AN INVESTIGATION OF THE RELATIONSHIP BETWEEN MAIN CONTRACTORS AND SUBCONTRACTORS IN THE ZAMBIAN CONSTRUCTION INDUSTRY

By

Tafadzwa Mudzvokorwa

A dissertation submitted to the University of Zambia in partial fulfilment of the requirements for the Degree of Master of Engineering in Project Management

The University of Zambia
School of Engineering
Lusaka

2016

DECLARATION

I hereby declare that this dissertation is entirely my own work except as specified in acknowledgements and that neither the dissertation nor the original work contained therein has been submitted to this or any other institution for a higher degree.

Signature…….

Date……..

Supervisor: Dr Erastus Mwanaumo

Signature…….

Date……..

Supervisor: Ms Balimu Mwiya

Signature…….

Date……..

CERTIFICATE OF APPROVAL

This dissertation of Tafadzwa Mudzvokorwa is approved as fulfilling the requirements for the award of the degree of Master of Engineering in Project Management by the University of Zambia.

NAME	**SIGNATURE**
_____	_____
External Examiner	
_____	_____
Supervisor and Internal Examiner	
_____	_____
Internal Examiner	
_____	_____
Dissertation Chairperson	

ABSTRACT

In recent years there have been a substantial number of projects conducted in the Zambian construction industry. Due to the magnitude and complexity of many of these projects, contractors have resorted to subcontracting to share responsibilities and mitigate project risks. The Zambian government has also invigorated the practice of subcontracting in the construction industry as it plays an important role in increasing economy viability and building capacity. Instead of improving project success, subcontracting can act as a catalyst for poor project outcomes. Though there are many reasons that contribute to problems from subcontracting, a poor relationship between main contractors and subcontractors can be seen as a notorious contributor affecting construction works.

The study aimed at investigating the relationship between the main contractors and subcontractors in the Zambian construction industry and recommend a framework that can be implemented to better the relationship. The study also examined the effects of a poor interface between main contractors and subcontractors in Zambia. Data collection techniques used included literature review, interviews and questionnaire surveys. The relative importance index was used to determine the ranking of the results of the study. Using the results adduced from the study a main contractor-subcontractor non-contractual partnering model was developed.

The study established that the relationship between main contractors and subcontractors in Zambia is poor therefore needing attention. Interface problems were caused by payment issues, poor communication, unexpected price escalations and poor construction work. In order to address interface problems, the study found that there was need for better communication between the parties, timely payments and subcontractors' access to labour and machinery. However, the study, had some limitations that need consideration when interpreting the results found. The limitations included scarcity of specific literature on subcontracting in the Zambian construction industry, the size of the sample only being limited to Lusaka. Nevertheless, these limitations could be addressed through further studies.

Keywords: Construction industry, Main contractor, Subcontractor, Partnering, Zambia

ACKNOWLEDGMENTS

First and foremost, I would like to thank the almighty God for enabling me to pursue my studies and for giving me the strength and health. Without Him, I would be nothing.

I would also want to extend my gratitude to Ms. Mwiya for her patience and pertinent guidance during the course of study. My heartfelt gratitude to Dr Mwanaumo for his support and guidance. Many thanks to the University of Zambia for providing the necessary facilities.

Further gratitude goes to my mother and brother; they mean all to me and I did this for them.

TABLE OF CONTENTS

LIST OF FIGURES xii

LIST OF TABLES xiii

LIST OF ABBREVIATIONS xiv

CHAPTER 1: ..... - 1 -

INTRODUCTION ..... - 1 -

1.1. Background ..... - 1 -

1.2. Problem statement ..... - 2 -

1.3. Research questions ..... - 3 -

1.4. Aim of the study ..... - 3 -

1.4.1. Specific objectives ..... - 3 -

1.5. Importance of the study ..... - 4 -

1.6. Brief research methodology ..... - 5 -

1.7. Organisation of the dissertation ..... - 6 -

1.8. Chapter summary ..... - 7 -

CHAPTER 2: ..... - 8 -

LITERATURE REVIEW ..... - 8 -

2.1. Introduction ..... - 8 -

2.2. Subcontracting ..... - 8 -

2.2.1. Types of subcontractors ..... - 10 -

2.2.2. Selection of subcontractors ..... - 11 -

2.3. Subcontracting in the Zambian construction sector ..... - 13 -

2.3.1. 20% subcontracting policy ..... - 13 -

2.3.2. Types of subcontractors ..... - 15 -

2.4. The relationship between the main contractor and subcontractors ..... - 15 -

2.4.1. Types of relationships ..... - 17 -
2.4.2. Factors contributing to relationship problems ..... - 18 -
2.4.3. Impacts of interface problems ..... - 26 -
2.4.4. General solutions to interface problems ..... - 27 -
2.5. Partnering ..... - 29 -
2.5.1. Definition of partnering ..... - 30 -
2.5.2. Types of partnering ..... - 31 -
2.5.3. Benefits and difficulties of partnering ..... - 33 -
2.6. Chapter summary ..... - 42 -
CHAPTER 3: ..... - 43 -
RESEARCH METHODOLOGY ..... - 43 -
3.1. Introduction ..... - 43 -
3.2. Research methodology ..... - 43 -
3.3. Research approaches ..... - 43 -
3.4. Research design ..... - 44 -
3.5. Research strategy ..... - 46 -
3.5.1. Experiment ..... - 46 -
3.5.2. Action research ..... - 46 -
3.5.3. Archival research ..... - 46 -
3.5.4. Survey ..... - 47 -
3.5.5. Grounded theory ..... - 47 -
3.5.6. Case study ..... - 47 -
3.5.7. Ethnography ..... - 48 -
3.6. Data collection ..... - 48 -
3.6.1. Primary research ..... - 48 -
3.6.2. Secondary research ..... - 55 -

3.7. Processing and analysis ..... - 58 -
3.7.1. Relative importance index ..... - 58 -
3.7.2. Average rating ..... - 59 -
3.8. Sampling ..... - 60 -
3.8.1. Probability sampling ..... - 60 -
3.8.2. Non-probability sampling ..... - 61 -
3.8.3. Response rate ..... - 63 -
3.9. Chapter summary ..... - 64 -
CHAPTER 4: ..... - 66 -
ANALYSIS AND DISCUSSION OF RESULTS ..... - 66 -
4.1. Introduction ..... - 66 -
4.2. Questionnaire data and analysis ..... - 66 -
4.2.1. Section one: respondents' general information ..... - 67 -
4.2.2. The main contractor-subcontractor relationship ..... - 70 -
4.2.3. Interface problem caused by main contractors ..... - 73 -
4.2.4. Interface problem caused by subcontractors ..... - 75 -
4.2.5. Interface problem caused by other factors ..... - 76 -
4.2.6. Top ten factors out of all the factors combined ..... - 77 -
4.2.7. Improving the interface between main contractors and subcontractor….. ..... - 80 -
4.3. Interview data and analysis ..... - 84 -
4.3.1. Interviewee general information ..... - 84 -
4.3.2. Involvement in a project affected by main contractor-subcontractor relationship. ..... - 87 -
4.3.3. Factors that contribute to relationship problems. ..... - 87 -
4.3.4. Factors that can improve the relationship ..... - 88 -

4.3.5. Contractual factors ..... - 89 -
4.3.6. Effect of nominated subcontractors ..... - 90 -
4.3.7. Effect of the 20% subcontracting policy ..... - 90 -
4.3.8. Subcontracting practice in Zambia ..... - 90 -
4.3.9. Improving the Zambian subcontracting environment ..... - 91 -
4.4. Summary of top factors ..... - 92 -
4.5. Chapter summary ..... - 93 -
CHAPTER 5: ..... - 94 -
THE PARTNERING PROCESS FLOWCHART MODEL ..... - 94 -
5.1. Introduction ..... - 94 -
5.2. Development of a non-contractual project partnering model ..... - 94 -
5.2.1. Decision to adopt partnering ..... - 98 -
5.2.2. Self-assessment ..... - 98 -
5.2.3. Engagement of facilitator ..... - 98 -
5.2.4. Partnering awareness training ..... - 99 -
5.2.5. Making the offer to partner ..... - 99 -
5.2.6. Kick-off partnering workshop ..... - 99 -
5.2.7. Follow-up partnering workshops ..... - 100 -
5.2.8. Facilitated dispute resolution session ..... - 100 -
5.2.9. Closeout workshop ..... - 101 -
5.2.10. Continuous improvement ..... - 101 -
5.3. Chapter summary ..... - 101 -
CHAPTER 6: ..... - 102 -
CONCLUSIONS, STUDY LIMITATIONS AND RECOMMENDATIONS .... - 102 -
6.1. Introduction ..... - 102 -
6.2. Conclusions ..... - 102 -

6.2.1. Nature of the relationship between main contractors and subcontractors in Zambia and how it was affecting projects.....- 102 -

6.2.2. Establish the factors leading to contention between subcontractors and main contractors in Zambia.....- 102 -

6.2.3. Establish factors that contribute to an effective interface between subcontractors and main contractors in Zambia.....- 103 -

