: 156-158).

The whole process of design, documentation, procurement and appointment accumulates in preparing a work breakdown structure (WBS). The main objective is to prepare a programme which highlights certain milestone that can be measured by the project manager, agents, engineers, contractors etc.

3.4.3.4 Project cost management

“Budgeting and cost management is the estimating of costs and the setting of an agreed budget, and the management of actual and forecast costs against that budget.” (APM, 2006: 40).

Project cost management includes the processes necessary to ensure that the project is completed within the approved budget. It consists of resource planning, cost estimating, cost budgeting, and cost control (PMI, 2000: 7). These activities are summarised in the following flow chart:

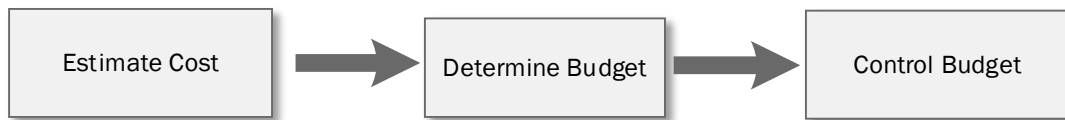


Figure 13: Project Cost Management overview

(Source: Own chart developed from PMI, 2008: 165)

The activities of financial management cannot be planned and executed in isolation. Close liaison with other functions of the enterprise is a prerequisite for the successful execution of financial activities. The budget is the plan of action used to achieve certain objectives; it is a monitory plan for a future period. The process of financial control includes setting specific standards, comparing the actual performance against the predetermined standard, evaluating the differences, and applying corrective measures (De Beer, Ferreira, Hübner, Jacobs, Kritzinger, Labuschagn, Le Roux, Stapelberg & Venter, 1999: 161-167).

APM (2012) defines budgeting and cost control as comprising the estimation of costs, the setting of an agreed budget, and management of actual and forecast costs against that budget (cited: Burke, 2013: 232).

All components of a baseline plan are underpinned by the estimate of what will happen. The accuracy of planning and control depends directly on the accuracy of the estimate. Project estimating also influences the decision making and risk making on a project (Burke, 2013: 232).

Performance of a project is reviewed at regular intervals and should consider non-financial information such as scope and schedule. This is used to make an assessment of the cost performance, which, compared against the total budget, assists in the development trends. These trends can be used to identify potential cost risk and to make the necessary corrective measures (APM, 2006: 40).

3.4.3.5 Project quality control

Project quality control ensures that the product or products of the project and the processes meets the required standard of the stakeholders. The requirements for quality are expressed in terms of acceptance (specification) and form the basis for quality management. Outputs can only be fit for purpose, if the purpose is understood. Quality assurance (QA) gives the stakeholders the assurance that the specified quality will be achieved. QA is achieved through quality control (QC), which is achieved by inspections, testing and quality audits. The success of QA and QC can be achieved by using techniques like risk management (APM, 2006: 28).

“Project quality management is the discipline that is applied to ensure that both the outputs of the project as well as the processes by which the outputs are delivered, meet the required needs of stakeholders. Quality is broadly defined as fitness for purposes or more narrowly as the degree of conformance of the outputs and process.” (APM, 2006: 28).

Project **quality control** describes processes required to ensure that the project adheres to the required standard and consists of quality planning, quality assurance, and quality control (PMI, 2000: 7). The following flow chart lists the activities when managing cost control:

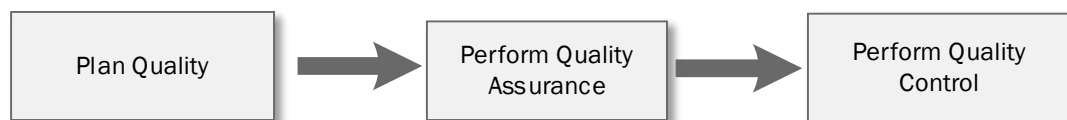


Figure 14: Project Quality Management overview

(Source: Own chart developed from PMI, 2008: 165)

Continuous improvement and quality circles are terms used by companies to describe their on-going processes of engaging their workforce to improve information, materials, products, services, and processes. Quality is interlinked with the other knowledge areas and can be traded off with them. For example, lowering the quality on risk management can lead to a risk not being identified timeously. This could result in unexpected crises management which can influence the rest of the project knowledge areas (Burke, 2013: 302-305).

3.4.3.6 Project resources management

“Resource management identifies and assign resources to activities so that the project is undertaken using the appropriate levels of resources and within an acceptable duration. Resource allocation, smoothing levelling and scheduling act as techniques used to determine and manage appropriate levels of resources” (APM, 2006: 38).

The APM divides resources into replenishable and re-usable resources. Replenishable resources can be used up or be absent and replaced with fresh supplies, e.g. raw materials. Re-usable resources, when no longer needed can be used for other uses, e.g. equipment and people. Resource allocation is the process of mapping resource activities or scheduling. Effective resource management ensures efficient usage of resources, confidence in a realistic schedules, and early identification of resource bottlenecks and conflicts (APM, 2006: 39).

Refining the search to **project human resources management**, it consists of organizational planning, personnel acquisition, and team development (PMI, 2000: 7). The following processes are involved in proper human resources management:

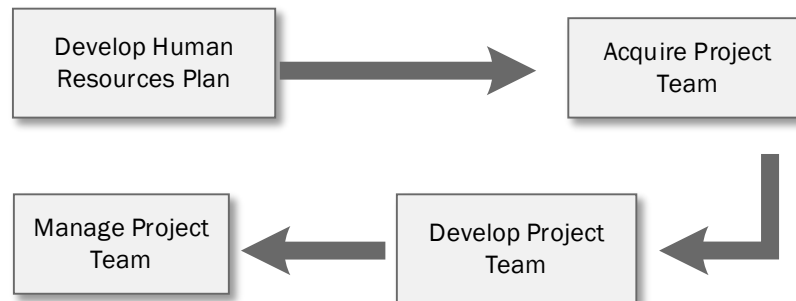


Figure 15: Project Human Resource Management overview

(Source: Own chart developed from PMI, 2008: 215)

Each individual in an enterprise or on a project who has authority over other personnel is responsible for motivating his/her assigned personnel, from top management to line management. It is the managers' responsibility to ensure efficient use and maintenance of labour production. The function of human resourcing is the process of having the right skills in the right quantity at the right time (De Beer et. al, 1999: 139-141).

3.4.3.7 Project communication management

"Communication is the giving, receiving, processing and interpretation of information. Information can be conveyed verbally, non-verbally, actively, passively, formally, informally, consciously or unconsciously." (APM, 2006: 102)

Project **communication management** ensures timely and appropriate generation, collection, dissemination, and storage of data. Communication planning, information distribution, performance reporting and administrative closure, all form part of communication management (PMI, 2000: 7).

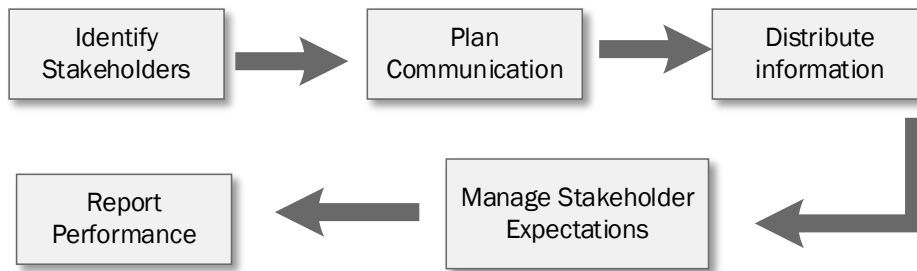


Figure 16: Project Communication Management overview

(Source: Own chart developed from PMI, 2008: 243)

There should be a communication strategy to ensure that all the parties on a project manage their various functions well to achieve the expected results. The main goals of such a strategy may include (Verster, 2006: 11):

- Contract communication

The contract terms should be clear to all the parties involved in a contract. The contract guides the official communication related to rights, obligations and administration of the contract (Verster, 2006: 11).

Effective communication, from the conceptual phase, throughout the life cycle and phases of a project to the closure of a project, is essential. The communication instruments may include risk reports, feasibility proposal, and cost plans through to site instruction (Zulch, 2012: 19).

- General communication

It is crucial that communication is done through the resources of a project, formally and informally. Resources stay the most important aspect of success on a project (Verster, 2006: 11).

In order to develop a strategy, a basic project structure should be considered. The following is an example of such a project structure:

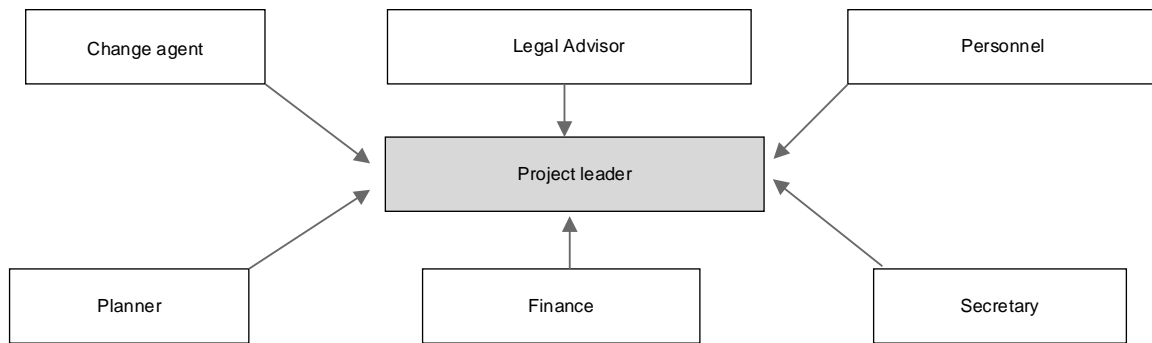


Figure 17: Project structure

(Source: v.d. Waldt & Knipe, 1998: 64)

3.4.3.8 Project risk management

Project risk management is a structured process to understand and proactively manage individual risks and overall project risk events. It minimises threats and maximises opportunities. Risk management should be incorporated throughout the project life cycle and not conducted in isolation from the other knowledge areas and an organisation's structure (APM, 2006: 26).

Project **risk management** includes risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring control. The actions involved in risk management are illustrated in the flow chart below:

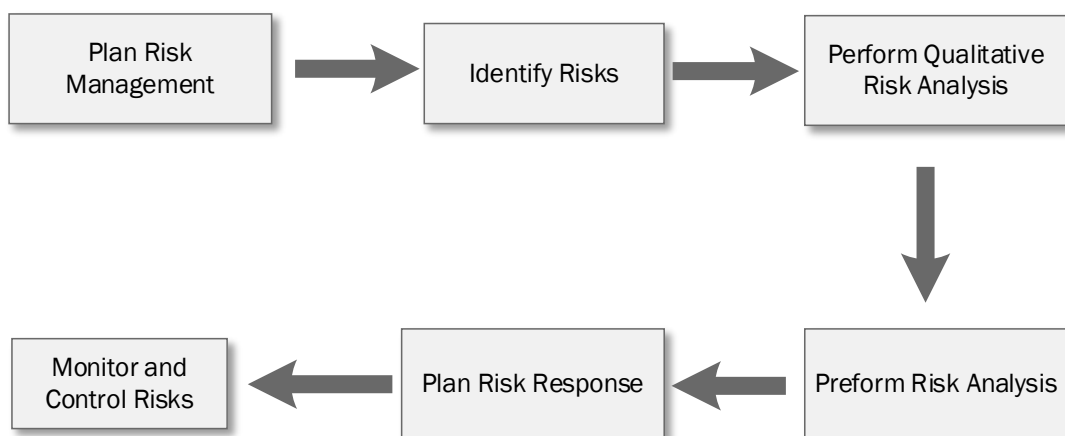


Figure 18: Project Risk Management overview

(Source: Own chart developed from PMI, 2008: 273)

Project risk management is usually conducted in conjunction with the viability study of the project at the beginning of the project life cycle. It can however be done through-out the project life cycle. Omission of project risk management can lead to complete failure of a project in terms of time, cost and quality (Knipe et al., 2002: 330-331).

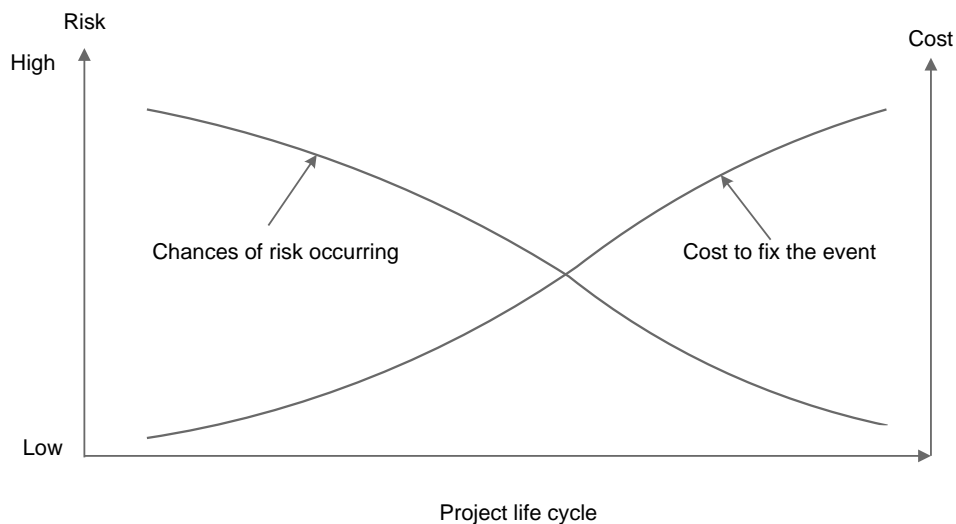


Figure 19: The Risk Management dilemma

(Source: Gray & Larson, 2000: 140, cited in Knipe et al., 2002: 336)

Once the risk has been assessed, the necessary mitigation planning has to take place. Risk mitigation aims to lessen the effects that an assessed risk may have on the project. Risk mitigation actions reduce the chance of an occurrence happening and/or reduces the impact of such occurrence. There are mainly pre-emptive actions and contingency actions (Knipe et al., 2002: 352). There are always risks on a project; the purpose of risk management is to ensure that levels of risk and uncertainty are properly managed so that the project is successfully completed (Knipe et al., 2002: 330).

3.4.3.9 Project procurement management

“Procurement is the process by which the resources (goods and services) required by a project are acquired. It includes development of the procurement strategy, preparation of contracts, selection and acquisition of suppliers, and management of the contracts.” (APM, 2006: 74).

Project **procurement management** describes the processes required to acquire goods and services outside the organisation. It includes procurement planning, solicitation planning solicitation source selection, contract administration, and contract closeout. This is illustrated in the following flow-chart:

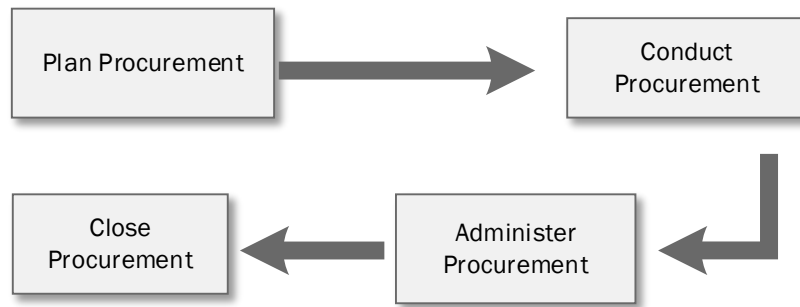


Figure 20: Project Procurement Management overview

(Source: Own chart developed from PMI, 2008: 313)

A term that relates to procurement is purchasing, which can be described as a group of activities that includes the following. Firstly, the requirements need to be established, e.g. the quality and the quantity. Continued research is needed to ensure that the best product is procured for the most effective price and the availability of suppliers. It involves the placing of orders and continual follow-ups to ensure timeous delivery. This is followed by receipt of the product, including inspection and approval, as well as the storage and controlling thereof. A procurement office will invest time in research as well as designing good systems of procurement and will also consider salvaging and disposing of redundant products. The objective of a business should always be profitability and satisfaction of consumer needs (Hugo, Badenhorst-Weiss & Van Rooyen, 2005: 7).

3.4.3.10 **Project integration management**

Project integration management is the function of bringing all the different knowledge areas together, through appropriate coordination between the knowledge areas and role players. It is a collection of processes involving making trade-offs among competing objectives and alternatives to meet or exceed the stakeholder expectations (Van der Waldt & Fox, 2015: 148).

Project **integration management** describes the processes required to ensure that the project is properly coordinated. It includes the activities needed to identify, define, combine, unify, and coordinate the various processes. It entails making decisions about resource allocation, making trade-offs among competing objectives and alternatives and managing the interdependence between the project management knowledge areas (PMI, 2000: 7). These items are summarised in the activities:

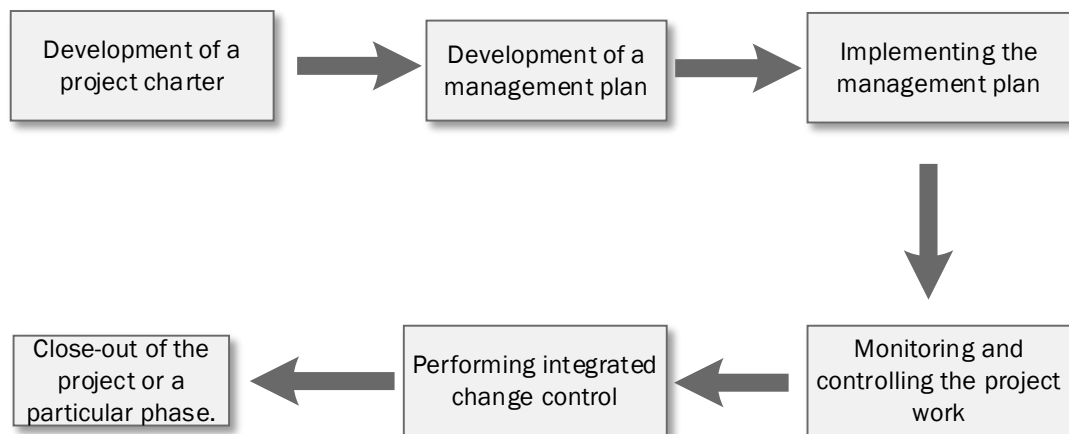


Figure 21: Project Integration Management overview

(Source: Own chart developed from PMI, 2008: 71)

The four applicable contracts identified in Chapter 2 all have the same basic relation of the agreement between the contractor and the employer, with the consulting agent as an amicable appointment by the employer to facilitate the project. Usually the design takes place prior to the appointment of the contractor. Although the employer has very little or no say in the internal management of a contractor's firm, the basic principles applies to the project design team's processes and the construction firm's execution of the design (Loots, 1995: 144). This is illustrated in Figure 22 below:

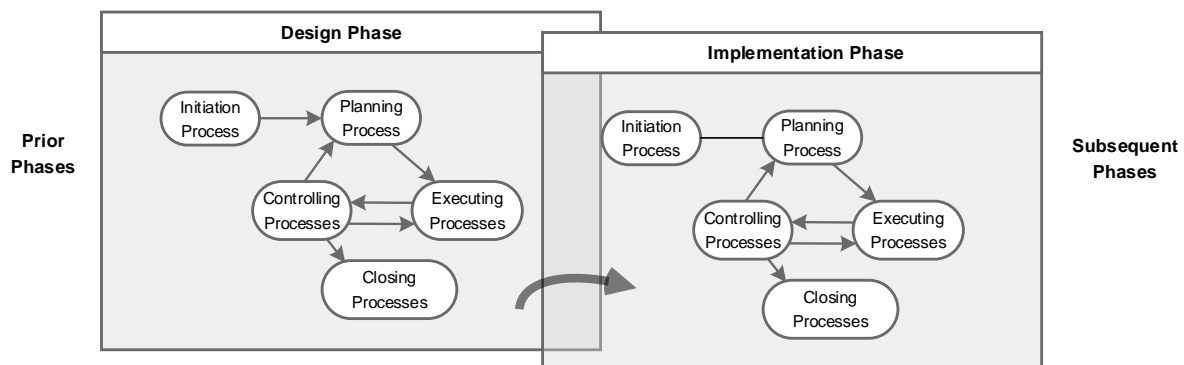


Figure 22: Integration between project phases

(Source: PMI, 2000: 31)

When considering the figure above it can be concluded that the overlapping section between the design phase and the implementation phase can be described as the procurement phase in a construction project. The major derivative from this section of project management means that any project has to be planned, has to be continually and actively monitored, and ultimately controlled.

“Change control is the process that ensures that all changes made to the project’s baselined scope, time, cost and quality objectives or agreed benefits are identified, evaluated, approved, rejected or deferred (APM, 2006: 42).

3.4.4 Construction management (CM)

The Chartered Institute of Building (Bale, 2010: online) defines construction management through its 6 themes as:

(1) The management of development, conservation and improvement of the built environment; (2) Exercised at a variety of levels from the site and project, through the corporate organisations of the industry and its clients, to society as a whole; (3) Embracing the entire construction value stream from inception to recycling, and focussing upon a commitment to sustainable construction; (4) Incorporating a wide range of specialist services; (5) Guided by a system of values demonstrating responsibility to humanity and to the future of the planet; (6) Informed supported and challenged by an independent academic discipline.

The South African Council for the Project and Construction Management Professions (SACPCMP) (2008: 3) defines construction management as:

“The management of the physical construction process within the built environment and includes the co-ordination, administration, and management of resources. The Construction Manager is the one point of responsibility in this regard.”

The main objective of the construction manager is to bring together all the facets or trades to complete the project. The following trades or functions are required in a good construction manager (Burke, 2003: 12):

- Good coordination leadership to put together a decent project team.
- Responsible and willing to take difficult decisions.
- Ability to integrate and coordinate the different trades and facets of a construction process.
- Operationally adaptable.
- Good negotiation skills.
- Gets the job done.
- Understands the business and has the required technical skills.
- Managing skills in the project.

- Good contractual background and understanding of changes and its impact.
- Keeps the client happy.

3.4.5 Main knowledge areas of construction management (CM)

Although the field of construction management shares the above-mentioned ten knowledge areas, there are some specific areas that are specific to the construction industry. In addition to the project management knowledge areas listed above, the following can be listed as the knowledge areas of construction project management: safety management, environmental management, financial management and claims management (Zulch, 2012: 24).

3.4.5.1 Safety management

“Health, safety and environmental management is the process of determining and applying appropriate standards and methods to minimise the likelihood of accidents, injuries or environmental impact both during the project and during operation of its delivery.” (APM, 2006: 30).

In South Africa the Occupational Health and Safety (OHS) environment is regulated by the OHS Act No 85 of 1993 and the regulations promulgated there-under. These regulations create obligations for employers, manufacturers, mandatories, etc. to provide safe and healthy working conditions. On 7 February 2014, the Construction Regulations 2014 were gazetted. This repealed the Construction Regulations 2003 (South Africa. Construction Regulations, 2014b).

The client is more explicitly described than in the previous regulations. A work permit will have to be applied for at least 30 days prior to the foreseen starting date. The client must prepare a baseline risk assessment to identify the major OHS risks for the intended construction project. The assessment must ensure a proper analysis of all the activities on the construction site. The high-risk activities should be addressed in the H&S plan of the contractor. Suitable, sufficiently documented, and coherent site specific health and safety specifications based on baseline risk assessment must be prepared. The designer must be provided with the health and safety specification by the employer. The client must ensure that the designer uses the health and safety (H&S) specifications during the design stage. The client must ensure that the designer carries out all the responsibilities contemplated in the regulations and include the H&S specifications in the tender document for construction. The client should appoint the principal contractor in writing, discuss and negotiate the principal contractor’s H&S plan and approve the plan. Furthermore, he/she should ensure that the H&S plan is implemented and

maintained, H&S audits and document verification are conducted at least every 30 days, and stop any contractor executing a construction activity which poses a threat to the health and safety of people on site. Where changes are brought about to the design or construction work, or where a client requires additional work to be performed, the client must ensure that sufficient H&S information is made available to the contractor (South Africa. Construction Regulations, 2014a: 10-13).

It is important to note that much more emphasis is now placed on the duties of the **designer**. The designer must now be a competent person, and several specific duties are imposed on the designer. He/she should incorporate all applicable (including industry best practice) safety standards into the design; take into consideration the H&S specifications provided by the client; inform the client (in writing) of any anticipated dangers or hazards relating to construction work; make available all information for the safe execution of work being designed or when the design is subsequently altered; refrain from including anything in the design that requires the use of dangerous procedures or materials that may be hazardous to the health and safety of people; take into account the hazards relating to any subsequent maintenance of the relevant structure; and take ergonomic related hazards into account in the design (South Africa, Construction Regulations, 2014a: 13-14). Before the project goes out to tender, the designer should make the following available to the client in a report (South Africa. Construction Regulations, 2014a: 13):

- all H&S information of the design that may affect pricing of the construction work;
- the geotechnical-science aspects; and
- the loading the structure can withstand.

When mandated by the client the designer must carry out inspections at appropriate stages to verify that construction is being carried out as per the design. He/she may stop any work not in accordance with the design's H&S aspects. After the final inspection of the completed structure, including the H&S aspects, the structure should be declared safe for use and a completion certificate should be issued (South Africa. Construction Regulations, 2014a: 14).

Most of the regulations however fall on the shoulders of the contractor. At least seven days prior to commencement of work the contractor will notify the provincial director in writing of the type of construction work to be undertaken. The contractor must appoint a full-time competent person as the construction manager and subsequent managers in writing, depending on the size of the project. The contractor must, before the commencement of any construction work and during such construction work, have a risk assessment done that will be incorporated in the H&S plan. In addition to the above the contractor should apply his/her mind with regard to

safety and where necessary appoint/assign a competent person (and highlighted in the regulations) (South Africa. Construction Regulations, 2014a: 15-47). The following areas are highlighted but are not necessarily limited to these items (South Africa. Construction Regulations, 2014a: 15-47):

- fall protection;
- safety of structure (temporarily and permanent) and temporary works;
- excavations;
- demolition work;
- tunnelling;
- scaffolding;
- suspended platforms;
- rope access;
- material hoists;
- bulk mixing plant;
- explosive actuated fastening device;
- cranes;
- construction vehicles and mobile plant;
- electrical installations and machinery on construction sites;
- use and temporary storage of flammable liquids on construction sites;
- stacking and storage on construction sites;
- fire precautions on construction sites;
- construction employees' facilities;
- safety around water environments; and
- safety through house-keeping referring to the Environmental Regulations for Workplaces, 1987.

3.4.5.2 Environmental management

Environmental legislation is subject-specific, e.g. noise, dust, protection of flora and fauna, and waste sustainability. Allowance should be made pro-actively in the project planning towards complying to the required regulations. The project manager and others involved in a project, owes a duty of care to themselves and others to act responsibly and upon the project manager's instruction (APM, 2006: 30-31).

In South Africa environmental management (EM) is mostly regulated by the Environmental Conservation Act No 73 of 1989, with its amendments published in May 2002. A large portion

of the act has however been replaced by the National Environmental Management Act No 107 of 1998 (South Africa, 2016: online).

Environmental law is not governed by a single legislation but is rather a combination of different legislative matters relating to different sections of the protection of the environment. Loots (1995: 663-677) mentions the different topics and legislation pertaining to them. Some of the applicable fields are listed below and include but is not limited to:

- water pollution;
- air pollution;
- noise pollution;
- radiation;
- solid waste;
- mining activities; and
- international law.

The goal of environmental management is to minimise the impact both during project implementation and during the operation of deliverables of a project by applying appropriate standards and methods (APM Body of Knowledge cited in Zulch, 2012: 43). It includes the activities to minimise the impact on the surrounding environment and natural resources and to operate within the limits stated in legal permits (PMI, cited in Zulch 2012: 43).

Environmental management goes hand in hand with health and safety. The processes involved with environmental management are those imposed by the applicable government's regulations, conditions, and permits. This can become a technical and complex subject and should be managed through proper budgeting, alternative selection and risk analysis (Zack, 2004: online).

The first most important step in **integrated environmental management** is the process of identifying potential environmental risk through an impact assessment (Loots 1995: 678). The processes of environmental management further include environmental planning, performance of environmental assurance, and performance of environmental control (PMI, cited in Zulch, 2012: 43).

To build on the above-mentioned integrated environmental management, one can consider the PLC as discussed in Section 3.4.2. The environmental impact of construction projects varies greatly, influenced by the design, location, and the end use. The environmental impact of a building within an urban environment, for example, will differ from the impact that an oilrig close to a sensitive coral reef will have. From the project viability research stage, the right

stakeholders or role players should be involved. Before any development can take place all the required town planning and permits have to be in place.

3.4.5.3 Financial management

Financial management can also be termed cost control and the main objective of a construction company is to make a return on their investment. The earned value system was developed with man-hours (labour cost) listed as the main drivers. Proper financial management is thus a vital function for any construction manager. The earned value system lays down the following criteria (Lester 2013: 256):

- Minimum site input. The personnel should spend their time managing the contract and not filling in unnecessary forms.
- Speed. The returns should be monitored and analysed efficiently to enable the company to take swift action.
- Accuracy. Expenditure should be monitored accurately for accurate decision making.
- Value for money. One should be able to relate the production of man-hours on a task against the output.
- Economy. The system should be inexpensive to manage.
- Forward looking. The main objective of the system is recognising the trends and taking remedial action swiftly.

Financial management is one of the most important functions of a person in charge of the finances. The function of financial management mainly focuses on the revenue and cash flow. A good financial manager will address the following areas on a project: cost and duration, assessing risk, implementing a financial plan, establishing cost and revenue baselines, analysing the cost of changes, performing cash flow analysis, preparing financial reports, and analysing potential corrective action plans (Zack, 2004: online).

3.4.5.4 Claims management

***“Issue management** is the process by which the concerns that threaten the project objectives and cannot be resolved by the project manager are identified and addressed to remove the threats they pose.”* (APM, 2006: 48).

***“Conflict management** is the process of identifying and addressing differences that if unmanaged would affect project objectives. Effective conflict management prevents differences becoming destructive elements in a project.”* (APM, 2006: 108).

Preventing and avoiding claims are the main functions in the management of claims. Managing claims involves, but is not limited to, claims for extra work, claims for additional time, impact of changes and delays, estimates of claims damages, schedule analysis, and analysis of both direct and indirect costs (Zack, 2004: online). Davison (2003: 18) lists incomplete pre-contract design and documentation as the perennial causes of claims. Bennett (2003: 263) expands on this by listing a few ways disputes can be prevented or the effect thereof minimised.

- Complete, clearly defined and accurate design documentation;
- Contracts that distribute the risks evenly;
- Constructible reviews in the design stages;
- The implementation of partnering whereby parties anticipate problems and commit themselves to find a solution;
- A reasonable, sufficient detailed project programme and adherence to it by all parties;
- Proper administration of contractor documentation;
- Limiting the amount of contract changes; and
- Dispute review boards or single experts for smaller projects.

The right of a party to submit a claim and the other to consider it is set out in the contract document. The submission of a claim does not mean that there is a dispute. However, the rejection of a claim may lead to a dispute. The rejection means that there is a difference in opinion. Dispute resolution is supposed to assist the parties in resolving a disagreement cost effectively, timeously and to the satisfaction of the parties (Verster, 2006: 13).

3.5 COMPARISON BETWEEN THE CONTRACTS AND PROJECT MANAGEMENT

According to the American Institute of Architects' guide, the delivery of integrated projects (cited in Greenhalgh & Squires, 2011: 247):

... a project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste and maximize efficiency through all phases of design, fabrication, and construction.

From this quotation, it can be derived that a project should be planned with the execution phase in mind. The design has to be conveyed to the contractor to complete the project as the client envisioned it. This should be kept in mind as the study progresses.

The following table summarises and compares the main themes of the four main contracts against the nine knowledge areas of project management as well as the additional four construction management themes. The main objective of each is to address any change that will inevitably occur to produce the desired product.

Table 10: Comparison between identified contract, project management and construction management themes

General contract themes	Project Management (Source: van der Waldt & Fox 2015)	Construction Management (Source: Zulch, 2012)
General	Scope Management	Environmental Management
Roles and responsibilities	Human Resources	
Time related items	Time Management	
Payment	Cost Management	Financial Management
Quality	Quality Management	
Risks or change	Risk Management	Safety Management
Termination		
Claims and disputes		Claims Management
	Stakeholder Management	
	Integration Management	
	Communication Management	
	Procurement Management	
Change		

When comparing the themes of the four main contracts against the main themes of project management, it seems to be very similar in nature. The construction management knowledge areas or themes fill the gaps that may occur from the challenges experienced on construction sites. Where possible, the themes have been listed against the appropriate contractual theme where it usually occurs in the contract document. All the themes are interdependent of each other and the listing does not necessary limit the themes to the specific contractual theme. This was highlighted under the contractual theme risk, which is spread throughout the contract.

As was discussed in Section 3.4.1 the main constant through-out any project is change which is ever present. This change should be managed through the main knowledge areas of project management. The assumed goal of the contract is thus to implement the rules of how these changes will be dealt with between the parties. From Table 10 it is seen that there are four knowledge areas which could not specifically be grouped under the contractual themes. They are stakeholder, integration, communication, and procurement management. Although these knowledge areas are not explicitly linked to any specific contractual theme, it does not mean that some sort of correlation does not exist. The next chapter will highlight any correlation that may exist.

3.6 CHAPTER CONCLUSION

It was learned that the South African Government's objective is to standardise procurement documentation. This will aid the industry by minimising the potential of misunderstanding of procurement documents, and the unnecessary exclusion of certain documentation, etc. It will further lower the risk of misunderstanding between the contracting parties. It was established that the basic PLC of a construction project can be divided into:

- design;
- procurement;
- implementation; and
- closure.

It was also learned that the four main contracts endorsed by the CIDB has very similar themes or clauses.

Chapter 3 presented project management, construction management, and the four main contracts to have very similar and overlapping themes or knowledge areas. This proves promising for consultants who may want to use these contracts to manage construction projects.

Thus far, it can be deduced that construction contracts have the potential to empower the employer to manage the project. It would seem that the objectives of the construction contracts are to deliver projects on time, within budget, and to the required quality. It is clear that similarities occur within the construction contracts, which gives a framework for the management of the project. It would seem that most South African effort is aimed at standardising these documents to enable all parties to be knowledgeable about what the content of the contract should include.

The next chapter reviews the four standard contract suites, in particular the contracts suitable for building construction.

CHAPTER 4 MAIN CLAUSES OF CONTRACTS AND THE MANAGEMENT THEMES

4.1 INTRODUCTION

In Chapter 3 it was established that the most basic structure of building contracts consists of the preparation of the procurement documents, the offer and acceptance, the execution of the contract, and the close-out of the contract. This is in line with the project life cycle as discussed in the previous chapter. The ten main project management themes, as well as four additional construction management themes, were identified. This chapter groups the four main contracts' structures and content to these themes to determine if such relation and potential management possibilities exist.

It was also established that the general structure of the four main contracts correlates with the main project management themes. This chapter determines to what end. Each project management knowledge area relates differently to each stage of the project life cycle (PLC). Most of the project management themes are applicable through-out the PLC. Figure 23 below shows the relationship of the construction project towards the PLC. This chapter further establishes the role of each contract towards the successful completion of the project.

The research's objective in this chapter is not to present a definitive interpretation of each contract and its project management application, but rather to highlight the potential of using the clauses contained in each contract to manage a project from an employer representative's perspective. It does not take into account the experience, knowledge and skills of the parties involved.

Annexure A encloses a summarising comparison table between the management knowledge areas and the different clauses of the investigated contracts.

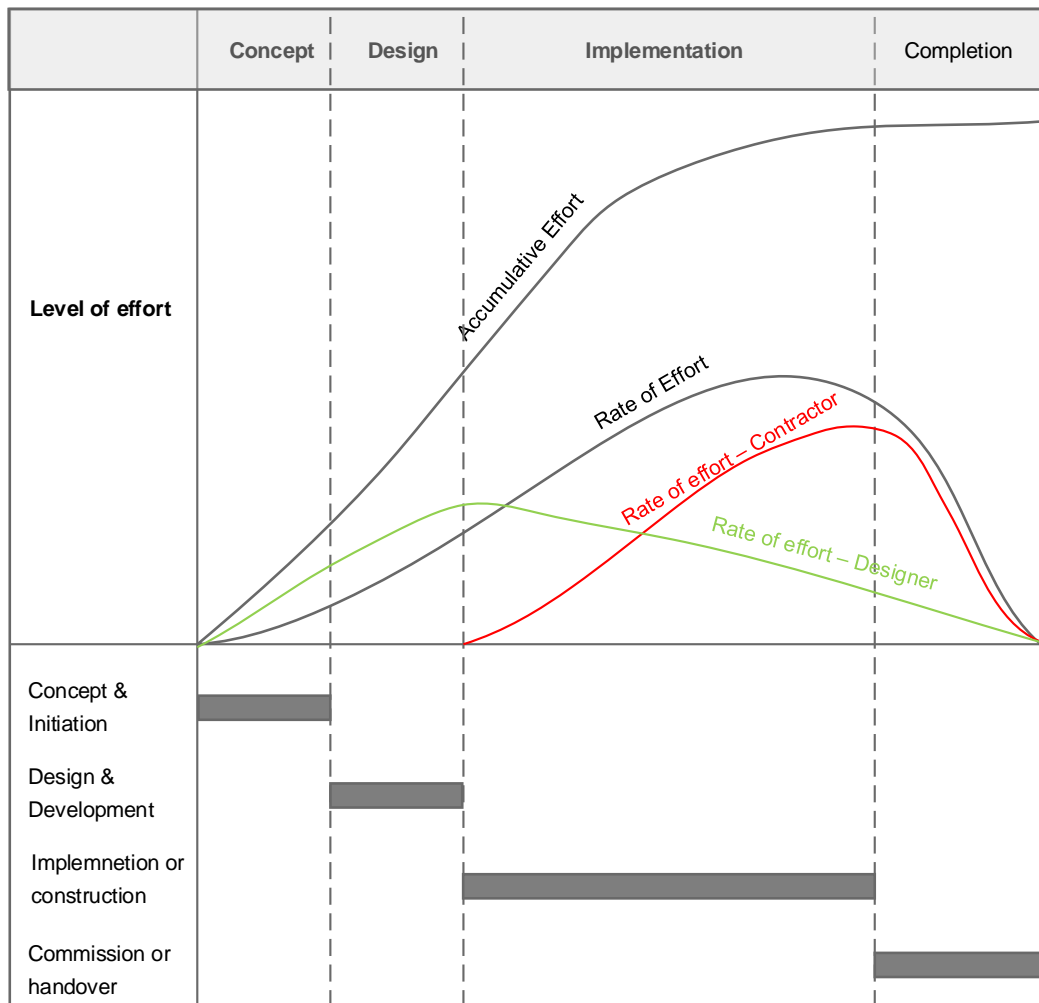


Figure 23: Project life cycle in construction

(Source: Burke, 2013:88: modified)

Each contract is now discussed by means of a short introduction and outline of the contract, before grouping the applicable clauses within each knowledge area. Financial management and cost management are discussed as one management theme, while health and safety, and environmental management are also discussed under one heading.

4.2 NEW ENGINEERING CONTRACT (NEC)

4.2.1 Introduction

The NEC proclaims that it is designed to facilitate and encourage good management of projects. Foresighted collaboration between all the contributors to the project is the aim of the contract. It prides itself that it provides a wide range of options to the parties so that no alterations are needed to suit the specific situation of the project (NEC, 2013a: Preface).

For the purpose of this study, the NEC Engineering and Construction Contract (ECC) is used.

A noticeable difference to the other contracts is that a project manager is appointed as the employer's main consultant or agent. It is further promulgated that the project manager's authority in the project should not be limited, which, according to the NEC, may increase the difficulty to resolve disputes. However, if the contractor believes any of the project manager's actions or decisions not to be in accordance with the contract, the matter may be referred to the adjudicator (CIDB, 2005b: 9).

The main objectives of the NEC contract are to improve an existing contract with regard to the aspects discussed next (NEC, 2013a: 1-5):

4.2.1.1 Flexibility

The contract may be used in many countries for engineering and construction work containing all the traditional disciplines/trades. It can be used when full or partial design responsibilities rest with the contractor. It can be implemented for specific types of tenders, such as competitive tenders, target contracts, cost reimbursable contracts, and management contracts (NEC, 2013b: 1-2).

4.2.1.2 Clarity and simplicity

The contract makes use of flow charts of procedures for the applicable parties in the contract. Optional clauses add to a set of nine main clauses. No cross referencing is made with language, and sentences are kept as simple as possible (NEC, 2013b: 2-3).

4.2.1.3 Stimulus to good management

The contract's proposition is that foresight and co-operative management of interactions between the parties can reduce risks to all the parties involved. The main objectives are teamwork and ownership by all parties involved on the project. An important by product of this is that a few issues relating to valuation of works or extensions of time are not left to be settled at the end of the project. According to the NEC, it is possible to provide arrangements for the different parties to contribute to the management of the project. Stimulating good management is one of foresightedness and assignment of clear functions and accountability by all parties. It continues to list the main items that the parties should be made aware of in any event which may

- increase the amount that the employer has to pay;

- delay completion of the works;
- impair the performance of the works, once completed; or
- affect others working on the project.

Whenever any such events are highlighted, the parties meet to address such events to seek mutually beneficial solutions through collaboration. The problem is usually addressed quickly and few items are left to be settled afterwards. Valuations and cost implications are discussed during these meetings. These events rely on an up-to-date and realistic programme. This programme is used in a joint decision-making fashion between the contractor and the project manager. The key phrase is “in the best interest of the employer”. (NEC, 2013b: 3-5).