6.2.4. Options to ensure relationship between main contractors and subcontractors in Zambia support the attainment of project goals.....- 103 -

6.3. Recommendations .....- 104 -

6.4. Limitations of the study.....- 104 -

REFERENCES.....- 106 -

APPENDICES.....- 117 -

APPENDIX 1: Questionnaire Cover Letter .....- 119 -

APPENDIX 2: Questionnaire.....- 120 -

APPENDIX 3: Structured interview guide .....- 125 -

LIST OF FIGURES

Figure 2.1: Contribution of Zambian Construction Industry to GDP (CSO, 2014) .....- 13 -

Figure 3.1: Flow Chart of Research Process. .....- 45 -

Figure 4.1: Percentage breakdown by respondents' sector in construction industry…. .....- 67 -

Figure 4.2: Percentage breakdown by respondents' management position.....- 68 -

Figure 4.3: Percentage breakdown by respondents' experience in construction industry.....- 69 -

Figure 4.4: Percentage breakdown by respondents' academic qualification.....- 69 -

Figure 4.5: Respondents perception on the relationships between main contractors and subcontractors.....- 70 -

Figure 4.6: Rating of relationship attributes .....- 71 -

Figure 4.7: Effects of a poor relationship between the main contractors and subcontractors.....- 72 -

Figure 5.1: Non-contractual project partnering model.....- 97 -

LIST OF TABLES

Table 2.1: *Content analysis of literature reviewed*.....- 35 -

Table 4.1: *Factors causing interface problems between main contractors and subcontractors caused by main contractors*.....- 73 -

Table 4.2: *Factors causing interface problems between main contractors and subcontractors caused by subcontractors*.....- 75 -

Table 4.3: *Factors causing caused by the external factors* .....- 76 -

Table 4.4: *Top ten factors causing interface problems between main contractors and subcontractors*.....- 77 -

Table 4.5*: Top ten attributes that can enhance the relationship between the main contractors and subcontractors by respondent category*.....- 80 -

LIST OF ABBREVIATIONS

ASAP	Accelerated Subcontracting and Procuring
CIDB	Construction Industry Development Board
CSO	Central Statistical Office
GDP	Gross Domestic Product
LPS	Last Planner System Approach
NCC	National Council for Construction
RDA	Road Development Agency
SCM	Supply Chain Management
SPEM	Subcontractor Performance Evaluation Model
UK	United Kingdom
WBS	Work Breakdown Structure
WEBES	Web-Based Subcontractor Evaluation System

CHAPTER 1:
INTRODUCTION

1.1. Background

The construction industry contributes significantly towards the economic output of a country (Mirawati et al., 2015). In 2014 the United Kingdom's (UK) construction industry contributed £103 billion in economic output which is 6.5% of the total. It also created 2.1 million jobs which was 6.3% of the UK total employment (Rhodes, 2015). In Zambia, the construction industry comprised 9.9% of the total national Gross Domestic Product (GDP) in 2014 and had a growth rate of 8.9% from 2013 (Central Statistical Office (CSO), 2016). For that reason, the construction sector is among the major economic sectors that contribute significantly towards the economic growth of Zambia.

Subcontracting is a major aspect of construction projects and its importance has increased in recent years (Ujene et al, 2011). Rajput and Agarwal, (2015) noted that 80 to 90% of the work on construction projects is performed by subcontractors. The rise in subcontracting is primarily due to projects becoming more complex and challenging owing to technical advances, tighter regulations and need for effective management of resources for a competitive edge (White and Marasini, 2014). The increase in complexity and size of construction projects, has made it impracticable for an organisation to develop expertise in all trades and disciplines required in the execution of the project (Construction Industry Development Board (CIDB), 2013). Therefore, contractors have exerted to subcontracting, to allow for specialisation (Okunlola, 2015).

Assigning work to a subcontractor reduces work load and limits the contractors risk exposure (Abdullahi, 2014). Subcontracting also assists with timely completion, improved quality, innovativeness and enhanced performance in environmental, health and safety issues on projects (Eriksson & Westerberg, 2011). However, subcontracting is seen as risk to construction projects (Yoke-Lian et al, 2013). This is because it can lead to poor project outcome (Ujene et al., 2011). A major aspect that

contributes to the degree of success or failure of projects which are subcontracted is the relationship between main contractors and subcontractors (Jin et al., 2013; Okunlola, 2015; White & Marasini, 2014).

When practicing subcontracting, interface problems can arise, for example, the lack of cooperation, and ineffective communication leading to an adversarial relationship between the main contractor and subcontractor (Huang et al, 2008). This kind of relationship induces project delays, cost overruns, litigations, and compromise project quality (Meng, 2012). However, a better interface between project parties can be used to ensure project success or even improve performance (Vilasini et al, 2012; Eom et al, 2015). This statement is reinforced by Eriksson and Westerberg (2011) who showed that the strategic alliances between contractors and subcontractors produce superior client satisfaction because of the overall improvement of on-site construction activities.

1.2. Problem statement

Subcontractor related problems are quoted as one of the main risk to construction projects (Mirawati et al., 2015). Problems with subcontractors have been identified as some of the factors contributing to delays in Malaysian and United Arab Emirates construction industry (Yoke-Lian et al, 2013). In Nigeria, Ujene et al., (2011) recognised subcontracting to be affecting the quality of projects. A study done in Zambia also identified that subcontracting is one of the causes of project schedule overruns (Kaliba, 2010). However, the issues arising from subcontracting have not been addressed and very little research has been conducted in Zambia to improve the subcontracting practice in particular the operational relationship between main contractors and subcontractors.

Realising the importance of subcontracting in developing the local contractors and providing employment, the Road Development Agency (RDA) has implemented the 20% subcontracting policy which has augmented the practice of subcontracting in Zambia. However, no research has been done on the practice of subcontracting to ensure that subcontracting is being practiced effectively and its benefits are being

experienced and not affecting the degree of project success in the construction industry. Therefore, the aim of this study is to investigate the relationship between subcontractors and main contractors and its effects on projects in the Zambian construction industry.

1.3. Research questions

1. What is the nature of the relationship between main contractors and subcontractors in the Zambian construction industry?
2. What are the factors that contribute to contention between subcontractors and main contractors in Zambia?
3. What are the factors that can help create a better interface between subcontractors and main contractors in Zambia?
4. What framework can be followed to ensure relationship between subcontractor and main contractor support the attainment of project goals in Zambia?

1.4. Aim of the study

The aim of this study is to investigate the relationship between subcontractors and main contractors and its effects on projects in the construction industry.

1.4.1. Specific objectives

Thus the specific objectives of this research are to:

1. Determine the nature of the relationship between main contractors and subcontractors in Zambia and how it is affecting projects.
2. Establish the factors that lead to contention between subcontractors and main contractors in Zambia.
3. Establish factors that contribute to an effective interface between subcontractors and main contractors in Zambia.
4. Suggest possible options that can be followed to ensure relationship between main contractors and subcontractors in Zambia support the attainment project goals.

1.5. Importance of the study

At the commencement of this research there was very limited information on the subcontracting practice in Zambia. Therefore, the successful completion of this study brings forth important information on subcontracting in the Zambian construction industry. This information is intended to improve the construction industry and promote project success by providing a better means of practice.

Construction activities in Zambia are primarily undertaken by foreign and local contractors, registered by the National Council for Construction (NCC). According to the NCC Annual Report, (2012), there were 3,887 registered contractors in Zambia of which, 3,732 were Zambian entities and 155 were foreign companies. 54% of the total registered contractors in that year were in Grade 6 which is the lowest category and most of the contractors being involved in building activities. The grade 1 category, the highest denomination only had 4% of the registered contractors and most of them foreign entities. Figure 1.1 illustrates the ratio of local contractors to foreign contractors in grade1.

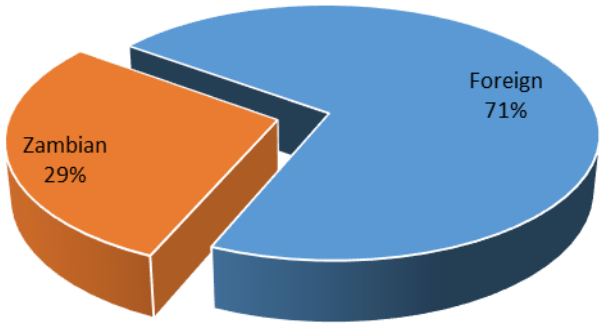

Figure 1.1: Ratio of Local versus Foreign Contractors in NCC Grade 1

This means most local contractors are not able to compete for a bid for major construction projects on the market which are dominated by a few, construction multinational enterprises. The local contractors resort to subcontracting work from large, multinational enterprises. This means subcontracting is very important in

providing opportunities for the local contractors. Deductions from this research will help local contractors to practice subcontracting effectively and also assist prospective local contractors to have means of best practice.

Subcontracting enables skills transfer from bigger well-established main contractors to small local subcontractors (CIBD, 2013). Therefore, in order for the small local contractors to develop and be able to compete with multinational contractors for major project they should be involved in many successful subcontracting arrangements. The findings from this research will provide information that will equip subcontractors to perform well in subcontracting hence betterment the reputation, experience and knowledge in order to promote local contractors moving from lower grades to higher grades of contractors.

1.6. Brief research methodology

The research methodology explains the way in which the research was carried out. It includes the research design, population, sample size, data collection, instrument design, instrument validity, pilot study, and the method of data processing and analysis. This research was designed to be conducted in the following stages:

Stage 1: Literature review

This stage involves the systematic reviewing of relevant literature on the research subject. Various literature related to subcontracting in the construction industry were reviewed. Literature reviewed covered areas about subcontractor selection, subcontracting in Zambia, conflicts and issues between main contractors and subcontractors and how to improve the relationship. This was done for the researcher to understand the subject, recognise what other researchers have previously achieved and lastly to prepare the research methodology appropriate for the research.

Stage 2: Study design

The next stage after an extensive review of literature was to design an approach that would allow for the collection of relevant data. A mixed method approach was adopted in this research. Where qualitative and quantitative methods were used

simultaneously. Therefore, structured interviews were conducted and questionnaires were designed and distributed by the researcher to collect information.

Stage 3: Data collection

After the development of the questionnaire, it was distributed among the contractors, consultants and clients in the construction industry. Data was collected from personnel in the construction industry in Lusaka the capital city of Zambia who are currently working or have worked on a completed or on-going construction project. The data collected was to help obtain the perspectives of practitioners regarding the relationship between contractors and subcontractors.

Stage 4: Data analysis and recommendations

The data collected was analysed using Microsoft Excel program. After the analysis of data collected the researcher came up with a conclusion on the relationship between contractors and subcontractors in Zambia. The last step was suggesting recommendations for a better interface and areas for further studies.

1.7. Organisation of the dissertation

The report is organized in seven chapters.

Chapter 1: Introduction – this is a general introduction to the topical area. It outlines the background, rationale, aim and objectives of the study. It also presents the achievements recorded in the study.

Chapter 2: Literature review – This chapter lays a foundation of the study through the review of literature relevant to the relationship between main contractors and subcontractors in construction industry. Literature review gives the reader knowledge and ideas that have already been established by other researchers.

Chapter 3: Methodology – The purpose of this section is to highlight the various research methodologies and the justification for the method adopted for the study.

This chapter presents the methods and plans used by the researcher to collect, analyse and interpret information.

Chapter 4: Findings and Data Analysis – This chapter serves to provide the reader with an overview of the significant findings from the research and their denotation.

Chapter 5: The Partnering Processes Flowchart Model – This chapter provides the suggested procedures that should be followed when implementing non-contractual project partnering between main contractors and subcontractors.

Chapter 6: Conclusions, Study Limitations and Recommendations – this chapter gives an overview of the study. Provide conclusions drawn from findings and recommendations based on the conclusion. It also states the limitations of the study

1.8. Chapter summary

This chapter provided an introduction of the topic to be studied and a brief overview of subcontracting. The use of subcontracting in the construction industry, its benefits, challenges encountered and the importance of the relationship between main contractors and subcontractors. The chapter also highlighted the study justification, objectives, summary of the research methodology and report layout. The next chapter will present a review of various literature reviewed on subcontracting and the relationship between main contractors and subcontractors.

CHAPTER 2:
LITERATURE REVIEW

2.1. Introduction

The previous chapter conveyed an introduction of the study. It presented an overview of subcontracting, its application in construction projects and also its benefits. The chapter presented the rationale and objectives of the research. This chapter presents a review of available literature on subcontracting and its application in the Zambian construction projects. The benefits of subcontracting and importance of the main contractor-subcontractor relationship were emphasised. However, it was shown that little attention was being paid to this relationship as a result a poor relationship typically exists between main contractors and subcontractors. The poor relationship affects projects negatively resulting in difficulties including disputes, cost and schedule overruns and poor work quality. A number of factors that contribute to a poor relationship were delineated. In addition, a number of methods suggested by researchers to resolve the relationship were outlined.

2.2. Subcontracting

A subcontractor is an individual or company hired by a general contractor to perform part or all of the obligations of the general contractor's contract. Since subcontractors are usually specialist in the execution of a specific job, they are ordinarily hired by contractors when the contractor lacks expertise in a specific type of work on the project (Okunlola, 2015). Subcontracting enables the contractor to limit their risk exposure and enables the expansion of the available workforce so that there are more opportunities to bid on new projects (Abdullahi, 2014). In construction projects, a typical group of subcontractors that will work on a project may include such diverse trades as electrical, steel erection, roofing and drywall to name a few. However, Smith and Hinze (2011) clarified that the range of opportunities for subcontractor is not limited to construction as it is possible for subcontractors to operate in the information technology and information sectors of business.

The practice of subcontracting offers several advantages over internalisation, such as production efficiency and organisational flexibility. Assigning work to a subcontractor reduces work load and limits the contractors risk exposure (Fah, 2006). Eriksson and Westerberg (2011) advocated that, subcontractor integration in projects can also assist with timely completion, improved quality, innovativeness and enhanced performance in environmental, health and safety issues in projects. Moreover, subcontractors play an important role in a construction project as they make up for the lack of manpower and technical know-how either, reduce costs and help mitigate project risks (Abdullahi, 2014).

Subcontracting is not only beneficial to the main contractor but also to a country's economy (Arditi and Chotibhongs, 2005). The benefits that can be expected from subcontracting from an economical point of view are; contractor development, global competitiveness, sustainable business growth, good environmental management and socio-economic development of developing countries (Dlungwana and Rwelamila, 2005). In Japan, subcontracting has been regarded as an important source of efficiency and competitiveness for industries in textiles, general machinery, electric machinery and automobiles (Mihara, 2015).

Due to the benefits of subcontracting and the increase in number and complexity of projects, there has been increased dependence on subcontracting within the construction industry (White and Marasini, 2014). In the South African construction industry, up to 70% of building and 30% of civil construction projects are subcontracted out (CIDB, 2013). Because of the increased dependence on subcontracting in the construction industry, the operational interface between main contractors and subcontractor has become an important aspect to successful project delivery (Akintan & Morledge, 2013).

An interface can be defined as a dimension between two parties that can mutually influence each other (Huang et al, 2007). Construction project involves so many parties, such as owners, designers, construction contractors, subcontractors, maintenance contractors, and material suppliers. Not managing the interface between

these parties can lead to cost overruns, project delays, litigations, and compromising project quality (Huang et al, 2007). On the contrary, a good relationship will sustain the project from planning until handover (Gadde and Dubois, 2010). A healthy relationship also possesses advantages to both the main contractors and subcontractor. For main contractors, good relationships with their subcontractors reduce the risk of poor quality work as well as cost and time overruns. Whereas for subcontractors the benefits are preferential status when bidding for work as well as support and guidance during the construction process.

However, the increase in complexity, the over-supply of specialist firms, and the declining construction output has cultivated an adversarial atmosphere which has had a negative effect on main contractor and subcontractor relationships (Matthews et al, 2000). Furthermore, relationship studies between main contractor and subcontractor have received little to no attention (Bankvall et al, 2010). This is detrimental considering the relevance the relationship has to the projects.

2.2.1. Types of subcontractors

In construction projects there are three main categories of subcontractors (CIDB, 2013), subcontractors can be identified as:

- specialist subcontractors; these are subcontractors that perform specialist services on a project. The works are typically building or engineering services such as electrical, ventilating, plumbing, heating, and air-conditioning;
- generalist and specialist trade subcontractors; this category generally consist of main contractors that use subcontracting as a means to get work when they are not under a contract. The subcontractors here offer general trade services or specialise on specific trades such as painting and brickwork; and
- labour-only subcontractors; these are skilled tradesmen that mainly perform labour-only services on a project. The main contractor will provide the materials and supervision.

However, Mbachu (2008) revealed that subcontractors can also be categorised from a contractual point of view, the categories are as follows:

- selected subcontractors, these are subcontractors solicited from a list that has been recommended in the tender documents as potential subcontractors;
- domestic subcontractors, these are hired by the main contractors to perform specific responsibilities; and
- nominated subcontractors, these are subcontractors that are nominated by the client or client's agent to perform specified task for the main contractor on a project.

2.2.2. Selection of subcontractors

Subcontractors play a vital role in executing significant portions of construction work on a project. Therefore, one of the most important factors to ensuring project success is having the correct subcontractor. This is because choosing the right subcontractor for the job influences, the parties' relationship and the quality of work. Consequently, it is important that the most appropriate subcontractors for relevant sub-works is selected during the bidding process. Tayeh (2009) emphasised this by stating that selecting the most appropriate subcontractors for the relevant work is highly critical for the overall project performance. During the bidding process optimum selection of subcontractors is vital for an accurate and realistic bid proposal. However, the importance of subcontractor selection is mostly underestimated and neglected in construction and little research has been conducted to aid general contractors in their selection of subcontractors (El-Mashaleh, 2009).