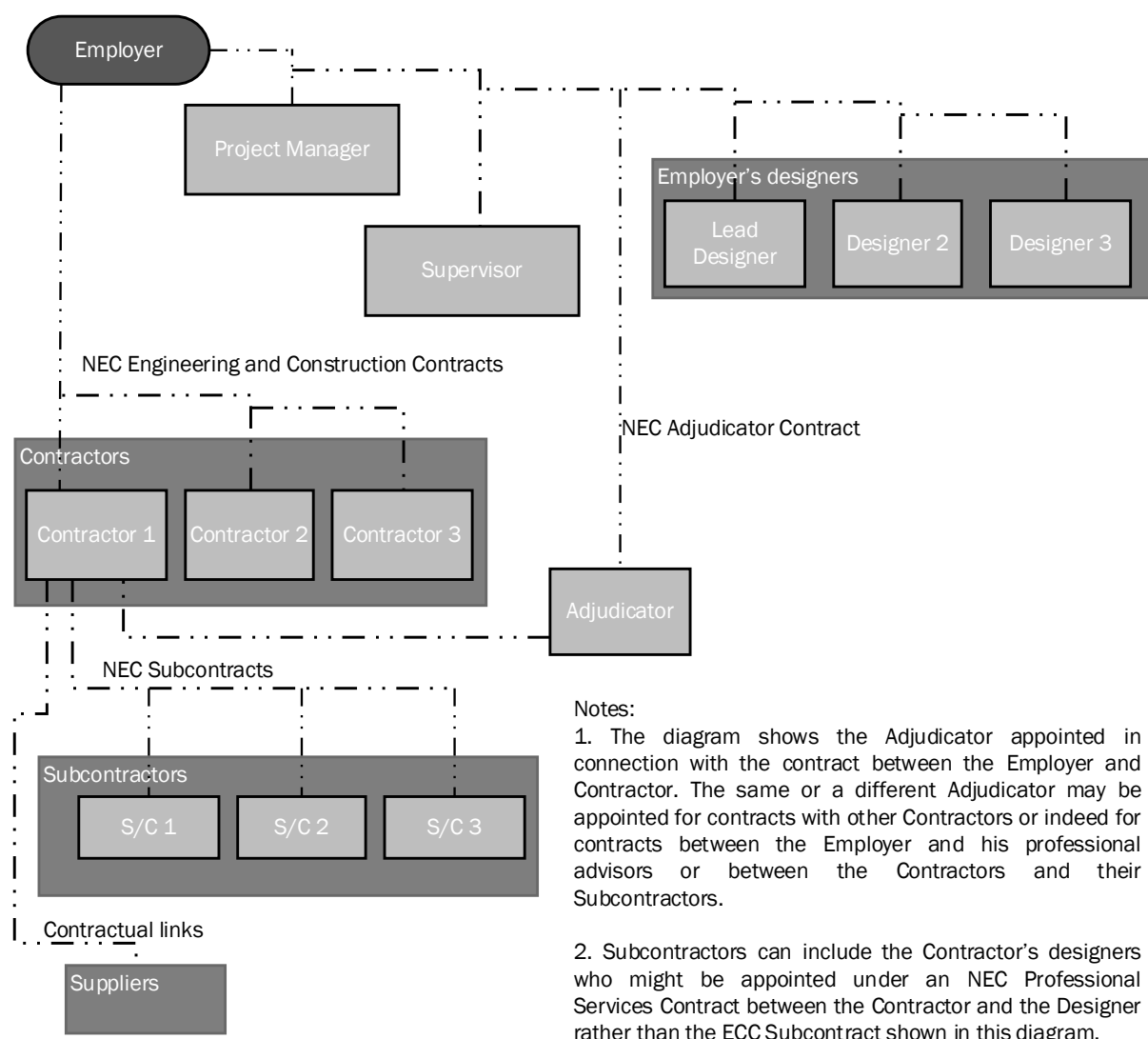


Figure 24: The NEC system – Key players and contractual links

(Source: NEC, 2013b: 9)

4.2.1.4 Roles and responsibilities

As can be seen from the figure above the contracting parties are the employer, project manager, supervisor, contractor, subcontractors, and the adjudicator. The contract is not specific towards the separate functions of the employer's designers, but is assumed to be covered under the contracting parties mentioned (NEC, 2013b: 8).

4.2.1.4.1 *Project managers*

The project manager has the role of principal agent (PA) or engineer or employer's agent if considering the other forms of contract. As with the other forms of contract the project manager is usually appointed at the start of the project before design starts. He/she may act on behalf of the employer and advise him/her on procurement, estimates and choosing an appropriate form of contract. It is advised to appoint a project manager who is close to the project and has the capacity to implement the contract. On large contracts multiple project managers may be appointed for the different contracts or the project manager may delegate his/her obligations. The ECC places a large amount of authority on the project manager and it advises not to put limits on the project manager's authority in the additional conditions of contract as this will make settlement of disputes difficult. If the contractor believes that the project manager is not acting in accordance with the contract, he/she may refer it to the adjudicator (NEC, 2013b: 10).

4.2.1.4.2 *Designers*

The employer's designer develops the design to meet the employer's requirements. However, if the requirement is a design and construct, the designer's role is usually to develop a performance specification, together with standards for design and materials which he/she may wish to be specified for inclusion in the works information. Under the ECC, the employer's designer is not referred to in the contract. However, the project manager should have access to the designer's advice (NEC, 2013b: 11).

4.2.1.4.3 *Supervisors*

The supervisor is appointed by the employer for a specific contract. Essentially his/her role is to check whether the works are constructed in accordance with the contract, similarly to the resident engineer or principal agent's representative. The supervisor has one significant contractual responsibility. Namely, it is his/her responsibility to issue the defects certificate, which signifies the end of most of the obligations of the parties. As with the project manager, the contractor can refer any wrong action to the adjudicator (NEC, 2013b: 11).

4.2.1.4.4 *Adjudicator*

The role of the adjudicator is to resolve any dispute between the parties quickly and efficiently without causing damage to the relationship between the parties. The decision is binding upon the parties and if one of the parties disagrees, he/she has a limited time to appeal to the tribunal. The adjudicator is jointly appointed by the contractor and the employer, who only becomes involved when a matter is referred to him/her. As per the contract he/she has a specified time limit to make his/her adjudication (NEC, 2013b:12).

4.2.1.5 **Core Clauses**

4.2.1.5.1 *General*

As with the other contracts, the contract's first clause focuses on the general arrangement and definitions. Clause 10.1 can almost be explained as being philosophical by simply stating that the applicable parties will act as per the contract and in the spirit of "mutual trust and co-operation" (NEC, 2013a: 3). This clause may be seen as the *basic* clause that sets out the way in which the scope is managed.

4.2.1.5.2 *Contractor's main responsibilities*

The contractor's main objective is to provide the works in accordance with the contract. The contractor may be responsible for certain designs, but have to submit these designs to the project manager for acceptance. If required, the contractor should do the same for equipment. The contractor should employ each key person in accordance with the contract data and may submit the credentials of a replacement, which is subject to the project manager's acceptance. The rest of the clause continues stating that the contractor should work with the rest of the team and that the contractor is responsible for appointing the subcontractors (NEC, 2013a: 7-8).

4.2.1.5.3 *Time*

This clause is mostly concerned with the key dates and the programme. This clause spells out the basics that should be included in the contractor's programme. The programme is subject to acceptance by the project manager. Instructions to stop work, reviewing the programme, taking over by the employer, and acceleration are also addressed in this clause (NEC, 2013a: 9-10).

4.2.1.5.4 *Testing and defects*

The very basics of the required inspections and tests are discussed. The project manager will notify the contractor of any defects that have to be attended to. If the contractor fails to correct any defect before the *defects date*, the employer may use another party to remedy the work at the expense of the contractor (NEC, 2013a: 11-12).

4.2.1.5.5 *Payment*

Clause 5 stipulates the procedure of payments with the default time for certifying the payment one week from the assessment date and a further three weeks after that for the employer to make the payment. The clause makes allowance for interest on money due to either party (NEC, 2013a: 13-14).

4.2.1.5.6 *Compensation events*

A list of items deemed to be compensation events, subject to certain criteria, is given. The clause indicates that the contractor should notify the project manager of any such compensation events' cost implication within eight weeks. If no such notification is received, the contractor is not entitled to a change in the prices. The contractor should submit quotations for the event within three weeks and the project manager should respond within two weeks after the receipt thereof. This quotation should indicate the impact of the event on the programme (NEC 2013a: 17-19).

4.2.1.5.7 *Title*

In short, except specified differently, all equipment and plant on the project becomes the title of the employer. This plant and material's title passes back to the contractor if it is removed from site with permission from the project manager (NEC 2013a: 20).

4.2.1.5.8 *Risks and insurance*

The clause opens with a list of risks allocated to the employer, followed by risks allocated to the contractor. The contractor is also responsible for all the insurance cover stated in the contract. Any additional insurance may be covered by either party as described in the contract data. Each insurance policy will be jointly in the name of the contractor and the employer. If the contractor fails to take out the necessary insurance the employer may do so at the contractor's cost (NEC 2013a: 21-23).

4.2.1.5.9 *Termination*

The last clause sets out the reasons, procedures, and compensation when terminating the contract by either party. The employer may terminate the project for any reason (in terms of the contractual procedures) and the contractor may terminate the project as per the listed reasons of Clause 9 (NEC 2013a: 24-26).

4.2.1.6 **Main option clauses**

The ECC makes provision in the contract for the type of pricing method as discussed in Chapter 2. The six options given in the contract pertain to the pricing methods (NEC 2013a: 1).

- Priced contract with activity schedules (Option A).
- Priced contract with bills of quantities (Option B).
- Target contract with activity schedule (Option C).
- Target contract with bills of quantities (Option D).
- Cost reimbursable quantities (Option E).
- Management contract (Option F).

4.2.1.7 **Dispute resolution**

Two options for dispute resolution are listed; one is specific to the United Kingdom on housing grants and is thus not applicable to the study. The study only focuses on Option W1, which stipulates that an adjudicator should be appointed for any dispute that may arise. The contract promulgates that such an adjudicator be appointed at the start of the project. The contract tables conditions when a matter may be referred to the adjudicator and by whom. The parties in the contract may also refer a matter to a tribunal, but only after it has been reverted to the adjudicator (NEC, 2013a: 42-45). The employer is given a choice of the tribunal and it is required that such a choice is given in the contract data. This may include arbitration, expert determination, a dispute resolution panel, or legislation, depending on the country in which the project is listed (NEC, 2013b: 95).

4.2.1.8 **Secondary options**

The secondary options do not necessarily have to be used when compiling the contract, but present the opportunity to the compiler to customise the contract to his/her specific requirements. The optional clauses range from contract price adjustments to bonus for early

completion to retention. Some of the items are standard in the other three contracts, such as sectional completion. The secondary options can thus not be ignored when compiling the contract and present the project manager with some additional project management tools. The following is a complete list of the seventeen optional clauses (NEC, 2013a: 48-59):

- **Price adjustment for inflation** – This option is only used with activity schedules and bills of quantities. As with the other contracts, this clause relies on the applicable country's indexes.
- **Changes in the law** of the country allow that any changes in the applicable countries may lead to a compensation event.
- **Multiple currencies** allow the project to be run with two applicable currencies. This is usually applicable when working on large infrastructure projects in more than one country. The construction of the Eurotunnel is an example of such a project. This option can only be used when priced schedules or bills of quantities are used.
- The **parent company guarantee** simply makes allowance for a large company that owns the construction company to take out the required insurance on behalf of the construction company it owns.
- **Sectional completion** as per the other three contracts, the ECC allows for the project to be divided into sections. These sections can then be completed separately from other sections of the project.
- **Bonus for early completion** is a handy incentive for the contractor to finish the project earlier. It can become a powerful tool for the project manager to manage time.
- **Delay damages** can be referred to as **penalties** for late completion by the contractor.
- The **partnering option** gives the parties listed in the schedule permission to form partnerships. This however does not relieve the main parties from their obligation of the main contract. This seems to be a complex arrangement and would require an investigation on its own.
- **Performance bond** is similar to the performance guarantee referred to in the JBCC PBA contract.

- **Advanced payment to the contractor.** As with the FIDIC (Red Book), allowance is made for an advanced payment to the contractor, countered with an advance payment bond.
- **Limitation of the contractor's liability for his/her design and reasonable skill and care.** The contractor is not liable for defects in the works due to his/her design if he/she can prove that he/she used reasonable skill and care to ensure that his/her design complied with the works information.
- **Retention.** As with the other contracts, the contract allows for a retainer to be held back on due payment to the contractor. This amount is then reduced when completion is reached.
- **Low performance** damages allow the contractor to be liable for damages to the employer for low performance in portions of the works completed. Stated differently, it constitutes a defect listed in the defects certificate that shows low performance in contrast to the contract data.
- **Limitation of liability.** The contract allows for the liability of the contractor toward the employer to be limited in accordance with this optional clause.
- **Key performance indicators** can become a power management tool and is similar to the bonus for early completion. There are targets that are set for certain items in the programme, with an incentive. When these items are completed on the specified date, the contractor may be rewarded in a specified manner.
- **Option Y (UK)**¹ allows for a **project bank account** to be opened with specific suppliers listed. It specifies arrangements of payments, deeds and termination.
- **The Housing, Grants, Construction and Regeneration Act 1996** is a specific optional clause for the United Kingdom.
- The option of **The Contracts' (Rights of Third Parties) Act 1999** allows for a specified third party to enforce a term on the contract only if it is stated in the contract data.
- The last optional clause allows for any **additional conditions of contract** to be written into the contract.

4.2.2 Comparison with the management knowledge areas

The following section compares the contract and its clauses to the ten management knowledge areas identified in Chapter 3. The following table summarises what has been discussed.

Table 11: The NEC sections compared against the management fields

NEC		Management themes	
Clause number	Schedule 1 : Core clauses	Project management	Construction management
Clause 1	General	Stakeholder management	Environmental management
Clause 2	The contractor's main responsibilities	Human resources	Safety management
Clause 3	Time	Time management	
Clause 4	Testing and defects	Quality management	
Clause 5	Payment	Cost management	Financial management
Clause 6	Compensation events	Scope management	Claims management
Clause 7	Title – pertaining to material and plant on site (to whom does it belong?)	Procurement management	
Clause 8	Risks and insurance	Risk management	
Clause 9	Termination	Communication management	
		Integration management	
Supplementary schedule of option			
Schedule 2	Main option Clauses - with six options		
Schedule 3	Dispute resolution - Two options		
Schedule 4	Secondary options Clauses with - 17 optional Clause		

(NEC, 2013a)

(Source: van der Waldt & Fox, 2015)

(Source: Zulch, 2012)

4.2.2.1 Project stakeholder management

The role players are clearly identified in the contract as mentioned above. Stakeholders or parties other than those already mentioned thus far are named “others”, while the “the parties” are defined as the two parties legally bound by the agreement, namely the employer and the contractor. The employer may change the project manager or the supervisor after he/she has notified the contractor of the name of the replacement (NEC, 2013a: 4).

In Clause 25 the arrangement between the employer and others are set out. The contractor will assist with any information that may be needed by others regarding the works. The contractor will cooperate and share the working area in accordance with the works information. The contractor will provide services as stated in the works information, failing which, any costs

incurred by the employer because of the non-provision may be claimed from the contractor after the situation has been assessed by the construction manager (NEC, 2013a: 7).

No nominated or selected subcontractors are allowed for on the contract. The contractor is responsible to provide the works as if he/she has not subcontracted. The appointment of subcontractors is, however, subject to approval by the project manager (NEC, 2013a: 8).

Clause 27 states that the contractor will provide access to the work for the project manager, the supervisor, and others, as notified to him/her by the project manager. It continues by stating that the contractor will obey an instruction which is in accordance with the contract and is given to him/her by the project manager or supervisor (NEC, 2013a: 8). This relates to communication arrangements, but implies that the project manager and supervisor are responsible for any instruction regarding the works. It often happens that the new tenant changes the requirements on (for example) finishes. This is all good as long as it is communicated to the project manager and/or supervisor and approved. The contractor can only alter the design if such an instruction comes from the project manager or the supervisor.

The main option clauses do not have a major effect on the arrangement of the stakeholders. If a dispute arises, the matter may be referred to an adjudicator. However, this is discussed under Section 4.2.2.13 (NEC, 2013a: 42).

Secondary option clauses that may have an effect on stakeholder management is parent company guarantee (Clause X4), partnering (Clause X12), and additional conditions (Clause Z).

From the above it can be seen that stakeholder management, to a large degree, can be influenced by the contractual clauses mentioned above. A large portion of the management areas of stakeholders, however, falls outside the implementation life cycle, which is managed by the project manager.

4.2.2.2 Project scope management

The entire document contributes to describing the scope of works. As was mentioned in Chapter 2, the NEC contract consists of the following documents (NEC, 2013b: 6):

- contract;
- contract data formats;
- schedule of cost components;
- works information;

- site information; and
- documents resulting from choosing secondary options.

Clauses 15 and 16 describe the site and site information. The site is defined as the area within the boundaries of the site, and the volumes above and below it is affected by the works included in the contract. Site information, on the other hand, is information which describes the site and its surroundings as a contained document described in the contract data (e.g. scope of works document) (NEC, 2013a: 4).

Clause 18 defines the working areas as the areas which are necessary for providing the works and only used in the contract, unless later changed in accordance with the contract (NEC, 2013a: 4).

In accordance with Clause 11.2 (19), the works information is information which specifies and describes the works or describes any constraints on how the contractor should provide the works. This information is contained in either a document specified in the contract data or an instruction given in accordance with the contract (NEC, 2013a: 4).

Secondary option clauses that may have an effect on stakeholder management are changes in the law (Clause X2), sectional completion (Clause X5), and additional conditions (Clause Z). The scope of works is never the same on separate contracts and thus needs to be tailor made for the specific project. The NEC contract allows for this to be specified in the contract data and the works information.

Clause 9 specifically addresses the reasons for each party to terminate (Clause 91), the procedures on termination (Clause 92), and payment due on termination (Clause 93) (NEC, 2013a: 24-26).

4.2.2.3 Project time management

The contract dedicates an entire core clause to time with each of the option clauses providing for acceleration of the contract. The secondary option clauses allow for a bonus for early completion (X6), delay damages (X7), low performance (X17), key performance indicators (X20), and additional conditions of contract (Z), which can be used in managing time on the project (NEC, 2013a).

Clause 30 defines the start, completion and key dates applicable to the contract. Clause 31 is very specific about what is required in the programme. It stipulates that the contract should be accepted or rejected by the project manager within two weeks of submission by the contractor.

The project manager should supply reasons as per Clause 31.3 why the programme has not been accepted. Clause 32 is concerned with revising the programme and stipulates that the effect of any change to the programme should be clear and visible. This includes the effects of the implemented compensation events. The contractor should further indicate on how he plans to deal with any delays and how defects will be corrected. Clause 33 allows the contractor access to and use of the site to enable him/her to complete the work included in the contract. The contractor may be instructed to stop the work and to start again (Clause 34). Clause 35 involves taking over arrangement and the time implications thereof. Acceleration (Clause 36) is allowed for and the contractor gives a quotation and stipulates the reasons why the work has to be accelerated and cannot be done in the specified period (NEC, 2013a: 9-10).

The NEC is very specific about the programme and gives the project manager power to accept or reject the proposed programme. This, together with the secondary option clauses listed above gives the project manager the potential ability to manage the time on the project.

4.2.2.4 Project cost management

Clause 5 defines the basics of assessing the amount due, payment of the amount due, and the defined cost. These basic clauses are read in conjunction with the main option clauses, each with its own payment mechanism. The different payment mechanisms are based on three important terms (NEC, 2013a: 59):

- price – as defined by the chosen main option;
- price for work done to date; and
- defined cost.

The project manager can correct wrongful payments in subsequent payments. The contract also allows for interest to be added by either party on late payment, for whom a payment was due, and not paid within the specified time (NEC, 2013a: 13).

Clause 6 pertains to compensation events and is a means to control costs and scope on the project. Compensation events are events which, if they occur, to no fault of the contractor, entitle the contractor to be compensated for the effect the event has on the prices and the completion date and/or key date. The clause is subdivided into six sub-clauses (NEC, 2013b: 68):

- Definitions (Clause 60).
- Notifications by either the project manager or the contractor (Clause 61).

- Submissions of quotations for compensation events (Clause 62).
- Rules on how assessment of the effect of time and money should be conducted (Clause 63).
- Assessments by the project manager (Clause 64).
- How changes are incorporated in the contract (Clause 65).

The secondary option clauses that may be applicable and used for quality management are: price adjustment for inflation (X1), multiple currencies (X3), retention (X16), additional conditions of contract (Z) (NEC, 2013a).

As mentioned above, with the main option clauses (options A to F), a specific payment control system can be chosen. The contract further allows for a schedule of cost components (SCC) to be compiled through options, namely target contract with activity schedule (Option C), target contract with bills of quantities (Option D), and cost reimbursable quantities (Option E). This SCC is similar to “day works” specified in the GCC. Items usually listed in the SCC are people (day rates), equipment, plant and materials, charges, manufacturing and fabrication, design costs, and insurances. Matters that are considered when compiling the SCC are (NEC, 2013b: 124):

- the treatment of compensation events in terms of their impact on costs incurred by subcontractors;
- specialist plant and equipment;
- provision for items not listed in the SCC as a fee, to be provided for; and
- the need for accuracy when assessing costs which are to be directly reimbursed.

The project manager has to carefully plan for any compensation event that may occur. As was mentioned in Chapter 3, financial management cannot be planned and executed in isolation. It is interdependent on all the other functions of the management knowledge areas. The contract does not manage this for the project manager, but rather makes allowance for fair compensation and is thus one of the means of managing the project costs.

4.2.2.5 Project quality control

The contract states that in order for the contractor to reach completion, he should adhere to the specified requirements as per the works Information. The defects certificate is a list of defects that the supervisor has provided to the contractor to correct (NEC, 2013a: 3).

Clause 4 describes testing and defects; and the clause only applies to tests and inspections required by the works information or the applicable law. The rest of the clause specifies the arrangement on (NEC, 2013a: 11-12):

- testing and inspection before delivery;
- searching for and notifying defects;
- correcting defects;
- accepting defects; and
- uncorrected defects.

The secondary option clauses that may be applicable and used for quality management are: limitation of the contractor's liability for his/her design and reasonable skill and care (X15), low performance damages (X17), and additional conditions of contract (Z) (NEC, 2013a).

It is clear that the project manager can manage the quality on the project through the necessary inspections. It should however be noted that the works information should be clear on the required standard. The supervisor should also still conduct the necessary inspection with regard the approval requirements.

4.2.2.6 Project resources management

Clause 11.2 (NEC, 2013a: 3-4): Equipment describes items provided by the contractor which are not required to be stated in the works information. The contractor uses this equipment to provide the works. Plant and material are items intended to become part of the works.

Clause 24 addresses the arrangement of the key persons. The contractor should employ each key person as stated in the contract or a replacement person, subject to approval by the project manager. The project manager may instruct the contractor to remove an employee after having stated his/her reasons (NEC, 2013a: 7). As stated earlier, the appointment of subcontractors is subject to approval by the project manager. The contractor is also responsible for health and safety requirements as stated in the works information (NEC, 2013a: 8).

Clause 7 states the title of plant, materials, and equipment. It highlights the employer's title to plant and material, and the marking thereof, including equipment outside the working areas. It also addresses the removal of equipment after it has been used and it is no longer needed. The contractor has no title of objects found within the site. The contractor only has title to materials from excavations as stated in the works information (NEC, 2013a: 20).

Except for the provision of additional conditions of contract (Clause Z), no further specific provision is made to control resources on site. The above-mentioned clause does however allow the project manager to have some control over key personnel and equipment to be used on site.

4.2.2.7 Project communication management

Clause 13 specifies that all communication which the contract requires shall be in a form that can be read, copied, and recorded. Writing is in the language of the contract. Communication may include, but is not limited to, instructions, certificates, submissions, approvals, records, acceptances, replies, and other notifications which may be required. If required, the project manager, supervisor, and/or contractor shall reply within the required period. Clause 13.4 states that the project manager should provide adequate reasons for not accepting a request. Certificates are copied to both the employer and the contractor. Any delay or withholding of acceptance or non-acceptance should be clearly communicated by the project manager, with adequate reasons (NEC, 2013a: 5).

Throughout the contract the time periods and requirements are given on communications. The contract tries to promote a spirit of mutual trust and co-operation as well as openness and the flow of communication.

4.2.2.8 Project risk management

Clause 16 deals with early warning and assigns the contractor and the project manager the duty of giving notice of any potential event. These events could increase the total price of the project, delay completion, and delay meeting key dates which may impair the performance of the works. Either party may instruct the other to attend a risk reduction meeting. Those attending the meeting are asked to co-operate in making and considering proposals on how to mitigate risk. Solutions are sourced and the effects analysed, actions are allocated in accordance with the contract. The risk register is then updated either by adding or removing items (NEC, 2013a: 5-6).

Clauses 17 to 19 also pertain to risk management. Clause 17 addresses ambiguities and inconsistencies. Either the contractor or the project manager notifies the one or the other as soon as an ambiguity or inconsistency between documents is noticed. The project manager then gives instruction on how to resolve the matter. Clause 18 deals with any matter that may be deemed illegal or impossible to execute. Clause 19 involves prevention and that the

contractor should give notice of an event which could impair the completion of the project according to the works information (NEC, 2013a: 6).

Clause 18 has already been discussed above and consists of the following sub-clauses (NEC, 2013a: 21-23):

- Clause 80 – employer’s risks.
- Clause 81 - the contractor’s risks.
- Clause 82 – repairs (the responsibility of the contractor until the defects certificate have been issued).
- Clause 83 – (each party indemnifies the other for items, which is the responsibility of the particular party).
- Clause 84 – insurance cover.
- Clause 85 – insurance policies.
- Clause 86 – if the contractor does not insure.
- Clause 87 – insurance by the employer.

Secondary option clauses that may have an effect on risk management is parent company guarantee (Clause X4), performance bond (Clause X13), advanced payment to the contractor (Clause X14), retention (X16), limitation of liability (X18), the contracts (Rights of third parties), and additional conditions (Clause Z).

4.2.2.9 Project procurement management

The project manager does not have much input in the contractor’s procurement processes except the approval of subcontractors (Clause 26), and quality of equipment, plant and materials. Clause 23 highlights that any design done by the contractor is subject to the project manager’s approval. When such design is not approved the project manager should provide relevant reasons in terms of the works insurance, the contractor’s design that have been accepted or an applicable law (NEC, 2013a: 7).

Of the secondary clauses, only Clause Z, additional conditions of contract, pose any possibility to be used under procurement management.

Active procurement management is limited to the processes before the implementation phase of the project life cycle except through the methods mentioned above. Proper works information (specifications) can however contribute to better procurement processes during construction.

4.2.2.10 Project integration management

No specific clauses highlight project integration; however many clauses can assist in integrating the management areas. The first example is Clause 10.1, which asks that the parties act in a spirit of mutual trust and co-operation. Clauses 16 to 19, as discussed under risk management, also assist in integrating the processes. Clause 31 can contribute considerably to the effective integration through the programme. If this is used in conjunction with Clause X20 of key performance indicators, the project manager has some means to bring all the management themes closer to cohesion. Clause X12 of partnering and Clause Z, additional conditions of contract, may also assist in possible integration of the project (NEC, 2013a).

4.2.2.11 Safety management

Clause 27.4 is the only place in the contract that health and safety is mentioned. It simply states that the contractor should act in accordance with the health and safety requirements stated in the works information. The NEC considers it appropriate and not necessary to include and summarise the legislation in the contract because each country's legislation may differ from the other (NEC, 2013b: 44).

The requirements are thus included in the works information and adhere to applicable law as referred to in Clause 12.2 of the contract.

4.2.2.12 Environmental management

Environmental requirements are addressed similarly to health and safety. Any environmental requirements are specified in the work information. No specific mention is made of the environment in the contract.

4.2.2.13 Claims management

As was mentioned in Chapter 3, the main objective of the contract is to avoid claims. To a large extent, claim management is included in all the clauses of the contract, starting with the risk register (Clause 11.2). Its aim is to list these risks by identifying it as early as possible (NEC, 2013a:4). As was mentioned under risk management, Clauses 16 to 19 promote early identification of possible risks, ambiguities, inconsistencies, illegal and impossible requirements, and prevention compensation events (NEC, 2013a: 6). The contract refers to the occurrences of claims as compensation events. In Clause 6 of the contract, the procedures and rules are set out on how to manage these events (NEC, 2013a: 15-19).

As already mentioned, a dispute arising under or in connection with the contract is reverted to an adjudicator. Clause W1 refers to the adjudication table and assists administrators, who can refer a matter to the adjudicator, noting under what circumstances and under what time parameters. The adjudicator's decision is binding on the parties unless and until revised by a tribunal (NEC, 2013a: 42-44). (Also refer to Section 4.2.1.7 above.)

From the above it can be seen that the contract makes provision to manage claims that arise from the contract and the construction process.

4.2.3 Conclusion

At first glance the NEC ECC contract seems to be a complex and difficult contract to comprehend. However, when dissecting the contract, it becomes clear that the contract is very similar to the other three contracts. Its core clauses, together with the optional clauses offer a similar management opportunity than the other contracts. There are, however, certain optional clauses that may assist in the management function of the employer through his/her agent. The most significant optional clause that is not found in the other contracts is Clause X20 – key performance indicators. It can be concluded at this stage that the NEC contract has much potential and can be used to assist in managing the project.

4.3 JBCC CONTRACT

4.3.1 Introduction

The contract clauses follow the project execution sequence and set out enforceable procedures, rights, and obligations when competently managed and administered, and protect the employer, the contractor, and subcontractors. Specific employer and contractor requirements are recorded in the contract data (JBCC, 2014b: 1).

A brief overview of the contract is discussed below before the document is compared against the project knowledge areas. At first glance the contract is structured more in line with the project life cycle than the project knowledge areas. This may lead to a different method of interpretation when project management procedures are applied.

4.3.1.1 Interpretation

This section starts with the definitions and interpretation of certain contractual terms followed by a short description of the applicable law and means of communication. The offer and

acceptance arrangements are discussed followed by assignment by the contracting parties (JBCC, 2014b: 7-8).

Very early on in the agreement, Clause 6.4 states that the contractor can give notice of the failure of the agent to act within his/her given authority. If the matter is not rectified within five working days, the contractor can suspend work in terms of Clause 28 of the contract. The contract continues to state that the employer will appoint a new agent within five working days after such a notice (as to suspend the work) have been received from the contractor (JBCC, 2014b: 8).

4.3.1.2 Insurance and security

Clause 8.1 explains works risk and states that the contractor is ultimately responsible for the site. It also states that the contractor shall take full responsibility for the works from the day that the site has been handed over to the contractor. This will be the case up to the day of practical completion (JBCC, 2014b:9). Clause 9.0 deals with indemnities, where the parties indemnify the other against certain risks that the other party is responsible for (JBCC, 2014b:9-10). Clauses 10 and 11 set out the arrangement with regard to insurances and securities respectively, and who is responsible for what (JBCC, 2014b: 10-12).

4.3.1.3 Execution

The execution section is divided into five main clauses, with Clauses 12 to 16 setting out the arrangement of the parties, namely the employer, contractor, principal agent, nominated and selected subcontractors, and direct contractors. Clause 17 deals with contract instructions and the influence it may have on the parties and the execution of the works (JBCC, 2014b: 12-18).

4.3.1.4 Completion

This sections deals with time and quality by including arrangements on interim completion (Clause 18), practical completion (Clause 19) sectional completion (Clause 20), the defects liability period and final completion (Clause 21), latent defects liability period (Clause 22), revisions of the date for practical completion (Clause 23), and finally the penalty for late or non-completion (JBCC, 2014b: 18-22).

4.3.1.5 Payment

Payment as a section of the contract is concerned about cash flows, payment certificates (Clause 25), recovery of expenses and/or loss (Clause 27), adjustment of the contract value, and final account (Clause 26) (JBCC, 2014b: 22-26).

4.3.1.6 Suspension and termination

Clause 28 deals with suspension by the contractor as a resolve for the failure by the employer or the principal agent to fulfil an obligation. Clause 29 addresses termination by either party, setting out the circumstances and arrangements surrounding termination (JBCC, 2014b: 26-29).

4.3.1.7 Dispute resolution

The last section and clause of the contract involves dispute resolution. As with most disagreements or formal correspondence on the contract, notice should first be given by either party. This allows the parties to try and resolve any issue that they may have. If such disagreement is not resolved within 10 working days, it will be deemed to be a dispute. It will, within 10 working days from this point, be referred to adjudication. Failure to adhere to this procedure will result in the dispute to be addressed by means of arbitration. At any time and in agreement with one another, the parties may refer the matter to mediation. The provisions relating to adjudication and/or arbitration will be suspended until either party gives notice that it should be resumed. The appointment of a mediator and procedures of the mediation process will be mutually agreed upon by the parties. Where a dispute is referred to arbitration, an arbitrator shall be appointed within 15 working days after the notice of failing, after which an application can be made by either party to the referred body (as per the contract data) or as default to the Association of Arbitrators (southern Africa). During the proceedings the parties will continue to perform their duties and obligations in terms of the agreement, notwithstanding the disagreement that may exist (JBCC, 2014b: 29-30).

4.3.1.8 Contract data

The contract data is a separate booklet that lists and captures the variables of the contract. It starts by capturing the tender information, which includes items such as the description of the works, information on the employers' agents, law, regulations and notices, documents included in the tender, and ultimately the contract, insurances, securities, payments, penalties, payment/adjustment of preliminaries, etc. (JBCC, 2014c: 1-10). The preliminaries are defined

by the contract as the priced items listed in the preliminaries document with any additions, alterations or modifications thereof incorporated in the contract documents (JBCC, 2014b: 6).

The Association of South African Quantity Surveyors (ASAQS) compiles a standard preliminaries document specifically for the JBCC PBA. It comprises three sections with Section A, a recital of the PBA. Section C allows for any special clauses to meet the particular circumstances of a project. Section B is the preliminary document as published by ASAQS with the following standard clauses (ASAQS, 2013: 1):

- Clause 3.0 Previous work and adjoining properties.
- Clause 4.0 Samples, shop drawings, and manufacturer's instructions.
- Clause 5.0 Deposits and fees.
- Clause 6.0 Temporary services – which is the same as the contract data of the PBA.
- Clause 7.0 Prime cost amounts
- Clause 8.0 Attendance of subcontractors.
- Clause 9.0 General items such as protection of the works, notice before covering work overhead work, etc.

4.3.2 Comparison with the management knowledge areas

The following section compares the contract and its clauses to the ten management knowledge areas identified in Chapter 3. Because the contract is structured according to the execution sequence, the headings differ from the standard management knowledge areas. Table 12 lists the main themes of the contract and the management themes highlighted in Chapter 3. The table further divides and distributes the knowledge areas as far as possible to the closest corresponding section within the JBCC PBA.

Table 12: The JBCC sections compared against the management fields

JBCC 2014 Sections	Management themes	
	Project Management	Construction Management
1. Interpretation	Stakeholder management	Environmental management
	Scope management	Safety management
2. Insurance and security	Risk management	
3. Execution	Procurement management	
	Human resources	
	Communication management	
4. Completion	Time management	
	Quality management	
5. Payment	Cost management	Financial management
6. Suspension and termination		
7. Dispute resolution		Claims management
8. Agreement		
	integration management	

(Source: JBCC, 2014b)

(Source: van der Walddt & Fox, 2015)

(Source: Zulch, 2012)

4.3.2.1 Project stakeholder management

Two contracting parties are defined in the contract, namely the employer and the contractor. The contract also defines other parties and groups them into the party of the employer or the contractor. This assists when allocating responsibility and assessing their interest and influence on the project. The contract defines the following stakeholders on the project (JBCC, 2014b: 4-6):

- agent – appointed by the employer;
- contractor;
- direct contractor – appointed by the employer;
- employer;
- principal agent – appointed by the employer; and
- subcontractor – appointed by the contractor on instruction by the employer.

Other stakeholders are also implied in the contract, but not specifically defined. They include the public for which the necessary insurance must be incurred (Clause 10.1.2); the authorities, which both parties have to recognise by abiding to the law; and financial institutions, which include insurers and banks (Clause 4.3). Clause 9 addresses the indemnities the two contracting parties have towards each other. Clause 9.1.4 further notes tenants and others authorised by the employer (JBCC, 2014b: 10).

Neither party may assign or cede rights or obligations under the contract without the prior written consent of the other party. The contract further states that consent to such a seeding may not be withheld for unreasonable reasons. The contractor shall not consent to a nominated subcontractor assigning or ceding terms of the agreement without the consent of the principal agent (Clause 4) (JBCC, 2014b: 7-8).

In Clause 6 the clients warrant that the principal agent has full authority and the obligation to act and bind the employer in terms of this agreement, but has no authority to alter this agreement. The employer may also appoint agents to deal with specific aspects of the work. The principal agent may, in return, authorise an agent to issue contract instructions towards a specific topic, but may not sub-delegate without the written consent of the principal agent. The employer, in return, shall not interfere with or prevent the principal agent or another agent from exercising fair and reasonable judgment in performing their tasks (JBCC, 2014b: 8).

Clauses 12 to 17 deal with the execution of the works. Clause 12 starts with duties and responsibilities of the parties, defining the obligations of the employer and the contractor. Clause 13 pertains to setting out of the works with the principal agent indicating the identifying pegs and beacons for indicating the site and datum level, as well as the levels required and dimensions needed. The contractor, however, is responsible for the correct setting out of the building. Clauses 14 and 15 define the roles of the nominated and selected subcontractors with Clause 16 highlighting the arrangement with direct contractors. Lastly, Clause 17 states that the principal agent may issue contract instructions to the contractor and also define the parameters surrounding the instructions (JBCC, 2014b: 12-18).

The following diagram shows the general relationship of the 'stakeholders' involved in the building process included in the JBCC PBA. It shows where the 'privity' of contract lays and who is responsible towards whom.

Contracts: SA Building industry

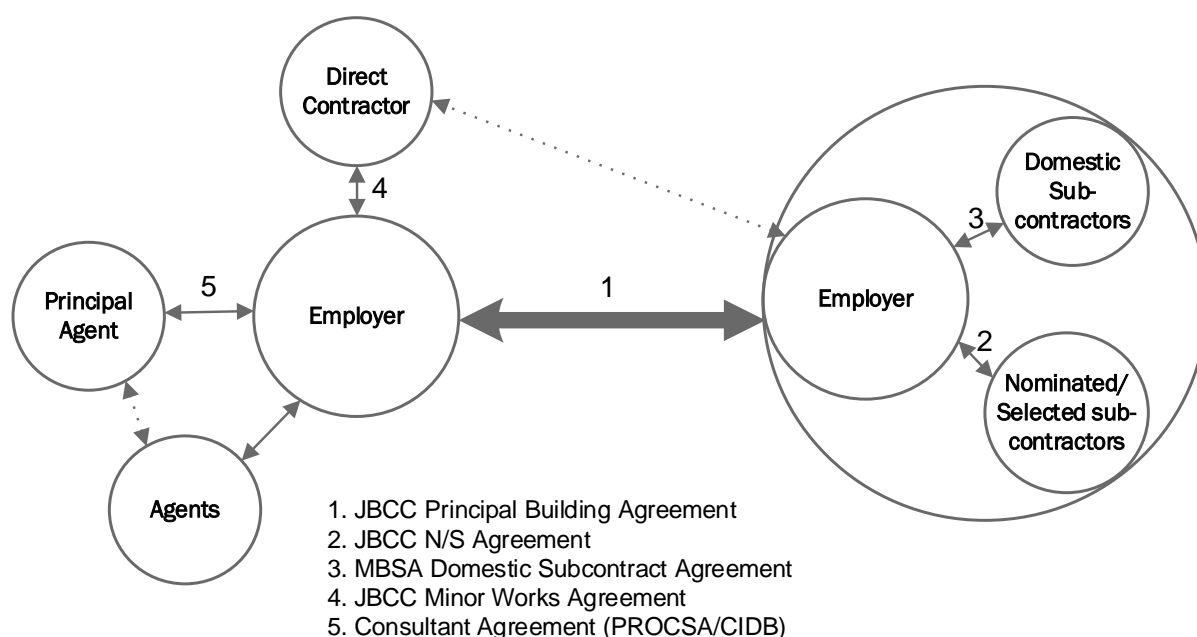


Figure 25: Contractual arrangement of stakeholders within the contract

(Source: JBCC-Guide, 2013: 2)

4.3.2.2 Project scope management

The contract defines the works as the extent of work to be executed by the contractor described in the contract documents and contract instructions, which includes free issue, and

materials and goods. Work or installations to be executed by direct contractors and others responsible to the employer are excluded (JBCC, 2014b: 6). The works are defined in the contract data and allows for additional documentation to be provided supplementing the description of the works. This additional information includes the description of the site.

The objective of the agreement is the execution of and the payment for the works for which the offer was made by the contractor and accepted by the employer (Clause 3.1). The contract shall be signed by both parties and the original kept with the principal agent, while copies will be provided to each party (Clause 5.1). Clause 7 defines the design responsibilities of the parties. By default, the contractor is not responsible for any design work (JBCC, 2014b: 7-9).

Under Clause 12 the obligations of the employer and the contractor are listed. The variables are, however, captured in the contract data as discussed above. The clause starts with the duties of the employer. The first few clauses pertain to the information on the site and resources of water and electricity (Clauses 12.1.2 to 12.1.5). It is the employer's obligation to define the extent of the work and to ensure that the principal agent supplies adequate construction information to the contractor (Clauses 12.1.13 and 14). The contractor's duties start with an obligation to inspect and acquaint him-/herself of circumstances under which the works will be executed (Clause 12.2.1) He/she shall further designate a competent person to continuously administer and control the works and to receive and implement notices and contract instructions (Clause 12.2.11). He/she will also keep copies of all construction information required for execution of the works on site (Clause 12.2.13) (JBCC, 2014b: 13-14).

The contractor is responsible for the correct setting out of the works and the principal agent is responsible for identifying the relevant beacons and datum level (Clause 13) (JBCC, 2014b: 14).

Clause 17 allows the principal agent to issue contract instructions, which may alter the scope of works within the parameters set out in the contract. Clauses 17.1.1 to 17.1.3 allow the principal agent to alter the scope of works by firstly rectifying information, secondly, by altering the design, and thirdly, by altering site arrangements. Clause 17.4 states that the contractor is not obliged to do additional work after the date of practical completion (JBCC, 2014b: 17-18).

4.3.2.3 Project time management

The contract period is defined as the period commencing on the intended date of possession of the site by the contractor and ending on the date of practical completion (private sector

agreement only). With regard to the public sector in South Africa, the intended date may be the date of appointment. This arrangement is captured in the contract data (JBCC, 2014a: 3).

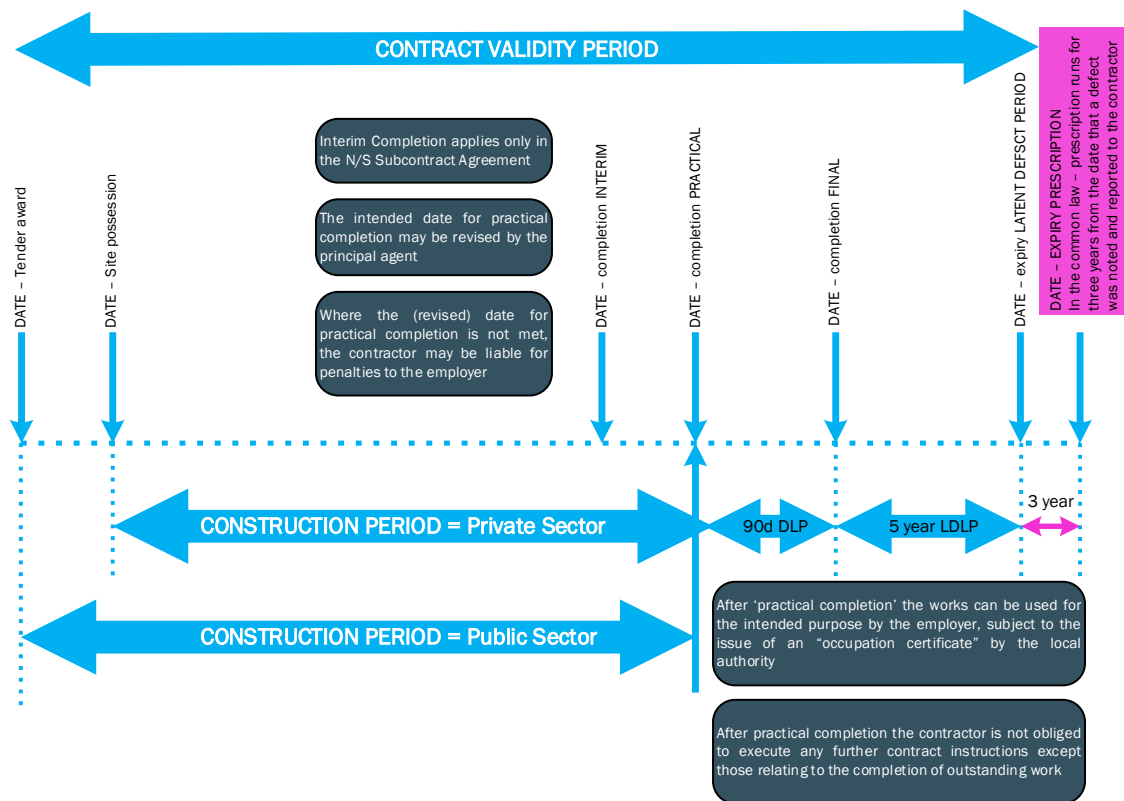


Figure 26: Completion stages in the JBCC building agreements

(Source: JBCC, 2014a: 21)

Clause 12.1.17 of the contract specifies that the employer should give possession of the site. Clauses 12.2.6 to 12.2.9 deal with the obligations of the programme of the contractor. The contract should submit a programme for the works in sufficient detail to enable the principal agent to monitor the work within 15 working days after the receipt of the construction information. The contractor will coordinate the programme with the subcontractors and direct the contractor. The contractor should regularly submit a progress report and a schedule of outstanding information to the principal agent to avoid delays. He/she should update the programme regularly and illustrate progress of the works. The revised programme should indicate where the practical completion date has changed. Clause 12.3 mentions that the principal agent and the contractor shall hold regular meetings to monitor progress of the works and deal with the technical coordination of matters. The principal agents will record and timeously distribute the minutes of such meetings. The JBCC PBA also gives a specific time frame within which the contractor should start with the works (ten working days – Clause 12.2.17) (JBCC, 2014b: 12-14).

The JBCC PBA makes allowances for penalties as an incentive to complete the project within a specified time (Clause 24). The contractor also has to cooperate and assist the principal agent in the preparation of interim payment certificates. The employer, in return, is obliged to make payment to the contractor in accordance with Clause 25 of the contract. The contract is clear on the time of payment to the contractor after the receipt of such a payment certificate (14 working days). The contract continues to stipulate the time the contractor has to pay subcontractors (7 days after the receipt of his payment) and any money owed to the employer (21 days after the payment certificate have been issued) (JBCC, 2014b: 22-23).

On page two of the contract the clauses are compared against the time period, the action by each party, and the purpose of each action (JBCC, 2014b). The time periods are identified as either calendar days or working days. This table follows the clause numbers and promises to assist the project manager in time management.

4.3.2.4 Project cost management

The contract sum is defined as the accepted tender amount, inclusive of tax, not subject to adjustment. The contract value, on the other hand, is a monetary value initially equal to the contract sum and is subject to adjustment in terms of the agreement. The final account is a document prepared by the principal agent that reflects the final contract value of the works when completed. In between the contract sum and the final account, payment certificates are issued on regular intervals by the principal agent to the parties certifying the amount due and payable in accordance with the contract. Penalties and recovery statements can also be issued during the progress of the project. The penalty is the stipulated amount per calendar day available by the contractor to the employer where the date or the revised date for practical completion is not achieved. The recovery statement, however, is a statement prepared and issued in conjunction with each payment certificate by the principal agent in terms of the contract to either party. (JBCC, 2014b: 4-6).

Although work risks (Clause 8) are discussed under risk management, it is relevant to note that the contractor is not responsible for the cost of making good physical loss and damage to the works caused by or arising from for certain items. The same applies to indemnities, which include claims as listed in Clause 9. The clause lists the items for which each of the parties indemnifies the other. Clauses 10 and 11, which deal with insurances and security, also have an effect on the budget and cash flow. The arrangement of these clauses may affect each party differently and has to be planned for (JBCC, 2014b: 9).

Clauses 12 and 17 are important in the management of the costs on the project. Clause 12 clearly states that the employer should make payment to the contractor (Clause 12.1.9) and if needed, may make advance payments (Clause 12.1.10). Clause 12.1.15 also allows the employer to make direct payment to a nominated or selected subcontractor if needed and under which circumstances. The contractor has the obligation to submit a priced document to the principal agent that includes all costs, overheads, and profit within 15 workings days after the acceptance of the contractor's offer. The principal agent may ask the contractor to adjust prices considered imbalanced and unreadable items, as well as eliminate mistakes without changing the contract sum (Clause 12.2.1). The contractor should cooperate with the principal agent in preparation of cash-flow projections and compilation of payment certificates (Clause 12.2.10) (JBCC, 2014b: 13-14). Clause 17 pertains to contract instruction and any scope change may influence the contract value of the project. This is a very important matter that has to be managed by the principal agent. Not excluding the other clauses, Clause 17.1.13 specifically relates to the principal agent's right to issue contract instructions with regard to budgetary allowances, prime cost amounts and provisional amounts (JBCC, 2014b: 17-18).

Clause 24 discusses the arrangement surrounding penalties for non-completion. Importantly, the employer has to notify the contractor when he/she intends to levy the penalty. The principal agent will then calculate such penalty and include the amount in the recovery statement and payment certificates. The contract data allows a due date for each month for the payment certificate to be issued (JBCC, 2014c: 7). Clause 25 sets out the requirements for payment and states that the contractor should assist in compilation of the cash flow and payment valuations by submitting the relevant documentation. If no such documentation is received the principal agent may use his/her discretion in providing such documentation. The specific requirements for each payment certificate are stipulated and may include material and goods, as well as the default payment periods. Importantly, Clause 25.5 states that the payment certificate does not necessarily mean that material and goods paid conform to the contract document (JBCC, 2014b: 23). Material and goods are defined as unfixed materials, goods, and/or items fabricated for inclusion in the works whether stored on or off the site or in transit, depending the description in the contract data (JBCC, 2014b: 5). If such material is certified, it becomes the property of the employer. The contract further sets out the arrangement of guarantee for construction and the percentage adjustment at the different completion stages. If no payment is received the contractor may, within the stipulated time, give five working days' notice to comply. If no reaction is found the contractor may suspend the works, exercise his/her lien and or call on the guarantee for payment (JBCC, 2014b: 23-14).

Clause 26 assists in managing the adjustments of the contract value and final account. The method determining the cost implication is set out in Clause 26.2. Clause 26.5 clearly states that the contractors should give notice to the principal agent within 20 working days of becoming aware of a possible additional expense, after which the contractor will have no claim. The contractor shall, within 40 days after such notice, submit a detailed and substantiated adjustment of the contract value. The principal agent will make fair assessment thereof within 20 working days of receiving this breakdown. The principal agent shall, within 90 days after practical completion, prepare the final account, in accordance with Clause 26.9. The contractor then has 45 working days to accept or object. If no acceptance or rejection is received, the final account is issued (JBCC, 2014b: 24-25).

Clause 17 sets out the circumstances when either party is entitled to recovery of expenses and or loss, including the right to use the security (JBCC, 2014b: 25-26).

4.3.2.5 Project quality control

Quality is interwoven in many of the clauses contained in the contract and goes hand in hand with scope management. There are certain systems in place to assure quality, for instance, completion certification by the principal agent. Contract information is all the information issued by the principal agent and/or agents including the contract document, specifications, drawings, schedules, notices, and contract instructions required for the execution of the works. Defects are any aspect of materials and workmanship forming part of the works that do not conform to the contract documents. Latent defect in the contract is a defect that a reasonable inspection of the works by the principal agent and/or agents would not have revealed. Free issue material is materials and goods supplied at no cost to the contractor by the employer intended for inclusion to the works (JBCC, 2014b: 4-5).

The contractor shall be responsible for the submission of designs done by the selected contractor for approval (Clause 7.3). The employers indemnify the contractor from any design that he/she is not responsible for and defects of free issued material (Clause 9.2.3 and 9.2.8) (JBCC, 2014b: 9-10). Clause 12.2.14 allows the employer and principal agent reasonable access to the works, workshops, and other places where work is being prepared, executed or stored. Clause 12.2.17 states that the contractor will give notice where free issue items have been delivered in poor condition or have been damaged prior to taking acceptance thereof. The contractor shall also provide, maintain, and remove temporary structures, construction equipment, and notice boards at practical completion (JBCC, 2014b:13-14).

The contractor is not responsible for the quality of direct contractors (Clause 16), but he/she is responsible for the quality of the nominated and selected subcontractors (Clauses 14.8 and 15.8). Clauses 17.1.5 to 17.1.12 allow the principal agent to issue contract instructions pertaining to inspections, protection of the works, re-execution, rectification of defects, and compiling a list for completion at practical and final completion (JBCC, 2014b:13-17).

Clauses 18 to 22 deal with completion and in particular in practical completion within the defects liability period and ultimately the latent defects liability period. The latent defects liability period is five years after the final completion date and requires the contractor to make good any latent defect before this term lapses. The process of achieving practical and final completion respectively is simplified as follows. The contractor gives notice that he/she would like the work to be inspected for practical completion. The work is inspected by the principal agent and a list of items (list for practical completion) is drawn up for the contractor to achieve practical completion. This process is repeated until such time as the required standard is achieved. If no such list is prepared by the principal agent, the contractor will give notice. If no further answer is received from the contractor, it is deemed that practical completion has been reached. Importantly, when the employer takes possession of the site, it will also be deemed that practical completion has been reached. The process for final completion is similar with a time limit of 90 days after the date of practical completion. Any guarantee, warranty or indemnity, other than security to the contractor, shall pass to the employer at the issue of the final completion certificate. A certificate of final completion shall be conclusive to the sufficiency of the works and that the contractor's obligations, as stated in Clause 12.2.17, have been fulfilled other than the latent default responsibilities (JBCC, 2014b: 18-20).

4.3.2.6 Project resources management

Construction equipment is defined as the equipment and/or plant provided by or belonging to the contractor and/or the subcontractor used during the construction period. Material and goods, on the other hand, are defined as unfixed materials, goods, and/or items fabricated for inclusion in the works whether stored on or off the site or in transit. The employer may provide free issue material free of charge to the contractor (JBCC, 2014b: 4-5).

Clause 17 of the JBCC PBA highlights the limitation on what the principal agent can issue contract instructions on. These contract instructions can go as far as to remove any person on site (Clause 17.1.18), removal of equipment and surplus construction material at termination (Clause 17.1.20), as well as control the expenditure of budgetary allowances, prime cost amounts, and provisional amounts (Clause 17.1.13). However, nowhere does it allow for contract instructions to influence the works programme or the contractor's internal

arrangements. Rectifications of discrepancies in the contract information, drawings, and technical documents can be rectified through a contract instruction. The contractor should continue with the contract instructions with due diligence or the principal agent may give notice to the contractor to continue within five working days of such site instruction being issued. Where the contractor does not comply after receiving notice of such an instruction, the employer may engage others to carry out such contract instruction. The contractor should further do the following (JBCC, 2014b: 17-18):

- Clause 12.2.7: The contractor has to coordinate the programme with the subcontractors.
- Clause 12.2.12: Keep records of daily records of categories of persons and construction equipment as well as contract instructions.
- Clause 12.2.15: Provide everything necessary for proper execution of the works in compliance with the contract documents.

4.3.2.7 Project communication management

A notice is defined as a communication issued by either party, the principal agent and/or agents to the other party or any agent to, inter alia, record an event, request for outstanding information, and/or where suspension and/or resumption of the works or termination of this agreement is contemplated (JBCC, 2014b: 5).

Clause 1.2 sets the stage on how communication is dealt with on the project and clearly states that certain communication will be in writing. This is reiterated in Clause 17.5, where it is stated that oral instruction shall be of no force or effect. (JBCC, 2014b: 18). Receipt of notices will be deemed to have been received on the same day, when hand delivered, electronic mail within one working day and registered post within seven calendar days after posting (Clause 2.5). Clause 2.3 also states that communication or notices between the parties shall be in the language of the agreement and in a format that can be read, copied, and recorded. (JBCC, 2014b: 7).

The principal agent shall timeously provide copies of drawings, un-priced bills of quantities, and other construction information as specified in the contract data (Clause 5.5) (JBCC, 2014b: 8).

Communication cuts through the entire document and is summarised on page 2 of the document (JBCC, 2014b: 2). From regular progress reports, site meetings, the arrangement of completion inspections to daily records, all are dependent on good communication.

4.3.2.8 Project risk management

In its preface the contract mentions that the document was drafted in such a way that in view of the constituents (as per Chapter 2), it portrays equitable distribution of the contractual risk. It continues to state that there are risks in amending the document (JBCC, 2014b: 1).

Risk is also an interwoven part of the contract and forms part of most the clauses. For instance, design responsibilities (Clause 7), which relates to the distribution of the risks of the particular responsibility. Clauses 8 to 11 specifically deal with risks and mitigation of risks through insurances and securities. Clause 8.1 sets the stage for the responsibility of the contractor. The contractors shall take full responsibility of the works from the date on which possession of the site is given up to and until the date of practical completion. The rest of the clause lists and states the liability of each party and the circumstances for it. The limit of the contractor's liability shall not exceed the contract works insurance and if the contract value exceeds the contract's sum by more than 10%, the party responsible for the insurance thereof will adjust the insurance and provide proof thereof (Clause 8.4) (JBCC, 2014b).

Clause 9 deals with indemnities and in Clause 9.2.1, for instance, the employer indemnifies the contractor for an act of omission by employees or one of his/her agents. Clause 10 covers other insurances, such as public liability insurance, lateral support insurance, etc. Where the works have to be completed in sections or forms part of the alterations, the employer will be responsible for contract works insurance, public liability insurance, supplementary insurance, and where applicable, removal of lateral support insurance in the joint names of the parties until the date of practical completion (Clause 10.2). Whoever is responsible for effecting the required insurance, proof of such insurance should be presented to the other party. It is deemed approved if no reasonable objection is lodged within 10 working days. The arrangement and possible termination of the contract for not effecting the required insurance is also set out in the clause (JBCC, 2014b: 9-11).

The contractors shall provide the employer with a guarantee for construction where applicable in accordance with the contract data, within 15 working days of accepting of the offer (Clause 11.1). This guarantee will either be a variable or a fixed guarantee for construction. Where no such guarantee is taken out, the client may withhold 10% on interim payments. This percentage is reduced as per the contract at the different completion stages or at the termination of the contract. Guarantee for advance payment means an advance payment is required, equal to the amount to be paid in advance to the contractor. The employer, on the other hand, will provide a guarantee for payment where required, 15 days after the acceptance of the offer. The contractor may, after giving notice of 10 working days, forthwith suspend the

work. The contractor will further waive his/her lien with the receipt of the guarantee for payment (JBCC, 2014b: 11-12).

In Clause 12 the responsibility of the parties is reiterated to effect the required guarantees and insurances. The risk of setting out is placed on the contractor provided the correct beacons and datum levels are given (Clause 13) (JBCC, 2014b: 12-14). Clause 24 pertains to the penalty and puts some incentive on the contractor to complete the work by the due date and thus lower the risk toward the employer. Payment certificates shall take into account the guarantees listed above (Clauses 25 and 26). Clause 27 deals with recovery and expenses and/or loss to the different parties. Were an amount is due to either party and has not been paid, the other party may recover the amount from the security provided if not from a subsequent payment certificate (Clause 27.3) (JBCC, 2014b: 22-26).

Neither party is responsible in the event of force majeure which is events or circumstances that (JBCC, 2014b:5).

- could not have been reasonably foreseen;
- is beyond the control of the parties; and
- could not reasonably have been avoided or overcome.

4.3.2.9 Project procurement management

The most powerful procurement management tool available to the employer is the procurement and appointment of a competent contractor. The employer has varying procurement control up to the appointment and/or termination (Clauses 17.1.14 and 17.1.14 to 17.1.16) of subcontractors, depending whether the subcontractors are nominated (Clause 14), selected (Clause 15), or directly appointed (Clause 16) (JBCC, 2014b: 14-17).

The client can also supply free issue material to suit the programme as already defined (Clause 12.1.12). In most causes the timeous supply and efficiency of the other management knowledge areas allow the contractor to effectively procure the required plant and material. This may apply to the supply of accurate and understandable specifications and drawings as well as efficient and accurate compilation of payment certificates to allow for the contractor's cash flow requirements.

4.3.2.10 Project integration management

As defined in Chapter 3, integration management involves the management of the different management knowledge areas. Throughout the contract such obligation is given to the

principal agent who shall ensure that the contractor is timeously provided with the required information on behalf of the employer and other agents. Clause 12 summarises the obligations, but does not necessarily limited the obligations of the two parties towards each other. In short, the clause asks the employer to allow the contractor to do his/her work and to provide adequate information to the contractor to do so. On the other hand, the contractor is obligated with more specific obligations towards execution and management of the implementation. This may include the compilation and submission progress reports on the works to the principal agent, and updating his/her programme where the practical completion date has been revised. Clause 12.3 highlights that regular meetings shall be held between the principal agent and the contractor to monitor progress and to deal with the technical coordination of the works. The principal agent shall record these meetings and distribute the minutes thereof timeously (JBCC, 2014b: 14).

All contract instructions flow through the principal agent as indicated in Clause 17.1. It is the most powerful tool towards coordinating the scope, time and quality on site. The contractor shall comply with and execute all site instructions (Clause 17.2), as far as it complies with Clause 17, legal and complacent to the law (Clauses 2.1 and 17.1.4).

4.3.2.11 Safety management

The contract does not explicitly address safety management and only through the preliminaries, Clauses 2.1 and 17.1.4, can additional requirements with regard to health and safety be implemented. In practice (South Africa), the alterations to the preliminaries are usually included in the bills of quantities, which may refer to additional documents as listed in the contract data (Clause 5) (JBCC, 2014c: 4). The consultant responsible for the health and safety agent is listed under tender information (JBCC, 2014c: 3).

4.3.2.12 Environmental management

Environmental requirements are similarly addressed as health and safety and sometimes with some overlapping responsibilities. Any environmental requirements are specified in the preliminaries, work information and contract documents listed in the contract data. No specific mention is made of the environment in the contract.

4.3.2.13 Claims management

The contractor may give notice on the above-mentioned site instructions' implication with regard to time and costs in terms of Clauses 23 (revision of the date for practical completion)

and 26 (adjustment of the contract value and final account) (JBCC, 2014b). If any disagreement between either party comes to light, either party should give notice to the other. The parties shall attempt to resolve such disagreement between them and record such resolution in writing. Where the disagreement is not resolved within 10 days the disagreement will be deemed to be a dispute. Adjudication will then take place. If no resolution is found, the matter will be referred for arbitration. The contract also makes allowance for either party (through mutual agreement) to refer a matter for mediation at any time (JBCC, 2014b: 29-30).

A clear process of submission and evaluation, with reasons, are given with each claim. The process and obligations are further explained in the JBCC explanatory notes. Claim is defined as follows: a formal request for compensation by either contracting party and evaluated by the principal agent (provided notice of a potential claim is given and the substantiated claim is submitted within the prescribed periods). Dispute, on the other hand, is explained as an unresolved disagreement between the contracting parties (or a claim) involving an independent entity to guide the process or to adjudicate such claim (JBCC, 2014a: 49). It lists the applicable clauses and explains the processes as briefly explained above and under Section 4.3.1.7 (Dispute resolution).

4.3.3 Conclusion

The JBCC PBA, may be the shortest form of contract, but addresses most of the management knowledge areas. An experienced principal agent (project manager) will be able to use the contract effectively in the management of the construction project. When compared to the other contracts, it seems to correspond to the least specific project management requirements. It does not have detailed requirements towards the programme. It allows the preliminaries to fill the gaps with regard to legislation, but allows the contract to be kept standard. This may assist in the prevention of interpretation.

4.4 GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION WORKS

4.4.1 Introduction

As with the two preceding contracts, this section starts with a short introduction and overview of the contract before the contract and its structure are compared against the management knowledge areas. The contract starts with the different clauses as discussed hereunder. At the back of the document, the contract price adjustment schedule (CPAP) and the adjudication board rules are included with five pro formas given as appendixes:

- Appendix 1: Form of offer and acceptance

- Appendix 2: Contract data
- Appendix 3: Performance statement
- Appendix 4: Disclosure statement
- Appendix 5: Adjudication board member agreement

4.4.1.1 General

Just like the other contracts, the General Conditions of Contract for Construction Work (GCC) starts with a list of definitions under its general clause. It is then followed with interpretations of notices, extent of indemnities, authority of representation, singular plural masculine feminine arrangements, and an explanation of the marginal notes. The contract summarises certain paragraphs in the right-hand margin, which allows for easy referencing of topics (SAICE, 2015: 1-6).

4.4.1.2 Basis of the contract

Clause 2 sets out the basics of the contract, from the employer's obligation (to give the contractor all the necessary information to price the document) to the contractor's obligation to visit and inspect the site prior to pricing the tender document. It states that the contractor may claim for additional time and costs if the scope is significantly different from the tender document and/or if any reasonable unforeseen circumstances occur. This clause, however, states that the contractor should immediately inform the employer's agent of any such delay. The clause closes by stating that neither party may concede or assign any part of the contract without the written consent of the other (SAICE, 2015: 8-10).

4.4.1.3 Employer's agent

Clause 3 focuses on the employer's agent and clearly states that this person should be a registered professional at an appropriate institution. One can refer to Chapter 2 for these institutions. The main function of the employer's agent is defined as administrator of the project on behalf of the employer. The employer's agent will act impartially to the two parties and in making any ruling consult with both parties to facilitate a mutual determination. If such a determination is not reached, he/she will make an impartial ruling on the matter. The employer may, via a written notice to the contractor and the employer's agent, authorise a person to act as a health and safety agent. The employer's agent may appoint a representative via a written notice to the contractor. The employer's agent's representative (EAR) may examine and test materials and observe how the works are carried out. He/she will also receive any information reasonably required. He/she has the authority to receive and deliver any communication

between the contractor and the employer's agent. The EAR, however, has no authority to relieve the contractor of any of his/her contractual obligations. The contract by default limits the EAR's authority to make orders that will cause a delay or additional cost, except explicitly authorised to do so (SAICE, 2015: 11-13).

4.4.1.4 Contractor's general obligations

Clause 4 focuses on the obligations of the contractor. It specifically states that the contractor shall comply with the EA's instructions on all matters relating to the works. The contractor will only take instructions from the EA or a representative authorised by him/her do so (e.g. the contractor will not take instructions from the employer except through the EA). The main obligations of the contractor are to complete the works in accordance with the provisions given. He/she is responsible for his/her designs where required. He/she is further responsible for his/her subcontractors. The contractor will provide reasonable opportunity for any person as far as conducting their work on site as required by the contract. The contract is specific that the contractor's plant on site should be for the applicable work. The clause continues to specify that the contractor is responsible for his/her own employees' arrangements and that competent persons should be appointed. The EA, however, has the authority to remove any person employed by the contractor who is guilty of misconduct, incompetent or negligent in his/her duties or whose presence on site is undesirable. The clause closes with the provision that the contractor will provide a competent superintendent subject to approval by the EA, called the construction manager. The construction manager (CM) has the authority to receive all oral or written communications from the EA or representative (SAICE, 2015: 14-20).

4.4.1.5 Time related matters

Clause 5 is concerned with time related matters relating to the commencing of the contract and the works up to the final approval certificate. It allows for a specific time limit to be set to achieve practical completion and also specifies that a penalty can be imposed on the contractor for late completion, provided that the necessary access to site has been given. The contract requires a programme to be submitted by the contractor and is very specific and has to fulfil a set of rules and be approved by the EA. The clause further looks at documentation to be provided timeously, designs by the contractor, and suspension and delays. Extension of time is allowed for in the contract with clear steps when reaching practical completion and the process of achieving final approval. Lastly, a latent defect period is specified and discussed (SAICE, 2015: 21-35).

4.4.1.6 **Payment and related matters**

Clause 6 focuses on remuneration of the contractor on completion of his/her obligations. The clause opens with a simple statement that the employer will pay the contractor for work done. It then continues with the nitty-gritty of technical specifications on the security and the different options of such a security. A large part of the clause focuses the measurement of work, variations, changes of quantities, method of measurement, day works, and allowances (provisional sums, prime cost sums). In essence a large portion of the clause focuses on the **change of scope** and the costs involved – **cost management**. The clause specifies that the contractor is entitled to remuneration of work done on a monthly basis within a specified period. The clause makes provision for the contractor to be paid interest for any late payment (SAICE, 2015: 36-51).

4.4.1.7 **Quality and related matters**

Quality and related matters are discussed in Clause 7 and refer to quality related to construction equipment (plant), workmanship and materials. Testing of materials, with the relevant reports, are allowed for in accordance with the **scope of works**. It specifies that the contractor will not cover up any work that requires inspection by the EA. The contractor should notify the EA timeously of any inspection that may be required. In return, the contractor has the right to claim for any delay caused by late inspections by the EA. The EA has authority to order, in writing, the rectification of any plant, materials or work that did not pass the required tests. Continued failure may lead to items being retested or accepted with a reduced cost to the employer, or rejected. The clause further stipulates that the EA may instruct a search of defects. The cost is born by the defaulting party in such an incident. Any unattended remedial work of defects may cause the employer either to accept the work with a reduced rate and/or to employ someone else to complete the work with the cost being deducted by the contractor (SAICE, 2015: 52-59).

4.4.1.8 **Risks and related matters**

Clause 8 deals with risks and related matters and starts with the items pertaining to the protection of the works, which includes such items as pollution prevention and excessive loads of traffic. The contractor shall take care of the works during the construction period. The contract then focuses on excepted risks (force majeure) and the indemnification by the parties. Clause 8.5 looks at reporting accidents before looking at insurances in Clause 8.6 to be effected by the relevant parties (SAICE, 2015: 60-67).

4.4.1.9 Termination of the contract

Clause 9 stipulates the arrangements for termination by either party. It acts as a final resort when the project is deemed unmanageable. The process of termination, however, is still covered by certain rules. The first section discusses general terms and arrangement and includes termination due to external/internal events, when the existing structure is destroyed, increased costs, and payment at termination. The contract then focuses on the arrangement of termination by the employer (Clause 9.2) and the contractor (Clause 9.3) (SAICE, 2015: 68-75).

4.4.1.10 Claims and disputes

The final clause (Clause 10) sets out the procedures for submitting a claim by the contractor up to the point where a dispute is declared. It discusses the claim for extension of time and/or costs and the requirements for such a claim. The methods of dispute resolution that is allowed for in the contract are (SAICE, 2015:76-85:

- amicable settlement;
- adjudication;
- arbitration; and
- court proceedings (legislation).

4.4.2 Comparison with the management knowledge areas

Table 13 compares the management themes identified in Chapter 3 against the general layout of the contract. As was seen in the previous contract, some of the clauses contain more than just one management knowledge area and some knowledge areas are located through-out the contract.

Table 13: The GCC sections compared against the management fields

GCC - 2015		Management themes	
Clause number	Clause heading	Project management	Construction Management
Clause 1	General	Scope Management	
Clause 2	Basis of contract	Integration Management	
		Communication Management	
Clause 3	Employer's agent	Stakeholder Management	
Clause 4	Contractor's general obligations	Human Resources	Environmental Management
		Procurement Management	Safety Management
Clause 5	Time related matters	Time Management	
Clause 6	Payment and related matters	Cost Management	Financial Management
Clause 7	Quality and related matters	Quality Management	
Clause 8	Risks and related matters	Risk Management	
Clause 9	Termination of contract		
Clause 10	Claims and disputes		Claims Management

(SAICE, 2015)

(Source: van der Waldt & Fox, 2015)

(Source: Zulch, 2012)

4.4.2.1 Project stakeholder management

In the contract certain definitions can be attributed to certain stakeholders in the contract. The transition from stakeholder to resource is debatable, but a representative of a stakeholder may be seen as a resource or representative of a stakeholder, depending on the circumstances. The agreement between the contractor and the employer is captured in the contract and is seen as agreed upon by the employer and the contractor, unless specifically stated otherwise. The contractor is defined as the person named in the contract data whose offer has been accepted in the form of offer and acceptance and the legal successors in title of this person. The employer, on the other hand, is defined as the person for whom the work is to be carried out and who is named in the contract data, including the legal successors in title of this person. The employer's agent is defined as the person named as such in the contract data, or any other person appointed from time to time by the employer, and of whom the contractor is notified, in writing, to act as such (SAICE, 2015: 1-5).

Common law or statute law shall determine whether any person acting on behalf of the employer, employer's agent (EA) or contractor is duly authorised to do so. The extent of their authorisation shall be by means of a written notice specifying limits, and identifying the person or office holder (Clause 1.2.3). Clause 1.2.2 states that indemnification of one party towards the other, or against third parties shall cover all claims, demands, proceedings, etc. Clause 8.4 on pages 63 and 64 of the contract sets out the specific arrangements on indemnification.

The obligations of the parties may not be altered or waived in contrast to the contract (Clause 1.3.1) (SAICE, 2015: 5-6).

Clause 2.5 reiterates that no authority may be ceded or any obligation not complied with without the written consent of the other party. The contract also states that the employer's agent shall be a registered professional in the built environment profession that is appropriate to the profession (Clause 3.1.1). His/her obligation is to administer the contract as agent of the employer according to the provisions of the contract (Clause 3.2.1). The employer's agent will further consult with the contractor and the employer in making decisions and ultimately act impartially according to the contract (SAICE, 2015: 10).

The EA may delegate his/her authority to the representative within his/her authority in terms of his/her scope. The limit of the EAR pertains to the following clauses (SAICE, 2015: 13):

- Clause 2.2 – Adverse physical conditions pertaining to making rulings.
- Clause 4.4.2 – Permission to the contractor to sub-contract any part of the contract.
- Clause 5.12 – Matters pertaining to the commencement of the project.
- Clause 5.14 – Matters pertaining to the completion of the works.
- Clause 5.16 – Matters pertaining to final approval.
- Clause 9.2 – Matters pertaining to termination by the employer.
- Clause 10.1 & 10.2 – Matters pertaining to claims.

The contractor may refer any matter to the employer's agent for clarification if an order or instruction is unclear (SAICE, 2015: 11-13).

4.4.2.2 Project scope management

The scope of works is defined as the document that specifies and describes the works which are to be provided, and any other requirements and constraints relating to the manner in which the work is to be carried out. Temporary works are the works required for or in connection with carrying out permanent works and include items not intended to be permanent. The site is defined as the land and other places made available by the employer, for the purposes of the contract, on, under, over, in, or through which the works are to be carried out. The site information in contrast is the document that describes the site at the time of tender. Contract data is the document that sets out the specific data which, together with the contract, describes the risks, liabilities and obligations of the parties as well as the administration of the contract. (SAICE, 2015: 2-5).

The contract (Clauses 2.1.2 and 2.1.3) requires the employer to make available all relevant data on the site, the works. However, the contractor shall be responsible for his/her own interpretation thereof as well as to acquaint him-/herself of the site and its surroundings and to have studied all available information prior to submission of his/her offer. Specific items listed that the contractor is deemed to be knowledgeable on, includes (SAICE, 2015: 8):

- The form and nature of the site and its surroundings.
- Environmental, hydrological and climatic conditions.
- The extent and nature of the work and materials needed.
- Access to site and available accommodation.
- The conditions influencing health, safety and the environment.
- Information on risks, contingencies.
- Other circumstances which may influence or affect the works (as far as is reasonable).

According to Clauses 2.3 and 2.4, if there is any ambiguity or discrepancy between the technical data provided at tender stage and actually encountered, the employer's agent will provide clarity and/or instruction. If the clarification or the lack thereof causes a delay and/or proven additional cost, the contractor is entitled to claim in accordance with Clause 10.1 (SAICE, 2015: 10).

The contractor shall design (to the extent provided in the contract), carry out, and complete the works and remedy any defects in accordance with the contract (Clause 4.1.1). The employer's agent may issue site instructions pertaining to the works, which the contractor shall carry out (Clause 4.2.1). The contractor shall comply with provisions, give the necessary notices and pay all fees, taxes, levies and other charges required to be given by law and the scope of works. He/she will also be responsible for necessary consents of these arrangements and approvals already provided by the employer (Clause 4.5.4). The contractor further indemnifies the employer of any breach of this arrangement (Clause 4.5.1). The employer is responsible for all approvals designed by his/her agents (Clause 4.5.2) (SAICE, 2015: 16).

Termination of the contract is set out in Clause 9 and deals with termination due to external or internal events. Termination may take place if, during the execution of the contract, the excepted risks listed in the contract materialise and materially affect the carrying out, or the cost of the works beyond the control of the contractor, or the supply of the labour or materials or the physical interference with access to the site (Clauses 9.1.1 and 9.1.2). Depending on the event, the arrangement of termination is given with the endeavour to complete the works, if possible. Where the contract is for alterations and/or additions and the existing structure is substantially destroyed, the employer may terminate the contract. If, due to the occurrence of

excepted risks, it results in increased cost, the contractor is entitled to compensation as set out in Clause 6.4. If the contract is terminated on any account in terms of Clause 9 the contractor shall be paid by the employer the amount due for all measured work carried out prior to the date of termination with applicable terms listed in the contract (Clause 9.1.5). The employer may terminate the contract if the contractor is sequestrated (or similar), if the contractor assigns the contract without written consent, and by certification of the employer's agent with reference to certain clauses, default of the contractor. If these conditions prevail, the employer may give notice to the contractor to rectify the matter within 14 days, after which ramification may be imposed by the employer in accordance with the contract. The contractor may terminate the contract if the employer has rejected the contract, failed to pay, interfered with the issue of a payment certificate, if the employer is sequestrated (or similar) or assigned the contract without written consent of the contractor. The contractor may give 14 days' written notice to the employer to remedy the default. Upon termination the contract shall still prevail to promote resolving the dispute and determining the amounts payable to either party. During these proceedings, common law will prevail and any trustees and liquidators will be informed of notices with regard to liquidation (or similar) (SAICE, 2015: 68-75).

4.4.2.3 Project time management

As with all four contracts, the contract allocates time limits to correspondence and notices submitted of required documents, etc. which are spread throughout the contract document. Certain definitions pertain to time management. The contract defines commencement date as the date when the form of offer and acceptance comes into effect. The meaning of day means a calendar day. Practical completion is defined as the whole or portion of the works that has reached a state of readiness, and fit for the intended purpose and occupation, without danger or undue inconvenience to the employer, even though some work may be outstanding. The due completion date is the date when practical completion was due to be achieved, taking into account any extensions that may have been granted (SAICE, 2015: 1-5).

The contract devotes an entire clause to time and related matters. The clause starts by mentioning how time calculations will be done, taking into account the starting date of such calculation and special non-working days (Clause 5.1). Clauses 5.2 to 5.4 concern the commencement date which is subject to the instruction by the employer's agent, the submission of the required documentation by the contractor and the necessary access to the site being given (SAICE, 2015: 21-23).

The contract specifies that the programme should be approved by the employer's agent (EA) and that it should be updated if the EA deems it necessary. The contract also stipulates the minimum requirements for such a programme and should indicate (SAICE, 2015: 23-24):

- the commencement date, the due completion date and the planned completion date;
- the sequence, timing and resources for carrying out the works;
- the dates for site access, possession, approvals, instructions, inspections, tests, and all required information;
- the events that influence the carrying out of the works, including the float and the contractor's time risk allowances;
- other programming information set out in the scope of works;
- a detailed cash flow; and
- include an update indicating the actual progress against the planned progress at least once a month.

The EA has to approve the programme within seven days after submission by the contractor or refute it, with a relevant reason, to allow the contractor to rectify his/her programme. Very important though, the contractor is not relieved from his/her responsibilities if the programme is approved by the EA. The contract also allows the EA to give notice if the contractor falls behind his programme. The contractor will not be entitled to additional funds to accelerate his/her progress after such a notice, providing provision is made for circumstances outside the contractor's control (SAICE, 2015: 23-24).

The contract must also be specific about the approval of working time outside the normal working hours. The contractor has to ask for permission before work can take place during these times. The contractor is entitled to extension of time if he/she did not receive the required information timeously from the employer and/or his/her agent. The employer's agent should give the necessary instructions for the required information, working procedures, and the like timeously. The contractor shall also give timeous notice of any additional information he/she may require e.g. for ordering material in advance etc. (Clause 5.9). The works may be suspended by the contractor if he/she does not receive payment or if the employer's agent instructs him/her to do so. The contractor will, however, protect the works as far as is necessary during this period. If no payment is received within 84 days after the receipt of the notice by the contractor, the contractor may terminate the contract (Clause 5.11). Clause 5.12 deals with the extension of time for practical completion. Clause 5.13 deals with penalties for delay. A penalty may be applied in accordance with the contract data if the contractor fails to complete the works to the extent that it entitles him to receive a certificate of practical

completion. The contractor will request a certificate for practical completion. The employer's agent will within 14 days of such request issue a list of outstanding items that prohibits the contractor from achieving practical completion. If no such list is issued, it shall be deemed that practical completion has been reached. The employer's agent will issue the certificate of practical completion as soon as the items have been completed, which entitles the employer to occupy the works. The final approval certificate is issued after the defects liability period has lapsed and all defects rectified. This is discussed in more detail under quality (SAICE, 2015: 24-35).

4.4.2.4 Project cost management

Certain definitions apply to cost management and financial management as stated in Chapter 3. The first definition regarding costs is the bill of quantities, which means the specific document so designated in the pricing data. Pricing data is defined as the document that sets out the pricing strategy which provides the criteria and assumptions to be taken into account by the contractor when developing the contract sum. The pricing strategy states the method of acquiring pricing and how the contractor will be remunerated during the construction period. In a re-measurement contract the contractor is paid an amount determined from the actual quantities of work completed multiplied by the rates or prices allowed for these items, subject to adjustments. The contract price is defined as the contract sum subject to additions and omissions in accordance with the contract. The contract sum, on the other hand, is the accepted amount provided for in the agreement as per the form of offer and acceptance. A fixed price contract means the contractor is paid the contract sum for carrying out the works subject to adjustments in accordance with the contract (SAICE, 2015: 1-4).

Clause 4.5.4 sets the stage for remuneration of the contractor for services rendered for the employer. The contract makes provision throughout that the contractor should be fairly compensated. Clause 4.8.2, for instance, makes provision that the contractor shall be remunerated for facilities provided for others (SAICE, 2015: 16-18).

Clause 6, as already mentioned, sets out the payment related items. Clause 6.1.1 states that the contractor shall be compensated for the construction, completion, and defects of the works in accordance with the provisions in the contract. The contractor shall, before commencing with the works, provide the required security for the performance of the contract. If the contractor fails to provide a security or it varies substantially to the requirements, the employer may retain ten per cent of the value of the works as retention. The employer's right to terminate will not be limited because of this arrangement. The performance guarantee should be kept

valid and enforceable throughout the construction period until the certificate of completion (SAICE, 2015: 36).

Clause 6.3 sets out the rules for variations and lists the items that the employer's agent may ask for, that may have an influence on the scope, time, and cost of the project, before the certificate of completion is issued (SAICE, 2015: 37). These are:

- a change in the quantities (increase or decrease);
- omission of any such work, not to be done by someone else;
- a change in the quality or character requirements of work;
- a change in levels, lines, position, and dimensions of any part of the works;
- additional work of any kind necessary for completion of the works; and
- a change in the specified or approved sequence or method of construction.

If the quantities increase or decrease in a re-measurement contract, it shall be deemed to be a variation (SAICE, 2015: 38). The criteria for calculating the value of variations is set out in Clause 6.4. The employer's agent shall, within 28 days after issuing the variation order (or otherwise specified), issue to the contractor and the employer the valuation of such instruction. The employer's agent will further more include such item in his/her monthly payment certificate evaluation (SAICE, 2015: 39).

The contract allows for day works (Clause 6.5) and if applied, the contractor shall be remunerated in accordance with the provision of the pricing data. If no allowance is made for such items, the gross remuneration of workmen, foremen, and their time will be considered in determining their cost. This, together with the net material costs, the applicable mark-up for attendance and profit will be used. The use of construction equipment shall be charged at rates stated in the contract data or through agreement between the employer's agent and contractor. The contractor shall, during the continuance of the day works, keep record on a daily basis. This will be used in the monthly day works statement that will be prepared (SAICE, 2015: 39-41).

Clause 6.6 sets out the arrangement with regard to provisional and prime cost sums as well as contingency amounts. Clause 6.6.3 states that the expenditure of such allowances is for the discretion of the employer's agent. Any portion not expended shall not form part of the contract price (SAICE, 2015: 41-42).

The employer's agent will determine the value of the work; he/she may ask the contractor to measure the work and material on site for the past month. When the employer's agent wants to conduct any measurement with the contractor present, he/she will give notice thereof. If the

contractor does not supply a statement of the measured work or fails to attend such a measurement date as described, the employer's agent may use his/her discretion in such measurement for payment certificate purposes. The method of measurement is set out in the contract data (SAICE, 2015: 42-44). Clause 6.8 makes allowances for adjustment of rates/or prices depending on whether it is allowed for or not. The contract price adjustment factor is specified as well as variations to special materials and changes in legislation that may occur (SAICE, 2015: 44). The arrangement of plant and material is set out in Clause 6.9 before the arrangement surrounding payments are discussed. When amounts become due and the necessary measurements have been done, the contractor will submit a monthly statement to the employer's agent in accordance with the provisions of Clause 6.10. When claiming material on site, the contractor will submit a statement and copies of the invoices (or receipts) in respect of the applicable purchases and the delivery of the materials for that particular payment certificate. The payment certificate will be subject to retention if applicable. The employer's agent will submit the payment certificate within seven days and barring any objections, the employer will pay the contractor within 28 days of the receipt of the payment certificate, subject to the contractor submitting a tax invoice (As required in South Africa). At practical completion the retention amount will be lowered to fifty per cent of the maximum limit of the retention amount. In the event of different defects liability periods being applicable to the contract, it will apply to the applicable part of works. The rest of the clause allows for the employer to deduct amounts due to him/her in terms of the contract or law (with the necessary notice to the contractor). If the employer, however, does not pay money due to the contractor by the due date, interest, as set out in the contract, may be charged until the entitled money has been paid. Fourteen days after the certificate of completion has been issued, the contractor must submit a completion statement to the employer's agent, after which he/she will submit the applicable certificate to the employer for payment within fourteen days. Within the fourteen days after the final approval certificate has been issued, the contractor shall submit a final statement claiming final settlement to the employer's agent. Similar to the above, the employer's agent has 14 days to issue the final payment certificate to the employer, who has 28 days to pay the contractor from such date. Clause 6.11 closes the payment items by stating that the contractor can ask for an adjustment of his/her general items if the contract value varies by more than 15 percent (SAICE, 2015: 46-51).