The selection techniques created by the researchers, call for an assessment that includes multiple criteria to make selection decisions. These techniques are there to diminish current practices which rely heavily on subcontractor's bid proposal to make selection decisions. A majority of the techniques of subcontractor selection are based on a set of subjective criteria, these are; performance on previous projects, financial strength, completion on time, safety record, timely payment to labour and suppliers (El-Mashaleh, 2009).

Haksever et al, (2001) conveyed that main contractors use commercial aspects as the overriding features in selecting a subcontractor, such as: experience in similar projects, previous project performance, previous disputes, current workload and price of bid. Several papers concluded that the lowest bid price is usually the key determinant factor for selecting subcontractors by general contractors (Luu and Sher, 2006). However, Arslan et al. (2008) argued relying on bid price for selecting a subcontractor may cause poor quality of work, delays and costs overruns that can cause major losses for construction companies in the long run.

Recently researchers have devised a number of models for subcontractor selection to assist the main contractor's decision making process in choosing a subcontractor. Ko et al. (2007) developed a selection model called the Subcontractor Performance Evaluation Model (SPEM). The model considers; construction method, duration, control ability, services after work completion, collaboration with other subcontractors, corporative manner and material wastage as crucial factors for subcontractor selection.

Tserng and Lin (2002) proposed an Accelerated Subcontracting and Procuring (ASAP) model. The model helps general contractors to select subcontractors by deciding on an appropriate trade-off between risk and profit for different combinations of subcontractors. ASAP is based on the assumption that all considered subcontractors are recognized as qualified subcontractors for the particular job.

Arslan et al (2008) highlighted that some of the proposed methods and approaches by researchers are complex and difficult to apply in practice. Arslan et al (2008) proposed a simple and user-friendly system model called web-based subcontractor evaluation system (WEBSES). The evaluation process is done using a weighted average score for considered subcontractors based on 25 evaluation criteria, which are assumed of identical importance.

2.3. Subcontracting in the Zambian construction sector

Subcontracting is extensively used in the construction industry as it allows the main contractors to employ a minimum workforce in construction projects and promotes specialization (Chung et al, 2003). In some cases, the main contractors will only act as construction management agents in construction projects and subcontract a large volume of their work to subcontractors. Like many countries with an increasing construction industry, Zambia has also augmented the practice of subcontracting in recent years. Figure 2.1 illustrates the growth in the Zambian construction industry.

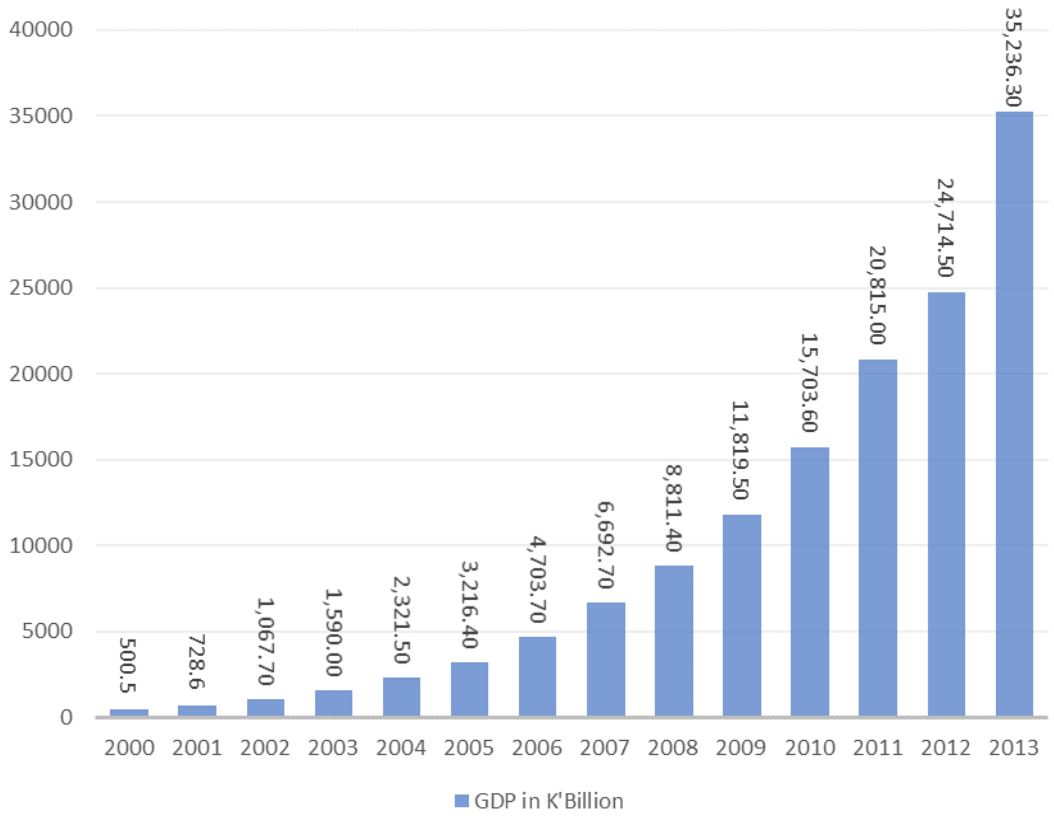

Figure 2.1: Contribution of Zambian Construction Industry to GDP (CSO, 2014)

Another aspect that has augmented the practice of subcontracting in the Zambian construction industry is RDA's 20% subcontracting policy.

2.3.1. 20% subcontracting policy

Zambia is a country that is aspiring to be a prosperous middle income Nation by 2030. A document named vision 2030 outlines in what manner Zambia aspires and

will work towards being a strong and dynamic middle-income industrial nation that provides opportunities for improving the wellbeing of all, embodying values of socio-economic justice. One of the objectives for economic growth is by promoting strong entrepreneurial capabilities, self-reliant, outward looking and enterprising, where nationals can take advantage of potential and obtainable opportunities giving opportunities for all citizens to become resourceful and prosperous nationals (Republic of Zambia, 2006). As a result, the government has encouraged Zambian citizens to participate in economy building activities and one of the major ones being contracting in the construction industry through subcontracting.

Acknowledged the significance of subcontracting in the Zambia, a ministerial statement was then issued on July 25, 2012 directing RDA to ensure a minimum of 20%subcontracting on all major road contracts to Zambian-owned Companies with shareholding structure as specified in the CEE Act No.9 of 2006. This statement was passed on in order to:

- empower local contractor hence encourage subcontracting among Zambians;
- this will then help in creating jobs for Zambian citizens;
- hence creating sustainable local contracting capacity and the systematic and subsequent upgrade of Zambian contractors from grade six through to grade one; and
- ultimately retaining capital in the country by reducing the number of foreign contractors hired to do projects in Zambia.

Despite all the benefits of subcontracting, without proper management its benefits cannot be fully experienced in reality it can turn out to be a loss. Many of the projects in Zambia have been delayed due to issues between main contractor and subcontractor (Kaliba, 2010).

2.3.2. Types of subcontractors

In Zambia the subcontractors are categorised into two groups: the domestic subcontractor and nominated subcontractor. A domestic subcontractor is a subcontractor who contracts with the main contractor to supply or fix any materials or goods or execute work forming part of the main contract. Basically this is a subcontractor that is employed or named by the main contractor. A nominated subcontractor is a subcontractor who is stated in the contract as being nominated or a subcontractor instructed to the main contractor by the client to employ. The most common type of subcontractor in Zambia is the domestic subcontractor. Nominated subcontractors are usually specialists for example on bridges, piling, electricals, surfacing.

2.4. The relationship between the main contractor and subcontractors

The oxford dictionary defines a relationship as the way in which two or more concepts, objects, or people are connected, or the state of being connected. In a construction project the important relationships are between parties involved in the supply chain. The supply chain in the construction industry involves a set of companies that form an activity chain. Here the output of another activity is the input to the next. Therefore, ideal relationships between parties in the supply chain is essential to the project success (Beach et al, 2005). As a result, many organisations have sought to improve the supply chain relationships in recent years (Beach et al, 2005). However, Beach et al, (2005) noted that in many project environments the concern and improvements in operational relationship has not been significant at the lower levels in the supply chain. Figure 2.2 shows the interconnectivity of activities and relationships in the construction industry supply chain in the UK.