4.4.2.5 Project quality control

All the quality specifications and inspections on the contracts boil down to is the final approval certificate issued by the employer's agent stating the date on which the works were completed and all defects corrected in accordance with the contract. This is precluded by the defects

liability period, which is defined as the period stated in the contract data, commencing from the issue of the certificate of completion, or certificates of completion in the event of more than one certificate having been issued for different parts of the works, during which the contractor has both the right and the obligation to make good defects in the materials, plant, and workmanship covered by the contract (SAICE, 2015: 2-3).

Clause 3.3.3.2 states that even if work, workmanship or material is not disapproved by the employer's agent's representative, it does not mean that the employer's agent may not disapprove of it later on (SAICE, 2015: 12-13).

According to Clause 4.1.2., the contractor will be responsible for any designs which are required by the contract to be done by him/her (for permanent works). Notwithstanding any approval by the employer's agent, the contractor will be responsible for such designs. The contractor shall furthermore comply with all applicable laws, regulations, statutory provisions, and agreements, and if requested, provide the necessary proof thereof (Clause 4.3) (SAICE, 2015: 14).

Clause 4.11 deals with the appointment of competent personnel by the contractor, with the employer's agent in a position to remove any person employed by the contractor from site. This person has to be guilty of misconduct, or incompetence or negligence in performing duties, or any person that has an undesirable presence on site. Clause 4.12 continues on the appointment of a contractor's superintendent (the construction manager), but will be elaborated on under resources (SAICE, 2015: 19-20).

As mentioned above, Clause 7 of the contract relates to quality and related matters. It addresses the quality of construction equipment, plant, workmanship, and materials. It sets out the basic requirements and allows for additional requirements to be stated in the contract data. The contract also gives the employer's agent authority to disapprove inadequate items as listed above (clauses 7.1 and 7.2). The contractor shall provide samples of materials intended to be incorporated into the works at his/her own cost, as stated in the scope of works. The contractor will furthermore conduct the necessary tests as set out in the scope works for work already included in the permanent works. The contractor would have made provision in his/her rates for such tests if specified to do so. The contractor will not cover up any work or plant that has to be inspected by the employer's agent before such inspection has been conducted. The contractor will give adequate written notice of such inspection. The contractor should allow for any such inspection in his/her programme which is reasonable. The contractor may however be entitled to compensation if delayed as specified in the contract (Clause 7.5).

Clause 7.6 deals with defective plant, materials, and work and the management thereof (SAICE, 2015: 52-56).

Clause 7.7 gives the employer's agent authority to instruct the contractor to search for defects. If the defect is the result of the contractor's default, he/she will not be remunerated for such investigation. The contrary is applicable if the fault is not of his/her doing. The same principle applies with rectification of defects during the defects liability period. The term fair wear and tear will be taken into account (Clause 7.8). Clause 7.9 allows for urgent remedial work to be done by the employer and the cost and other arrangement to be determined as soon as practically possible by the employer's agent (SAICE, 2015: 57-59)

4.4.2.6 Project resources management

Construction equipment is defined as appliances or things of any nature required for carrying out, completing or correcting defects in the works, but do not include materials, plant, or things that are part of, or intended to form part of, the permanent works. Plant, on the other hand, is defined as machinery, apparatus, articles, and things of all kinds that become part of the permanent works to be provided in accordance with the contract (SAICE, 2015: 1-4).

As mentioned earlier, a grey area may exist between stakeholder management and resource management with regard to the representatives of some of the stakeholders. The employer's agent's representative (EAR) will therefore observe how work is carried out, and examine and test materials and workmanship. He/she will also receive information which may be required from the contractor. He/she will have the authority to assign certain authority to him/her as stated in the contract and be able to deliver and receive written and oral communication on behalf of the employer's agent. His/her authority is, however, limited, as set out above and within the contract. Clause 3.3.6 states that the contractor can refer any instruction or order of the EAR to the employer's agent if he/she is dissatisfied with it. The employer's agent will promptly confirm, reverse, or vary such instruction or order (SAICE, 2015: 12-13).

Subcontractors have already been discussed, but can be seen as resources that have to be managed by the contractor. As already stated, the appointment of a subcontractor, whether selected or not, will not result in an agreement between the employer and the subcontractor and will not relieve the contractor from any liability or obligation under the contract. Clause 4.3.2 states that the contractor may be asked to present proof to the employer's agent with regard to duties, taxes, levies, and contributions as required by legislation applicable to the work and the particular contract (SAICE, 2015: 14-15).

The contractor shall supply the specified facilities for persons engaged in any work on site. They may include the employer, any other contractor employed, and other persons authorised by the employer, and any local or statutory authorities. Adequate notice of the necessity should however be given to the contractor (Clause 4.8.1) (SAICE, 2015: 18).

Clause 4.9 discusses the arrangement surrounding construction equipment and states that it will be intended for the particular project. The employer's agent will give consent before equipment is removed from site. Clause 4.10 simply states that the contractor will be responsible for his/her own employees. The competence of the employees has already been discussed under quality management (Clause 4.11). Clause 4.12 deals with the appointment of the construction manager, who shall provide the necessary superintendence while the work is being carried out (SAICE, 2015: 19-20).

4.4.2.7 Project communication management

Writing is defined as hand-written, typed or printed communication (comprising words, figures or drawings) including facsimiles, electronic communication, or any similar communication resulting in a permanent record. Clause 1.2 highlights that any written communication between the parties is deemed to be delivered if handed to the addressee or his/her agent or delivered to the address of the addressee as stated in the contract data. The default language of the contract is English unless stated otherwise (SAICE, 2015: 5-6).

The employer would have made available all the necessary information on the site and data relevant to the works. The contractor, however, remains responsible for his/her own interpretation of this information (Clause 2.1.2). Clause 2.2, as already discussed highlights that the contractor will communicate any adverse conditions encountered during the implementation of the works (SAICE, 2015: 8).

Throughout the contract, communication is highlighted, for instance Clause 6.3.2 highlights the fact that any order for variations should be in writing (SAICE, 2015: 37). The methods and time related to notices and other communications is given within the particular clauses.

4.4.2.8 Project risk management

Fossils may be seen as potential risks, and is touched on in Clause 4.7. All fossils, articles of value, structures and other items of archaeological or geological value found on site are the property of the employer. The contractor should take reasonable precautions to prevent damage to such items and will inform the employer's agent when such an item has been found. The employer's agent will forthwith issue an instruction on how to deal with the matter. This

may lead to a time and cost claim from the contractor and thus is a risk to the project (SAICE, 2015: 17-18).

Clause 8 relates to risk and related matters and starts by specifying that the contractor is responsible for the works after the site has been handed over. The contractor shall protect the work, prevent pollution as far as possible, and consider external infrastructure, such as roads to and from the site, and the public. The contractor shall further take care of the works against damage or physical loss. Excepted risks are discussed, similar to force majeure in other contracts. The next topic relates to indemnities of the parties followed by the reporting of accidents and lastly insurance. The contractor shall effect any required insurance in accordance with the contract data. The contract specifies the minimum insurance that has to be in place before commencing with the work to be the following (SAICE, 2015: 60-67):

- insurance of the works, plant and all material by both the contractor and/or the employer;
- insurance for the contract price; and
- insurance for professional fees.

Additional insurances that may be required include:

- a coupon policy for special risk insurance issued by Sasria (South African special risks insurance association);
- public liability insurance;
- support insurance – e.g. when lateral support is needed for adjoining property or when unstable ground conditions is present; and
- any other insurance specified in the contract data.

It is deemed that the contractor will affect the required insurance for any appointed subcontractors. The clause closes with the fact that the applicable insurance company must be registered in South Africa and be subject to the employer's approval. The contractor must be able to provide proof of such insurance being in place and if the contrary, the employer may affect his/her own insurance as required to the cost of the contractor (SAICE, 2015: 60-67).

4.4.2.9 Project procurement management

The preface of the contract indicates that the GCC 2015 should be used in conjunction with the Construction Industry Development Board's (CIDB's) Standard for Uniformity in Construction Procurement and in conjunction with SANS 1921 (ii). This portion of the project

life cycle falls outside the implementation phase, but as already established, influences the implementation phase. Clause 2.1.1 relates to this matter, where the relevant information has to be supplied to the contractor to make an informed offer (SAICE, 2015: 8).

The contract has specific items that bring the tender procurement phase together with implementation procurement. The contract defines the form of offer and acceptance as the document that formalises the legal process of offer and acceptance and rise to the contract. An example is attached to the contract as Appendix 1. A supplementary agreement is an additional contract between the employer and the contractor for carrying out work, supplemental to the original contract, which does not have to be carried out by a variation (SAICE, 2015: 3-5).

Clause 1.3.4 expands on the supplementary agreement by stating that such an agreement will be seen as a separate agreement and not as a variation to the existing contract. Clauses 1.3.5 and 1.3.6 deal with copyright and in short states that the copyright will remain with the party responsible (who paid for it) for the design. (SAICE, 2015: 6-7).

Most of the procurement functions during the implementation phase reside with the contractor, e.g. plant, equipment, and materials. Clause 4.4 overlaps with the domain of both the contractor and the employer. According to the contract, however, the contractor remains responsible for their contractual obligations. Clause 4.6 discusses patent rights and has a similar arrangement to Clauses 1.3.5 and 1.3.6 highlighted above (SAICE, 2015: 15-20).

The programme becomes important for the subcontractor and the employer when materials have to be ordered and with regard to free issue materials. Clause 5.6 is thus important for coordinating procurement by others (SAICE, 2015: 23).

4.4.2.10 Project Integration management

Through-out the contract integration, management promoting clauses are found with some items not discussed as of yet. General items are defined as items stipulated in the pricing data relating to general obligations, site services, facilities, and/or items that cover elements of the cost of work which are not considered as proportional to the cost of the permanent works (SAICE, 2015: 3). Interestingly, the default governing law is specified as the South African law, except if specified otherwise (SAICE, 2015:7).

Adverse physical (Clause 2.2.) conditions can influence the scope of works and require the contractor to give notice to the employer's agent as soon as he/she becomes aware of the condition, stating the nature and extent of the physical conditions, artificial obstructions

encountered, and the additional work required to address the situation. The contractor shall carry out the additional work as proposed unless instructed otherwise. The contractor is further entitled to claim for delay in practical completion and/or additional cost, provided the cost and time of all work prior to the notice is given in the contract data (SAICE, 2015: 9).

4.4.2.11 Safety management

The GCC 2015 mentions that the employer may give written notice to the contractor that an employer's agent can act as a representative according to the Occupational Health and Safety Act (Clause 3.2.4) (SAICE, 2015: 11).

Clause 5.8 relates to non-working times and may be seen as a safety precaution. It asks for permission and particulars when the contractor wants to work at the identified non-working times (SAICE, 2015: 26).

Clause 8.4 indemnifies the employer of any obligations specified in Clause 8, e.g. safety of people on site. The contractor should make the necessary allowances for such insurances in his/her rates. It also specifies risk which falls outside the control of the contractor and the consideration of extension of time with regard to any such risks. The contractor shall report any accidental incident to the EA, who may require a report on the matter within 48 hours of such accident occurring (Clause 8.5) (SAICE, 2015: 63-65).

4.4.2.12 Environmental management

No specific clauses mention the environment and again it is through legislation and the appointment of an agent by the employer, that such obligations can be specified and imposed on the contractor.

4.4.2.13 Claims management

The contract devotes an entire clause to claims and disputes in Clause 10. The contractor may claim for extension of time and for compensation. The contractor shall, within 28 days after the circumstance or event, give written notice setting out the particulars as per Clause 10.1.1.1, making the event identifiable and quantifiable. If the particulars cannot be captured within this time (perhaps it is an on-going matter), the contractor should at least make the employer's agent aware of the matter. The period of 28 days may be extended given circumstance is reasonable. Clause 10.1.3 sets out the requirements of recoding the claim and putting the necessary documentation together. The employer's agent shall, within 28 days, give a ruling on the claim. The contractor or the employer may submit a dissatisfaction

claim, with the necessary documentation, to the employer's agent. He/she will, within 28 days after the receipt of such a claim, give a ruling in writing to both parties (Clause 10.2) (SAICE, 2015:80).

The contractor or the employer may give a dispute notice (Clause 10.3), provided that dispute arises out of the rejected claim, the relevant clause is referenced, the employer's agent is copied in the notice, the nature of the dispute is clearly stated, and given within 28 days of the event that gave rise to the claim. If the matter cannot be amicably resolved and adhering to the rules above, the matter shall immediately be referred for adjudication. The employer's agent shall give a ruling on the matter and will be in force even if the matter is referred for adjudication. The parties may at any time agree to settle a dispute amicably by a third party. The contract allows for an adjudication board to be appointed within 56 days after the commencement date, failing which an ad-hoc adjudication process is started. Either party may disagree with the adjudication board's decision and refer the matter to arbitration or court proceedings. The adjudication board's decision will prevail and be implemented until overturned. The arbitration proceedings, if not stated differently in the contract data will be in accordance with the rules of conduct for arbitration issued by the Association of Arbitrators (South Africa). The arbitrator shall set out the facts and provisions when an award is given. If the contract data does not allow for arbitration and if a matter could not be resolved by arbitration, the matter may be referred to court (SAICE, 2015: 80-84).

Clause 10.9 states that a dispute resolving person or persons shall be appointed by agreement by the parties, failing which (within seven days) either party may refer the matter to the president, or his/her nominee, or the South African Institute of Civil Engineering may nominate a person. Throughout the above mentioned proceedings the parties will continue with their obligations on the contract (SAICE, 2015: 84-85).

4.4.3 Conclusion

It is noticeable that the GCC is written for South Africa, when it refers to the Health and Safety Act and the fact that South African law will be deemed to be the governing law if no other is specified. It addresses most of the management knowledge areas comprehensively. The JBCC PBA, and the GCC in general state that a claim from the contractor is deemed to be accepted when no reaction is presented by the employer or the employer's agent. The contract is also specific about the programme and gives the employer's agent the authority to accept or reject the programme. From the analysis above, it seems that the contract indeed gives the employer's agent ample power to manage the project to its intended purpose.

4.5 FEDERATION INTERNATIONALE DES INGENIEURS-CONSEILS (FIDIC) 1999

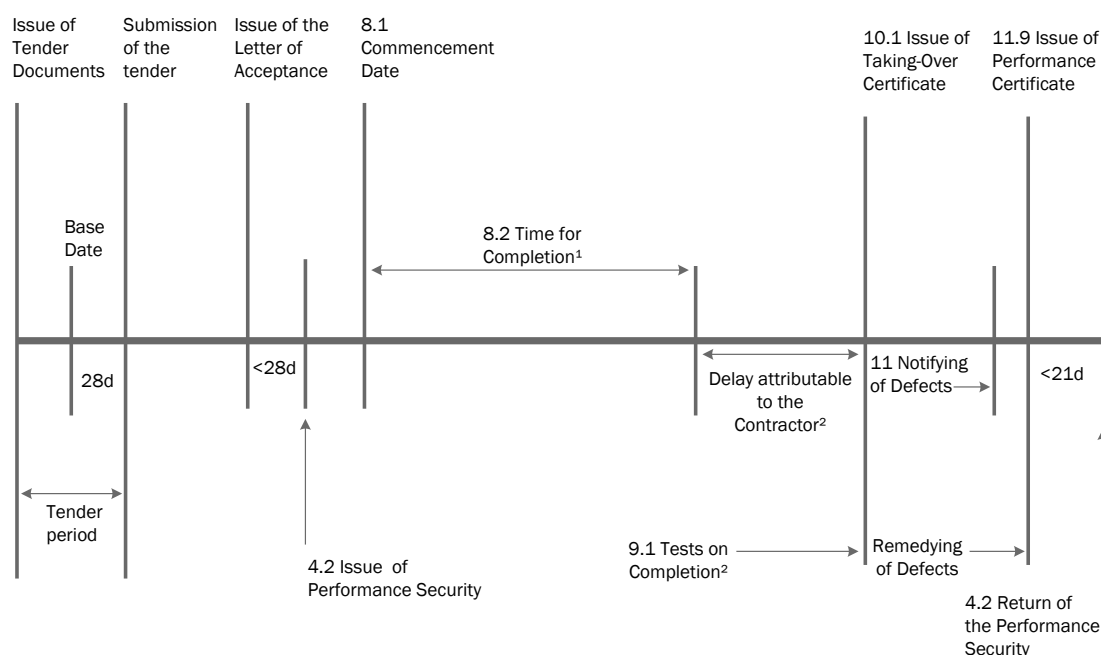
4.5.1 Introduction

Of the four main contracts, the FIDIC Conditions of Contract for Construction (Red Book) seemingly has the most themes or main clauses. On closer inspection the 20 clauses have a similar structure to the rest of the contracts. Of the four contracts, the FIDIC Red Book is the oldest and was published in 1999. Similar to the other contracts, the first clause deals with the general arrangement and starts by highlighting certain definitions, interpretations, communications, law and language, priority of the documents, the contract agreement, assignment, care and supply of documents, delayed drawings or instructions, copyrights, confidential details, compliance with laws and joint and several liabilities. The definitions are also grouped into sections pertaining to the contract; parties and persons; dates, tests, periods and completion; money and payments; works and goods; and other definitions. Clause 1 gives a brief overview of the contract and it can be seen that much of the management knowledge areas are contained and touched on. The contract allows for it to be used internationally. In Clause 1.5 the priority of the documents forming the contract is set out with the contract taking precedence (FIDIC, 1999a: 1-8).

After Clause 1, the Conditions of Contract is divided into eight discrete subject areas identified as follows (Bunni, 2005: 504-505):

- Clauses 2 to 4 deal with rights, duties, and obligations of the triangular relationship of the employer, engineer, and contractor.
- Clauses 5 to 7 address **resources** and include nominated subcontractors, personnel and labour, and plant, materials and workmanship.
- Clauses 8 to 10 address **time** aspects, namely commencement, delays and suspension, tests on completion, and employer taking over.
- Clause 11 deals with defects liability.
- Clauses 12 to 14 deal with **cost** terms such as measurement and evaluation, variations and adjustments, contract price, and payments.
- Clauses 15 to 16 deal with termination by either the employer or the contractor, which includes suspension.
- Clauses 17 to 19 incorporate and deal with **risk** and responsibilities, insurances, and force majeure (excepted risks).
- Clause 20 is concerned with claims, disputes and settlement.

The contract itself comprises four sections, namely the general conditions, consisting of the 20 contractual clauses, the guidance for the preparation of particular conditions, forms of the letter of tender, contract agreement, and finally dispute adjudication agreement. The general conditions are prepared on the basis of a bill of quantities being prepared; additional data is needed in the appendix to tender. More details are included in the general conditions than needed and needs to be identified as relevant in the appendix to tender. The sub-clauses not applicable to the particular contract may be omitted or not invoked, rather than writing additional clauses. The appendix to tender makes provision for these items and becomes a checklist for the compiler of the contract. The document includes charts to clarify the sequence of the contract activities. The documents allow for amendments to take place to suit the circumstances, but great care should be taken to ensure that no ambiguity is created. The following chart illustrates the many events that may take place on the project and illustrates the project life cycle (FIDIC, 1999a: Foreword).



Typical sequence of Principal Events during Contracts for Construction

1. The Time for Completion is to be stated (in the Appendix to the Tender) as a number of days, to which is added any extensions of time under Sub-Clause 8.4.
2. In order to indicate the sequence of events, the above diagram is based upon the example of the Contractor failing to comply with Sub-Clause 8.2.
3. The Defects Notification Period is to be stated (in Appendix to Tender) as a number of days, to which is added any extension under Sub-Clause 11.3.

Figure 27: FIDIC Typical Sequence of Principal Events during contracts for Construction

(Source: FIDIC, 1999a: Foreword)

The tender documents issued to tenderers consist of the conditions of contract, the specifications, the drawings, the letter of tender, and schedules for completion by the tenderer.

The contract specifically mentions the bill of quantities and day work schedules, which may be needed for minor works. Instructions to tenderers should also be issued to the tenderers to advise and highlight any special matters that may form part of the contract. The specification may include some of the following items, with references to the applicable sub-clauses (FIDIC, 1999b: 3):

- Requirements for contractor's documents (Clause 1.8).
- Permissions being obtained by the employer (Clause 1.13).
- Phase possession of foundations, structures, plant or means of access (Clause 2.1).
- Contractor's designs (Clause 4.1).
- Other contractors (and others) on the site (Clause 4.6).
- Setting-out points, lines and levels of reference (Clause 4.7).
- Third parties (Clause 4.14).
- Environmental constraints (Clause 4.18).
- Electricity, water, gas and other services available on the site (Clause 4.19).
- Employer's equipment and free-issue material (Clause 4.20).
- Nominated subcontractors (Clause 5.1).
- Facilities for personnel (Clause 6.6).
- Samples (Clause 7.2).
- Testing during manufacture and/or construction (Clause 7.4).
- Test on completion (Clause 9.1).
- Provisional sums (Clause 13.5).

The sub-clauses contained in the conditions of contract refer to the appendix of tender and thus the pro-forma appendix to tender becomes the checklist for most of these items. The instruction to tenderers may require further information from tenderers and include a questionnaire in the schedules. This can be used when the CIDB's standard tender conditions are to be applied (FIDIC, 1999b: 3).

4.5.2 Comparison with the management knowledge areas

The following section compares the standard clauses of the FIDIC Red Book against the management knowledge areas as established in Chapter 3. The eight sections of the contract conditions have already been highlighted. The following table compares the possible relevant clauses against the relevant knowledge areas, even though many of the knowledge areas are contained in different sections of the Conditions of Contract.

Table 14: The FIDIC (Red Book) sections compared against the management field

FIDIC - 20 Main Clauses		Management themes	
Clause number	Clause heading	Project management	Construction management
Clause 1	General provisions	Scope management	Environmental management
		Communication management	Safety management
		Integration management	
		Procurement management	
Clause 2	The employer	Stakeholder management	
Clause 3	The engineer		
Clause 4	The contractor		
Clause 5	Nominated subcontractors	Human resources	
Clause 6	Staff and labour		
Clause 7	Plant, materials and workmanship		
Clause 8	Commencement, delays and suspension	Time management	
Clause 9	Test on completion		
Clause 10	Employer's taking over		
Clause 11	Defects liability	Quality management	
Clause 12	Measurement and evaluation	Cost management	
Clause 13	Variations and adjustments		Financial management
Clause 14	Contract price and payment		
Clause 15	Termination by employer	Risk management	
Clause 16	Suspension and termination by contractor		
Clause 17	Risk and responsibility		
Clause 18	Insurance		
Clause 19	Force majeure		
Clause 20	Claims, disputes and arbitration		Claims management

(Source: FIDIC, 1999a)

(Source: van der Walde & Fox, 2015)

(Source: Zulch, 2012)

4.5.2.1 Project stakeholder management

Clauses 2 to 6 refer to the parties and people that will work on the project, from the employer to the labourer on site. As mentioned above, the line between resource management and stakeholder management is drawn at the representatives.

Clause 1.1.2 defines party as the employer or contractor, depending on the context. The engineer is defined as the person appointed by the employer to act as the engineer for the purpose of the contract and named in the appendix to tender, or another person appointed from time to time by the employer and notified to the contractor under Sub-Clause 3.4

(replacement of the engineer). The other entity defined is the Dispute Adjudication Board (DAB) who consists of one to three people so named in the contract (FIDIC, 1999a: 2).

Clause 1.7 highlights that none of the parties may assign the whole or any part of the contract under the contract without the agreement from the other party. Clause 1.14 states that the contractors constitute a joint venture, consortium or other unincorporated grouping of two or more persons. These people shall be deemed jointly and individually liable to the employer, shall notify the employer of their leader, and the contractor shall not alter its composition or legal status without the prior consent of the employer (FIDIC, 2015: 6-8)

The employer shall ensure that the contractor has the necessary information and access to the site to conduct business. The employer shall provide reasonable assistance to the contractor to obtain copies of the applicable laws and permits of the country. The employer will ensure that personnel will cooperate on site. Furthermore, the employer shall, within 28 days, provide the contractor with evidence of his/her financial arrangements (FIDIC, 1999a: 8-10).

The employer shall appoint an engineer who carries out the duties and obligations as per the contract. He/she will however not have authority to amend the contract, but shall be deemed to act on behalf of the employer. The engineer may assign some of his/her duties to the resident engineer or independent inspectors. Importantly, this assignment shall be in writing. The delegation authority shall be as per the written notice or letter. The engineer may as per the other contract issue new and additional information to the contractor. The employer may replace the engineer, but have to give 42 days' notice prior to doing so (FIDIC, 1999a: 10-11).

The contractor shall execute and complete the works in accordance with the contract and the engineer's instructions. Where necessary the contractor shall conduct his/her own designs to fulfil his/her obligations. Where any part of the permanent works has to be designed, the contractor shall submit to the engineer any such design for approval. The contractor shall provide a performance security to the client, subject to the employer's approval. The contractor shall appoint a representative known as the contractor's representative prior to the commencement date. The contractor may not subcontract the entire works and will be fully responsible for his/her appointed subcontractors. The engineer has to give consent to the contractor prior to the appointment of subcontractors not specified in the contract. The clause continues by spelling out the contractor's obligations of setting out of the works, safety procedures, quality assurance, notice of delivery of plant and goods, the contractor's own equipment, protection of the environment, electricity, water and gas, employer's equipment and free-issue material, progress reports, security on site and fossils. The contractor is

deemed to be satisfied of the correctness and sufficiency of the accepted contract amount and have taken into account the data, interpretations, necessary information, inspections, examinations, and satisfaction data pertaining to the site. The contractor will notify the engineer if he/she encounters any unforeseeable physical conditions. Lastly, the contractor is responsible for any access routes and rights of way, avoids any interference of the public, and will confine his/her operations to the designated site (FIDIC, 1999a: 12-20).

4.5.2.2 Project scope management

The general layout of the contract has been discussed in the Introduction, but the following items can be highlighted as inclusive of the scope of works. Clause 1.6 states that the parties will enter into the agreement within 18 days after the contractor receives the letter of acceptance, unless they agree otherwise. The agreement will be based on the form annexed to the particular conditions with the costs of stamp duties and similar charges imposed by law carried by the employer (FIDIC, 1999a: 6). The contract is defined as the agreement, the letter of acceptance, the letter of tender, the conditions, the specification, drawings, the schedules, and other documents listed in the contract agreement or in the letter of acceptance. Clause 1.1.6 defines the contractor's documents as the calculations, computer programs and other software, drawings, manuals, models, and other documents of a technical nature supplied by the contractor under the contract. The site includes places where permanent works are to be executed and which plant and materials are to be delivered, and any other places as may be specified in the contract as forming part of the site (FIDIC, 1999a: 1-5).

Variations and adjustments are allowed for in Clause 13 and makes allowance for variations and adjustments on the contract price to take place. Importantly the clause states that the contractor will only apply such modifications if a written instruction has been received. Variations and adjustments can occur due to (FIDIC, 1999: 37-39):

- some value engineering from either the contractor or the engineer, subject to the approval of the engineer;
- different currencies;
- provisional sums;
- day works;
- changes to the applicable country's legislation, and
- adjustment for changes in costs (e.g. inflation).

Clauses 15 and 16 set out the arrangements for termination by the employer and the contractor respectively. Each clause states that either party has to give 14 days' notice prior

to termination of the contract except in cases of bankruptcy or corruption. The clauses continue by setting out the arrangements after termination on valuation, payment and cessation of work, and removal of the contractor's equipment. The employer has the right to terminate the contract at any time of his/her convenience by giving 28 days' notice prior to the termination. He/she may however not execute the works himself/herself or arrange for others to do so if the applicable clause is used to terminate the contract (FIDIC, 1999a: 47-50).

4.5.2.3 Project time management

As per the previous contracts the start date (commencement date) is specified by the engineer with a specific completion date either per section or the project as a whole. The contract allows for the engineer to issue such instruction or in default of such an instruction, the contractor will commence with work on site within 42 days after the contractor receives the letter of acceptance. A programme is required within 28 days after receiving notice and specific requirements are set for the programme, namely (FIDIC, 1999a:26-27)

- the order of work with its time allocations specific to documentation, manufacturing, installation, and testing;
- subcontractors' timeline;
- sequence and timing of tests; and
- supporting documentation.

Very importantly, the contract states that the employer's personnel may base their planning on this programme. The engineer may give notice when the contractor has fallen behind on his/her schedule on which the contractor shall submit a revised programme. The contractor shall adopt these revised methods. The contractor is entitled to an extension of time because of the following (FIDIC, 1999a:27):

- variation or other substantial change in the quantity of an item of work included in the works;
- any reasonable delays covered under the contract;
- adverse climatic conditions;
- unforeseeable shortages in the availability of personnel or goods caused by epidemic or governmental actions; or
- delays caused by the employer or his personnel.

As per the other contracts, Clause 8.7 makes allowance for **delay damages**, which are basically a **penalty** clause for late completion of the works. The clause also continues to state

that the engineer may suspend the work and depending who's fault such a suspension may be, cost for such a suspension is calculated in due consideration of cause and time (FIDIC, 1999a: 28-29).

Clause 10 allows for taking over of the works in sections or parts and makes provision for the contractor to be compensated when delayed in his/her progress due to others. As per the GCC, the delay damages (penalty) are reduced in proportion to the section completed (FIDIC, 1999a: 30-32).

Another time related matter that needs to be taken cognisance of, is time for completion, which is defined as the time for completing the works or section under Sub-Clause 8.2 (time for completion) as stated in the appendix to tender with any extension under Sub-Clause 8.4 (extension of time for completion), calculated from the commencement date. The taking over certificate is similar to the practical completion of the JBCC principal agreement with the performance certificate being the same as the final completion certificate. The contract defines the defects notification period as the period for notifying defects in the works or a section under Clause 11.1 (completion of outstanding work and remedying defects) as stated in the appendix to tender, including any extension, calculated from the date on which the works or section is completed as certified under Sub-Clause 10.1 (taking over of the works and sections). It is important to take note that a day means a calendar day and a year means 365 days (FIDIC, 1999a: 2-3).

4.5.2.4 Project cost management

Measurement and evaluation proceedings are set out in Clauses 12 to 14. Clause 12 states that the engineer will conduct such measurement of work done together with the contractor. If the contractor fails to attend, the engineer's measurement will be deemed as accurate. The default type measurement method is a bill of quantities (BoQ), although other measurement methods are allowed for. The clause also makes allowance for changes in rates and for omissions (FIDIC, 1999a: 35-36).

Clause 13 has been discussed briefly under scope management above. It was established that variations and adjustments may occur and that the contractor will only implement them if the engineer instructs or approves a variation. The contract promotes value engineering, whereby the contractor submits a proposal for accelerating completion, reducing the cost to the employer, improving efficiency or value, or other benefits to the employer. The variation procedures have already been discussed. The clause allows for the contract price to be paid in more than one currency, to be determined and stated. The proportion of the work pertaining

to that currency is calculated and the contract price amended. The rest of the clause sets out the arrangements on provisional sums, day works, changes in legislation and adjustments and changes in costs (CPAP) (FIDIC, 1999a: 36-40).

The contract states that the contractor will give a proposed breakdown of any lump sum prices within 28 days of the commencement date. He/she will also give a project schedule of payment in the form required in the contract. The contract makes allowance for advance payment to the contractor and the deduction of the applicable instalments in the interim payment certificates. The contract also allows for material and plant on site to be remunerated up to 80 per cent of the estimated cost of such an item. The default period for payment by the employer is 56 days after the receipt of the statement and the supporting documentation by the engineer. The contractor is entitled to compound interest on any certificate not paid within the specified time. The retention amount will be reduced by 50 per cent at the date of the taking over certificate. When submitting the final statement, the contractor shall also submit a written discharge which confirms that the final statement represents the full and final settlement of all money owed to him/her on the contract. The final statement should be submitted within 56 days after the performance certificate has been issued (FIDIC, 1999a: 40-47).

4.5.2.5 Project quality control

Clause 7 relates to resource management and quality management. The clause, as per the GCC contracts, stipulates that the contractor is ultimately responsible for quality as specified in the contract. It continues that the contractor should supply the necessary samples and allow for inspections and testing by the engineer as required. If any of the plant, material or workmanship's tests fails, the engineer may reject such item and require the contractor to rectify such defect (FIDIC, 1999a: 24-26).

Clauses 9, 10 and 11 stipulate the process to follow when the project nears completion. The contractor will give the engineer not less than 21 days' notice before the envisioned completion date. The engineer in return will instruct for such test or tests to take place within 14 days of the requested date or on the specified date. If such tests are delayed by the employer or his/her representative, the contractor is entitled to compensation. If the delay is caused by the contractor, the engineer may instruct the contractor that such a test should be conducted within 21 days. If the test does not take place within this time the employer's personnel may continue with such test at the risk of the contractor. If the test or tests take place and fail to pass, the engineer may ask for a repeat of the test, set a date for the contractor for such a retest or issue the taking over certificate on the request of the employer with duly reduction of the contract value (FIDIC, 1999a: 30-35).

Clause 11 sets out the arrangement for the defects notification period, which in latent terms is the period after which the employer can take possession of the works, but allowing the contractor to make good any defects that have to be repaired. It is the period between the issuing of the taking over certificate (practical completion certificate) and the performance certificate (final completion certificate). Most of the cost of this work is carried by the contractor and involves work to bring the works to completion in accordance with the contract. If there are any additional work required the variation procedure will apply, which will be discussed later on. The defects notification period may be extended for any reasonable reason but not longer than two years from the original date (as per the date of the issue of the taking over certificate). If the contractor fails to remedy the defects within the specified time the employer may carry out the work him/herself, reduce the contract amount (reasonably) or terminate the contract. After this period has lapsed and the required tests have been performed, the performance certificate is issued by the engineer (FIDIC, 1999a: 32-35).

4.5.2.6 Project resources management

Clause 1.1.2 defines the contractor's representative as the person named by the contractor in the contract or appointed from time to time by the contractor under Sub-Clause 4.3 (contractor's representative), who acts on behalf of the contractor. The clause further defines the employer's personnel as the engineer, the assistants, referred to in Sub-Clause 3.2 (delegation by the engineer) and all the other personnel, labourers, and other employees of the engineer and the employer, and any other personnel notified to the contractor by the employer or the engineer, as employer's personnel. The contract conditions continue to define the contractor's personnel as the contractor's representative and all personnel whom the contractor uses on site, who may include the personnel, labourers, and other employees of the contractor and of each subcontractor and any other personnel assisting the contractor in the execution of the works. The subcontractor subsequently is defined as any person so named in the contract as a subcontractor, or any person appointed as subcontractor, for a part of the works and the legal successors in the title to each of these persons (FIDIC, 2015: 2).

The contract further allows for the appointment of nominated subcontractors, either through stating this in the contract or under Clause 13 (variations and adjustments) by the engineer. The contractor shall be under no obligation to employ a nominated subcontractor against whom the contractor raises reasonable objection by notice to the engineer. The contractor shall pay the necessary payment due to the subcontractor and may be asked to produce evidence of such payment (FIDIC, 1999a: 21).

Clause 6 starts by specifying that the contractor is responsible for his/her own personnel and for their arrangements. It goes further by stating basic requirements from basic wage rates (to the particular country at that time), working hours, facilities, and health and safety. It also states that the contractor shall appoint competent personnel (qualified) for their specific jobs. The contract allows the client to have a say in the appointment of personnel up to the point of review of their qualifications and the instruction to remove any person or employer who (FIDIC, 1999a: 22-23):

- persists in any misconduct or lack of care;
- carries out duties incompetently and negligently;
- fails to conform to any provisions of the contract; and
- persists with actions which are detrimental to the health and safety of personnel on the site.

Clause 1.1.5 is concerned with the definition on works and goods and includes contractors' equipment, goods, materials, permanent works, plant, section, temporary works, and works. Contractor equipment is defined as all the apparatus, machinery, vehicles, and other things required for the extension and completion of the works and the remedying of defects. It does however exclude temporary works, employer's equipment, plant, materials, and any other things intended to form part of the permanent works. Goods, on the other hand, are defined as contractor's equipment, material, plant and temporary works or similar. Materials are defined as things of all kinds intended to form or forming part of the permanent works, including the supply-only materials to be supplied by the contractor under the contract. Plant is defined as the apparatus, machinery and vehicles intended to form part of the permanent works (FIDIC, 1999a: 4).

Clause 7 is concerned with plant, materials and workmanship. Items pertaining to quality have already been discussed above. Plant and material will, within the law of the particular country, become the property of the employer either when it is delivered to site or when the contractor is entitled to payment of the value of the plant and materials. The contractor shall also pay royalties, rents, and other payments for natural materials obtained outside the site and the disposal of material from demolitions and excavations and other surplus materials in accordance with the contract. The rest of the clause includes topics on the manner of execution, samples, inspections, testing, rejection, and remedial work, discussed under quality management (FIDIC, 1999a: 25-26).

4.5.2.7 Project communication management

Clause 1.2 defines certain contractual wording and communication towards the contract. As with the other contracts, it defines “written” or “writing” as hand-written, type-written, printed or electronically made documents resulting in a permanent record. Clause 1.3 builds on this by stating that all approvals, certificates, consents, determinations, notices, and request shall be writing and the deliverance thereof is traceable. Both parties should be copied in such communication. Clause 1.4 is concerned with the law and language (FIDIC, 1999a: 5-6).

Clause 1.8 sets out who is responsible for keeping and taking care of which documents. The specifications and drawings will be kept by the employer unless stipulated differently. The contractor, on the other hand, will be responsible for the contractor’s documents as defined earlier. The clause closes by stating that should any party become aware of any error or defect of a technical nature in a document, they will promptly give notice to the other thereof (FIDIC, 1999a: 6).

The rest of the clauses contain more detailed specifications surrounding timelines and requirements of communications, such as notices, approvals, etc.

4.5.2.8 Project risk management

Clause 4.24 highlights that all fossils, coins, articles of value or antiquity, including structures or other remains of geological or archaeological value, shall be placed in the care of the employer. The contractor shall further ensure that his/her personnel take the necessary precautionary measures with regard to the above. The rest of the clause deals with the procedure the contractor needs to follow when such items are found. The engineer, after receiving the required information from the contractor shall make the necessary determination (FIDIC, 1999a: 20).

Clauses 15 and 16 relate to risks to the employer and contractor, but can be seen as the outcome of risks and have been discussed under scope management.

Clause 17 starts by indicating that each party indemnifies the other of a list of items ranging from health and safety of each other’s personnel to the financial and property damage caused by items that the other party were responsible for. Each party indemnifies the other of the designs they are responsible for and of the use of any equipment, plant or works outside the specifications of the contract. It states that the contractor is responsible for the site and its operation from the commencement date up to the date when the taking over certificate is issued. The risks of the employer are listed in Clause 17.3 and the contractor is entitled to

claim any loss of damages if such occurrences take place (FIDIC, 1999a: 53). This is discussed in broad terms in Clause 19 - Force majeure (FIDIC, 1999a: 56).

Clause 18 starts by requesting transparency by each party to provide the other with the necessary proof of the required insurances, proof of payment, and the necessary policies. It states that each party will provide the other with the necessary documentation. The contract allows for any party to effect the insurance for the works and the contractor's equipment, with the default stating that it is the obligation of the contractor, with one or some exclusions. The same can be said about the insurance against injury to persons and damage to property (public liability insurance). The contractor will, however, take full responsibility for his/her own personnel and must ensure that his/her subcontractors effected the necessary insurance (FIDIC, 1999a: 53-56).

4.5.2.9 Project procurement management

As was discussed in the previous sections, procurement can be divided into pre-implementation and during the implementation phase. The letter of tender is submitted by the tenderer in which his/her offer is made based on the tender document. The letter of acceptance is the formal acceptance of the offer, signed by the employer. This letter may include any annexed memoranda comprising agreements. Clauses 1.10 and 1.12 deal with the arrangement surrounding copyright and confidentiality (FIDIC, 1999a: 2- 8).

Nominated subcontractors, plant and materials, and workmanship have been discussed under the other management areas and are similar to the other contracts. The programme is just as important for subcontractors and suppliers to supply their services.

4.5.2.10 Project integration management

The appendix to tender forms part of the letter of tender and as mentioned contains the contract variables. Variations are defined as any change to the works as per the instruction approved variations, in line with Clause 13 (variations and adjustments). If there is any ambiguity between the documents the necessary clarification will be given by the engineer. Bringing the document together, Clause 1.5 prioritises the document and ranks the documents as follows (FIDIC, 1999a: 5-6):

- the contract agreement;
- the letter of acceptance;
- the particular conditions;

- the general conditions;
- the specifications;
- the drawings and
- schedules and any other documents forming part of the contract.

Throughout the contract the engineer can find clauses and specifications that may aid him/her in the integration management of the project. One such paragraph can be found in Clause 8.3 pertaining to the programme. This clause states that the contractor is obliged to promptly give notice to the engineer of possible events or circumstances that may adversely affect the project. The engineer in return asks the contractor to submit an estimate and possible repercussion of such event (FIDIC, 1999a: 27).

4.5.2.11 **Safety management**

Clause 1.13 states that the contractor shall abide to the applicable laws and indemnify the employer harmless against and from the consequences of any failure to do so (FIDIC, 1999a: 8). The Construction Regulations 2014, as referred to in Chapter 3, can be seen as regulations and laws that the contractor should abide by. However, in the regulations roles and responsibilities are set out for the parties involved that should be taken into consideration.

Clause 4.8 stipulates that the contractor shall implement the following (FIDIC, 1999a: 15):

- comply with all applicable regulations;
- take care for safety of all persons entitled to be on site;
- reasonably keep the site and works clear of unnecessary obstruction;
- provide fencing, lighting, and guarding of the works until handed over; and
- provide the necessary temporary work.

The guidance notes state that if the site is shared, some of the items listed above may be shared, e.g. safety guards (FIDIC, 1999b: 7).

The contract highlights a few health and safety matters in Clauses 6.4, 6.5 and 6.7. Clause 6.4 highlights labour law applicable to the contractor's personnel and will ensure that his/her employees adhere to all the applicable laws. Clause 6.5 is concerned with working hours and states that no work may take place outside normal working hours except with the necessary permission by the engineer or if it is unavoidable or stated in the contract. Clause 6.7 specifically addresses health and safety and states that the contractor shall take the necessary precautions to maintain health and safety of his/her personnel. He/she will, in collaboration with the local authorities, ensure that medical staff, first aid facilities, sick bay, and ambulance

services are readily available. The contractor shall furthermore appoint an accident prevention officer who will have the authority to issue site instruction on the protection of the site. The contractor shall inform the engineer as soon as an accident occurs and will maintain these records and reports. (FIDIC, 1999a: 22-23).

4.5.2.12 Environmental management

Of the four contracts, the FIDIC Red Book is the only one that clearly mentions the protection of the environment. Clause 4.18 states that the contractor shall protect the environment both on and off site, which is reasonable. The contractor should further limit damage and nuisance to people and property resulting from pollution, noise, as well as other consequence of the works. Emissions, surface discharge, and effluent shall be lower than the applicable laws and/or specifications (FIDIC, 2015: 18).

As with the other contracts, additional requirements may be included in the tender documentation in accordance with Clause 1.4. (FIDIC, 1999a: 5).

4.5.2.13 Claims management

Clause 20.1 indicates that the contractor shall give notice of any entitlement he/she may deem to have for extension of time or additional costs. He/she will submit such notice to the engineer as soon as possible when he/she becomes aware of such occurrence and not later than 28 days. The contractor shall keep the required or deemed necessary documentation on the matter. Within 42 after the contractor became aware of such occurrence the contractor will submit a full and detailed report on the matter. The procedure takes into account that the occurrence can go beyond this time period and asks for continued claims by the contractor until such an occurrence have ceased. The contractor will send a final claim within 28 days after such occurrences have ended. The engineer will approve or disapprove such claim within 42 days after the receipt of the claim with the necessary documentation. The engineer will continue in accordance with Clause 3.5 to determine the extent of the claim and the necessary steps that should be followed (FIDIC, 1999a: 58-59).

The contract stipulates the appointment of a dispute adjudication board (DAB), jointly appointed by the parties. The DAB will by default comprise three people mutually chosen by the three parties involved in the project. The contract allows for amicable settlement and finally the arbitration processes to be followed. The contract however does not refer to litigation, but allows for the applicable law of a specific country as per Clause 1.4 of the contract (FIDIC, 1999a: 60-62).

4.5.3 Conclusion

Of the four contracts, the FIDIC Red Book proved the easiest to divide into the management knowledge areas. It was also the only contract that referred to value engineering. Also, of the four contracts, the contract has remained unchanged for the longest period, with the 1999 revision. This may suggest that the contract have met many of the relevant demands of the market, the past 18 years.

4.6 CHAPTER CONCLUSION

As indicated before, a summary of the comparison above between the management knowledge areas and the different clauses of the investigated contracts are attached as Annexure A.

All the contracts promote early warning of potential delays. The objective of any manager is to ensure that all the parties know exactly what is expected from one another. The main aim should be to do your part well enough to enable other parties to do theirs. Timeous, correct, and understandable flow of information is crucial.

The above review makes it clear that the dynamics of the contract are much more than merely stating: the contractor will supply a completed project by a certain time, to a certain standard, by a certain date or penalties will be applied and that the employer will pay the contractor for work done on a certain date.

Main hypothesis: It is clear that all the contracts considered are conducive to managing the construction process. Arguably some contracts address certain management areas better than others. By understanding the structure of a particular contract, the agent can supplement the documentation to act as a project specific project plan. Experience of the particular contract may be key to addressing management 'gaps' that may occur in one particular contract.

First sub-hypothesis: It is clear that all the contracts address all the management areas regarding time, cost, and quality management. Risk management and the allocation thereof were quite prominent in all the contracts.

Second sub-hypothesis: Each contract sets very clear rules and procedures on most of the project management themes or areas. The challenge is to know about these parameters and to use them during the construction process.

The third sub-hypothesis could not be evaluated against the literature study. It does however indicate that the building contract poses the potential to act as a project management plan. The empirical study further investigates this matter.

Each contract clearly addresses the required management areas to a greater or a lesser degree. A good project manager will be able to plan for the construction process and be able to ensure that the correct specifications are included in the tender documentation and ultimately in the contract. He/she will also be able to monitor the set parameters to monitor the progress, quality, and costs.

CHAPTER 5 EMPIRICAL DATA PRESENTATION, INTERPRETATION AND DISCUSSION

5.1 INTRODUCTION

Considering the preceding literature study, this chapter focuses on a survey that was conducted within the industry. A copy of the questionnaire (survey) is attached as Annexure B. This chapter deals with the methodology of the survey and analyses of the results of the survey by interpreting the data. The questionnaire is divided into two distinct sections. The first deals with the methodology of the survey as well as the demographics and profiles of the respondents; the second with the survey results of the questions relevant to the research methodology and hypothesis. The chapter starts with a short methodology, setting out the goal of the survey and its questions, the method of data collection, and the interpretation thereof.

A quantitative approach was used to collect data by using a questionnaire sent to a selected sample group. For clarity between the meaning of qualitative and quantitative methods of sampling (or data collection), the following:

“If you are collecting data on frequency of occurrence of a phenomenon or variable, you will obtain quantitative data. If you are collecting data on the meaning of phenomena, you will obtain qualitative data. Quantitative data is numerical data while qualitative data is nominal or named data” (Collis & Hussey, 1997: 140).

Care was taken to analyse the data in a transparent and honest fashion. The prevention of the following statement comes to mind: *“if you torture the data long enough, it will confess”* (Coase, 1994: online).

5.2 PURPOSE AND RESEARCH METHODOLOGY

The purpose of the chapter is to analyse the results of the respondents' answers regarding the use of construction contracts in relation to project management. The frequency and opinions of the respondents' answers are used to establish the status quo with regard to the research topic.

The chapter concludes by comparing the empirical collected data against the hypothesis and sub-hypotheses. This sets the stage for an in-depth data analysis in Chapter 6, of both the empirical data collected and literature data.

5.3 EMPIRICAL DATA

5.3.1 Method of analysis of data

Davies (2007: 54-55) notes that during a survey, you will be required to gather a sample that is appropriate to your objectives, that you can recruit in the time available, that you can recruit in the available setting, and that should be as good as you can make it. Specific individuals were identified and targeted during the survey, with the aim to identify knowledgeable individuals, while still being as inclusive as possible. Davies (2007: 57-58) refers to this method of data collection as purposive sampling.

Rated questions are included in the survey and for the purpose of analysis, these questions are evaluated using the following formula (Survey Monkey, [n.d.]: online):

Equation 1: Rated questions

w = weight of ranked position

x = response count for answer choice

$$\frac{X_1W_1 + X_2W_2 + X_3W_3 \dots X_nW_n}{\text{Total}}$$

With regard to questions categorising answers according to percentage groups, these answers are analysed by using the average weight of that group. For example, if the category is between 41% and 60%, the weight of this group would be 0.505 or 50.5%.

5.3.2 Data received

A questionnaire was sent to 110 professionals within the field of architecture, quantity surveying, project management, engineering, contracting, and academics. An initial response rate of 57% was achieved with a total of 64 questionnaires returned. Of these, 48 (44%) were completed in full, 1 (1%) answered more than 90% of the questions and 12 (11%) completed more than 70% of the questions with 3 (3%) completing less than 30% of the questionnaire.

Table 15: Response rate of survey

Completion category	Number	Response rate	Actual response rate
30% complete	3	3%	
70% complete	12	11%	
90% complete	1	1%	1%
Fully complete	48	44%	44%
Total returned questionnaires	64	58%	45%
Total questionnaires circulated	110		

The respondents that completed 70% or less were not considered during the data analysis. This was to ensure that the quality of the data submitted was not compromised. To put it into perspective, 70% equals 19 questions answered, of which 5 questions are outcome based. The result is that these respondents did not answer the control questions within the survey. After exclusion of the incomplete questionnaires, the real response rate was 45%. Where applicable, response rates are indicated to validate the accuracy of the results. Figure 28 illustrates the above findings with the green bars representing the responses considered in the data analysis.

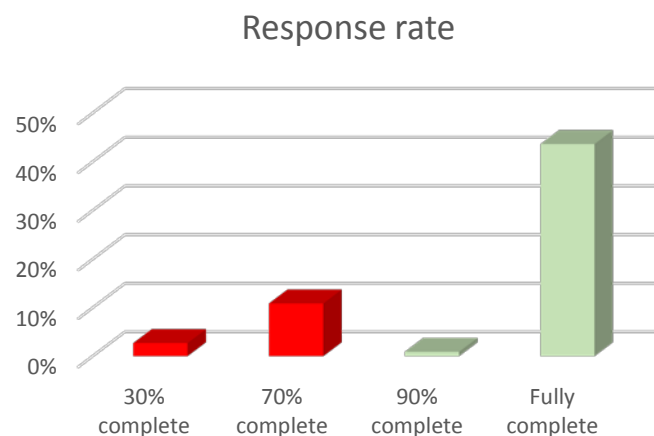


Figure 28: Response rate of respondents

Twenty-seven questions were asked, with the objective of establishing the background, knowledge, and experience of the respondents, before asking specific outcome-based questions. The questions were categorised as follows:

- Questions 1 to 8 established the profile of the respondent e.g. whether he/she is a professional, etc.
- Questions 9 to 14 highlighted the respondents' expertise on construction contracts and the industry.
- Questions 15 to 24 were aimed at establishing the respondent's opinion on the role the construction contract plays towards managing the project.
- Questions 25 to 27 addressed specific open questions to answer the secondary research questions of the research.

5.3.3 Profile of the respondents

Section A of the survey consisted of questions regarding the profile, qualifications, professional registration, and years of experience. Experience and categorisation of the

respondents give an indication of the knowledge and role that the respondents play within the implementation of the construction project. Unfortunately, the two potential clients identified did not respond to the survey. However, ample consultants who act on behalf of the client did respond.

Table 16: Company profile of respondents (stakeholder profile)

Q1: Which of the following best describes your company in the construction industry?		
Answer options	Response per cent	Response count
Contractor	16.7%	8
Consultant	72.9%	35
Employer	0.0%	0
Other (please specify)	10.4%	5
<i>answered question</i>		48
<i>skipped question</i>		0

Table 16 summarises the profiles of the respondents and when considering the literature study, it is indicative of the *stakeholder profiles* of the respondents. Consultants were the largest group at 73% of the total number of respondents. Of the five respondents categorising themselves as 'other', four were academics and one a subcontractor.

Question 2 went further to profile each of the respondents' profession, and identifying the role he/she may play within their organisation. Figure 29 illustrates the relationship between the respondents' stakeholder relationship against their particular profession. It can be seen that most of the respondents are quantity surveyors (50%) with project managers (17%) being the second largest group.

Q2: Which of the following categories best describes your profession?

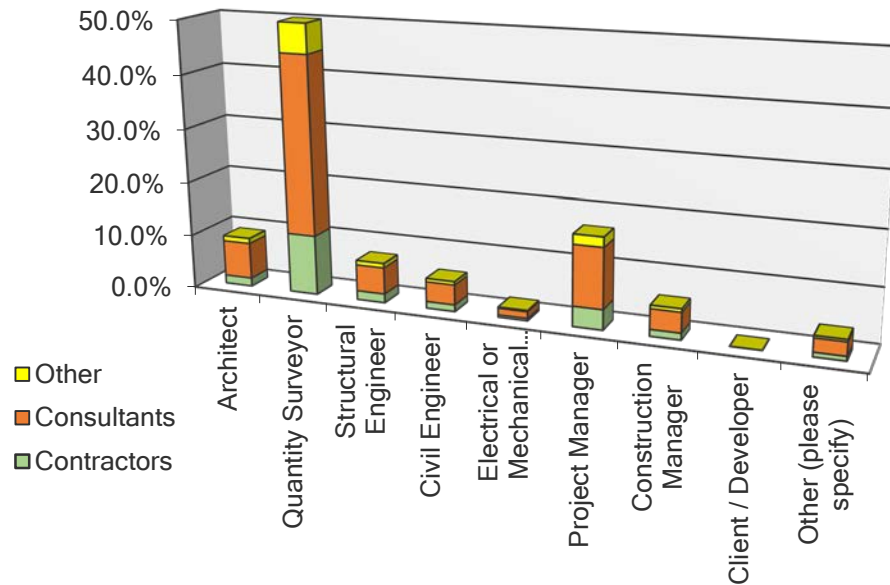


Figure 29: Respondents' professions

Questions 3 and 4 considered the respondent's experience and gender. The results are shown in Table 17 and Figure 30 below. The largest portion of the respondents have more than 25 years of experience, with the general survey pool's experience relatively equally distributed.

Table 17: Years of experience against gender

Q3: Please indicate your years of experience in the profession as highlighted above.				
Answer options	Response per cent	Response count	Male	Female
Less than 5 Years	18.8%	9	14.6%	4.2%
6 - 10 Years	22.9%	11	16.7%	6.3%
11 - 15 Years	14.6%	7	8.3%	6.3%
16 - 20 Years	6.3%	3	6.3%	0.0%
21 - 25 Years	12.5%	6	12.5%	0.0%
More than 25 Years	25.0%	12	22.9%	2.1%
<i>answered question</i>		48		
<i>skipped question</i>		0		

Q4: Please indicate your gender.

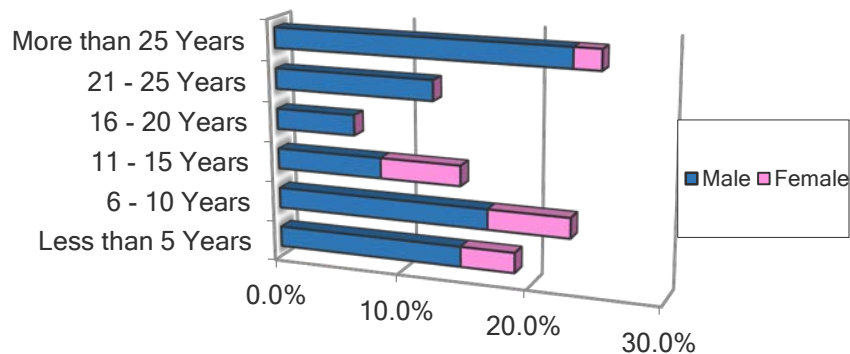


Figure 30: Years of experience against gender

Question 5 asked the nationality of the respondents and only one respondent was a non-South Africa citizen. Questions 6 and 7 were included to establish the expertise of the respondents by rating their education as well their professional registration status. The majority (50%) of the respondents had an honours degree or a NQF level 8 degree. Four respondents indicated that they have a doctoral degree and 41 respondents indicated that they are registered with their respective councils. Some respondents are registered with more than one council (e.g. Council for Quantity Surveying and Project Management). Table 18 and Figure 31 illustrate these results.

Table 18: Level of education and professional affiliation

Q6: Please indicate your highest educational qualification & Q7: Are you registered with a professional statutory council?				
Answer options	Response per cent	Response count	Professional per cent	Professionally registered
Secondary School [NQF Level 4]	0%	0	0%	0
Tertiary institution diploma [NQF Level 6]	4%	2	4%	2
Tertiary institution first degree [NQF Level 7]	17%	8	13%	6
Tertiary institution honours degree [NQF Level 8]	50%	24	46%	22
Tertiary institution master's degree [NQF Level 9]	21%	10	17%	8
PhD [NQF Level 10]	8%	4	6%	3
Other (please specify)	0%	0	0%	0
answered question		48	85%	41
skipped question		0		

Level of education and professional registration

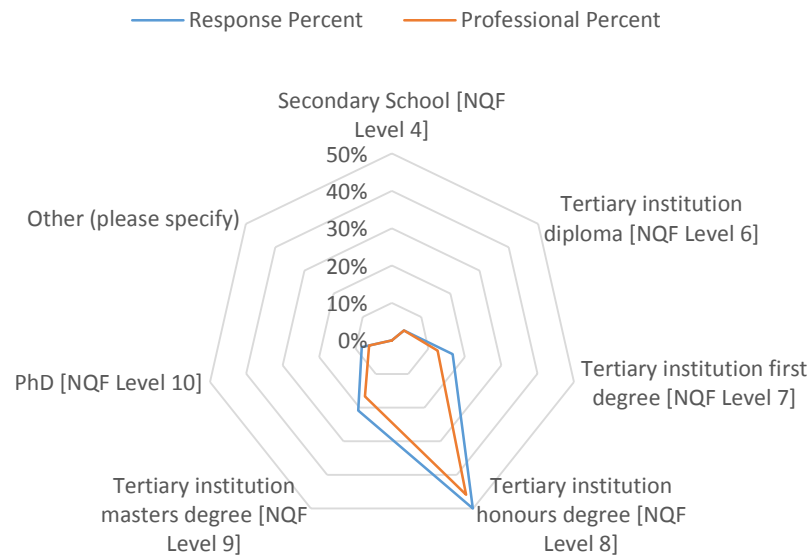


Figure 31: Level of education and professional registration

Question 8 asked whether the respondents were registered voluntarily with any professional body. Thirty-five respondents indicated that they voluntarily belong to a professional body. From the information discussed above, it can be derived that the respondents represent an evenly distributed pool of professionals and stakeholders within the construction industry. The following section establishes the respondents' exposure to actual construction work.

5.3.4 Expertise of the respondents

Most of the respondents had either worked on building contracts and/or civil works. They had also conducted most of their work in the Free State province. Interestingly, specialist work is also rated as high by the respondents and this may be attributed to some being arbitrators and quantity surveyors who are exposed to specialist fields. Figure 32 and Table 19 illustrate these results.

Q9: Please indicate the approximate percentage (%) with regard to the type of construction projects you are mostly involved with.

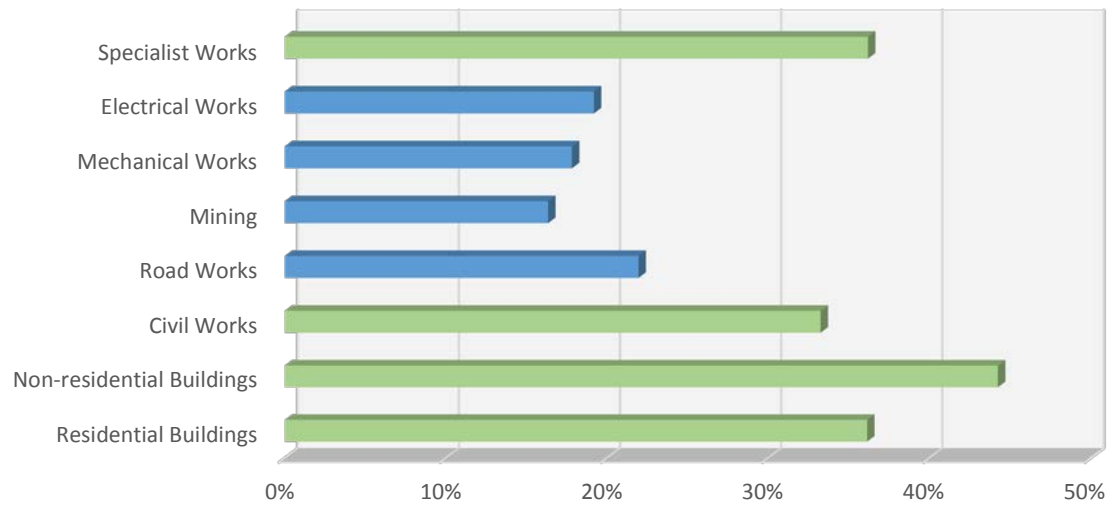


Figure 32: Type of projects/respondents are exposed to

Most of the respondents' expertise lay within the South African border, although some had worked outside the country's borders.

Table 19: Location of the respondents work

Q10: Please indicate the approximate percentage (%) of where your work is located next to the listed location below.									
Answer Options	<10%	10-20%	21-40%	41-60%	61-80%	>80%	N/A	Rated Average	Response Count
Free State	9	2	4	3	1	18	0	55%	37
Eastern Cape	9	1	1	0	0	0	6	5%	17
Western Cape	6	2	3	2	1	1	4	22%	19
Northern Cape	12	5	2	0	0	1	5	11%	25
Kwazulu Natal	6	1	1	1	0	0	6	8%	15
Mpumalanga	6	3	0	0	0	0	8	4%	17
Limpopo	8	2	1	0	1	1	6	14%	19
North West	6	6	0	3	1	0	6	16%	22
Gauteng	6	2	1	1	5	8	8	39%	31
African Countries	11	1	0	1	0	1	5	11%	19
Other International Countries	5	0	0	0	1	0	9	6%	15
<i>answered question</i>									48
<i>skipped question</i>									0

The majority of the respondents' monetary value for their projects is for work less than R 50million, with the rest distributed between the other categories respectively as shown in the radar chart below:

Q11: What is the average monetary value of the projects that you are involved in?

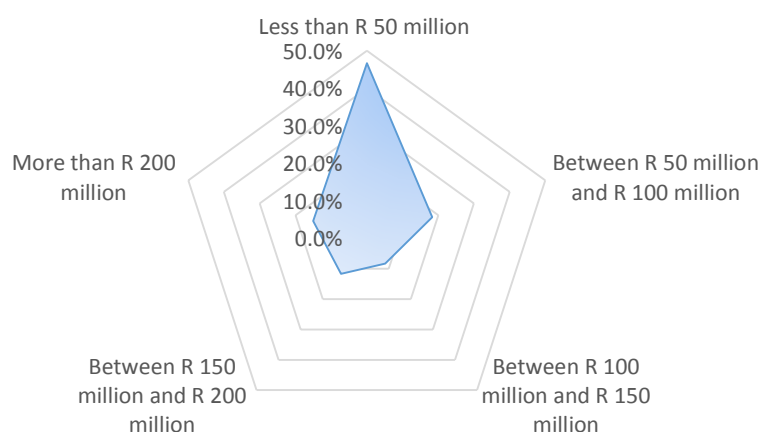


Figure 33: Monetary value of respondents' work

Questions 12 and 13 established that the respondents are mostly exposed to, and comfortable with the JBCC suite of contracts. Figure 34 and Figure 35 illustrate these results.

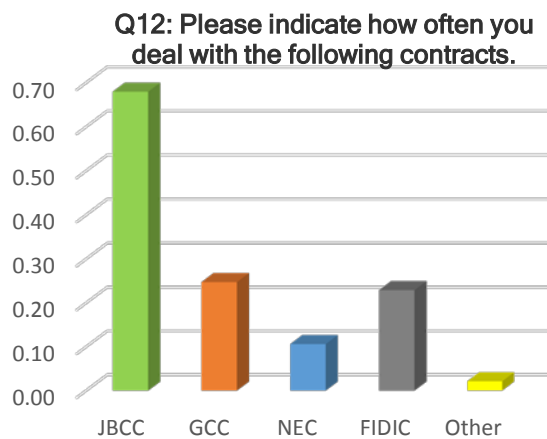


Figure 34: Respondents' exposure to the different contracts

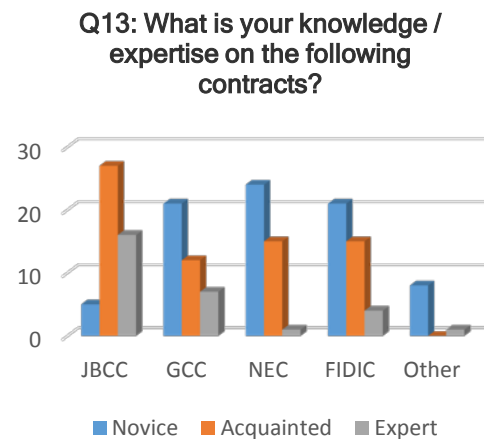


Figure 35: Respondents' knowledge of the different contracts

The last question before the study focused on the outcome-based questions deals with the respondents' exposure to their daily activities surrounding contracts. The majority of the respondents rate contractual matters as part of their daily activities (41% and more of their daily activities).

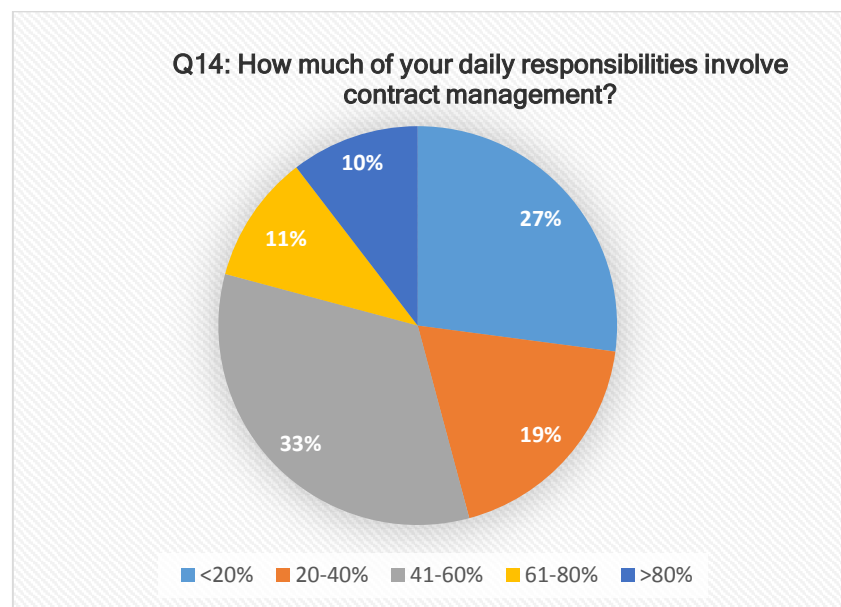


Figure 36: Daily activities involving contractual matters

The respondents' expertise towards contracts seems to be relevant with the majority having ample knowledge of contractual matters. The following section focuses on the outcome-based questions.

5.3.5 Outcome-based questions and data

Questions 15 to 24 are specific outcome-based questions to acquire insight into the use and potential of construction contracts, specifically regarding the management of the construction project. Questions 15 and 16 asked the opinion of the respondents towards the involvement of the agent and contractor regarding the management of the three main knowledge areas on projects, namely time, quality, and cost management. The subsequent questions are interrelated, for instance, Question 19 tried to establish who is responsible for quality, adding the employer as a variable. Through these questions, insight could be gathered on the role of the contract towards controlling the implementation process. towards time, quality and cost. This is significant towards the resource planning of the parties towards site representation. Table 20 and Figure 37 illustrate the findings of involvement of the agent and contractor during construction. The result suggests that the contractor and agent share the daily responsibility towards time, quality and cost. This is significant towards the resource planning of the parties towards site representation.

Table 20: Responsibility of the agent against the contractor

Q15&Q16: In your opinion, how involved should the agent and the contractor be in the daily operation of the construction project		
Answer options	agent	contractor
Time	57%	54%
Quality	59%	55%
Cost	57%	56%
<i>answered question</i>		48
<i>skipped question</i>		0

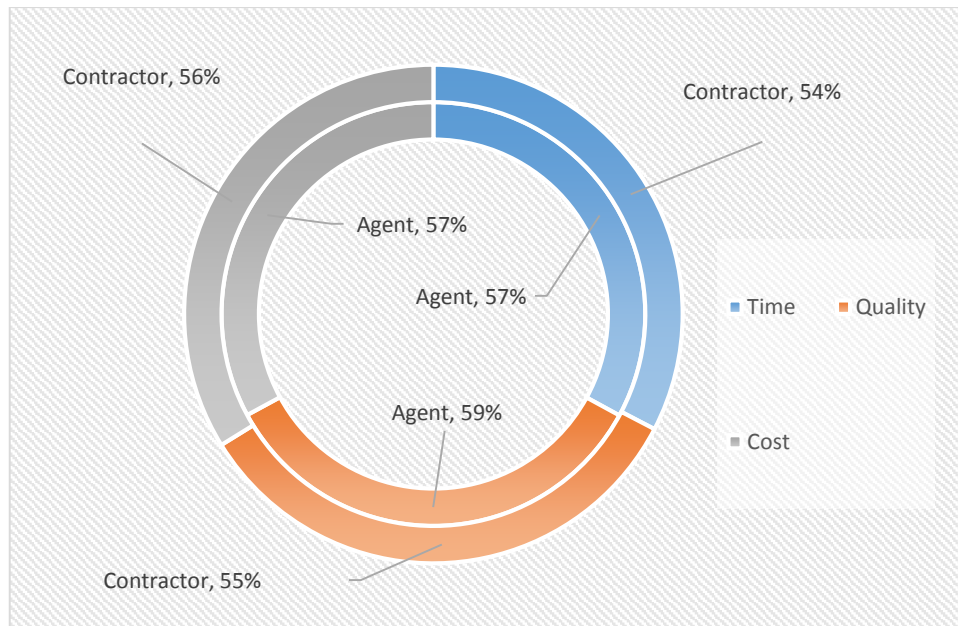


Figure 37: Involvement of the agent against the contractor

Figure 38 shows the response toward the responsibility of quality implementation on the construction site. By comparing Question 19 with Questions 16 and 17, it can be concluded that even though the contractor is mainly responsible for the quality of workmanship on site, he/she requires the support or involvement of the employer through his/her agents.

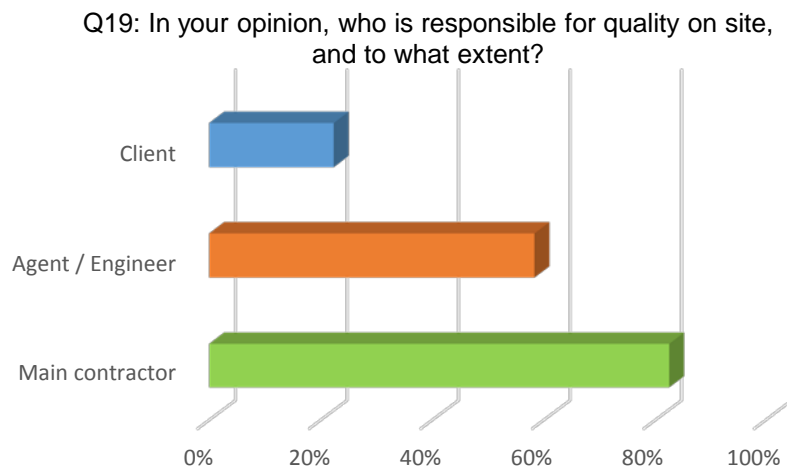


Figure 38: Opinion towards responsibility of quality

Forty-seven of respondents (98%) indicated in Questions 17 that the project can be controlled through the contract (generally used construction contracts). In Question 18 it was asked to what extent, a further 62% of the respondents indicated that 61% and more of the project can be controlled through the contract.

Table 21: Agent's control during the contract

Q18: If answered "Yes" above, please indicate to what extent.		
Answer options	Response per cent	Response count
<20%	4.3%	2
20-40%	6.4%	3
41-60%	27.7%	13
61-80%	40.4%	19
80%	21.3%	10
<i>answered question</i>		47
<i>skipped question</i>		1

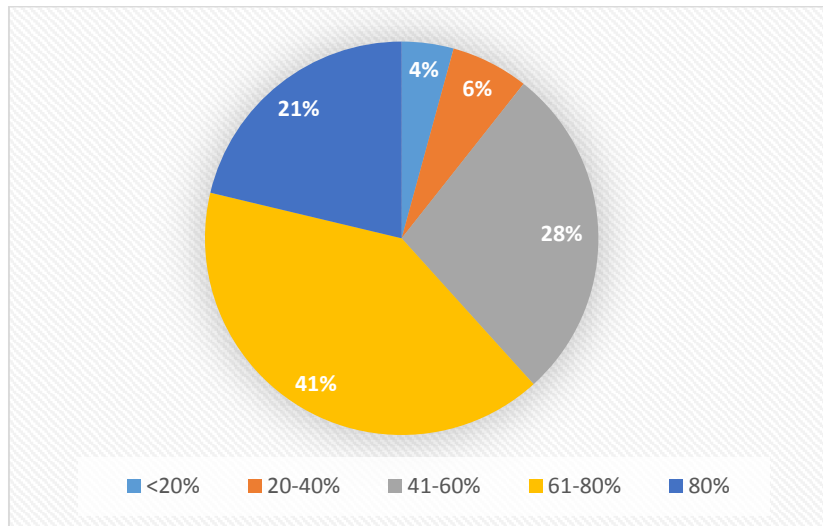


Figure 39: Agent's control during the contract.

Questions 20 to 22 are questions rated from 1 to 5 with 1 the least applicable (strongly disagree or least conducive) and 5 the most applicable (strongly agree or most conducive). Question 20 in particular enquired about the respondents' opinion on the contract's ability to manage the project taking into account the ten knowledge areas of project management and the four knowledge areas a construction management. All the categories were ranked higher than the mean with cost management ranked the most manageable knowledge area through the contract.

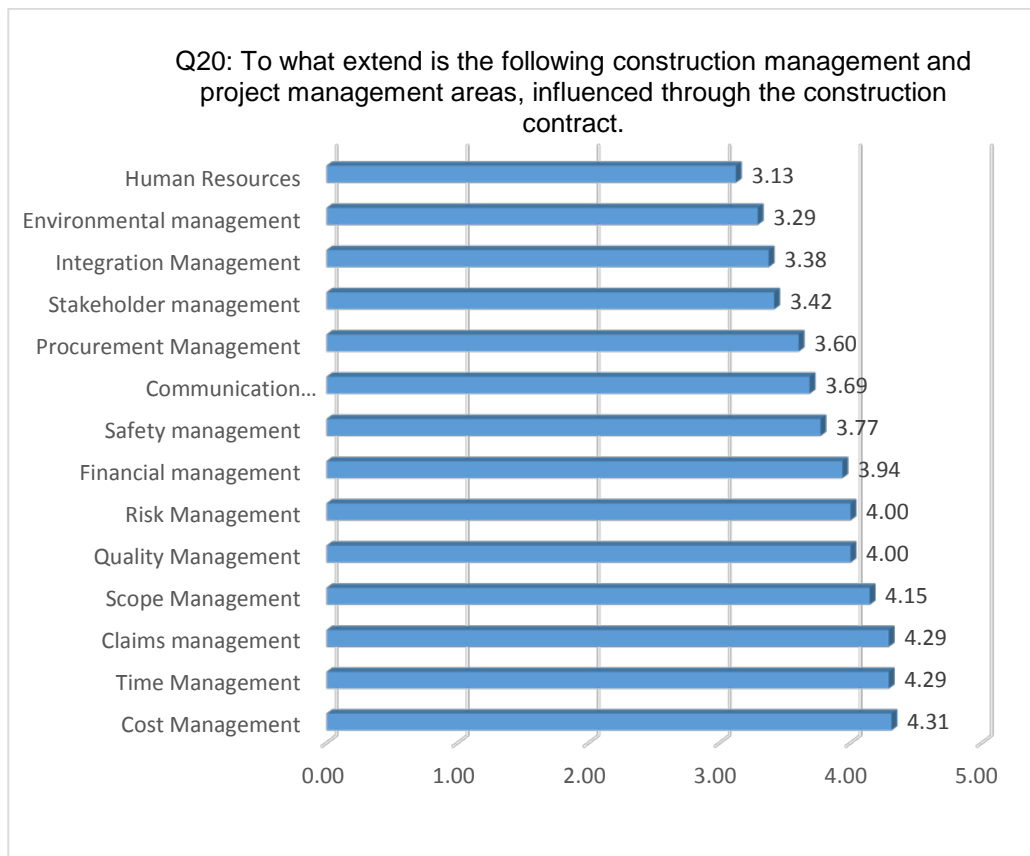


Figure 40: Influence of the contract on the ten knowledge areas

Question 21 makes five specific statements towards the successful implementation of the project of which the respondents had to agree or disagree with. The rating averages are all higher than 4 and thus in agreement with the statements made. Figure 40 lists and illustrates the answers, with the implementation of the standard contract ranked the lowest (4.09).

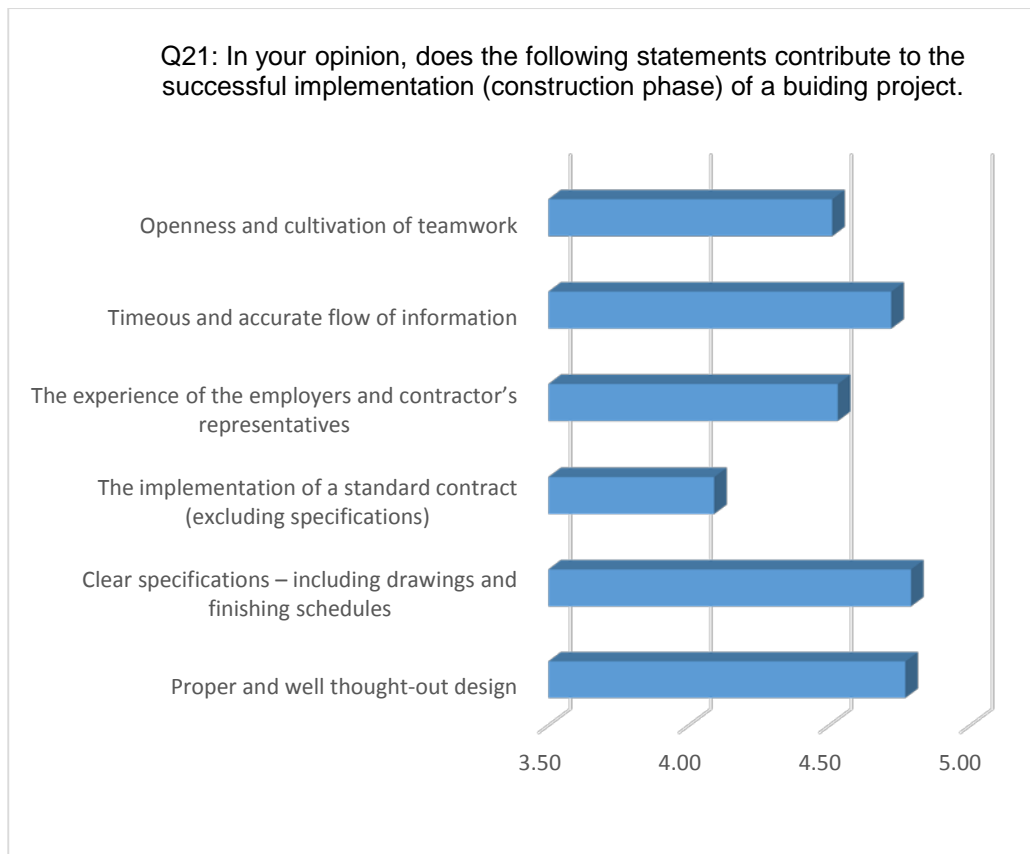


Figure 41: Statements affecting management of projects

The contracts were ranked next by getting the respondents' opinion on the contracts' ability to solve problems during construction. The JBCC suite of contracts was ranked the highest compared to the other contracts. Table 22 and Figure 42 illustrate these findings.

Table 22: Ranked contracts most conducive to problem solving

Answer Options	Rating Average	Response Count
JBCC	4.22	48
GCC	3.55	48
NEC	3.52	48
FIDIC	3.75	48
Other	1.50	45
<i>answered question</i>		48
<i>skipped question</i>		0

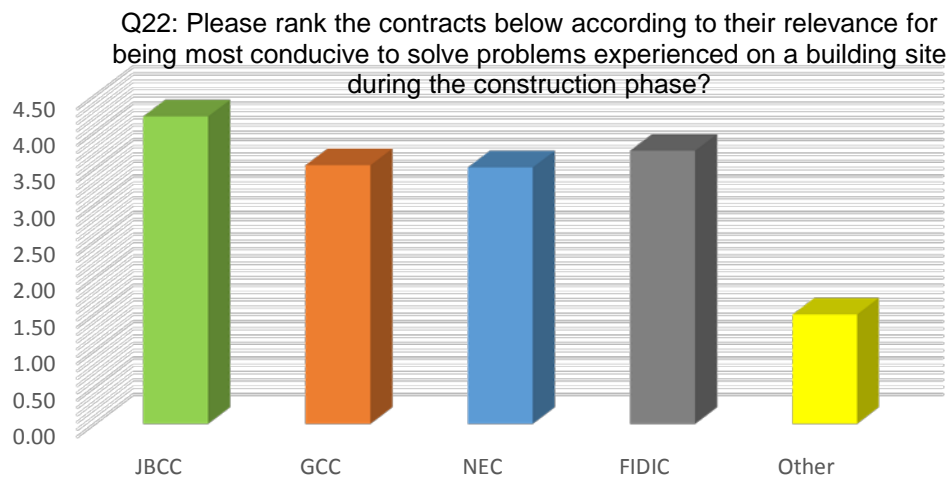


Figure 42: Ranked contracts most conducive to solve problems

Question 23 builds on the above question by asking which contract in the respondents' opinion gives the agent the best opportunity to manage the project. The JBCC enjoyed the highest support with the GCC the lowest. These answers should however not be separated from the backgrounds of the respondents' and their experience or exposure to the applicable contracts. If for example, the research sample had more exposure to the NEC contract, it would have painted a different picture.

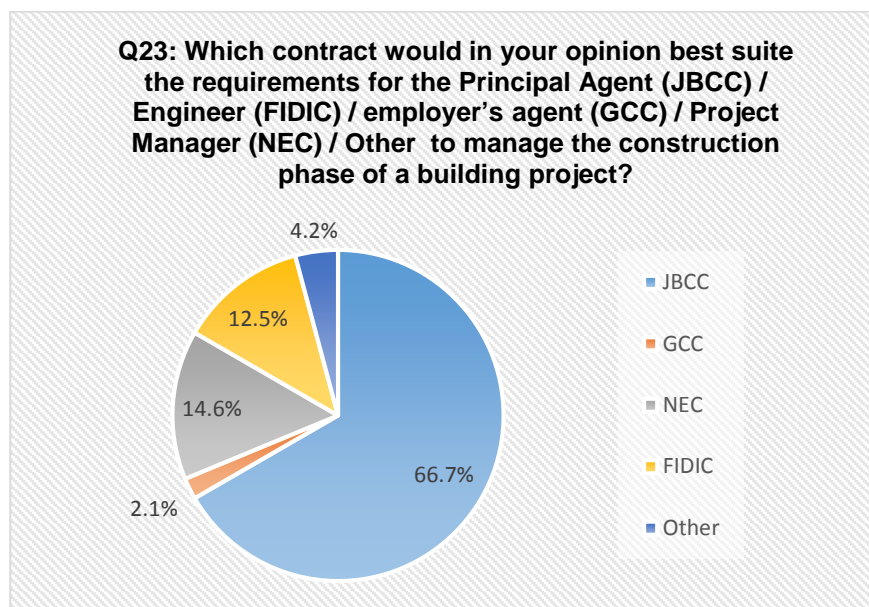


Figure 43: Ranked contract in terms of the agent's ability to manage the project

The last question (Question 24) before the open questions, established that the South African construction industry may adapt to using the contract as a management tool during the construction process. An emphatic majority (96%) indicated that this is the case. The study now enters the final section before the conclusion, which consists of the open ended questions.