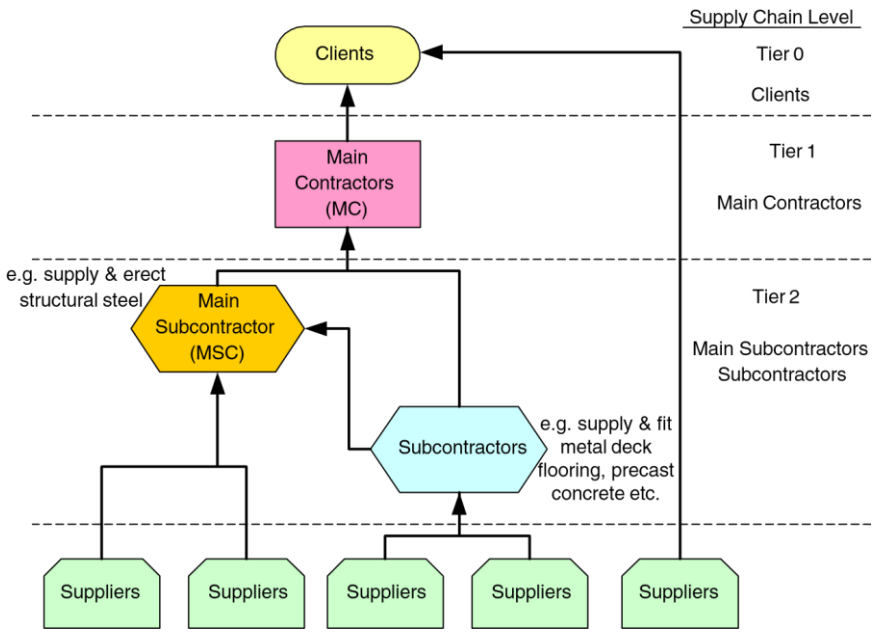

Figure 2.2: The UK construction industry supply chain

Source: (Beach et al, 2005)

The interaction between head contractor and subcontractor on the supply chain often contributes to the degree of success or failure of any large-scale construction project (Jin et al, 2013). Meng, (2012) revealed project poor performance can be effectively reduced by improving some aspects of this relationship. On the other hand, when the interface is not properly managed the likelihood of project poorly performing is increased (Meng, 2012). If the contractual and personal features of the relationship between the main contractor and their subcontractors are uncertain, the likelihood of disputes arising is significantly increased. Disputes and conflicts between main contractors, subcontractors and other project participants often result in costly litigation and dissatisfied customers (Dossick and Schunk, 2007). It is therefore inarguable that the effective management of the interface between the main contractor and subcontractor can significantly increase the chances of project success.

In spite of its importance, and its effect on projects, the construction industry places very little emphasis on the main contractor-subcontractor relationship. The relationships between main contractors and subcontractors are often characterized as being strained by conflict and mistrust. The relationships are mostly transactional in

nature and this enables the main contractor to effectively allocate excessive risk to the subcontractor (Miller et al. 2002). Miller et al, (2002) reiterated that the poor relationships between main contractors and subcontractors are contributed by the traditional procurement procedures based on price. The relationships between the general contractor and the subcontractors can mostly be characterized as pure competitive market relationships. As a result, the heavy reliance on competitive tendering for acquiring subcontracted works result in adversarial attitudes between the two parties. The main contractors mostly seek cost reductions rather than expertise and mutual cooperation from subcontractors. The relationship also involves a significant amount of uncertainty (Jin et al, 2013). The uncertainties usually stem from the nature of the construction process and others from the uncertainty of a potential partner's performance during the construction process.

2.4.1. Types of relationships

The construction industry supply chain relationships are quite diverse, among which three distinct forms are; the traditional relationship, the project partnering relationship and strategic partnering relationship (Meng, 2012). The traditional relationship is a purely contractual relationship. This is usually a one-off contract setting, where companies are engaged through a competitive environment. It is criticised by many researchers as it often leads to selfish objectives, poor communication, a lack of trust among the parties, confrontations, problem escalation, and a lack of continuous improvement (Meng, 2012).

On the other hand, partnering is encouraged by many researchers because it is recognised a collaborative supply chain relationship (Meng, 2012). There are no fixed definitions used when defining partnering although common themes prevail in the relationship the relationship is based on trust, dedication to common goals, and an understanding of each other's individual expectations and value (Matthews et al, 2000). Partnering can be classified into project partnering focused on a single project and strategic partnering based on multiple projects.

2.4.2. Factors contributing to relationship problems

Researchers in recent years have conducted research in order to resolve the interface issues. Many factors have been identified as the causes to an ineffectual interface between the main contractor and the subcontractor in projects. For example, in Malaysia the lack of subcontractor skills was found to be one of the major contributor to contractor subcontractor relationships problems, causing delay in 78 construction projects studied (Kadir et al, 2005). Other than causing delay, coordination problems with subcontractor affected the construction labour productivity of residential projects in Malaysia (Alaghbari et al, 2007). From the reviewing and analysis of various literature related to main contractor and subcontractor relationships, key words or factors that lead to an ineffectual interface were collected. The following are the major causes of a poor interface between the main contractor and subcontractor extracted from various literature.

a) Factors caused by main contractors or subcontractors

From literature review a number of factors were identified as causing interface problems between main contractors and subcontractors. Most of these factors are within the control of the main contractor or the subcontractor and can be solved by these two parties. The factors include, communication problems, payment problems, non-adherence to the construction schedule, revisions, multilayer subcontracting, poor quality work, lack of trust, health and safety, bid shopping, takeover of equipment.

i) Communication

Communication is described as the imparting or exchanging of information by speaking, writing, or using any other medium. During a construction project there are many parties that are involved. Often in large projects a contractor can work with several subcontractors which means for the subcontractor to do work accordingly and to be in sync with the main contractor proper communication is required. Briscoe et al, (2005) discussed that communication exchange requires effective communication systems for safeguarding appropriate dependable flows of information in a project.

Lack of proper communication between parties in a project is recognised as one of the major causes of delays in Malaysian construction industry (Sambasivan and Soon, 2007). Fearne and Flower, (2006) described the absence of coordination and communication integrated along with adversarial and disjointed relationships between involved parties in a project as a primary reason for the perceived poor construction supply chain.

Proper communication between the main contractor and the subcontractor is vital for a project to be successful. An effective communication structure that exists throughout the whole project is essential to ensure project success. There are various aspects that make the communication between the main contractors and contractor to be effective. Main aspects are the means of communication, the timing of communication and amount of information communicated. The means used for communication between the parties in the project is important and requires special attention. Normally, communication among construction parties could be done verbally, face to face or by phone calls, or written such as normal mail, memo, facsimile or other means. However, Eriksson, (2015) noted that more face to face meetings on projects can strengthen integration in construction projects.

Conflicts could rise due to poor communication, when information is communicated from main contractor to subcontractors in the dying moments of a scheduled task. This will likely put pressure on subcontractors because of insufficient time for planning, scheduling, preparation and execution of the task. As a result, the products or work will likely not meet the highest quality, or even less than the desired by the main contractor and this can cause relationship problems between the main contractor and subcontractor (Huang et al, 2008).

ii) Payment problems

In many cases subcontractors claimed to have experienced some form of payment delay from the main contractors that is not linked to any work or service on the part of the subcontractor (CIBD, 2013). These delays in the payment have significant effects on subcontractors who as small companies are more vulnerable to cash flow

delays. Payment problems are more prevalent in private sector projects since in public sector projects, subcontractors have some protection from the client (CIBD, 2013).

Payment delays may occur when the main contractor face financial problems during a project usually due to poor management, meagre cost estimates or payments delayed by the owner. Such problems can delay the payment of funds to the subcontractor hence delaying work. In construction, timely payment of the subcontractor is regarded as one of the most serious aspects to resolve in order to create and maintain a long term relationship between the contractor and the subcontractor (CIBD, 2013).

Payment issues have caused lack of trust between the subcontractor and main contractor, and both parties are overtly suspicious in all business dealings. In some cases, the contractor is perceived a poor paymaster and this will complicate the relationship even further (Okunlola, 2015). Payment issues are acknowledged as one of the key determinants of successful relationships between main and subcontractors, with subcontractors reluctant to work with main contractors with a reputation for not paying on time. In this regard legislation has been introduced in many countries, to enforce the right of subcontractors and suppliers to receive payments irrespective of various issues with the main contractor. However, payment problems are still a major issue and require attention.

iii) Non-adherence to the construction schedule

Once a construction project is awarded, its time duration is identified, the completion time of the project is then defined and included in the contract. It becomes the contractor's objective to schedule his construction activities and that of his subcontractors to meet the identified project duration and ensure project success. Within this schedule a main contractor will allocate work to the subcontractor and that work is supposed to be accomplished with the main schedule in consideration. Hence the subcontractor can be considered as having their own schedule with their own deadline.