5.3.6 Open-ended questions

Questions 25 to 27 were open-ended questions, directly related to the research question and secondary research questions. Some of the respondents did not complete this section of the survey and the table indicates these findings. These three questions are listed as follows:

- In your opinion, what is the leading cause of poor management on a construction site?
- What is perceived to be the main objective of the main building contracts in South Africa?
- What are the potential benefits of managing a construction project through the most commonly used contracts in the South African Built Environment?

To enable the data to be analysed and interpreted, different categories were derived from the answers provided. The answers of the respondents were separated into two groups, with the entire pool of respondents' answers listed in one column and those with more than 25 years of experience listed in a separate column. The column named "All respondents" also includes the respondents with more than 25 years of experience. It was deemed appropriate to quote three of the respondents' answers. These respondents all have more than 25 years' experience, are registered professionals and are leaders in the industry. They have been exposed to contracts throughout South Africa and Africa and have been advising as well as mentoring throughout their careers.

Question 25: The main causes of poor management on a construction site which could be categorised are the lack of experience and the lack of good communication. The consultants were blamed the most, with the contractor not far behind. Unfortunately, the categories could not be linked emphatically to the consultants, the contractor, or the client.

Table 23: Open answers

Q25: In your opinion, what is the leading cause of poor management on a construction site?			
Number	Category	All respondents	More than 25years of experience
1	Consultants	11	7
2	Contractor	9	5
3	Clients	3	1
4	Resource management	4	0
5	Communication	15	0
6	Experience	21	6
7	Excessive Fee discounts	1	1
8	Poor documentation	7	1
9	Accountability	1	0
10	General Project management	6	0
11	Conflicts	1	0
<i>answered question</i>			47
<i>skipped question</i>			1

The following responses by the respondents are highlighted (all from respondents with 25years more experience):

- Respondent 1: “Poor quality of work by contractor/subcontractors and late payments by client and contractor. Needs firm actions by leading consultant which is often not properly handled”
- Respondent 2: “Incompetent PM by consultants and lack of good experienced construction management by contractors.”
- Respondent 3: “Poor design, poor documentation and low skilled staff.”

The survey revealed that the respondents deemed the lack of experience, poor communication and the consultants to be the three main contributors towards poor management on site.

Question 26: From the survey, protection of the parties is perceived to be the main objective of the building contracts. Other categories listed are risk, quality, time, stakeholder, general, scope, and conflict management. Standardised documentation was also mentioned, which assists in improving transparency and ultimately protecting both parties. The answers of Question 26 are illustrated in Table 24.

Table 24: Respondents' list of objectives of the main building contract.

Q26: What is perceived to be the main objective of the main building contracts in South Africa?			
Number	Category	All respondents	More than 25years of experience
1	Protection / fairness	20	8
2	Risk management	5	1
3	Quality management	4	1
4	Cost management	8	1
5	Time management	6	1
6	Management of parties / Stakeholders	5	1
7	General management	4	0
8	Conflict management	1	0
9	Standardised documentation	1	1
10	Scope management	6	1
<i>answered question</i>			46
<i>skipped question</i>			2

The following responses by the respondents are highlighted (all from respondents with 25years more experience):

- Respondent 1: "To provide an equitable distribution of risks and that will recognize and cater for the problems encountered in the local building industry."
- Respondent 2: "To be fair to all parties if applied and managed pro-actively."
- Respondent 3: "Fairness between employer and contractor."

It was revealed that the protection of the parties through transparency and allocation of specific responsibilities is the main objective of the construction contract.

Question 27: The benefits of managing the construction process through the building contract is highlighted in Table 25. Standardisation, cost, quality, and scope management were the main themes highlighted by the respondents.

Table 25: Benefits of managing the construction process during the contract.

Q27: What are the potential benefits of controlling a construction project through the main contracts in the South African Built Environment?			
Number	Category	All respondents	More than 25years of experience
1	Standardised documentation/ fairness/ protection	14	4
2	Accountability	4	2
3	Successful completion	3	0
4	Quality management	11	2
5	Cost management	16	6
6	Time management	9	2
7	Stakeholder management	2	2
8	Scope management	10	4
9	Conflict/claims management	6	2
10	Information management	1	1
11	Communication management	2	1
12	Risk management	1	0
<i>answered question</i>			45
<i>skipped question</i>			3

The following responses by the respondents are highlighted (all from respondents with 25years more experience):

- Respondent 1: “The better the project is controlled by all parties involved the better the changes for a successful project.”
- Respondent 2: “On time and within budget projects.”
- Respondent 3: “Understanding the content, using the form of contract as a dispute avoidance tool.”

It is interesting to note that the main knowledge areas of project and construction management are rearing its head. This gives reassurance that the respondents categorise and think in this manner when they think of the construction process. The following section focuses on the conclusion of the survey information summarised above.

5.4 CHAPTER CONCLUSION

With the empirical data listed in the preceding section, this chapter concludes by summarising the results and interpreting the results through comparison against the literature study. In the first section of the chapter it was established that the respondents have adequate experience and expertise to comment on the research topic. They represent most of the stakeholders found in the construction industry.

Considering the hypothesis, all but one respondent indicated that the project can indeed be managed through the contract. Most of the respondents (62%) indicated that over 61% of the project’s managerial activities can be managed by the contract.

The first sub-hypothesis was supported with time, cost, and quality highlighted specifically by the respondents as important objectives of the contract. However, the overwhelming majority of the respondents indicated that protection and fairness are the main objectives of the construction contract. Claims, risk, quality, cost, time, and scope management were all rated higher than 4 out of 5 as being supportive in the management of the contract.

The second sub-hypothesis could be supported with respondents highlighting most of the project and construction management as being potential guide areas in the implementation of the contract.

The third sub-hypothesis was supported with inexperience of the parties, in particular the consultants and the contractor, highlighted as the leading cause of poor management. Poor communication was also highlighted as a cause to poor management of the construction process.

The indication that a specific contract is more conducive to proper project management on site was not considered relevant to the research. The contractor's ability to manage the project is rather indicative of the respondents' experience.

In conclusion, the empirical data suggests that the main hypothesis is supported. All the knowledge areas are supported by the construction contract, some more than others. In Chapter 6 the literature review together with the empirical study are concluded. The study is evaluated and additional research topics proposed.

CHAPTER 6 CONCLUSION

6.1 INTRODUCTION

The problem statement and the hypothesis, as stated in Chapter 1, are as follows:

Chapter 1 started with an overview of the research topic, which enabled the researcher to formulate the research problem. This research problem was used to identify the research questions to eventually compile the hypothesis to be tested through the literature study and the empirical study.

Chapter 2 started by introducing the history of building contracts, in particular in South Africa. Next, the parties and main types of contracts were identified, and their basic structure was highlighted. The four most commonly used contracts within South Africa were identified, and served as a basis to which the contracts could be compared against project management principles.

Chapter 3 identified the stages of forming and executing a building contract within South Africa. It identified the basic stages as planning, formulation of the contract, and the execution thereof. The procurement process was documented and the structure of such a document highlighted. The chapter then shifted its focus to project and construction management knowledge areas before concluding with a short comparison between the general layouts of contracts against the main identified management areas.

Chapter 4 focused on the four contracts used most often in South Africa with and in-depth identification of the clauses corresponding with the main knowledge areas identified in the previous chapter. The first initial test of the hypothesis could then be made before moving on to the empirical study.

Chapter 5 comprised the empirical survey by means of a questionnaire derived from the literature study. A secondary test of the hypothesis could then be made.

6.2 FINDINGS

6.2.1 Research questions

The main research question was identified as follows:

Does the construction contract and in particular the building contract, equip the employer's agent with the necessary authority to manage the construction processes on site?

From the literature study it could be derived that contracts indeed have a structure that equips the agent with the authority to manage the construction process. The empirical

study supported this and highlighted that the agent is often to blame for the management issues.

The secondary research questions were subsequently identified as follows:

Q2.1 Can the consultant control the building project through the building contract and to what extent?

The literature and empirical study indicated that the agent can control the construction process. It did however highlight some limitation towards the dealings of the contractor, which is clearly specified in the contract documents. Experience and effort are needed to specify, monitor, and keep the contractor to the specifications.

Q2.2 What is perceived to be the main objective of the main building contracts in South Africa?

It was found that respondents deemed fairness and protection of the parties as the main objectives of the contract. The literature study indicated the same, categorising it as risk management.

Q2.3 What is the potential benefits of controlling a construction project through the main contracts in the South African Built Environment?

Standardisation, cost, quality, and scope management were the main themes highlighted by the respondents. From the literature it could be concluded that standardisation is a major benefit to the project.

Q2.4 If not the status quo, would the South African Built Environment adapt the practice of managing the construction project through the application of the main building contracts?

There has been a major drive from government to standardise the procurement and contract documentation. The fact that the CIOB promotes standardised documentation that promotes contracts conducive to project management is evidence that the South African built environment is beginning to move towards this practice. Almost all respondents (96%) indicated that the South African built environment will adopt this practice.

These questions, together with the hypotheses, drove the study through the literature study as well as the empirical study. The next section of this chapter summarises the findings and compares the results against the hypotheses.

6.2.2 Hypotheses

- First hypothesis

The first hypothesis of the study is defined as follows:

Some building contracts equip the employer's agent with the necessary power to control or manage the construction project more effectively than others.

The hypothesis is supported by both the literature and empirical studies. The literature study proved that the four contracts reviewed contain and promote the project management areas. It however noted that each project is different and has different requirements. Each contract reviewed allows for deviation of the contract data to be made to allow for these specific requirements. The procurement methods also play a role in the structure of the contract and cannot be ignored.

The empirical study supported the hypothesis and highlighted that experience is key to the successful implementation of the contract. The consultant and the contractor were highlighted as the parties that contribute the most toward the proper management of the construction project, with emphasis on the consultant that often under estimate his/her role.

- Second hypothesis

The second hypothesis (or the first sub-hypothesis) of the study is defined as follows:

The main objective of any building contract is to serve as an agreed guide to deliver each construction project on time, within budget and to specified standard.

The study supported this hypothesis, emphasising the protection of the parties' interests. The literature study showed that contracts have these three main knowledge areas as specific themes written into the contract, while the empirical study indicated that all three these themes or knowledge areas are rated higher than 4 out of 5, as being objectives of the building contract.

- Third hypothesis

The third hypothesis (or the second sub-hypothesis) of the study is defined as follows:

Certain parameters within a building contract can prompt each party within the contract to deliver certain required responses to assist in the successful completion of the project.

In the literature study it was shown that all four of the contracts most commonly used have clear parameters when it comes to management of the construction process. Three of the four have very particular specifications on the programme and gives the agent ample

power to ensure that the contractor indeed compiles a particular works programme as required. The four identified contracts however allow the agent to compile the procurement document in such a way as to supplement the contract in order to be conducive to teamwork. The empirical study supported this finding.

- Forth hypothesis

The forth hypothesis (or the third sub-hypothesis) of the study is defined as follows:

Most parties within the South African construction industry do not utilise the potential of the standard building contracts.

The literature study hinted that this may be the case, but the empirical study confirmed that experience is key to using the potential of building contracts in the management of the contract.

6.3 RECOMMENDATIONS

6.3.1 General recommendations

Some recommendations that stemmed from the study are:

The compiler of the procurement document and ultimately the contractor should compile the document to act as the project implementation plan (PIP). This PIP is supplemented by the contractor's plan in accordance with the procurement document. It is also recommended that the project manager, engineer, or agent who will ultimately be responsible for the implementation of the project be appointed from the inception stage together with the proposed site representative.

When the design stage is completed, the documentation should be of a high standard and the basic principle of making changes as early as possible should be applied. Requests for information should be 'few and far between', as the saying goes. If the required information is not available at this stage, allowance for the time and effort needed should be made by all parties. Transparency is needed in this instance and the project life cycle kept in mind.

Very clear completion targets (work breakdown structure (WBS)) with a projected cash flow should be prepared by the contractor. The employer's agent should then continually compare the actual progress against the PIP.

The focus of the project should be the project as a whole and some elements of the project or knowledge areas. The parties should play the ball and the players during the project. Transparency is needed and each team member should share their knowledge instead of considering their knowledge as an advantage over the other party.

The employer's agent should take responsibility as project manager on the project. This person should have ample experience to supply the contractor with the necessary information and guidance.

6.3.2 Recommendations for further study

From the research, other subject areas with the potential for further study arose. They include:

- Collaborative and electronic tender methods and the role they can play towards the building of super project teams with common objectives.
- The influences and possibilities of Building Information Modelling (BIM) technology on building contracts and procurement methods.
- Managing the construction project strictly according to the contract and the effect it may have on the relationships between the construction team.
- Alternative incentives or rewards for construction project stakeholders and their effect on project delivery.

6.4 FINAL CONCLUSION

No building project should be done without a contract, be it a verbal agreement with directly appointed labourers or a complex multi-storey building. The nature of building projects is too complex to allow them to be done by a single person. Over the years many different professions have evolved to serve the client and incorporate the available technology of the time. These specialists fulfil the role of a master builder of old, taking soil conditions, structural design, aesthetics, practicalities, resources, health and safety, time and budget, to name but a few, into consideration.

The study showed that the South African Government's aim is to standardise building contracts to ensure that a basic standard is kept. Through this process, four contract suites have been proposed by the CIDB. These contracts have very similar structures to that proposed by the Project Management Body of Knowledge as well as incorporating the basics of the construction management knowledge areas. The study established that the contracts have the potential to be used as a project implementation plan (PIP). It was further established that experience is key to correct interpretation and implementation of the contract or PIP. This knowledge can greatly assist in the development of the project's procurement documentation, which should plan and consider all the project life cycle stages.

The goal of the building contract should be to protect the parties who enter into the agreement. The agreement should be incorporated more into the project implementation

plan and should become the PIP. Parties should be familiar with it and responsibility should be taken towards it. The employer's agent should take responsibility as the project manager on the project and guide the parties through the processes stipulated in the PIP. The project implementation plan or the contract can however only be effectively implemented if the required time, budget, and experience are devoted to its implementation and maintenance.

BIBLIOGRAPHY

Association of Project Managers (APM) Body of Knowledge. 2006. *APM body of knowledge*. 5th edition. High Wycombe, Buckinghamshire: Association for Project Management.

Bale, J. 2010. *CIOB'S professionalism: an inclusive definition of construction management*. [online]. Available from: <<http://www.ciob.org/redefining-construction-management>> [Accessed 30 August 2015]. UK: CIOB.

Baylis, P. 2006. The best project outcome. In: Semolic, B., Kerin, A. & Stare, A. (Eds.). *Proceedings of the 1st ICEC & IPMA Global Congress on Project Management, 5th World Congress on Cost Engineering, Project Management & Quantity Surveying*, April 23-26, 2006, Ljubljana, Slovenia. Document 32.

Bennett, F.L. 2003. *The management of construction: a project life cycle approach*. Oxford, UK: Butterworth-Heinemann.

Bennett, J. & Radosavljevic, M. 2012. *Construction management strategies, a theory of construction management*. Chichester, West Sussex: Wiley-Blackwell.

Binnington, Copeland & Associates (BCA). 2014. *Training, engineering & construction consultants & trainers: contract law training manual*. (CESA-227-11/2014). A Hill International Company.

Binnington, C. 2005. *The NEC, panacea for employers?* [online]. Available from: <<http://www.bca.co.za/article/article-16-the-nec-panacea-for-employers/>> [Accessed 12 December 2015].

Bowen, P.A., Hall, K.A., Edwards, P.J., Pearl, R.G. & Cattell, K.S. 2002. Perceptions of time, cost and quality management on building projects. *The Australian Journal of Construction Economics and Building*, 2(2), pp. 48-56.

Bowles, J.E. & Le Roux, G.K. 1992. *Quantity surveying, an introduction*. 2nd edition. Centrahil: Q.S. Publications.

Bunni, N.G. 2005. *The FIDIC forms of contract*. 3rd edition. Oxford, UK: Blackwell Publishing.

Burke, R. 2003. *Project management, planning & techniques*. 4th edition. Ringwood: R. Burke.

Burke, R. 2010. *Fundamentals of project management*. Ringwood: R. Burke.

Burke, R. 2013. *Project management techniques*. 2nd edition. Ringwood: R. Burke.

Chartered Institute of Building (CIOB). 2016. *Media-Centre*. [online] Available from: <<http://www.ciob.org/media-centre>> [Accessed 16 July 2016].

Clough, R.H., Sears, G.A., Sears, S.K., Segner, R.O. & Rounds, J.L. 2015. *Construction contracting: a practical guide to company management*. 8th edition. Hoboken, NJ: Wiley & Sons.

Coase, R.H. 1994. *Essays on economics and economists: good reads*. [online]. Available from: <<http://www.goodreads.com/quotes/1249307-if-you-torture-the-data-long-enough-it-will-confess>> [Accessed 17 October 2016].

Collis, J. & Hussey, R. 1997. *Business research, a practical guide for undergraduate and postgraduate students*. Hampshire, NY: Palgrave Macmillan.

Construction Industry Development Board (CIDB). 2005a. *Best practice Guideline #C1 Preparing procurement documents*. Pretoria: CIDB. 2nd edition of CIDB document 1009.

Construction Industry Development Board (CIDB). 2005b. *Best practice Guideline #C2 Choosing an appropriate form of contract for engineering and construction works*. Pretoria: CIDB. 2nd edition of CIDB document 1010.

Construction Industry Development Board (CIDB). 2006. *Standardized construction procurement documents for engineering and construction works*. South Africa. Pretoria. August. [online] Available from: <<http://www.cidb.org.za/publications/Documents>> [Accessed 31 July 2015].

Construction Industry Development Board (CIDB). 2009. *Understanding the structure of tender and contract documents*. [online] Available from: <http://www.cidb.org.za/procurement/procurement_toolbox> [Accessed 17 July 2015].

Construction Industry Development Board (CIDB). 2015a. *Standard for uniformity in construction procurement*. South Africa. Pretoria. July. [online] Available from: <<http://www.cidb.org.za/publications/Documents>> [Accessed 16 September 2016].

Construction Industry Development Board (CIDB). 2015b. *CIDB "About us"*. [online] Available from: <<http://www.cidb.org.za/AboutUs/Pages/Legislative-Mandate.aspx>> [Accessed 16 September 2015].

Construction World. 2016. Protecting the rights of building operations. an interview with the Joint Building Contracts Committee's (JBCC) CEO, Mr Uwe Pultz. pp 8-9. September.

Davies, B.D. 2007. *Doing a successful research project: using qualitative or quantitative methods*. Hampshire, NY: Palgrave Macmillan.

Davison, R.P. 2003. *Evaluating contract claims*. Oxford, UK: Blackwell Publishing.

De Beer, A.A., Ferreira, E.J., Hübner, C.P., Jacobs, H., Kritzinger, A.A.C., Labuschagne, M., Le Roux, E.E., Stapelberg, J.E. & Venter, C.H. 1999. *Business management: a practical and interactive approach*. Sandton, SA: Heinemann Higher and Further Education.

Du Plessis, W. 2016. Push boundaries across disciplines. *Construction World*, September, pp. 30-31.

Emmitt, S. & Gorse, C. 2003. *Construction communication*. Oxford, UK: Blackwell Publishing.

Farlex. 2015. *The Free Dictionary*. [online]. Available from <<http://legal-dictionary.thefreedictionary.com/Quasi-Judicial>> [Accessed 06 January 2016].

Federation Internationale des Ingenieurs-Conseils (FIDIC). 2015. [online]. *Official website*. Available from: < <http://fidic.org/about-fidic> > [Accessed 30 December 2015].

Fédération Internationale des Ingénieurs-Conseils's (FIDIC). 1999a. *General conditions of contract for construction works, for building and engineering works designed by the employer*. Geneva: FIDIC.

Fédération Internationale des Ingénieurs-Conseils's (FIDIC). 1999b. *General Conditions of Contract for construction works, for building and engineering works designed by the employer. Guidance for the Preparation of Particular Conditions*. Geneva: FIDIC.

Fédération Internationale des Ingénieurs-Conseils's (FIDIC). 2012. *2011/2012 Annual Report*. Geneva: FIDIC.

Finsen, E. 2005. *The building contract, a commentary on the JBCC agreement*. Cape Town, SA: Juta & Co Ltd.

Gould, N. 2004. *Dispute resolution in the construction industry: an overview*. *Construction Law Seminar September 2004*. Fenwick Elliott LLP.

Gould, N., King, C. & Britton, P. 2010. *Mediating construction disputes: an evaluation of existing practice*. London: King's College Centre of Construction & Dispute Resolution).

Greenhalgh, B. & Squires, G. 2011. *Introduction to building procurement*. Abington, UK: Spon Press.

Hugo, W.M.J., Badenhorst-Weiss, J.A. & Van Rooyen, D.C. 2005. *Purchasing and supply management*. 4th edition. Pretoria, SA: Van Schaik.

Joint Building Contracts Committee (JBCC). 2013. *The JBCC Principal Building Agreement and Nominated / Selected Subcontract Agreement Edition 6.0 August 2012: Notes*. JBCC Seminar 06 June 2013. Bloemfontein.

Joint Building Contracts Committee (JBCC). 2014a. *Guide to completion, valuation certification and payment, Edition 6.1*. South Africa. March.

Joint Building Contracts Committee (JBCC). 2014b. *The JBCC Principal Building Agreement Edition 6.1*. South Africa. March.

Joint Building Contracts Committee (JBCC). 2014c. *The JBCC Principal Building Agreement Edition 6.1 - Contract Data*. South Africa. March.

Joint Building Contracts Committee (JBCC). 2015. *JBCC documents quick guide*. [online]. Available from: <<http://www.jbcc.co.za/?page=quickguide>> [Accessed 31 December 2015].

Knipe, A., Van Der Walddt, G., Van Niekerk, D., Burger, D. & Nell, K. 2002. *Project management for success*. Sandown, SA: Heinemann.

Lester, A. 2013. *Project management, planning and control: managing engineering, construction and manufacturing projects to PMI, APM and BSI standards*. 6th edition. Oxford, UK: Butterworth-Heinemann.

Loots, P.C. 1995. *Construction law and related issues*. Kenwyn, SA: Juta & Co Ltd.

Malherbe, G. De C. & Lipshitz, M. 1979. *Malherbe and Lipshitz on building contracts*. Berne Convention. The Building Industry Federation. South Africa.

Maritz, M.J. & Siglé H.M. 2010. *Quantity surveying in South Africa*. [Pretoria], SA: Construction Economics Associates (Pty) Ltd.

McKenzie, H.S. 2009. *McKenzie's law of building and engineering contracts and arbitration*. Kenwyn, SA: Juta & Co Ltd.

McKenzie, H.S. 2014. *McKenzie's law of building and engineering contracts and arbitration*. Kenwyn, SA: Juta & Co Ltd.

Nagel, C.J., Boraine, A., De Villiers, W.P., Jacobs, L., Lombard, Löt, D.J., Prozesky-Kuschke, B., Roestoff, M., Van Eck, B.P.S. & Van Jaarsveld, S.R. 2000. *Besigheidsreg*. 3^{de} uitgawe. Durban, SA: Butterworths.

National Home Builders Registration Council (NHBC). 2016. *Files* [online] Available from: <<http://www.nhbrc.org.za/files>> [Accessed 23 September 2016].

New Engineering Contract (NEC). 2015. *Official website*. [online]. Available from: <<https://www.neccontract.com/>> [Accessed 30 December 2015].

New Engineering Contract 3 (NEC3-ECC). 2013a. *Engineering and construction contract*. London : NEC.

New Engineering Contract 3 (NEC3-GN). 2013b. *Engineering and construction contract. Guidance notes and flow charts*. London: NEC.

Othman, A.A.E. & Harinarain, N. 2009. Managing risks associated with the JBCC (Principal building agreement) from the South African contractor's perspective. *Acta Structilia*, 16(1), June, pp. 83-119.

Project Management Institute (PMI). 2000. *A guide to the project management body of knowledge (PMBOK guide)*. 4th edition. Newton Square, PA: Project Management Institute.

Project Management Institute (PMI). 2008. *A guide to the project management body of knowledge (PMBOK guide)*. 4th edition. Newton Square, PA: Project Management Institute.

Putlitz, U. 2013. *Joint Building Contracts Committee (JBCC) seminar*. Oliewenhuis, Bloemfontein.

South African Council for the Quantity Surveying Profession (SACQSP). 2014. *Registration policy and guide to the APC*. Midrand, South Africa.

South Africa. 2000a. *Architectural Profession Act No 44 of 2000*. Government Gazette No 21755, 01 December. Cape Town: Government Printer.

South Africa. 2000b. *Construction Industry Development Board Act No 38, 2000*. Government Gazette No 21819, 17 November. Cape Town: Government Printer.

South Africa. 2000c. *Engineering Profession Act No 46 of 2000*. Government Gazette No 21821, 01 December. Cape Town: Government Printer.

South Africa. 2000d. *Project and Construction Management Professions Act No. 48 of 2000*. Government Gazette No 21823, 01 December. Cape Town: Government Printer.

South Africa. 2000e. *Quantity Surveying Professions Act No 49, 2000*. Government Gazette No 21824, 01 December. Cape Town: Government Printer.

South Africa. 2014a. *Construction Regulations 2014*. Government Gazette No 37305, 07 February. Pretoria: Government Printer.

South Africa. Department Environmental Affairs. 2016. *Official website*. [online]. Available from: <<https://www.environment.gov.za/legislation/guidelines>> [Accessed 24 July 2016].

South African Bureau of Standards (SABS). 2003. *South African National Standard (SANS) 10403:2003 formatting and compilation of construction procurement documents, Edition 1*. Pretoria: SABS Standards Division.

South African Bureau of Standards (SABS). 2004. *South African National Standard (SANS) 294 Guide for construction procurement processes, methods and procedures, Edition 1*. Pretoria: SABS Standards Division.

South African Institution of Civil Engineering (SAICE). 2010. *General conditions of contract for construction works*. South Africa: SAICE (Print 3.1).

South African Institution of Civil Engineering (SAICE). 2015. *Official website*. [online]. Available from: <<http://saice.org.za/book-store/general-conditions-of-contract-for-construction-works-3rd-edition-2015>> [Accessed 30 December 2015].

South African Institution of Civil Engineering (SAICE). 2015. *General conditions of contract for construction works*. South Africa: SAICE.

Survey Monkey, [n.d]. *Ranking questions*. [online]. Available from: <http://help.surveymonkey.com/articles/en_US/kb/How-do-I-create-a-Ranking-type-question> [Accessed 23 October 2106].

The Association of South African Quantity Surveyors (ASAQs). 2013. *Preliminaries for use with the 2013 edition of the JBCC agreements (PBA and NSSA Edition 6.0, MWA Edition 5.0)*. South Africa. September.

The Free Dictionary. 2015. *Legal dictionary*. Available from: <<http://legal-dictionary.thefreedictionary.com/quantum+meruit>> [Accessed 29 August 2015].

The South African Council for the Project and Construction Management Professions (SACPCMP). 2008. *Registration rules for professional construction mentors in terms of Section 18(1) (c) of the Act, 2000 (Act No. 48 of 2000)*. [online]. Available from: <<http://www.sacpcmp.org.za/downloads/83-policy>> [Accessed 30 August 2015].

Van der Merwe, S., Van Huyssteen, L.F., Reinecke, M.F.B., Lubbe, G.F. & Lotz, J.G. 1993. *Contract, general principles*. Kenwyn, SA: Juta & Co Ltd.

Van der Waltd, G. & Knipe, A. 1998. *Project management for strategic change and upliftment*. Johannesburg, SA: International Thomson Publishing (Southern Africa) (Pty) Ltd.

Van der Waltd, G. & Fox, W. 2015. *A guide to project management*. 2nd edition. Cape Town, SA: Juta and Company.

Verster, J.J.P. 2006. Managing cost, contracts, communication and claims: a quantity surveying perspective on future opportunities. In: Semolic, B., Kerin, A. & Stare, A. (Eds.). *Proceedings of the 1st ICEC & IPMA Global congress on project management, 5th World congress on cost engineering, project management & quantity surveying*, Ljubljana 23 – 26 April 2006. Slovenia: ZMP.

Zack, J.G. 2004. *Project management in crisis*. International Cost Engineering Council (ICEC) 4th World Congress. Cape Town 17-21 April 2004. South Africa: ICEC. [online] Available from: <<http://www.icoste.org/news/icmj-2/>> [Accessed 06 September 2015].

Zulch, B.G. 2012. *The construction project manager as communicator in the property development and construction industries*. Thesis (PhD). Bloemfontein: University of the Free State.

ANNEXURE A: SUMMARY OF PMBOK AREAS AGAINST CONTRACT CLAUSES

NEC			
Number	Project management	Clauses highlighted	Supplementary documentation needed
1	Stakeholder Management	Clauses 1, 25, 27, X4, X12 & Z.	The document does address stakeholder management
2	Scope Management	Clauses 1, 9, 15, 16, 18, 11.2, X2, X5 & Z	The entire document is conducive to scope management
3	Time Management	Clauses 1, 30, X6, X7, X17, X20 & Z	The contract dedicates an entire Core Clause to time with many Option Clauses providing for acceleration of the contract.
4	Cost Management	Clauses 1, 5, 6, X1, X3, X16, A, B, C, D, E, F & Z.	These basic clauses are read in conjunction with the main Option Clauses, each with its own payment mechanism.
5	Quality Management	Clauses 1, 4, X15, X17 & 17	Supplementary documentation, specific to the contract document should be provided.
6	Resources Management	Clauses 1, 7, 11, 24, Z	The contract has little control over the day to day arrangements of the contractor. It does however allow the standard and appointment contractor and items such as H&S, plant and materials and the appointment of a computable foreman.
7	Communication Management	Clauses 1, 13	Although only clause 13 gives specific mention of communication, it is found throughout the document.
8	Risk Management	Clauses 1, 16, 17, 18, 19, X4, X13, X14, X16, X18 & Z	The contracts is conducive to spread the risks between the parties and tries to prevent rise to risk items through a early warning system.
9	Procurement Management	Clauses 1, 26, 23, Z	Active Procurement Management is limited to the processes before the implementation phase of the project life cycle except through the methods mentioned above.
10	Integration Management	No specific clauses	No specific clauses highlights project integration, however many clauses can assist in integrating the management areas.
Construction Management			
11	Safety management	Clauses 1, 27.4	No specific allowance in document - Supplementary H&S documentation is needed.
12	Environmental management	No clause	No specific allowance in document - Supplementary H&S documentation is needed.
13	Financial management	Refer to item 4 above	
14	Claims management	Clauses 1, 6, 11, 16, 19 & W clauses	Contract allows for claims management and promotes claim prevention

JBCC			
Number	Project management	Clauses highlighted	Supplementary documentation needed
1	Stakeholder Management	Clauses 1, 10.1.2, 4, 6, 9 & 12 to 17 dealing with execution of work.	No specific clauses deals with the management area, but it is dealt with throughout the document.
2	Scope Management	Clause 1, 3.1, 5.1, 7, 12, 13 & 17.	Supplementary documentation is needed.
3	Time Management	Some specific clauses include: 1, 12, 24 & 25.	On page two of the contract the clauses are listed against the time period, the action by which party and the purpose of each action is compared.
4	Cost Management	Clauses 1, 8, 9, 10, 11, 12 to 17 dealing with execution of work, 24, 25 & 26.	Again, many clauses throughout the document includes clauses pertaining to cost management, with clause 24-26, more specific towards payments etc.
5	Quality Management	Clauses 1, 7, 12, 14, 16 & 18 to 22 which deals with completion.	Quality is interwoven in many of the clauses contained in the contract and goes hand in hand with Scope Management.
6	Resources Management	Clauses 1, 12 to 17.	Mostly defined within the execution section of the document.
7	Communication Management	Clauses 1, 17.5, 2.5, 5.5.	Communication arrangements are summarise in page two of the document. Also, communication is stipulated throughout the contract and only some of the applicable clauses are highlighted.
8	Risk Management	Clauses 1, 8 to 11.	An entire section of the document is dedicated to risks and supplemented with other clauses throughout.
9	Procurement Management	Clauses 1, 12, 17, 14, 15 & 16.	The most powerful procurement management tool available to the employer is the procurement and appointment of a competent contractor.
10	Integration Management	Clauses 1, 12 & 17	Throughout the contract such obligation is given to the principal agent who shall on behalf of the employer and other agents ensure that the contractor is provided with the required information timeously
Construction Management			
11	Safety management	No specific clauses	The contract does not explicitly address safety management and only through the Preliminaries.
12	Environmental management	No specific clauses	Additional documentation is needed.
13	Financial management	Refer to item 4 above	
14	Claims management	Clauses 1, 23, 25, 26 & 27.	Procedures are given, with an impartial Agent appointed. Prevention of disputes are possible, but not explicitly put on paper.

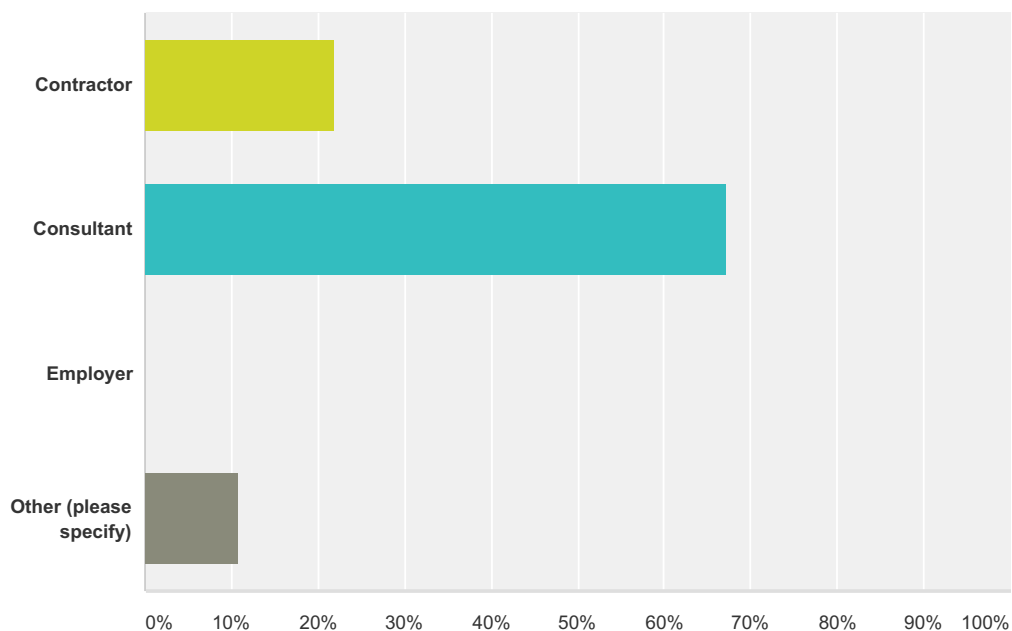
GCC			
Number	Project management	Clauses highlighted	Supplementary documentation needed
1	Stakeholder Management	Clause 1, 2.5, 3.1.1, 3.2.1, 8.4.	Arrangement between the contracting parties is given at the beginning of the document.
2	Scope Management	Clauses 1, 2.1.2, 2.1.3, 2.3, 2.4, 4.1.1, 4.2.1, 4.5.1, 4.5.4, 9 & 6.4.	The Scope of Works is defined as the document that specifies and describes the Works which are to be provided, and any other requirements and constraints relating to the manner in which the work is to be carried out.
3	Time Management	Clauses 1,5	The contract devotes an entire clause to time and related matters. It is however not limited to this clause. Throughout the document time is allocated and discussed.
4	Cost Management	Clauses 1, 4.5.4, 4.8.2 & 6	An entire clause is dedicated to payments and costs, supplemented by the rest of the document.
5	Quality Management	Clauses 1, 3.3.3.2, 4.1.2, 4.11, 7	An entire clause is dedicated to quality, supplemented by the rest of the document.
6	Resources Management	Clauses 1, 3.3.6, 4.3.2, 4.8.1, 4.9, 4.10, 4.11, 4.12.	Most of the responsibility is given to the contractor.
7	Communication Management	Clauses 1, 2.1.2, 2.2 & 6.3.2	Throughout the Contract, communication is highlighted, with no specific clause dedicated to it.
8	Risk Management	Clauses 1, 4.7 & 8.	An entire clause is devoted to the risk management with other clauses acting as supplementary clauses.
9	Procurement Management	Clause 1, 2.1.1, 4.4, 4.6 & 5.6.	The most powerful way of procurement is through the appointment of the contractor and subcontractors. Supplementary documentation is needed.
10	Integration Management	Clause 1, 2.2.	Through-out the contract Integration management promoting clauses are found.
Construction Management			
11	Safety management	Clauses 1, 3.2.4, 5.8, 8.4 & 8.5.	Some reference is made to particular H&S matters, but supplementary documentation is needed.
12	Environmental management	No Particular clauses	No specific clauses is mentioned only through legislation. Additional specifications is needed.
13	Financial management	Refer to item 4 above	
14	Claims management	Clause 1, 10	An entire clause is devoted to the claims with other clauses acting as supplementary clauses.

FIDIC			
Number	Project management	Applicable clauses	Supplementary documentation needed
1	Stakeholder Management	Clauses 1, 2, 3, 4, 5 & 6.	Contractual arrangements is given, supplementary documentation may be added.
2	Scope Management	Clauses 1, 13, 15 & 16.	Scope management is interwoven with the entire document. Supplementary documentation is needed in the form of Conditions of Contract.
3	Time Management	Clauses 1, 8, 10, 11.	The contract is very specific about the requirements of the programme that should be provided by the contractor.
4	Cost Management	Clauses 1, 12, 13 & 14	The contract sets out budget, payment variation arrangements with applicable time clauses. It is supplemented with additional clauses that touch on the matter.
5	Quality Management	Clauses 1, 7, 9, 10 & 11	The responsibility lies with the contractor with specific arrangement surrounding testing commissioning and taking over given by the contract.
6	Resources Management	Clauses 1, 4.3, 3.2, 6, 7, 13.	The responsibility lies with the contractor. The contract does give the employer good management capability by setting standards towards, plant materials subcontractors etc.
7	Communication Management	Clauses 1.2, 1.3 & 1.8	The contract specifies the general arrangement and obligation in the first clause of the document, but is supplemented by the rest of the document.
8	Risk Management	Clauses 1, 4.24, 15, 16, 17 & 18	A specific clause dedicated to risks and supported by four other clauses pertaining to risk items.
9	Procurement Management	No specific clauses.	Active procurement management is limited to the appointment of the contractor, sub consultants and specification of the material, plant etc.
10	Integration Management	No specific clauses.	No specific clause pertains to integration management and is addressed by the preceding clauses.
Construction Management			
11	Safety management	Clauses 1, 4.8, 6.4 to 6.7.	The applicable law will prevail, but certain minimum standards are set in the contract. Supplementary documentation would be needed.
12	Environmental management	Clause 1, 4.18	The applicable law will prevail, but certain minimum standards are set in the contract. Supplementary documentation would be needed.
13	Financial management	Refer to item 4 above	
14	Claims management	Clause 1, 20	A dedicated clause is provided with the opportunity to make minor amendments in the Contract Conditions.

ANNEXURE B: SURVEY QUESTIONS AND DATA

Q1 Which of the following best describes your company in the construction industry?

Answered: 64 Skipped: 0

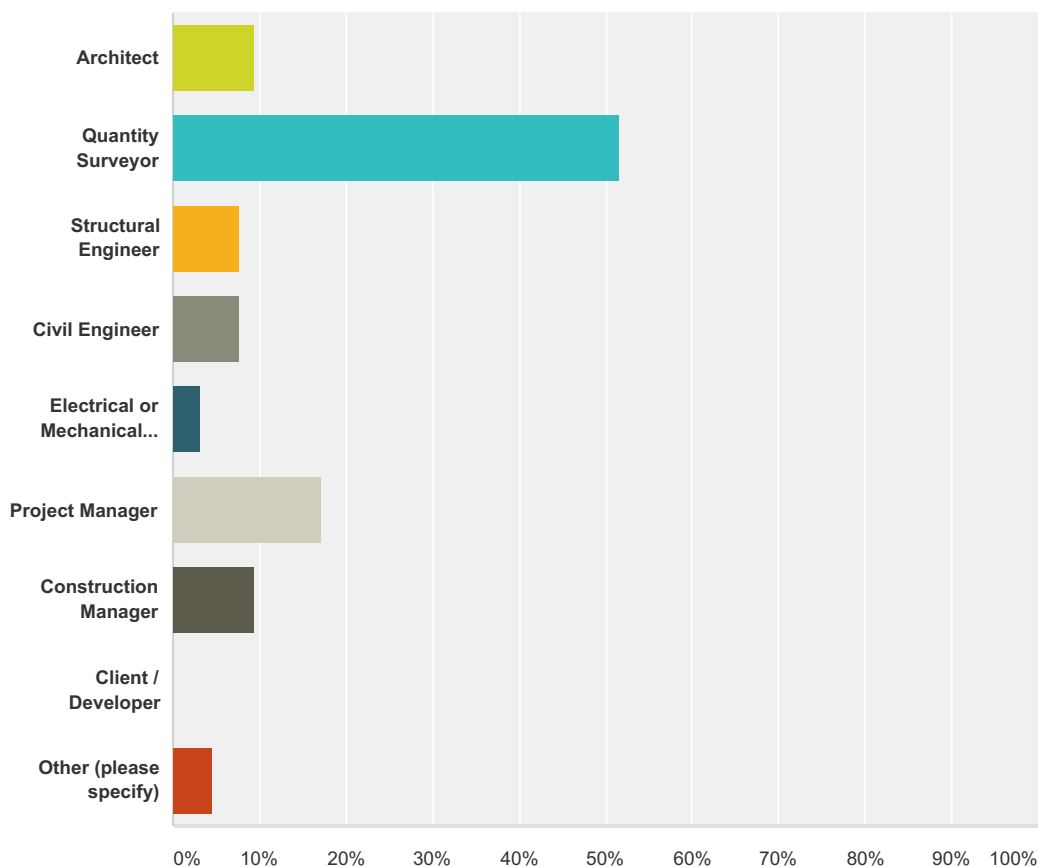


Answer Choices	Responses
Contractor	21.88% 14
Consultant	67.19% 43
Employer	0.00% 0
Other (please specify)	10.94% 7
Total	64

#	Other (please specify)	Date
1	Academia	9/15/2016 9:06 AM
2	Adjudicator	9/14/2016 10:30 PM
3	Tertiary institution	9/14/2016 6:47 PM
4	UFS	9/14/2016 12:13 PM
5	Academic	9/13/2016 9:27 AM
6	Sub-Contractor	9/12/2016 3:43 PM
7	Academic	9/9/2016 9:12 PM

Q2 Which of the following categories best describes your profession?

Answered: 64 Skipped: 0

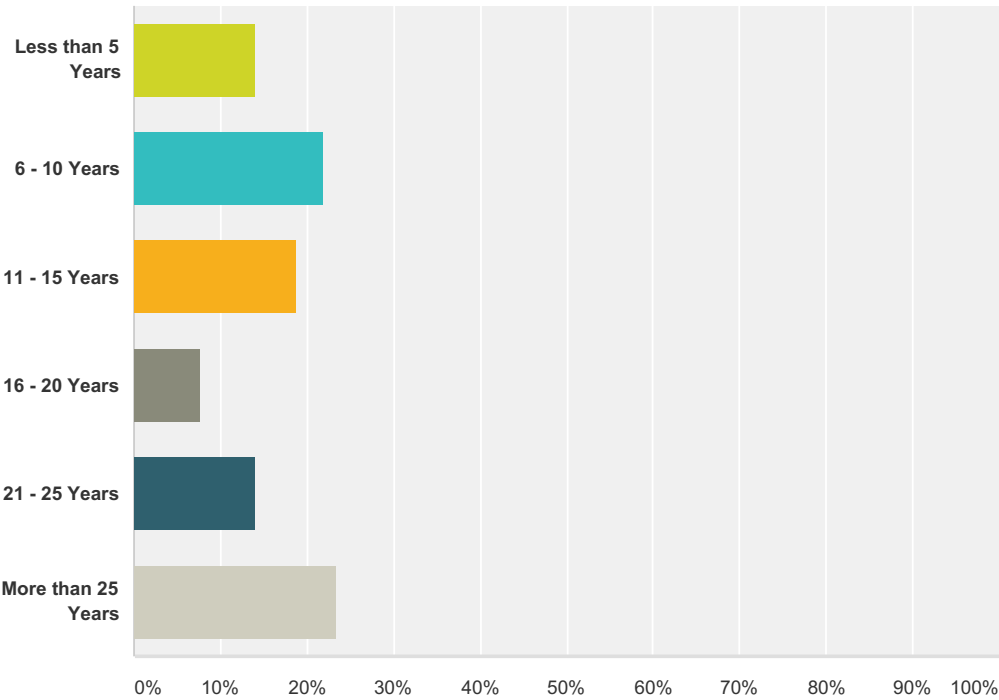


Answer Choices	Responses
Architect	9.38% 6
Quantity Surveyor	51.56% 33
Structural Engineer	7.81% 5
Civil Engineer	7.81% 5
Electrical or Mechanical Engineer	3.13% 2
Project Manager	17.19% 11
Construction Manager	9.38% 6
Client / Developer	0.00% 0
Other (please specify)	4.69% 3
Total Respondents: 64	

#	Other (please specify)	Date
1	dispute consultants	9/21/2016 2:31 PM
2	N/A	9/16/2016 9:27 AM
3	Lecturer	9/14/2016 12:13 PM

Q3 Please indicate your years of experience in the profession as highlighted above.

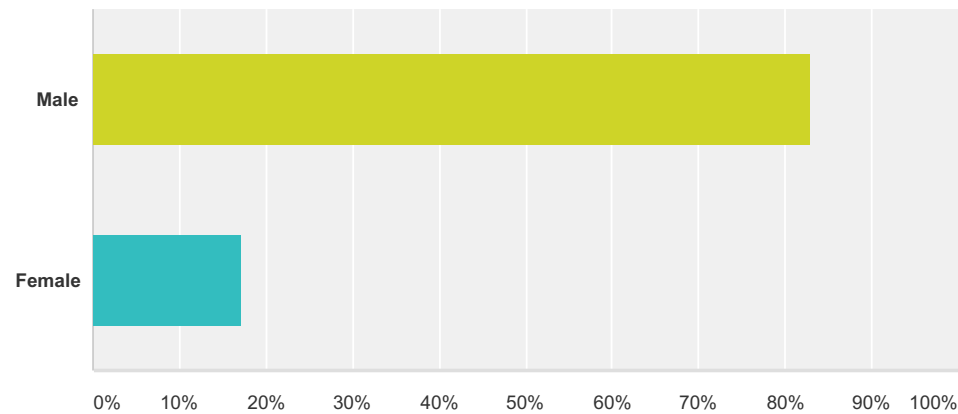
Answered: 64 Skipped: 0



Answer Choices	Responses
Less than 5 Years	14.06%9
6 - 10 Years	21.88%14
11 - 15 Years	18.75%12
16 - 20 Years	7.81%5
21 - 25 Years	14.06%9
More than 25 Years	23.44%15
Total	64

Q4 Please indicate your gender.

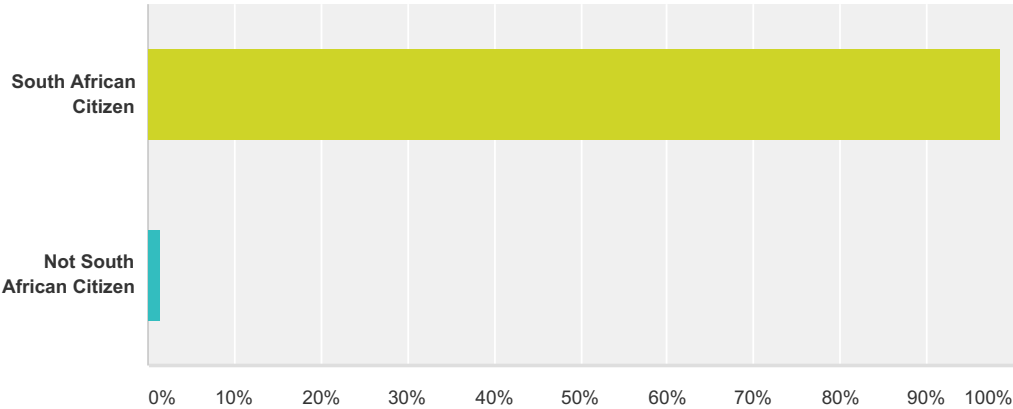
Answered: 64 Skipped: 0



Answer Choices	Responses	
Male	82.81%	53
Female	17.19%	11
Total		64

Q5 Please indicate your Nationality.

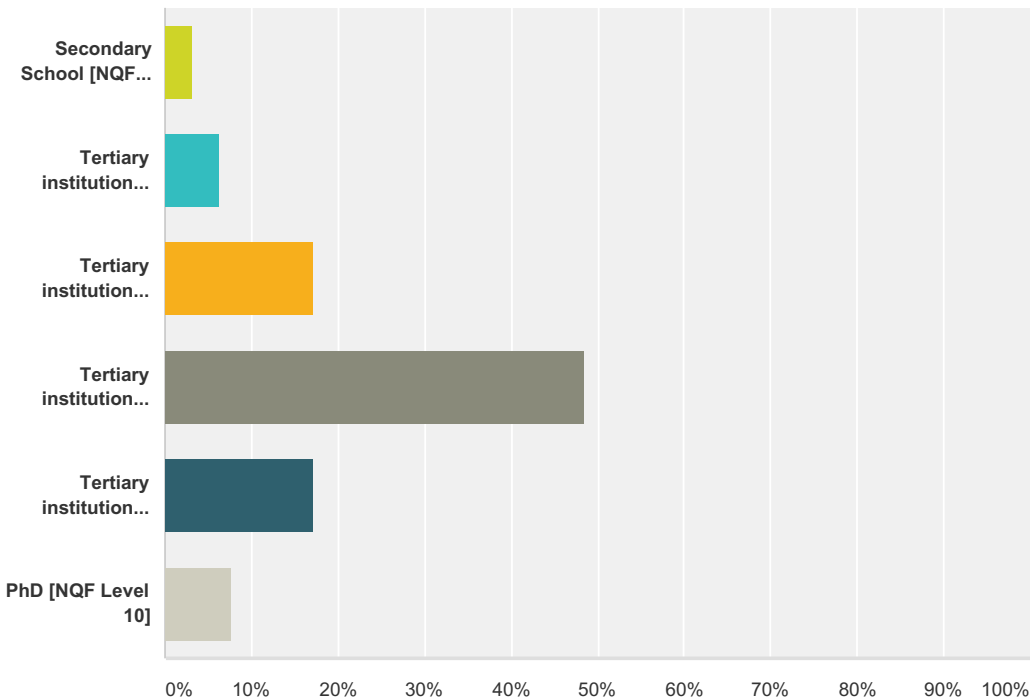
Answered: 64 Skipped: 0



Answer Choices	Responses	
South African Citizen	98.44%	63
Not South African Citizen	1.56%	1
Total		64

Q6 Please indicate your highest educational qualification.

Answered: 64 Skipped: 0

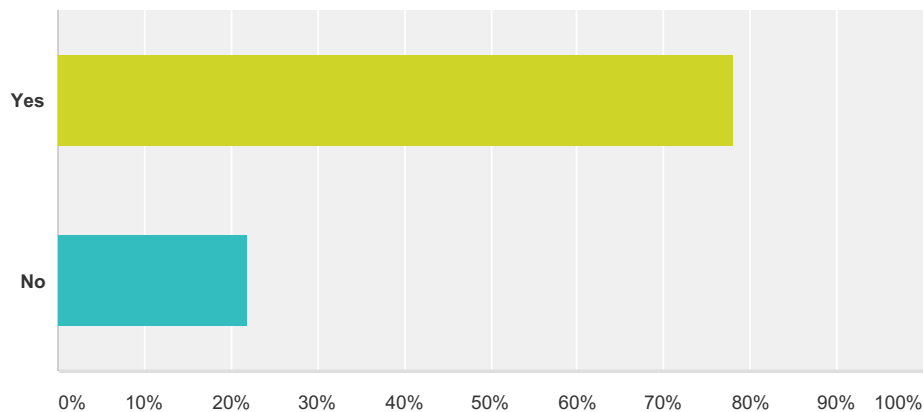


Answer Choices		Responses	
Secondary School [NQF Level 4]		3.13%	2
Tertiary institution diploma [NQF Level 6]		6.25%	4
Tertiary institution first degree [NQF Level 7]		17.19%	11
Tertiary institution honours degree [NQF Level 8]		48.44%	31
Tertiary institution masters degree [NQF Level 9]		17.19%	11
PhD [NQF Level 10]		7.81%	5
Total			64

#	Other (please specify)	Date
	There are no responses.	

Q7 Are you registered with a professional statutory council?

Answered: 64 Skipped: 0



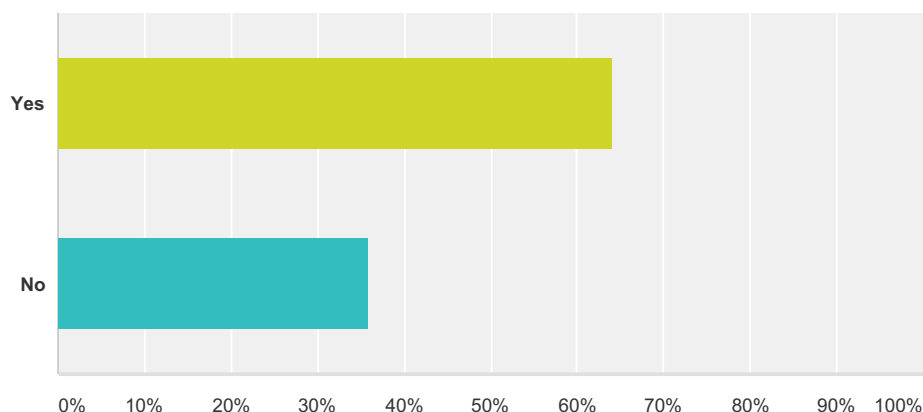
Answer Choices	Responses
Yes	78.13% 50
No	21.88% 14
Total	64

#	If "Yes", please specify	Date
1	RICS, SACQSP	9/30/2016 10:18 AM
2	SACAP since 2012	9/27/2016 9:12 AM
3	SACQSP	9/26/2016 4:03 PM
4	SACQSP	9/23/2016 1:18 PM
5	SACQSP	9/22/2016 12:11 PM
6	Qs council	9/21/2016 10:31 PM
7	ECSA	9/21/2016 4:57 PM
8	SACQSP; ASAQS	9/21/2016 4:42 PM
9	sacqsp and sacpcmp	9/21/2016 2:31 PM
10	PMI (PMP)	9/21/2016 12:48 PM
11	SACQS	9/21/2016 12:42 PM
12	SACQSP	9/21/2016 11:35 AM
13	SACQSP, ASAQS, RICS	9/21/2016 11:31 AM
14	ECSA	9/21/2016 9:41 AM
15	SACQSP	9/20/2016 9:51 AM
16	SACAP	9/20/2016 9:09 AM
17	Sacap	9/20/2016 8:55 AM
18	SACQSP	9/20/2016 8:53 AM
19	engineering council of south africa	9/20/2016 8:19 AM
20	Sacpcmp	9/20/2016 6:22 AM
21	ECSA	9/19/2016 11:32 AM
22	ECSA & SACPCMP	9/16/2016 3:42 PM

23	SACPCMP	9/16/2016 11:36 AM
24	ECSA, SACPCMP	9/16/2016 9:49 AM
25	SACQSP	9/16/2016 9:08 AM
26	CIDB	9/16/2016 9:04 AM
27	SACQSP	9/15/2016 9:06 AM
28	ECSA	9/14/2016 10:30 PM
29	SACQSP	9/14/2016 6:32 PM
30	SA Council for QS	9/14/2016 5:47 PM
31	SACAP, SACPCMP	9/14/2016 3:14 PM
32	ECSA, SACPCMP, PMI	9/14/2016 8:37 AM
33	SACPCMP	9/13/2016 12:29 PM
34	SACQSP	9/12/2016 3:43 PM
35	SACAP	9/12/2016 1:12 PM
36	Can.QS and Can.CPM	9/11/2016 7:33 PM
37	SACPVP	9/9/2016 9:12 PM
38	SACPCMP	9/9/2016 2:48 PM
39	SACQSP	9/9/2016 2:43 PM
40	ECSA	9/9/2016 2:29 PM
41	SACQSP	9/9/2016 1:40 PM

Q8 Are you a member of a voluntarily professional body?

Answered: 64 Skipped: 0



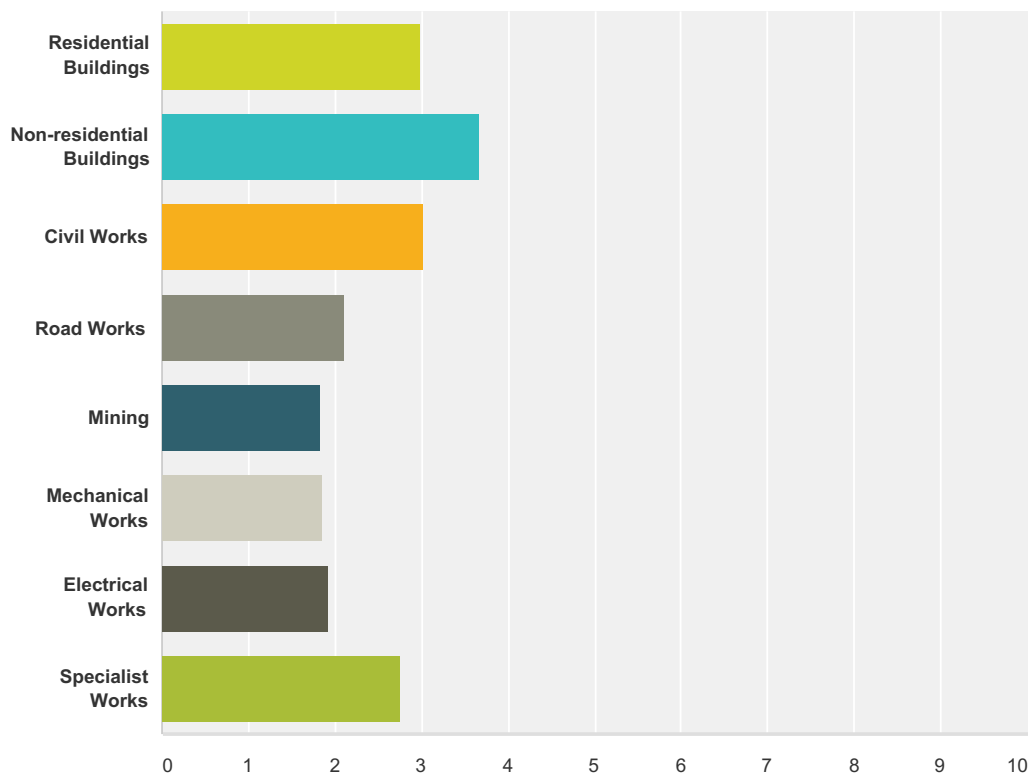
Answer Choices	Responses
Yes	64.06% 41
No	35.94% 23
Total	64

#	If "Yes", please specify	Date
1	ASAQS	9/30/2016 10:18 AM
2	Free State institute for Architects	9/27/2016 9:12 AM
3	ASAQS	9/26/2016 4:03 PM
4	ASAQS	9/23/2016 1:18 PM
5	ASAQS	9/22/2016 12:11 PM
6	Mrics	9/21/2016 10:31 PM
7	SAICE	9/21/2016 4:57 PM
8	rics asaqs ciob aa	9/21/2016 2:31 PM
9	MAQS	9/21/2016 12:32 PM
10	ASAQS	9/21/2016 11:35 AM
11	SAICE	9/21/2016 9:41 AM
12	ASAQS	9/20/2016 9:51 AM
13	SAIAT	9/20/2016 9:09 AM
14	ASAQS	9/20/2016 8:53 AM
15	SAICE	9/20/2016 8:19 AM
16	SAICE	9/16/2016 3:42 PM
17	SAIEE, SARPA, IESSA	9/16/2016 9:49 AM
18	ASAQS	9/16/2016 9:08 AM
19	NSPI iof SA / MBA	9/16/2016 9:04 AM
20	ASAQS	9/15/2016 9:06 AM
21	SAICE	9/14/2016 10:30 PM
22	Ciob and Rics	9/14/2016 6:47 PM

23	RICS	9/14/2016 6:32 PM
24	Association of SA QS	9/14/2016 5:47 PM
25	SAIA, GiFA	9/14/2016 3:14 PM
26	ASAQS	9/14/2016 12:13 PM
27	SAICE	9/14/2016 8:37 AM
28	ASAQS	9/11/2016 7:33 PM
29	PMSA	9/9/2016 9:12 PM
30	SACPCMP	9/9/2016 2:48 PM
31	ASAQS	9/9/2016 2:43 PM
32	SAICE	9/9/2016 2:29 PM
33	ASAQS	9/9/2016 1:40 PM

Q9 Please indicate the approximate percentage (%) with regard to the type of construction projects you are mostly involved with.

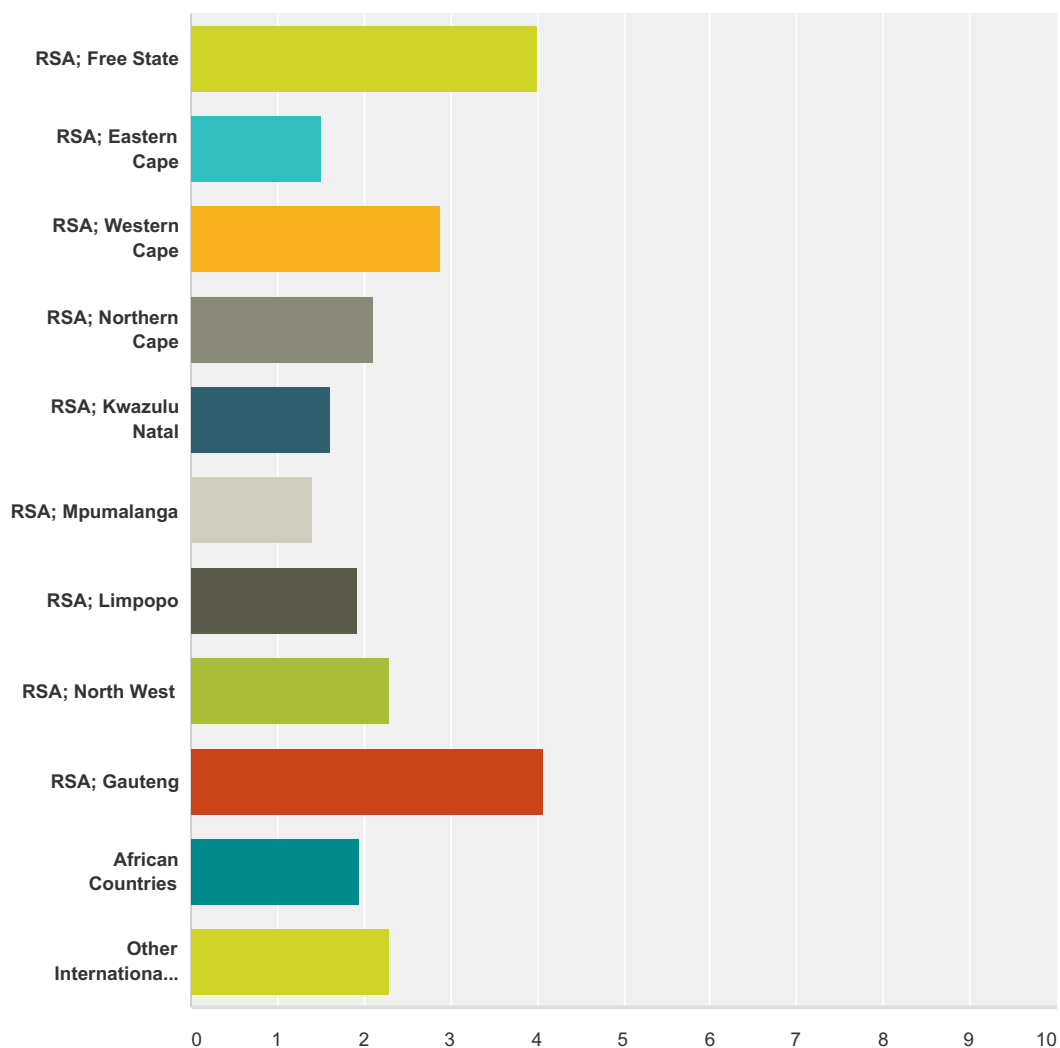
Answered: 60 Skipped: 4



	<10%	10-20%	21-40%	41-60%	61-80%	>80%	Total	Weighted Average
Residential Buildings	31.91% 15	17.02% 8	12.77% 6	10.64% 5	14.89% 7	12.77% 6	47	2.98
Non-residential Buildings	13.73% 7	13.73% 7	17.65% 9	23.53% 12	9.80% 5	21.57% 11	51	3.67
Civil Works	23.26% 10	25.58% 11	11.63% 5	13.95% 6	16.28% 7	9.30% 4	43	3.02
Road Works	53.57% 15	21.43% 6	10.71% 3	0.00% 0	3.57% 1	10.71% 3	28	2.11
Mining	70.83% 17	8.33% 2	8.33% 2	0.00% 0	4.17% 1	8.33% 2	24	1.83
Mechanical Works	64.29% 18	10.71% 3	14.29% 4	3.57% 1	0.00% 0	7.14% 2	28	1.86
Electrical Works	60.71% 17	14.29% 4	10.71% 3	7.14% 2	0.00% 0	7.14% 2	28	1.93
Specialist Works	46.43% 13	10.71% 3	3.57% 1	14.29% 4	10.71% 3	14.29% 4	28	2.75

Q10 Please indicate the approximate percentage (%) of where your work is located next to the listed location below.

Answered: 60 Skipped: 4

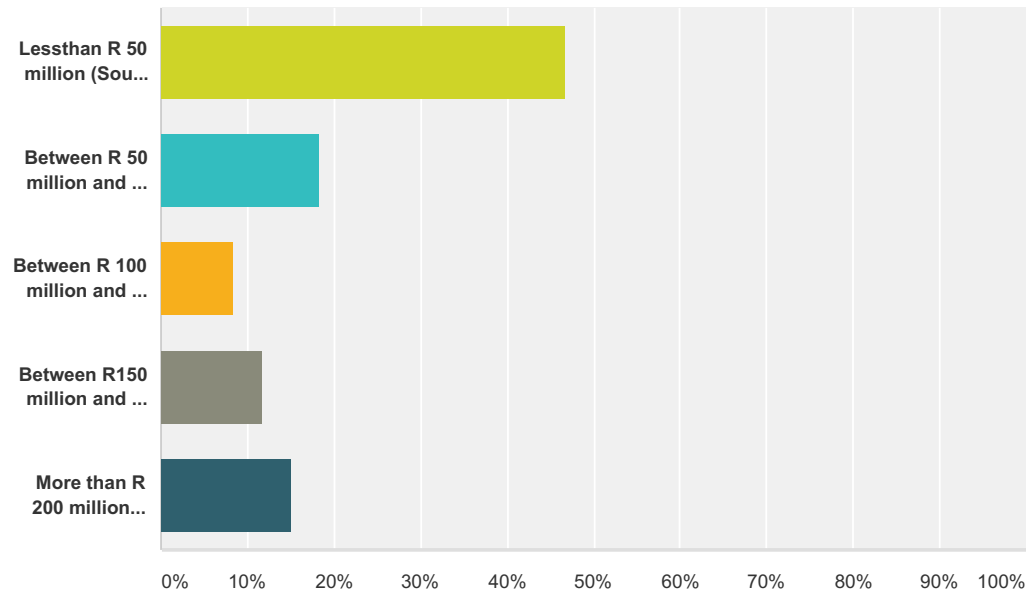


	<10%	10-20%	21-40%	41-60%	61-80%	>80%	N/A	Total	Weighted Average
RSA; Free State	22.73% 10	9.09% 4	9.09% 4	6.82% 3	4.55% 2	45.45% 20	2.27% 1	44	4.00
RSA; Eastern Cape	42.86% 9	14.29% 3	9.52% 2	0.00% 0	0.00% 0	0.00% 0	33.33% 7	21	1.50
RSA; Western Cape	27.27% 6	9.09% 2	13.64% 3	9.09% 2	9.09% 2	9.09% 2	22.73% 5	22	2.88
RSA; Northern Cape	45.45% 15	18.18% 6	6.06% 2	0.00% 0	0.00% 0	12.12% 4	18.18% 6	33	2.11
RSA; Kwazulu Natal	38.89% 7	5.56% 1	5.56% 1	5.56% 1	0.00% 0	0.00% 0	44.44% 8	18	1.60
RSA; Mpumalanga	30.00% 6	20.00% 4	0.00% 0	0.00% 0	0.00% 0	0.00% 0	50.00% 10	20	1.40
RSA; Limpopo	39.13% 9	13.04% 3	4.35% 1	0.00% 0	4.35% 1	4.35% 1	34.78% 8	23	1.93
RSA; North West	24.14% 7	31.03% 9	0.00% 0	10.34% 3	3.45% 1	3.45% 1	27.59% 8	29	2.29

RSA; Gauteng	16.22% 6	8.11% 3	2.70% 1	2.70% 1	13.51% 5	29.73% 11	27.03% 10	37	4.07
African Countries	47.83% 11	8.70% 2	0.00% 0	4.35% 1	0.00% 0	8.70% 2	30.43% 7	23	1.94
Other International Countries	27.78% 5	0.00% 0	0.00% 0	0.00% 0	5.56% 1	5.56% 1	61.11% 11	18	2.29

Q11 What is the average monetary value of the projects that you are involved in?

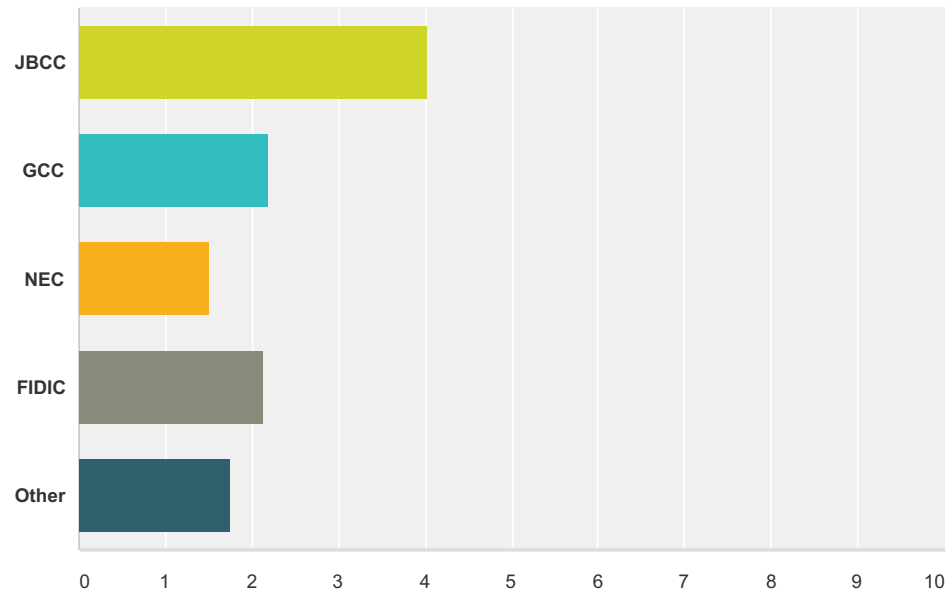
Answered: 60 Skipped: 4



Answer Choices	Responses	
Less than R 50 million (South African Rand)	46.67%	28
Between R 50 million and R 100 million (South African Rand)	18.33%	11
Between R 100 million and R 150 million (South African Rand)	8.33%	5
Between R 150 million and R 200 million (South African Rand)	11.67%	7
More than R 200 million (South African Rand)	15.00%	9
Total		60

Q12 Please indicate how often you deal with the following contracts.

Answered: 60 Skipped: 4

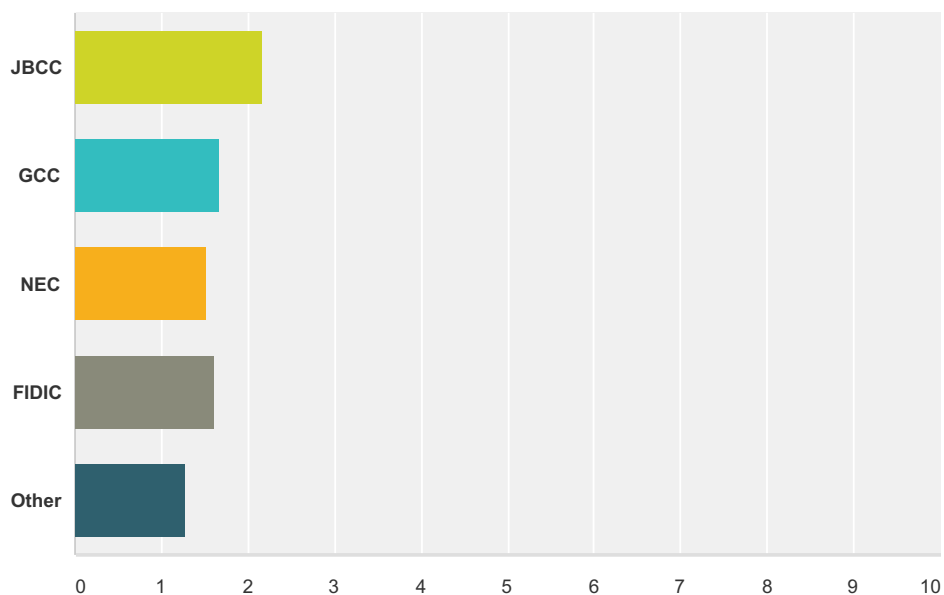


	<20%	20-40%	41-60%	61-80%	>80%	N/A	Total	Weighted Average
JBCC	10.53% 6	5.26% 3	12.28% 7	12.28% 7	56.14% 32	3.51% 2	57	4.02
GCC	40.91% 18	9.09% 4	13.64% 6	4.55% 2	11.36% 5	20.45% 9	44	2.20
NEC	48.72% 19	10.26% 4	2.56% 1	2.56% 1	2.56% 1	33.33% 13	39	1.50
FIDIC	30.95% 13	21.43% 9	9.52% 4	4.76% 2	7.14% 3	26.19% 11	42	2.13
Other	17.65% 3	0.00% 0	0.00% 0	5.88% 1	0.00% 0	76.47% 13	17	1.75

#	Other (please specify)	Date
	There are no responses.	

Q13 What is your knowledge / expertise on the following contracts?

Answered: 60 Skipped: 4

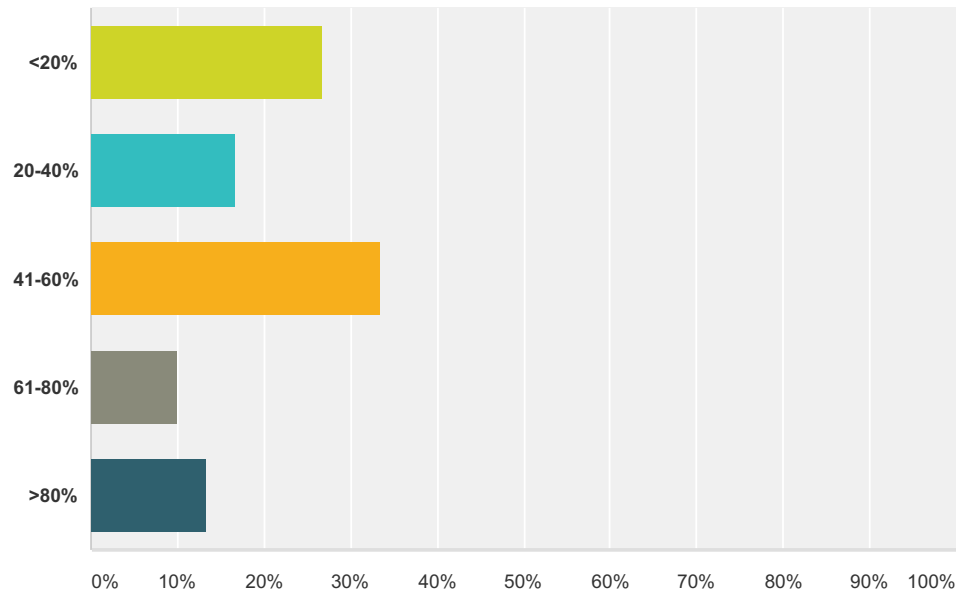


	Novice	Acquainted	Expert	Total	Weighted Average
JBCC	13.33% 8	55.00% 33	31.67% 19	60	2.18
GCC	51.02% 25	30.61% 15	18.37% 9	49	1.67
NEC	55.10% 27	36.73% 18	8.16% 4	49	1.53
FIDIC	50.00% 24	39.58% 19	10.42% 5	48	1.60
Other	81.82% 9	9.09% 1	9.09% 1	11	1.27

#	Other (please specify)	Date
1	no knowledge	9/9/2016 2:35 PM

Q14 How much of your daily responsibilities involve contract management?

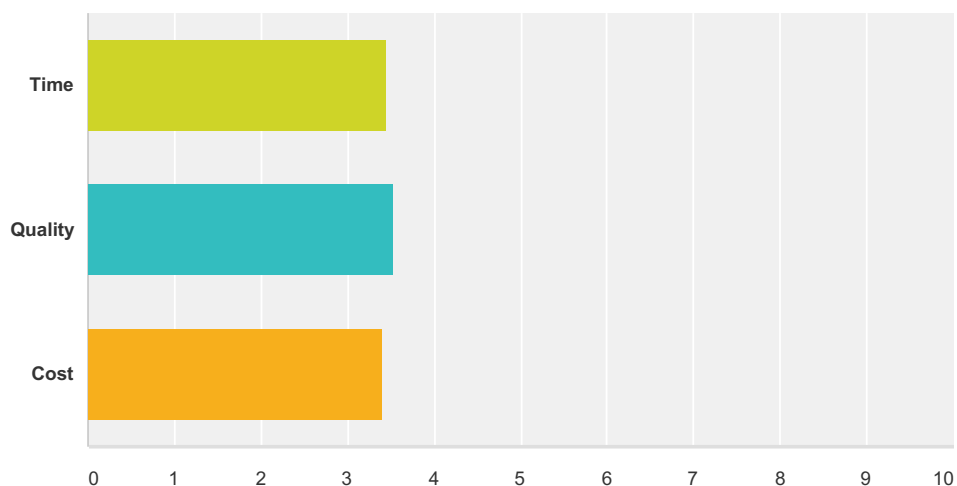
Answered: 60 Skipped: 4



Answer Choices	Responses	
<20%	26.67%	16
20-40%	16.67%	10
41-60%	33.33%	20
61-80%	10.00%	6
>80%	13.33%	8
Total		60

Q15 In your opinion, how involved should the Principal Agent (JBCC) / Engineer (FIDIC) / Employer's Agent (GCC) / Project Manager (NEC) be in the daily operation of the construction project

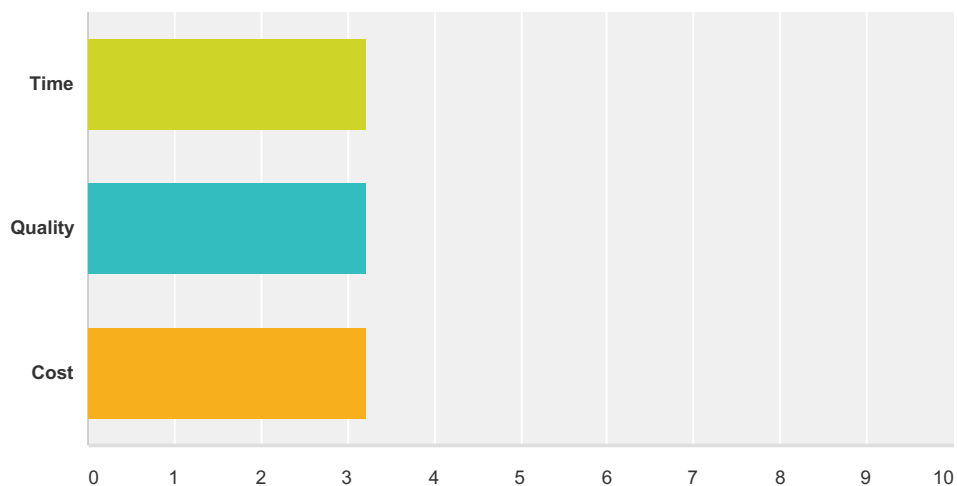
Answered: 60 Skipped: 4



	<20%	20-40%	41-60%	61-80%	>80%	Total	Weighted Average
Time	5.00% 3	21.67% 13	23.33% 14	23.33% 14	26.67% 16	60	3.45
Quality	12.07% 7	8.62% 5	24.14% 14	25.86% 15	29.31% 17	58	3.52
Cost	10.34% 6	12.07% 7	25.86% 15	29.31% 17	22.41% 13	58	3.41

Q16 In your opinion, hypothetically from the contractor's perspective, how involved should the Principal Agent (JBCC) / Engineer (FIDIC) / Employer's Agent (GCC) / Project Manager (NEC) be in the daily operation of the construction project.

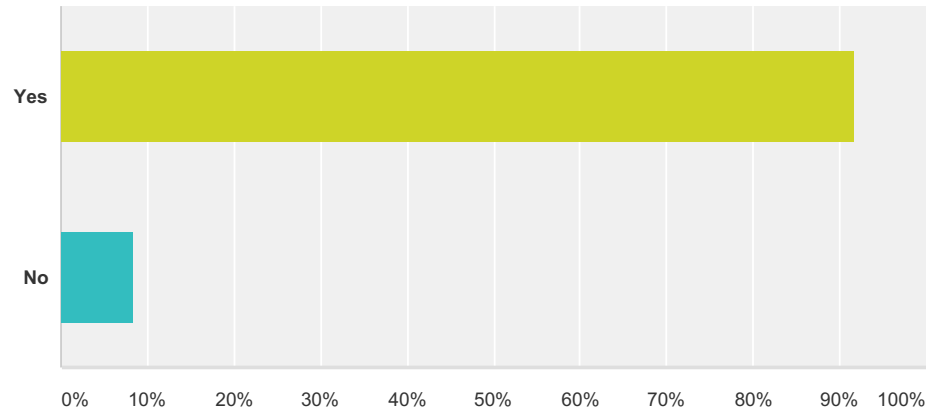
Answered: 60 Skipped: 4



	<20%	20-40%	41-60%	61-80%	>80%	Total	Weighted Average
Time	8.33% 5	28.33% 17	21.67% 13	16.67% 10	25.00% 15	60	3.22
Quality	15.52% 9	15.52% 9	29.31% 17	12.07% 7	27.59% 16	58	3.21
Cost	12.07% 7	22.41% 13	24.14% 14	13.79% 8	27.59% 16	58	3.22

Q17 In your opinion, would it be possible for the Principal Agent (JBCC) / Engineer (FIDIC) / Employer’s Agent (GCC) / Project Manager (NEC) to control the building project through the building contract?

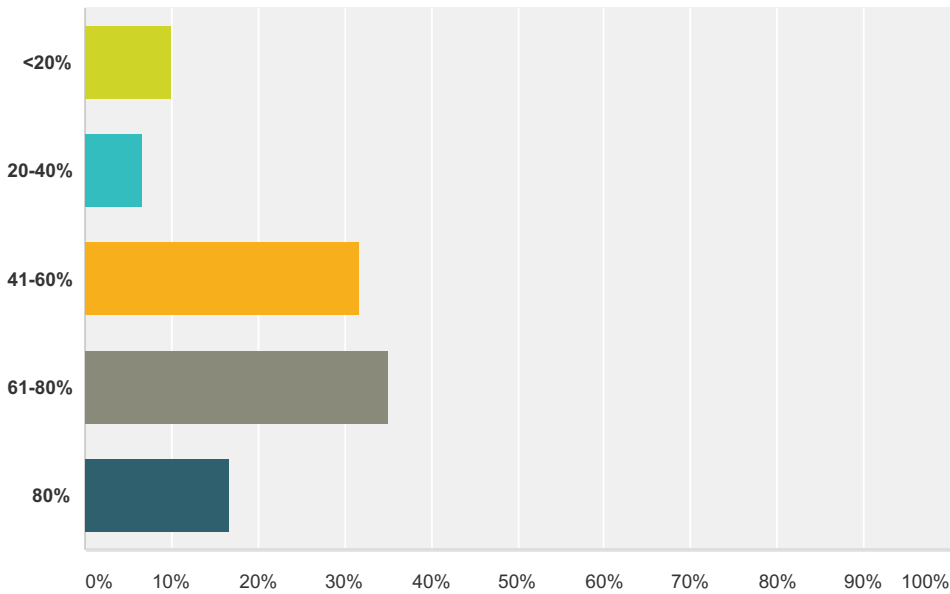
Answered: 60 Skipped: 4



Answer Choices	Responses	
Yes	91.67%	55
No	8.33%	5
Total		60

Q18 If answered "Yes" above, please indicate to what extent.