A conflict may occur between the contractor and his subcontractors if any of the parties does not adhere to the schedule. This applies to both parties the main contractor and subcontractor because if any party delays the execution of his scheduled construction activities, it will consequently delay the progress of the activities of the other party. Likewise, it is important to insure all the parties stick to the planned schedule to ensure project success (Sambasivan and Soon, 2007).

iv) Revisions

During project execution there is a risk that the client may change specifications or requirement of work to be redone. Enshassi et al (2007) indicated such changes of drawings and specification during execution affects productivity. The low productivity leads to interface problem between main contractor and subcontractor. Problems may occur when the client approve a revision when there is a need to add, delete, or modify the original work-drawings and the scope of work is carried out by the subcontractor. The problems usually occur between the main contractor and subcontractor when agreeing the cost of carrying out the work specified in the revision.

v) Multilayer subcontracting

Multilayer subcontracting or latent subcontracting is the further subcontracting downstream by subcontractors, with or without the knowledge or consent of the main contractor or client (Yoke-Lian et al, 2012). Subcontractors' usually further subcontract work to be less vulnerable to fluctuation in business, have more flexibility in workforce coordination, and be able to reduce cost of management (Andy NG and Price, 2010). However multilayer subcontracting is one of the major causes of poor construction quality and construction site safety (Yoke-Lian et al, 2012). Multilayer subcontracting also affects the interface between main contractor and subcontractor as the main contractor will lose direct control over project works (Abdullahi, 2015).

vi) Poor quality work

Normally when the main contractor has been awarded the construction contract, they will perform some part of the construction work while another part of the work is allocated to the subcontractor to do. Therefore, the main contractor's success on the project relies on the temporary bounded interdependent services of the subcontractor (White, 2014). Thus if any of the parties does not perform their work with acceptable standards, their work will affect the other party. Consequently, it will create interface problems between the main contractor and the subcontractor.

vii) Lack of trust

Trust is an ambiguous and complex phenomenon and, has been studied and described by researchers in many ways depending on their discipline and the problems they have been studying. Trust can be described as the belief that someone or something is reliable, good, honest or effective. It is the assured reliance on the character, ability, strength, or truth of someone or something. Humphreys et al., (2003) recognised that a major requirement for success in a main contractor and subcontractor relationship is trust. Hartman and Caerteling, (2010) argued the significance of both price and trust when selecting a subcontractor and concluded they were both important mechanisms. Miller et al., (2001) highlighted that, the increase in the prevalence of unfair practices in construction projects has resulted in dispute and conflict descending from financial self-interest between various stakeholders within the process. Therefore, the presence of a transparent relationship between main contractor and subcontractor can increase the chance of a project being successful.

viii) Health and safety

The construction industry on average has a high rate of occupational injury and fatality than most industries. In this regard safety is a crucial aspect that requires profound consideration in a construction project. It has been noted that the rate of injury increases among contractors and their workers on large and complex projects, particularly those which require a large number of subcontractors (Enshassi et al, 2008). In this regard virtually all general contractors have a requirement to ensure

their subcontractors work in a safe manner and to conduct their on-site operations in compliance with relevant safety codes and laws (Clough et al, 2005).

On a project, a contractor may employ hundreds of workers, in addition the main contractor may use the services of several subcontractors who in turn have dozens of workers. There exists a possibility that there will be an injury or a loss of life for anyone of the labourers. However, the responsibility on health and safety will not be clear. Chiang (2008) supported this by indicating that it is apparent that there is confusion about which party is really responsible for jobsite safety.

Subcontractors have been known to rarely employ safety professionals and have no interest in safety work. Tayeh, (2009) believed that subcontractors have no interest in safety matters because most of them believe that safety should be the responsibilities of the principal contractors. According to Arditi and Chotibhongs (2005), the reason for subcontractors' disinterest in health and safety issues is due to the expense incurred in implementing such a program. On the other hand, the general contractors usually leave the responsibility of safety to subcontractors and may never take an active part in ensuring that the subcontractor is actually necessary safety measures.

Lack of proper safety regulations and standards on the work site, can lead to injury or even loss of life (Tayeh, 2009). This can lead to interface problems as there will be issues of responsibility between the main contractor and the subcontractor. In addition, interface problems may arise when the main contractor enforces safety measures that are too burdensome for some subcontractors to comply with.

ix) Bid shopping

Bid shopping is an unethical practice whereby the main contractor seeks other bids, using the lowest bid as leverage for better offers. Although the main contractor can see bid shopping as beneficial in terms of lower costs and market dynamics, the resulting savings do not come without a price. Subcontractors who have won a contract through bid shopping to the point where they don't know whether the job will be profitable aren't likely to exhibit a spirit of trust. Bid shopping promotes

lower quality work by subcontractor in an effort to cut costs even more. It can delay project completion due to derisory planning. The Construction Industry Development Board South Africa, (2013) noted that bid shopping damaged the contractor's reputation, ultimately leading to subcontractors refusing to bid for such a contractor.

Miller and Degn, (2003) concluded that bid shopping affects the relationship between the main contractor and subcontractor as it may lead to a breakdown in trust and collaboration between the parties. The subcontractor will not trust the main contractor as they are under the assumption that the main contactor just wants to take advantage of them. At the same time the main contractor will also be in distrust they will assume the subcontractor will attempt to cut as many corners as possible in order to save costs. Bid shopping therefore creates an adverse business environment that is likely to cause a contentious atmosphere between contractors and subcontractors.

x) Takeover of equipment

This is a clause usually used by main contractors to sanction them the right to utilise the subcontractor's specialised equipment in the event that the subcontractor cannot perform their work. This would occur usually if a subcontractor goes bankrupt during the course of the project or is terminated. Hence takeover of equipment would allow the main contractor to keep the project progressing by using the subcontractor's equipment to perform the essential work on the project. Subcontractors would often take issue with the clause as they will be suspecting that the main contractor is abusing them by exercising their right to take the subcontractor's equipment, but without a reasonable cause. As a result, subcontractors will not be willing to be in a relationship with a main contractor that has exercised this right.

xi) Termination for convenience

This is a contract provision that permits a main contractor to terminate the contract of the subcontractor for virtually no reason but just for the main contractor's convenience. In some projects, main contractors possess this one-sided right to pay the subcontractor for the portion of work completed and then suspend all work under the subcontract. This right when used by the main contractors, subcontractors see it

as heavy-handed and harsh (McCord, 2010). The exercising of this right would therefore negatively impact their relationship with the particular main contractor that engaged in his practice (Sears et al, 2008).

b) External factors

External factors are those impacting the relationship between main contractors and subcontractors but beyond the control of the main contractor or the subcontractor. In general, they are independent of subcontractor's or main contractor's performance, but could directly affect the success of their relationship or even the project. The influence of these factors on the relationships vary from time to time depending on change in public interests, market fluctuations, policy changes and environmental conditions. These factors include unexpected changes in material and labour costs, environmental issues, change of governmental regulations and laws.

i) Unexpected changes in material and labour costs

The construction industry is characterised by extensive use of heavy machinery, a sizeable amount of material and labour force. The costs for labour and costs for materials are factors that need special attention for the project to be successful (Yik et al, 2006). If either the main contractor or if the subcontractor overlooks something or makes a mistake in the initial cost estimation for the pricing of materials and labour, there will likely be project costs overruns and possibly project failure and this can lead to interface problems. Issues with changes of cost usually arise as a result of inflation in a developing country. Because of inflation material or labour can escalated beyond their estimation, the main contactor or his subcontractor may make a loss instead of profit.

ii) Environmental issues

During project execution there is always a risk that the project will be affected by natural factors for example, weather problems or geological problems. These factors cannot be controlled by human beings accordingly, the factors are called the "acts-of-God" factors (Huang et al, 2008). When there are severe weather conditions it becomes difficult to perform certain construction activities. Consequently, the

subcontractor work may be affected possibly causing delays and quality short falls. When such a situation occurs there can be problems between the main contractor and subcontractor.

Besides severe weather, a situation may occur when contractor or his subcontractor may find out that the geological characteristics of the project site ware not as expected. For example, the site may be rocky, having different elevation hence requiring more work than level ground. If the contractor or main contractor submitted a bid for site with normal geological characteristics, losses will be incurred and conflicts may arise between the contractor and his subcontractor (Tayeh, 2009).

iii) Change of governmental regulations and laws

Mortaheb et al, (2010) identified that change of government laws and regulations over the construction industry can affect the relationship between project parties. Issues such as taxation and licenses can affect, the work done by a main contractor or a subcontractor on a project. The work can merely become unfeasible or the quality, duration and costs can be affected, this in turn will affect the relationship between the main contractor and subcontractor.

2.4.3. Impacts of interface problems

Mortaheb et al, (2010) listed a number of impacts that arise from poor interfaces between project parties in Iran. With the use of interviews and questionnaires different viewpoints of owners, contractors, and consultants were collected. From these viewpoints impacts were collected, analysed and prioritized, as follows:

1. time overrun in terms of delay;
2. cost overrun;
3. poor project quality;
2. disputes between different project parties;
3. arbitration;
4. suspension of the work or contract termination; and
5. litigation.

2.4.4. General solutions to interface problems

The following are the suggested means to minimize relationship problems on construction project, hence increase probability of project success:

- Othman, (2002) suggested that in order to achieve smooth execution project activities during the construction phase, a balanced flow of information between main contractors and subcontractors is crucial.
- Akintan and Morledge (2013) suggested the Last Planner System Approach (LPS) as a means of managing challenges between main contractors and subcontractors. The last planner system approach is a production tool developed to improve planning on construction projects. Its essential objective is to build trust amongst project participants using factors such as: collective pull-based planning, measurement, learning, and continual improvement.
- Kadefors (2004) affirmed, in order to build trust among parties, fairness is fundamental. Therefore, it is essential to have a more equitable distribution of project risks between the main contractor and subcontractor to engender trust between the two. By sharing risks, the parties see the projects as a collective enterprise, thus strengthening the chances of project success.
- Mignot (2011) advised that project participants need to eradicate stereotypes, ideologies and do away with their professional delineations to be able to trust one another. Stereotypical behaviour among project members causes members of a particular professional group to separate themselves from others, within the same work environment, who they perceive as not sharing their professional orientations. These behavioural stereotypes can form barriers between subcontractors and main contractors.
- Akintan and Morledge (2013) stressed that there must be a system that ensures a prompt and sustained sharing of information between the main contractor and subcontractor. In addition, the parties must have an understanding that if information flow is affected or knowledge sharing is hindered it will eventually affect the level of trust between them thus compromising the project.
- Fah (2006) recognised that in order to solve problems and minimise its negative effects on a project, a proper plan should be devised. Therefore, actions that are

to be taken to reduce problems should be well researched with the problem and its root causes comprehended. Planning for problem solving should be collective encouraging partnership between the parties.

- Jin et al (2013) noticed that many interface problems are often linked to the imbalance of power existent in the relationship. Despite subcontractors being vital to the main contractor's success, subcontractors are often taken for granted. The interface between the two groups are increasingly controlled by head contractors disregarding that maintaining high quality relations is beneficial to both the main contractors and subcontractors. Imbalance of power between head contractors and subcontractors can be eliminated by forming partnership based relationship that are based on mutual objectives and fair contracts.
- Khalfan et al, (2005) advocated that with mutual cooperation and harmonisations main contractors and subcontractors can secure project success. Through an integrated supply chain, the skills of subcontractors can be evaluated and used to enable incremental improvements and innovation in a project. In addition, subcontractors are often divorced from the main contractor's decision making processes. Therefore, in order to enhance value creation in construction projects subcontractors should be integrated into the decision-making processes as well.
- (Enshassi et al, 2012) recommended that main contractors should issue the financial payments to the subcontractor on time, as it enables the subcontractor to cover expenses, purchase the required materials and pay for the labours on time, therefore ensuring the completion of the works without delay. Moreover, contractors are also recommended to supply and store the required materials early to ensure the continuity of the works and evade the shortage of materials on site. Whereas for the subcontractor, Enshassi et al, (2012) suggested the use of all safety measures, the utilisation of modern techniques for management of labours and materials, the proposing of suitable and reasonable prices that ensure acceptable margin of profit for them and lastly the employing of a sufficient number of qualified technical staff.
- Andy NG and Price, (2010) identified 18 site coordination problems and 16 essential causes to problems leading to poor site coordination in building projects from literature review and advice from experienced industrial practitioners. They

then grouped the causes into three categories, namely staffing related causes; technical related causes; and management system related causes. Using a questionnaire survey, they found that management system related problems were well above technical related causes and staffing related causes. As a result, they suggested that main contractors should focus their efforts in the management systems, especially communications, hence forth develop more efficient and effective site coordination and this is likely going to lead to improved subcontractor performance in construction projects.

- Rajput and Agarwal (2015) advocated that the documentation between main contractors and subcontractors regarding designs, drawings, plans, schedules and management systems should be clear and complete. They suggested that if the main contractor is not content with the performance of subcontractors they must issue warnings to the subcontractor before assigning part of the work to a new subcontractor. Moreover, the main contractor should inform the initial subcontractor well in advance. The parties should also consider their financial conditions and plan carefully in order to not face problems of financial crisis during a project. To the subcontractors, Rajput and Agarwal (2015) suggested that they should do their work with respect to terms and conditions which are given in the contract document. Conforming to required standards and finishing work within the required time. To do so the subcontractor should possess high quality material and sufficient experienced labour.

2.5. Partnering

Projects in the construction industry are organised, controlled and executed by many parties with different knowledge and skills such as architects, engineers, suppliers and subcontractors. Because of their diverse knowledge and understanding, the parties might have different goals and objectives in a project, causing conflicts and induce adversarial relations (Widen et al, 2014). Therefore, there is need for coordination between the multiple project parties to ensure the smooth sailing of projects. Partnering is seen as a means of moving away from this adversarial relationship in construction projects to a more collaborative method of managing projects (Khalfan & Swan, 2007).

The notion of partnering practised today is not a recent phenomenon. The first broad application of partnering as a procurement method was in the USA with Arizona State Highways and the US Army Corps of Engineers in the 1950s (Hong Kong CIC, 2012). The partnering projects delivered cost savings and reduction in project time delivery. In the early 1990s partnering was adopted in the Australian and the United Kingdom construction industries. Success experienced with project partnering in the UK led to many private sector organisations entering into strategic long-term arrangements. The UK and Australian partnering experience was transferred to the South African and Hong Kong construction industries. Today, the total use of partnering agreements and arrangements around the world has increased markedly (Hong Kong CIC, 2012)

2.5.1. Definition of partnering

There is no definite definition of partnering as partnering projects can differ from each other and because it is difficult to define the exact factors that a partnering strategy consists of (Widen et al, 2014). Partnering is generally understood as a commitment by parties involved in a project to work closely or cooperatively, instead of competitively and adversarial. It is a long term commitment between two or more organisations to implement a structured collaborative approach that facilitates team work across contractual boundaries for the purposes of achieving specific business objectives (California Department of Transportation Division of Construction, 2013).

The intention of having a joint relationship using partnering, is to reducing disputes hence improve cooperation and enhance efficiency by shortening the length of time taken to solve disputes and complete works, thus reducing costs and increasing margins. Therefore, for partnering to be successful, all parties involved must appreciate the benefits of collaborative team effort in a project. There should exist a relationship that is based on trust, dedication to common goals, and an understanding of each other's separate expectations and values. This attitude and commitment must be steered by a commitment from the top management and adopted down at all levels within all organisations involved (Hong Kong CIC, 2012).

2.5.2. Types of partnering

Partnering has been categorised in different ways by various researchers. The categorising employed is usually based on the duration of the partnering arrangement. Here partnering can be either project partnering or strategic partnering where project partnering is based on a single project whilst strategic partnering is based on a long term commitment (Meng, 2012). However, for this research partnering methods are classified using Hong Kong Construction Industry Council (Hong Kong CIC, 2012) method where partnering arrangements are categorised based on contractual status.

a) Non-contractual partnering

A Non-contractual partnering arrangement is not legally binding meaning it does not change the terms of contract or the contractual relationships that exist between the parties. Here the contract can act as an insurance policy should the parties retreat from their roles and responsibilities under the partnering agreement (Skeggs, 2003). It involves the building of harmonious working relationships between stakeholders by aligning of shared goals and objectives. Through this development of trust and shared goal there is an increase in the likelihood of project success. Non contractual partnering can be applied to both strategic partnering and project partnering environments. There is no set arrangement for adopting non-contractual partnering as a result it can be applied to traditional contracts and in alternative procurement methods (Hong Kong CIC, 2012). An important aspect that normally exists in a non-contractual partnering environment is the project charter.

i) Project charter

A project charter sometimes referred to as a partnering agreement, is a non-binding document that typically comprises a statement of basic principles and objectives that are envisioned to guide and govern the relationship between the parties in a partnering arrangement. Parties involved in the arrangement will sign on the document therefore it serves as evidence of a moral commitment by all parties to act in a collaborative manner in the best interests of the project and work together. A partnering charter is developed during the initial workshop in the partnering process.

ii) Non-contractual partnering process

There is no standard method of employing non-contractual partnering in construction projects however a number of guidelines have been designed as good practices to be followed. The Hong Kong Construction Industry Council, (2012) provided a non-contractual partnering process where the first step was conducting an initial partnering workshop where the parties signal their intention to adopt a partnering approach and decide on the way the partnering arrangement will be conducted. Throughout the project life cycle there will be partnering review workshops or follow-up sessions that a held at various stages in order to review project performance according to the initial established mutual goals. The parties should be involved in continuous improvement to improve the partnering process and enhance the relationship. Finally, there is a close-out workshop at the end of the project to assess the contribution of partnering to the project outcome and determine lessons learnt. Figure 5.1 provides an overview the process of project partnering.