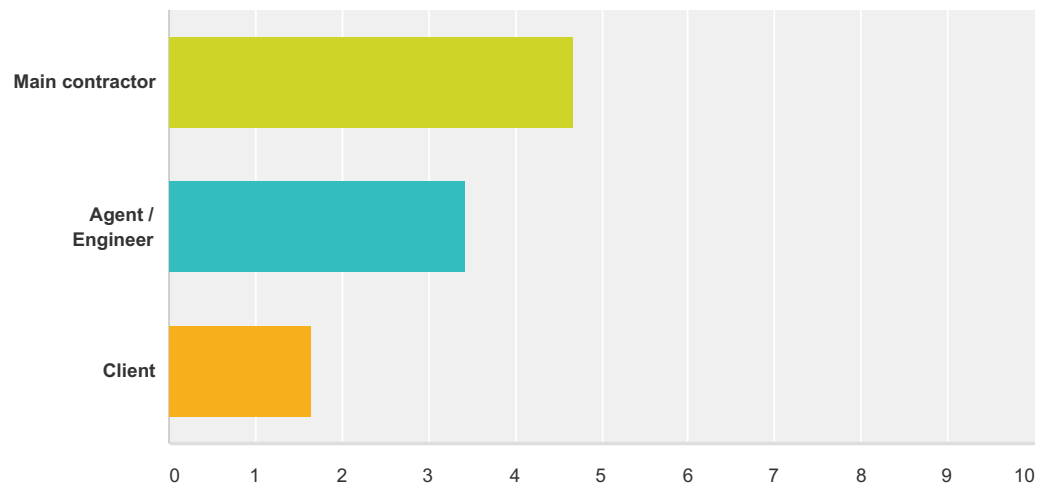
Answered: 60 Skipped: 4



Answer Choices	Responses
<20%	10.00%6
20-40%	6.67%4
41-60%	31.67%19
61-80%	35.00%21
80%	16.67%10
Total	60

Q19 In your opinion, who is responsible for quality on site, and to what extent?

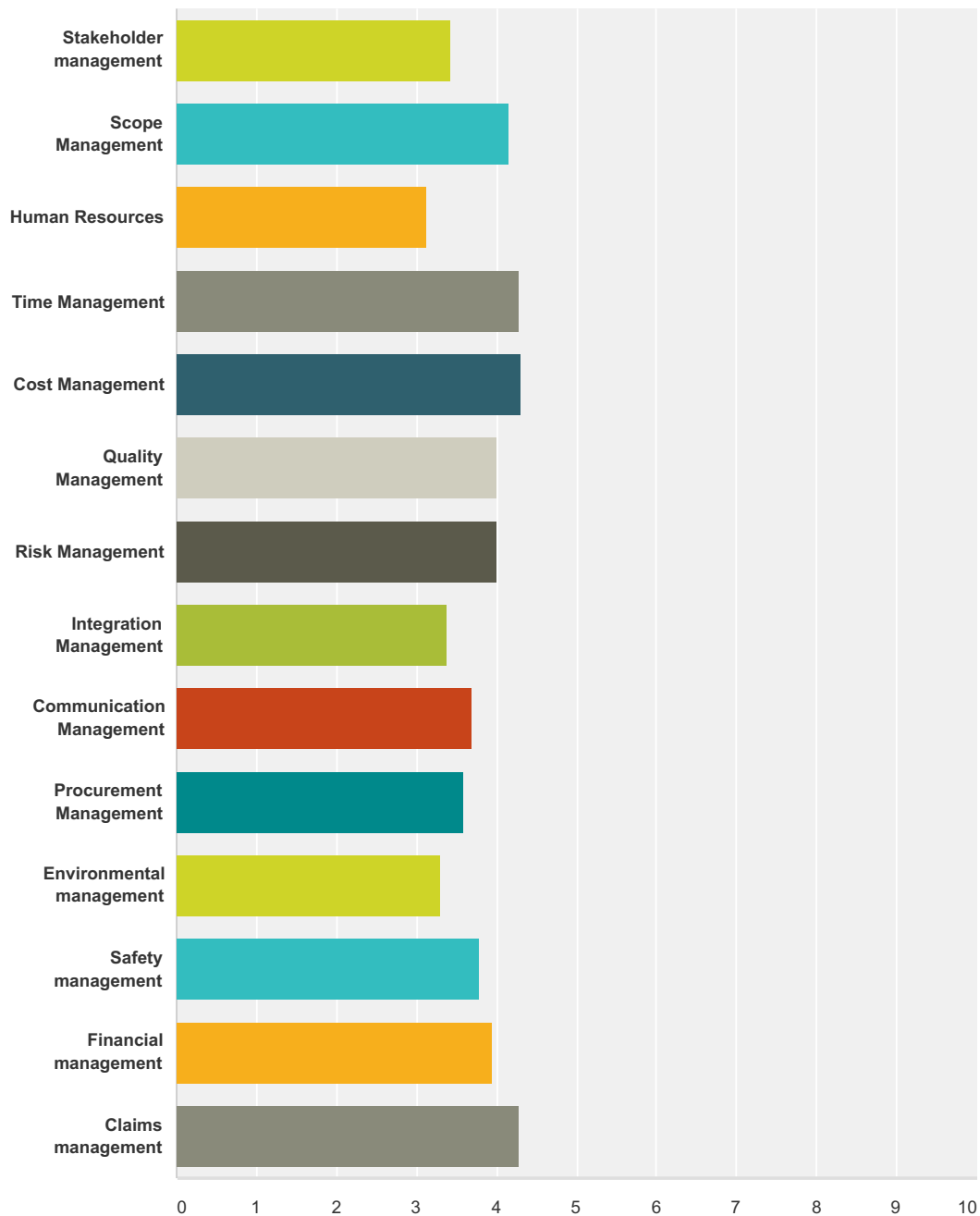
Answered: 60 Skipped: 4



	<20%	20-40%	41-60%	61-80%	>80%	Total	Weighted Average
Main contractor	0.00% 0	1.72% 1	1.72% 1	24.14% 14	72.41% 42	58	4.67
Agent / Engineer	7.02% 4	19.30% 11	24.56% 14	22.81% 13	26.32% 15	57	3.42
Client	62.26% 33	18.87% 10	13.21% 7	3.77% 2	1.89% 1	53	1.64

Q20 Please use the following scale to apply the most appropriate response: 1 Strongly disagree 2 Disagree 3 No influence 4 Agree 5 Strongly agree
In your opinion, to what extent is the following construction management and project management areas, influenced through the construction contract.

Answered: 48 Skipped: 16

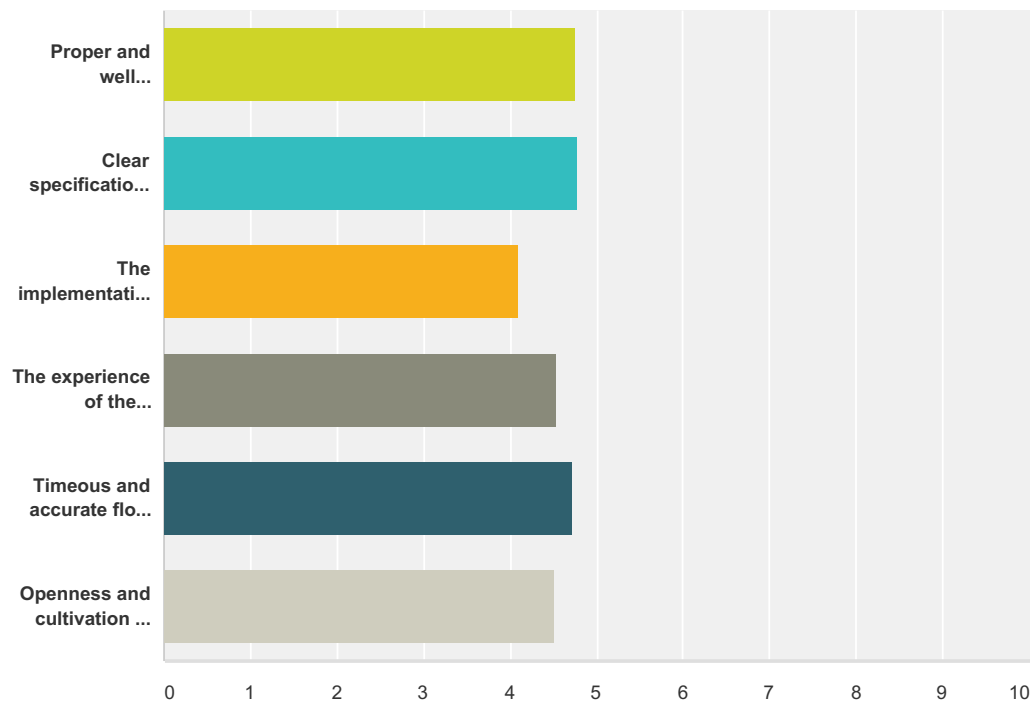


	1	2	3	4	5	Total	Weighted Average
Stakeholder management	6.25% 3	10.42% 5	31.25% 15	39.58% 19	12.50% 6	48	3.42

Scope Management	2.08% 1	6.25% 3	8.33% 4	41.67% 20	41.67% 20	48	4.15
Human Resources	8.33% 4	22.92% 11	33.33% 16	18.75% 9	16.67% 8	48	3.13
Time Management	0.00% 0	4.17% 2	10.42% 5	37.50% 18	47.92% 23	48	4.29
Cost Management	0.00% 0	2.08% 1	10.42% 5	41.67% 20	45.83% 22	48	4.31
Quality Management	0.00% 0	8.33% 4	16.67% 8	41.67% 20	33.33% 16	48	4.00
Risk Management	0.00% 0	10.42% 5	16.67% 8	35.42% 17	37.50% 18	48	4.00
Integration Management	0.00% 0	18.75% 9	37.50% 18	31.25% 15	12.50% 6	48	3.38
Communication Management	2.08% 1	12.50% 6	14.58% 7	56.25% 27	14.58% 7	48	3.69
Procurement Management	4.17% 2	8.33% 4	22.92% 11	52.08% 25	12.50% 6	48	3.60
Environmental management	8.33% 4	18.75% 9	25.00% 12	31.25% 15	16.67% 8	48	3.29
Safety management	6.25% 3	10.42% 5	16.67% 8	33.33% 16	33.33% 16	48	3.77
Financial management	0.00% 0	14.58% 7	14.58% 7	33.33% 16	37.50% 18	48	3.94
Claims management	0.00% 0	4.17% 2	8.33% 4	41.67% 20	45.83% 22	48	4.29

Q21 Please use the following scale to apply the most appropriate response: 1 Strongly disagree 2 Disagree 3 No influence 4 Agree 5 Strongly agree
In your opinion, does the following statements contribute to the successful implementation (construction phase) of a building project.

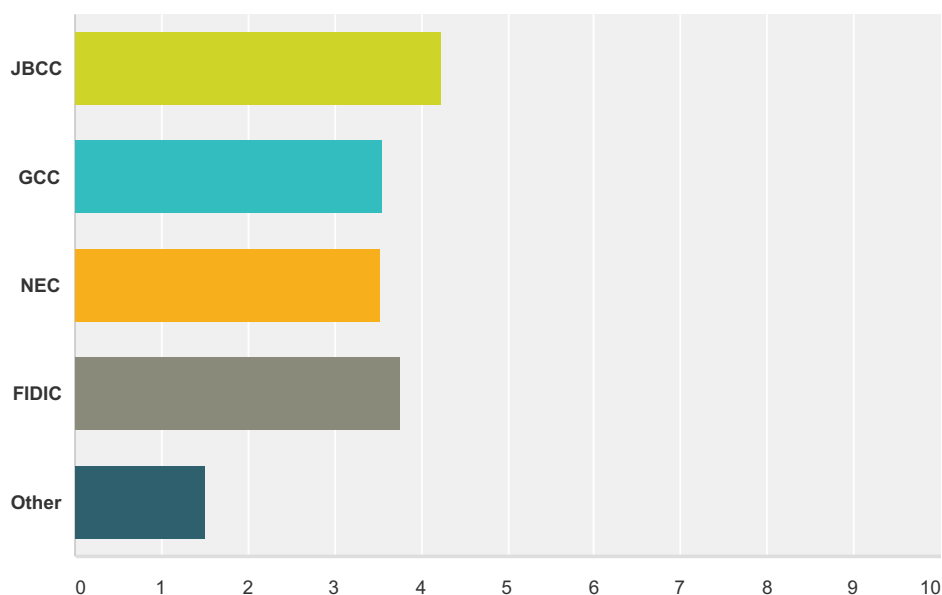
Answered: 48 Skipped: 16



	1	2	3	4	5	Total	Weighted Average
Proper and well thought-out design	0.00% 0	0.00% 0	2.08% 1	18.75% 9	79.17% 38	48	4.77
Clear specifications – including drawings and finishing schedules	0.00% 0	0.00% 0	2.08% 1	16.67% 8	81.25% 39	48	4.79
The implementation of a standard contract (excluding specifications)	6.25% 3	2.08% 1	10.42% 5	37.50% 18	43.75% 21	48	4.10
The experience of the employers and contractor's representatives	0.00% 0	4.17% 2	6.25% 3	22.92% 11	66.67% 32	48	4.52
Timeous and accurate flow of information	0.00% 0	2.08% 1	0.00% 0	22.92% 11	75.00% 36	48	4.71
Openness and cultivation of a teamwork	0.00% 0	2.08% 1	4.17% 2	35.42% 17	58.33% 28	48	4.50

Q22 Please use the following scale to apply the most appropriate response: 1 Not conducive 2 Little conducive 3 Conducive 4 More conducive 5 Very Conducive
Please rank the contracts below according to their relevance for being most conducive to solve problems experienced on a building site during the construction phase?

Answered: 48 Skipped: 16

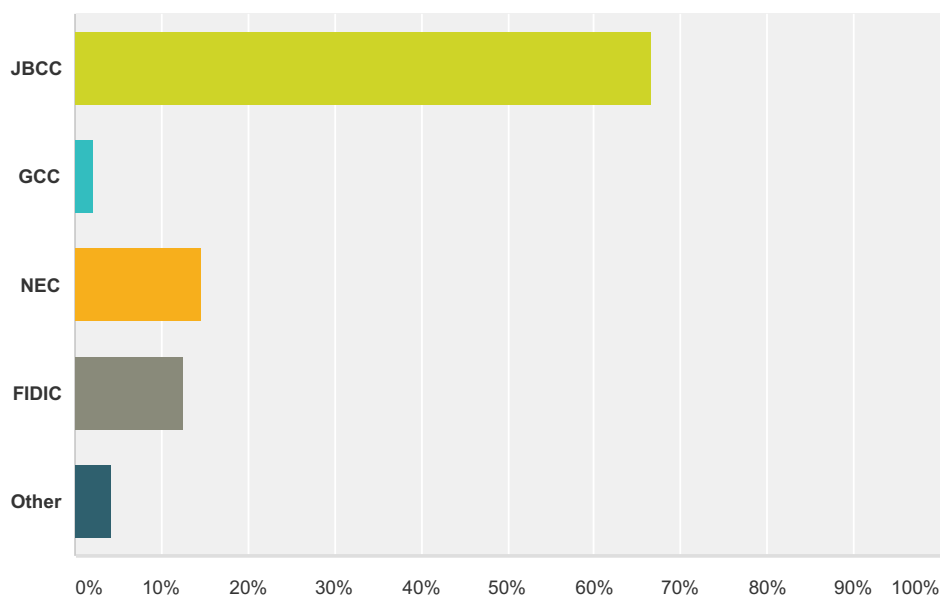


	1	2	3	4	5	No comment	Total	Weighted Average
JBCC	0.00% 0	2.08% 1	16.67% 8	27.08% 13	41.67% 20	12.50% 6	48	4.24
GCC	2.08% 1	6.25% 3	18.75% 9	22.92% 11	10.42% 5	39.58% 19	48	3.55
NEC	2.08% 1	8.33% 4	8.33% 4	14.58% 7	10.42% 5	56.25% 27	48	3.52
FIDIC	2.08% 1	6.25% 3	6.25% 3	22.92% 11	12.50% 6	50.00% 24	48	3.75
Other	4.44% 2	4.44% 2	0.00% 0	0.00% 0	0.00% 0	91.11% 41	45	1.50

#	Other (please specify)	Date
1	NA	9/14/2016 10:52 AM

Q23 Which contract would in your opinion best suite the requirements for the Principal Agent (JBCC) / Engineer (FIDIC) / Employer's Agent (GCC) / Project Manager (NEC) / Other to manage the construction phase of a building project?

Answered: 48 Skipped: 16

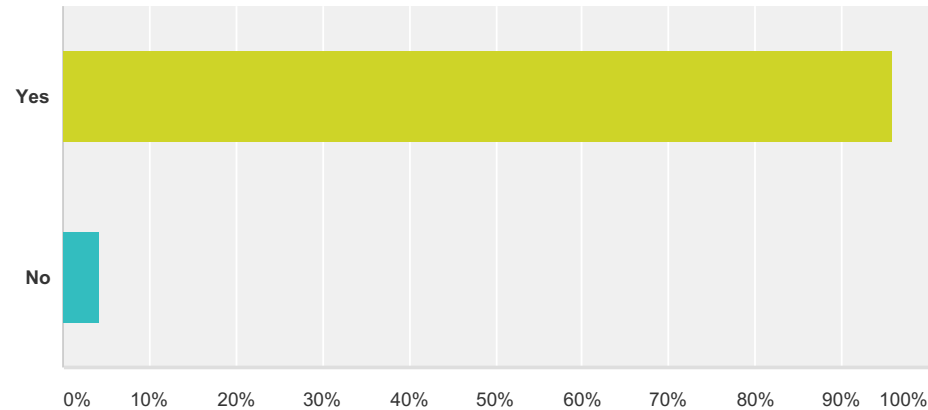


Answer Choices	Responses
JBCC	66.67% 32
GCC	2.08% 1
NEC	14.58% 7
FIDIC	12.50% 6
Other	4.17% 2
Total	48

#	Other (please specify)	Date
1	Unsure	9/14/2016 12:19 PM
2	NA	9/14/2016 10:52 AM
3	no comment	9/9/2016 2:36 PM

Q24 If not the status quo, would the South African Built Environment adapt the practice of managing the construction project through the application of the main building contract?

Answered: 48 Skipped: 16



Answer Choices	Responses	
Yes	95.83%	46
No	4.17%	2
Total		48

Q25 In your opinion, what is the leading cause for poor management on a construction site?

Answered: 47 Skipped: 17

#	Responses	Date
1	lack of knowledge from Principle Agents / Project manager	9/30/2016 10:26 AM
2	The lack of resources and time as well as the clients unwillingness to listen to advice	9/27/2016 12:32 PM
3	Poor communication.	9/27/2016 10:16 AM
4	Flow and availability of information for decision making	9/26/2016 4:11 PM
5	Expertise and Experience	9/23/2016 1:39 PM
6	lack of communication, proper management structures, lack of reporting systems and production reports, weak construction managers	9/22/2016 12:30 PM
7	Lack of knowledge and experience, as well as miscommunication.	9/22/2016 12:28 PM
8	Inexperience and poor planning	9/22/2016 11:23 AM
9	Lack of expertise	9/21/2016 10:42 PM
10	Lack of experience/training of the principal agent and or contractor	9/21/2016 5:52 PM
11	Poor communication	9/21/2016 5:04 PM
12	knowledge experience skills	9/21/2016 2:43 PM
13	Inexperience of Consultants Excessive fee discounts Experience of the Main Contractor	9/21/2016 1:07 PM
14	Construction experience	9/21/2016 1:05 PM
15	Contractor's experience and capability	9/21/2016 1:00 PM
16	Lack of information	9/21/2016 11:41 AM
17	Experience of the contractor and coordination between the consultants and the site agent.	9/21/2016 11:40 AM
18	- Inexperienced Contractors; - Insufficient/Incomplete Architectural Drawings and Specifications; and - Unrealistic Timelines.	9/20/2016 10:21 AM
19	Lack of proper information and specifications	9/20/2016 9:40 AM
20	Not sufficient experience	9/20/2016 9:23 AM
21	Proper planning and lack of skills. Inexperienced staff	9/20/2016 8:48 AM
22	Poor Procurement & Politics	9/20/2016 8:40 AM
23	- Project Schedule not regarded as the mean of day to day scope of work. - Bad communication. - Insufficient details.	9/16/2016 4:19 PM
24	EXPERIENCE	9/16/2016 3:52 PM
25	Communication	9/16/2016 9:59 AM
26	Poor communication	9/16/2016 9:22 AM
27	resource management	9/16/2016 9:19 AM
28	Weak main contractor	9/16/2016 9:14 AM
29	Poor quality of work by contractor/subcontractors and late payments by client and contractor. Needs firm actions by leading consultant which is often not properly handled	9/15/2016 9:22 AM
30	Inexperience of supervising staff	9/14/2016 6:45 PM
31	Incompetent PM by consultants and lack of good experienced construction management by contractors	9/14/2016 6:13 PM
32	poor design - poor documentation - low skill staff	9/14/2016 3:23 PM
33	Poor communication and inexperience	9/14/2016 12:23 PM
34	Inexperienced Team Members	9/14/2016 10:54 AM

35	In general, it is my opinion that a lack of clear definitive structures, processes, and procedures could be seen as the leading causes for poor management on a construction site.	9/13/2016 2:19 PM
36	Lack of Communication	9/13/2016 1:27 PM
37	Inexperience of the site staff.	9/13/2016 9:54 AM
38	Conflicts	9/13/2016 9:37 AM
39	Incompetent personnel.	9/12/2016 4:23 PM
40	AGENTS	9/12/2016 1:16 PM
41	Foreman and Contract Manager	9/12/2016 9:57 AM
42	Lack of experience	9/11/2016 7:49 PM
43	Communication	9/9/2016 9:20 PM
44	Planning and Communication	9/9/2016 3:05 PM
45	Lack of experienced staff and accountability.	9/9/2016 2:50 PM
46	communication and lack of expertise	9/9/2016 2:37 PM
47	late information from consultants.	9/9/2016 2:03 PM

Q26 What is perceived to be the main objective of the main building contracts in South Africa?

Answered: 46 Skipped: 18

#	Responses	Date
1	protection to both contractual parties	9/30/2016 10:26 AM
2	to finish the job not taking quality in account	9/27/2016 12:32 PM
3	To manage the contractor and reduce risk.	9/27/2016 10:16 AM
4	To organise, govern the relationship between the employer and the contractor as well as to stipulate each parties rights and responsibilities.	9/26/2016 4:11 PM
5	Management	9/23/2016 1:39 PM
6	to guide the contract contractually and make sure that specifications are adhered to and set out correctly	9/22/2016 12:30 PM
7	To protect the interest of both client and contractor	9/22/2016 12:28 PM
8	To establish a standard set of rules to which all parties must conform to facilitate the timeous completion of the project within the agreed parameters - time, value and quality.	9/22/2016 11:23 AM
9	Fair compensation for work done	9/21/2016 10:42 PM
10	Empower the Contractor to do his work.	9/21/2016 5:52 PM
11	No comment	9/21/2016 5:04 PM
12	quality products at a competitive price in reasonable time	9/21/2016 2:43 PM
13	To protect both contracting parties and to establish the objectives of the agreement	9/21/2016 1:07 PM
14	Allow fairness to all parties	9/21/2016 1:05 PM
15	To ensure successful completion of the construction works	9/21/2016 1:00 PM
16	Cost efficient and completed in time	9/21/2016 11:41 AM
17	To finish a quality project on time for the client.	9/21/2016 11:40 AM
18	To ensure that a Building Project is completed in time, in budget and to the quality stated by the client by way of a legal document to ensure both parties (contractor and the design team) work together.	9/20/2016 10:21 AM
19	Complete projects on tie within budget	9/20/2016 9:40 AM
20	To implement the contract	9/20/2016 9:23 AM
21	To manage risk	9/20/2016 8:48 AM
22	To manage the works from a legal perspective & to protect the interests of the client and contractor equally.	9/20/2016 8:40 AM
23	- Protect the interest of all parties involved.	9/16/2016 4:19 PM
24	STANDARDISE CONTRACTS	9/16/2016 3:52 PM
25	Complete in time within budget	9/16/2016 9:59 AM
26	Risk mitigation	9/16/2016 9:22 AM
27	to finish in time and with in budget	9/16/2016 9:19 AM
28	Fairness	9/16/2016 9:14 AM
29	To provide an equitable distribution of risks and that will recognize and cater for the problems encountered in the local building industry	9/15/2016 9:22 AM
30	To spell out the roles and responsibilities of the contracting parties and to fairly distribute risk to the parties	9/14/2016 6:45 PM
31	To be fair to all parties if applied and managed pro-actively	9/14/2016 6:13 PM
32	fairness between employer + contractor	9/14/2016 3:23 PM
33	Management of risk	9/14/2016 12:23 PM
34	To guide procedures to be followed during project implementation.	9/14/2016 10:54 AM

35	The main objective should be the successful completion of the construction project according to the terms and conditions of the main building contract.	9/13/2016 2:19 PM
36	To allocate duties to the involved parties and deal with risk and uncertainties	9/13/2016 1:27 PM
37	Successful delivery of the project	9/13/2016 9:54 AM
38	Control conflicts	9/13/2016 9:37 AM
39	Tho protect both the client and the contractor.	9/12/2016 4:23 PM
40	PROTECTION	9/12/2016 1:16 PM
41	To protect both the Client and Contractor.	9/12/2016 9:57 AM
42	Completion of the job in all fairness to the parties involved.	9/11/2016 7:49 PM
43	Protecting all parties interest involved in the construction project.	9/9/2016 3:05 PM
44	To protect the parties.	9/9/2016 2:50 PM
45	to make as much money as possible	9/9/2016 2:37 PM
46	To protect the client	9/9/2016 2:03 PM

Q27 What are the potential benefits of controlling a construction project through the main contracts in the South African Built Environment?

Answered: 47 Skipped: 17

#	Responses	Date
1	successful completion of projects within time, budget and cost	9/30/2016 10:26 AM
2	better control	9/27/2016 12:32 PM
3	A successfully completed project.	9/27/2016 10:16 AM
4	The best benefit will be a completed project on time, withing budget and to the desired quality.	9/26/2016 4:11 PM
5	Management of parties and control of cost	9/23/2016 1:39 PM
6	Contractual obligations are fulfilled, binding agreements are set out, claims are well articulated, scope of works is properly set out	9/22/2016 12:30 PM
7	Protection of interests.	9/22/2016 12:28 PM
8	Unambiguous directions and procedures to deal with the execution of and most common variables in a construction project.	9/22/2016 11:23 AM
9	Completion on time and on budget	9/21/2016 10:42 PM
10	Tried and tested contracts. All parties should know and understand them.	9/21/2016 5:52 PM
11	No comment	9/21/2016 5:04 PM
12	see 26 above	9/21/2016 2:43 PM
13	To set out a clear undertaking from both contracting parties as to what the expectations are of the agreement. To control and manage costs, information flow, production and quality.	9/21/2016 1:07 PM
14	Work completed within specifications, budget and time	9/21/2016 1:05 PM
15	Same as 26	9/21/2016 1:00 PM
16	Promotes flow of information	9/21/2016 11:41 AM
17	There would be less confusion and arguments in the overall industry.	9/21/2016 11:40 AM
18	- Quality Control; - Cost Control; and - Time Control.	9/20/2016 10:21 AM
19	The contract already have procedures in place to management time and money claims.	9/20/2016 9:40 AM
20	Good delivery	9/20/2016 9:23 AM
21	Risk minimization as well as timely completion of projects	9/20/2016 8:48 AM
22	Fairness and transparency	9/20/2016 8:40 AM
23	- Everything will happen on the same standard and involved parties will gain more knowledge as they progress. Thus the whole standard of the building industry will be lifted.	9/16/2016 4:19 PM
24	STANDARD CONTRACTS WILL ASSIST TO LIMIT DISPUTES	9/16/2016 3:52 PM
25	Quality and financial	9/16/2016 9:59 AM
26	Sets out clear responsibilities to complete a project successfully	9/16/2016 9:22 AM
27	guideline to manage your project	9/16/2016 9:19 AM
28	Better over-all management resulting in cost control, better communication and safety	9/16/2016 9:14 AM
29	The better the project is controlled by all parties involved the better the changes for a successful project	9/15/2016 9:22 AM
30	One point responsibility Early knowledge of financial commitment Consistent quality control	9/14/2016 6:45 PM
31	On time and within budget projects	9/14/2016 6:13 PM
32	understanding the content - using the form of contract as a dispute avoidance tool	9/14/2016 3:23 PM
33	Increased management of time, cost and quality	9/14/2016 12:23 PM

34	To reduce conflict.	9/14/2016 10:54 AM
35	The benefit of directly avoiding disputes related to the terms and conditions of the main contract.	9/13/2016 2:19 PM
36	-It establishes the parties duties, responsibilities and expectations -There is a set document to rely on (solve problems) in cases where there might be differences between the parties. -Covers issues that are likely to occur and ways to deal with them	9/13/2016 1:27 PM
37	No Comment	9/13/2016 9:54 AM
38	Address conflicts	9/13/2016 9:37 AM
39	For every action there is a agreed legal reaction.	9/12/2016 4:23 PM
40	MEASUREMENT TOOL FOR ACTIVITIES ON SITE	9/12/2016 1:16 PM
41	To complete a project to the satisfaction of both Client and Contractor.	9/12/2016 9:57 AM
42	To deliver the project within the agreed time frame, agreed budget and expected quality.	9/11/2016 7:49 PM
43	Cost savings	9/9/2016 9:20 PM
44	Interest surety.	9/9/2016 3:05 PM
45	Standardisation.	9/9/2016 2:50 PM
46	increase quality	9/9/2016 2:37 PM
47	To set rules, guidelines, protect the client	9/9/2016 2:03 PM

ANNEXURE C: TURN-IT-IN REPORT

BUILDING CONTRACTS, A MEANS TO MANAGE THE CONSTRUCTION PROCESS: A SOUTH AFRICAN PERSPECTIVE

ORIGINALITY REPORT

% **19**
SIMILARITY INDEX

% **15**
INTERNET SOURCES

% **5**
PUBLICATIONS

% **11**
STUDENT PAPERS

PRIMARY SOURCES

1 www.cidb.org.za % **2**
Internet Source

2 Submitted to University of Witwatersrand % **1**
Student Paper

3 www.safcec.org.za % **1**
Internet Source

4 www.saiat.org.za % **1**
Internet Source

5 etd.uovs.ac.za % **1**
Internet Source

6 Submitted to University of Cape Town % **1**
Student Paper

7 222.197.192.76 % **1**
Internet Source

8 Submitted to University of Pretoria % **1**
Student Paper

9 intranet.kv3.co.za <% **1**
Internet Source

10	Submitted to University of Lincoln Student Paper	<% 1
11	www.skillpower.co.nz Internet Source	<% 1
12	Submitted to University of Northumbria at Newcastle Student Paper	<% 1
13	"Internationale Standardbedingungen", Handbuch des internationalen und ausländischen Baurechts, 2005 Publication	<% 1
14	Submitted to Glasgow Caledonian University Student Paper	<% 1
15	www.neccontract.com Internet Source	<% 1
16	Bunni. "The 1999 Red Book", The FIDIC Forms of Contract, 04/04/2005 Publication	<% 1
17	www.jbcc.co.za Internet Source	<% 1
18	Submitted to The University of Manchester Student Paper	<% 1
19	econom.nsu.ru Internet Source	<% 1
20	www.cpas-egypt.com Internet Source	<% 1

21	Robinson, . "The Employer and the FIDIC Conditions of Contract for Construction (CONS) - 'The Red Book'", An Employer s and Engineer s Guide to the FIDIC Conditions of Contract Robinson/An Employer s and Engineer s Guide to the FIDIC Conditions of Contract, 2013. Publication	<%1
22	Submitted to Coventry University Student Paper	<%1
23	Submitted to Sheffield Hallam University Student Paper	<%1
24	motpropgroup.co.za Internet Source	<%1
25	www.apm.org.uk Internet Source	<%1
26	Submitted to Nelson Mandela Metropolitan University Student Paper	<%1
27	Submitted to Mancosa Student Paper	<%1
28	fenwickelliott.co.uk Internet Source	<%1
29	Submitted to University of Salford Student Paper	<%1
30	site.iugaza.edu.ps Internet Source	<%1

31	Submitted to Asian Institute of Technology Student Paper	<% 1
32	Submitted to The Robert Gordon University Student Paper	<% 1
33	Submitted to University of Leeds Student Paper	<% 1
34	www.gautengleg.gov.za Internet Source	<% 1
35	www1.fidic.org Internet Source	<% 1
36	Submitted to University of Bath Student Paper	<% 1
37	www.slideshare.net Internet Source	<% 1
38	Submitted to Tshwane University of Technology Student Paper	<% 1
39	siteresources.worldbank.org Internet Source	<% 1
40	law.jrank.org Internet Source	<% 1
41	Submitted to University of KwaZulu-Natal Student Paper	<% 1
42	www.asaqs.co.za Internet Source	<% 1

43	www.tcil-india.com Internet Source	<% 1
44	196.34.135.244 Internet Source	<% 1
45	Submitted to College of Estate Management Student Paper	<% 1
46	ftp.info.usaid.gov Internet Source	<% 1
47	www.chennaietrail.gov.in Internet Source	<% 1
48	dctgdansk.pl Internet Source	<% 1
49	ipa.nic.in Internet Source	<% 1
50	Robinson, . "The Engineer and the FIDIC Conditions of Contract for Construction (CONS) - 'The Red Book'", An Employer s and Engineer s Guide to the FIDIC Conditions of Contract Robinson/An Employer s and Engineer s Guide to the FIDIC Conditions of Contract, 2013. Publication	<% 1
51	www.sadepartmentwb.org Internet Source	<% 1
52	www.apeop.org.br Internet Source	<% 1

53	www.atkinson-law.com Internet Source	<% 1
54	zoneofarc.files.wordpress.com Internet Source	<% 1
55	www.fenwickelliott.co.uk Internet Source	<% 1
56	www.thomastelford.com Internet Source	<% 1
57	ajce.or.jp Internet Source	<% 1
58	Submitted to University of South Africa Student Paper	<% 1
59	www.minalcon.com Internet Source	<% 1
60	Submitted to University of Melbourne Student Paper	<% 1
61	www.integralsolver.com Internet Source	<% 1
62	Submitted to University of Hong Kong Student Paper	<% 1
63	"Property Developers: Have You Registered As A Home Builder?", Mondaq Business Briefing, April 23 2015 Issue Publication	<% 1
64	Submitted to British University In Dubai Student Paper	<% 1

65	www.scribd.com Internet Source	<% 1
66	91.186.162.87 Internet Source	<% 1
67	"8-K: MULTI FINELINE ELECTRONIX INC.", EDGAR Online-8-K Glimpse, April 29 2009 Issue Publication	<% 1
68	Submitted to University of Stellenbosch, South Africa Student Paper	<% 1
69	www.constructionbooksdirect.com Internet Source	<% 1
70	www.triplethreeelc.com Internet Source	<% 1
71	www.nou.edu.ng Internet Source	<% 1
72	www.google.com.om Internet Source	<% 1
73	www.saflii.org Internet Source	<% 1
74	www.civils.org.za Internet Source	<% 1
75	www.delhimetrorail.com Internet Source	<% 1

76	Submitted to 76830 Student Paper	<% 1
77	www.publicworks.gov.za Internet Source	<% 1
78	www.whichbuildingcontract.co.uk Internet Source	<% 1
79	Submitted to Heriot-Watt University Student Paper	<% 1
80	www.openpm.co.uk Internet Source	<% 1
81	files.shareholder.com Internet Source	<% 1
82	sheqafrica.com Internet Source	<% 1
83	Submitted to University of Southern Queensland Student Paper	<% 1
84	www.greenbuilding.co.za Internet Source	<% 1
85	www.accaglobal.com Internet Source	<% 1
86	Submitted to North West University Student Paper	<% 1
87	progresprogram.org Internet Source	<% 1

88

www2.fidic.org

Internet Source

<% 1

89

www.coursehero.com

Internet Source

<% 1

90

Submitted to Rosebank College

Student Paper

<% 1

91

Winter, Christoph Hans Heinrich (Prof. Dr. Bernd Kochendörfer, Prof. Dr. Dieter Jacob, Prof. Dr. Margit Enke and TU Bergakademie Freiberg, Wirtschaftswissenschaften). "On the Appropriateness of Contractor-Led Procurement", Technische Universitaet Bergakademie Freiberg Universitaetsbibliothek "Georgius Agricola", 2009.

Publication

<% 1

92

Submitted to Erasmus University Rotterdam

Student Paper

<% 1

93

files.ohscon.webnode.com

Internet Source

<% 1

94

www.whitecase.com

Internet Source

<% 1

95

Submitted to Da Vinci Institute

Student Paper

<% 1

96

Submitted to Kingston University

Student Paper

<% 1

97	Submitted to Australian Institute of Business Student Paper	<% 1
98	www.rics.org Internet Source	<% 1
99	Submitted to Emirates Aviation College, Aerospace & Academic Studies Student Paper	<% 1
100	www.fairhousing.org.uk Internet Source	<% 1
101	business.itu.edu Internet Source	<% 1
102	atns.net.au Internet Source	<% 1
103	www.saace.co.za Internet Source	<% 1
104	www.saflii.co.za Internet Source	<% 1
105	Submitted to University of Nottingham Student Paper	<% 1
106	www.sacpcmp.org.za Internet Source	<% 1
107	www.exampmp.com Internet Source	<% 1
108	Submitted to Buckinghamshire Chilterns University College Student Paper	<% 1

109	www.afd.fr Internet Source	<%1
110	Bunni. "A Precise Record of the Alterations, Omissions and Additions in the 1999 Yellow and Silver Books as Compared with the 1999 Red Book", The FIDIC Forms of Contract, 04/04/2005 Publication	<%1
111	www.uniqwa.ac.za Internet Source	<%1
112	www.bradmarine.com Internet Source	<%1
113	Submitted to Chifley Business School Student Paper	<%1
114	archive.org Internet Source	<%1
115	www.saflii.org.za Internet Source	<%1
116	www.sbfpjica.org Internet Source	<%1
117	Submitted to University of Birmingham Student Paper	<%1
118	www.dailytenders.co.za Internet Source	<%1
119	civilengineeringarticles.blogspot.co.uk Internet Source	<%1

120	Submitted to Laureate Higher Education Group Student Paper	<% 1
121	chennaietrorail.gov.in Internet Source	<% 1
122	www.portqasim.org.pk Internet Source	<% 1
123	www.hillintluk.com Internet Source	<% 1
124	thomastelford.com Internet Source	<% 1
125	nihemp.ac.za Internet Source	<% 1
126	www.arcdirectory.co.za Internet Source	<% 1
127	www.ceb.lk Internet Source	<% 1
128	www.upbsn.org Internet Source	<% 1
129	www.bluedesigns.org Internet Source	<% 1
130	Submitted to Queen Mary and Westfield College Student Paper	<% 1
131	Submitted to International University of	<% 1

132	farmsafewa.org Internet Source	<% 1
133	www.mydebtcounselling.co.za Internet Source	<% 1
134	"Analysis of Claims Based on Provisions in 4th Edition of FIDIC Contracts.", NBM & CW, Nov 1 2010 Issue Publication	<% 1
135	Submitted to Leeds Metropolitan University Student Paper	<% 1
136	Submitted to National University of Singapore Student Paper	<% 1
137	www.mbombela.gov.za Internet Source	<% 1
138	Submitted to Singapore Management University Student Paper	<% 1
139	www.wbs.ac.za Internet Source	<% 1
140	Submitted to Loughborough University Student Paper	<% 1
141	www.eletrabrasrondonia.com Internet Source	<% 1

142	Submitted to University of Johannesburg Student Paper	<% 1
143	season2.pmpcafe.com Internet Source	<% 1
144	www.saiv.org.za Internet Source	<% 1
145	www.equalityni.org Internet Source	<% 1
146	www.archi.seoul.kr Internet Source	<% 1
147	www.un.org Internet Source	<% 1
148	www.cuts-international.org Internet Source	<% 1
149	www.ecia.co.za Internet Source	<% 1
150	www.eaab.org.za Internet Source	<% 1
151	www.treasury.gov.za Internet Source	<% 1
152	pm4dev.com Internet Source	<% 1
153	kpwd.gov.in Internet Source	<% 1

154	Internet Source	<% 1
155	yly.fyfz.cn Internet Source	<% 1
156	himachal.nic.in Internet Source	<% 1
157	www.ssinc.co.za Internet Source	<% 1
158	pmbok5.wordpress.com Internet Source	<% 1
159	www.ppaghana.org Internet Source	<% 1
160	Submitted to Massey University Student Paper	<% 1
161	www.epa.gov Internet Source	<% 1
162	keralapwd.gov.in Internet Source	<% 1
163	www.cbe.org.za Internet Source	<% 1
164	www.newsroom.uktradeinvest.gov.uk Internet Source	<% 1
165	www.geomatics.uct.ac.za Internet Source	<% 1
166	69.63.136.221	

167

www.responsivemanagement.com

Internet Source

<% 1

168

www.pmueinrip-binamarga.com

Internet Source

<% 1

169

www.rwi-essen.de

Internet Source

<% 1

170

remrec.org

Internet Source

<% 1

171

Robinson. "Review of the FIDIC Conditions of Contract for Construction (CONS) - 'The Red Book'", A Contractor s Guide to the FIDIC Conditions of Contract Robinson/A Contractor s Guide to the FIDIC Conditions of Contract, 04/20/2011

Publication

<% 1

172

apcbipmp.gov.in

Internet Source

<% 1

173

jkera.org

Internet Source

<% 1

174

www.hklegal.co.uk

Internet Source

<% 1

175

www.isqa.unomaha.edu

Internet Source

<% 1

176

scm4me.blogspot.com

177 pmcompetence.net

Internet Source

<% 1

178 Glover, Jeremy. "Ps - Changes To The FIDIC Form Of Contract.(International Federation of Consulting Engineers)", Mondaq Business Briefing, Nov 28 2016 Issue

Publication

<% 1

179 www.bowman.co.za

Internet Source

<% 1

180 tiasa.org.za

Internet Source

<% 1

181 www.crowell.com

Internet Source

<% 1

182 www.ownerbuilding.co.za

Internet Source

<% 1

183 www.moneyweb.co.za

Internet Source

<% 1

184 natagri.ufs.ac.za

Internet Source

<% 1

185 skemman.is

Internet Source

<% 1

EXCLUDE QUOTES OFF

EXCLUDE
BIBLIOGRAPHY ON

EXCLUDE MATCHES < 5 WORDS