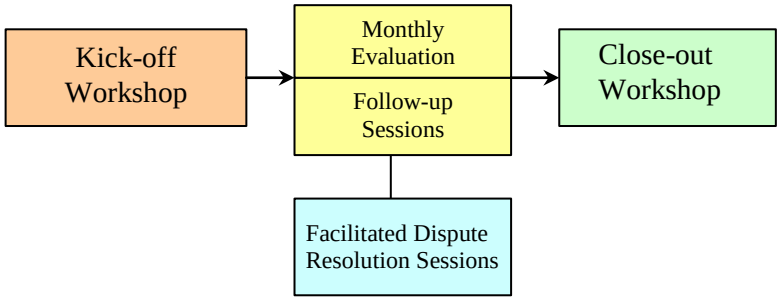

Figure 5.1: Project partnering lifecycle

(Source: California Department of Transportation Division of Construction, 2013)

b) Contractual partnering

In a non-contractual partnering arrangement, there are no legal partnering contractual terms that can be enforced in case of disputes between partnering parties. The traditional contract exists along with the partnering arrangement, therefore the legal relationship between the parties is still as set out in the traditional contract. This means there is a chance that in times of problems the partnering charter can be ignored and the traditional contract will prevail. Contractual partnering is

implemented to solve this issue. In contractual partnering, partnering principles are incorporated into the construction contract. This is done by either amending the existing traditional contract to make it more partnering friendly or adopting a full standard partnering contract (Hong Kong CIC, 2012).

i) Amending an existing form of contract

Adopting contractual partnering by amending existing form of contract involves incorporating clauses that promote partnering behaviour into contract forms currently used. This method allows parties to adopt partnering while using traditional construction contracts which they are familiar with.

ii) Adopting a full standard partnering contract

There are various standard partnering contracts used in construction industries around the world. Adopting a full standard contract is especially applicable in large, complex and high-value projects that need cooperation between the project parties. The Hong Kong Construction Industry Council, (2012) identified that the three main forms of partnering contracts are, NEC Partnering Option, PPC 2000 Partnering Agreement, ICE Partnering Addendum and JCT Constructing Excellence.

2.5.3. Benefits and difficulties of partnering

Beach et al, (2005) noted that generally researchers agree that partnering is beneficial on a number of dimensions, there also exist some doubt on the magnitude and nature of the benefits that can be realised from partnering. However, in the right circumstances the rewards of partnering can be substantial. Some of the benefits accomplished when partnering identified by Chan et al, (2004) are:

- increased opportunity for profit;
- improved productivity;
- the establishment of long-term trusting relationships;
- improved decision and reaction time;
- improved conflict resolution strategies;
- less risk for cost overruns or delays;
- reduced exposure to litigation;

- enhanced quality of construction work;
- reduction in claims;
- lower exposure to cost escalations;
- efficient resolution of situations; and
- reduced overall project cost.

Despite the possible benefits experienced due to partnering, there are some barriers to implementing successful partnerships. Chan, (2004) identified a number of difficulties that might exist in partnering and impede the collaborative approach, these difficulties include:

- the misunderstanding of the partnering concept;
- relationship difficulties;
- cultural barriers;
- uneven commitments among parties;
- communication issues;
- inefficient problem solving;
- lack of efforts to support the partnering arrangement; and
- dishonourable relationships.

Table 2.1: *Content analysis of literature reviewed*

Author	Year	Title	Objectives	Methodology	Conclusions/Comments
Xiao-Hua Jin, Guomin Zhang, Bo Xia and Yingbin Feng	2013	Relationship between Head Contractors and Subcontractors in the Construction Industry: A Critical Review	To ascertain the reasons for disputes between head contractors and subcontractors, and to identify effective strategies for managing subcontractors in order to decrease the possibility of conflict and disputes arising.	Critical literature review	The research identified that interactions between head contractors and subcontractors are adversarial due to the imbalance of power existent in the relationship. Relations between the two groups are increasingly controlled by head contractors however, maintaining high quality relations is beneficial to both head contractors and subcontractors
Ojo Stephen Okunlola	2015	The Effect of Contractor-Subcontractor Relationship on Construction Duration in Nigeria	To determine the causes of strain relationship in the Nigerian context and the effect on project performance.	Questionnaire survey	It was concluded that strain relationship between contractors and subcontractors could cause time overrun. It was determined that the projects with interface problems had an average overrun of almost 30% over the initial estimated completion duration. However, delays can be reduced if there is a mutual cooperation and understanding between main contractors and subcontractors.
Harry White, Ramesh Marasini	2014	Management of Interface between Main Contractor and Subcontractors for Successful Project Outcomes.	To investigate the ways of facilitating the interface between the main contractor and subcontractor in general.	Case Study, Questionnaire and Semi-Structured Interviews	The study highlighted that prevailing adverse relationships are influencing the performance of construction projects. The lack of trust is a key factor affecting the relationships between main contractors and subcontractors. However, the proactive involvement of the parties in maintaining

Author	Year	Title	Objectives	Methodology	Conclusions/Comments
					continuity of the team from procurement to construction stage and transparency in the processes were key success factors for effective relationship between the parties.
Rong-Yau Huang, Chin-Tien Huang, Hung Lin, and Wen-Hsiang Ku	2008	Factor Analysis of Interface Problems Among Construction Parties —A Case Study of MRTS	To categorize a variety of interface problems in the MRTS construction projects as well as identify their individual impacts in order to clarify the interface problems.	Literature reviews, interviews, and survey questionnaires	The research identified six dimensions in the interface problems. Among which the experience and coordination dimensions were determined as crucial as they most affect the progress rate and quality in a project.
Antony Okwogume Ujene, Emmanuel Achuenu and Okon Eta Abakadang	2011	The Nature and Effects of Subcontracting On the Performance Of Building Projects In South-South Zone Of Nigeria	To identify the trades mostly executed by subcontractors in Nigeria, determining the effect of subcontractor's performance on building projects executed and to determine the factors that influence the performance of subcontractors	Questionnaire survey	The study found out that delay in progress payment, effectiveness of client's representative team and misunderstanding of client's requirement were the aspects that affected performance of subcontractors and projects the most. Therefore, in order to improve project performance, the researchers suggested that, quality requirement, clear definition of client requirements and scope of work should be well articulated and defined during the time of engagement. In addition, there should be well equipped project team that will monitor the subcontractors and the payment of subcontractors should be timely for jobs executed.

Author	Year	Title	Objectives	Methodology	Conclusions/Comments
Lew Yoke-Lian, S. Hassim, R. Muniandy, and Law Teik-Hua	2012	Review of Subcontracting Practice in Construction Industry	To summarize literature on types of subcontractors, the common problems caused by subcontractors, and current proposed methods to betterment the subcontracting practice.	Literature Review	From the literature review the researchers concluded that, effective subcontractor selection and monitoring can minimize the problems in subcontracting and can help to determine the success of construction companies. The researchers noted that the problems of subcontractors, if ignored, can cause an enormous impact to the construction project. In addition, the impact can extend into the operation of the main contractor's organisation. Thus, special attention should be given to the issues of subcontractors, who are the main participants in many construction projects today.
Adnan Enshassi, Zohair Medoukh,	2008	The contractor-subcontractor relationship: the general contractor's view	Study to explore the actual working relationship between contractors and subcontractors.	Questionnaire survey	The results indicate that more than 90% of the work is performed by subcontractors in the Gaza Strip. The study indicated that there existed an informal characteristics relationship between general contractors and subcontractors. This type of relationship can be a source of problems which may affect the progress and the quality of the work.
Obafemi A. Akintan and	2013	Improving the Collaboration between	To examine some of the relational problems between main contractors	Questionnaire s and	The study found that the main reasons for the breakdown of trust between main

Author	Year	Title	Objectives	Methodology	Conclusions/Comments
Roy Morledge		Main Contractors and Subcontractors within Traditional Construction Procurement	and subcontractors, and the practices engendering them.	Interviews	contractors and subcontractors are the issues of delayed payments to subcontractors, interruption to work party's plan, exclusion from decision making processes, and the inclusion of harsh contract terms in subcontract agreements by main contractors for example pay when paid. A majority of the respondents were sceptical about the possibility of employing collaborative principles on traditional construction procurement projects. The research found out that most of the problems identified originate because of the standard form of contract employed in traditional construction procurement.
Paul Humphreys, Jason Matthews and Monan Kumaraswamy ,	2003	Pre-construction Project Partnering: From Adversarial to Collaborative relationships	To determine the importance of partnership and how a partnership relationship between main contractor and subcontractor can be implemented successfully in a project.	Case Study	The case study demonstrated that partnering can successfully be applied between main contractors and subcontractors and improve project performance. The partnering approach used in the case study was found to have benefits for the client, subcontractor and professional consultants. The benefits found included lower costs, improved team approach and less conflicts.
B.L. Rajput	2015	Study of Pros and	The objective was to study present	Questionnaire	The study found that subcontracting

Author	Year	Title	Objectives	Methodology	Conclusions/Comments
and Dr. A.L. Agarwal		Cons of Subcontracting System Adopted in Executing Indian Construction Projects	subcontracting practices in construction industry in India, study the issues arising between main contractors and subcontractors which are affecting project performance and finally, recommendations are proposed in this paper to reduce these identified issues.		practice may cause some interface problems between main contractor and subcontractor which will impact on time, cost and quality of construction projects. The researchers highlighted ten major problems according to the view point of main contractors and subcontractors. Recommendation were given to both main contractors and subcontractors on how to improve the interface between them.
Patrick James McCord	2010	Subcontractor Perspectives: Factors That Most Affect Their Relationships with General Contractors - A Pacific Northwest Study	To evaluate a list of relationship factors and determine the most important factors that affect the relationship between the subcontractor and the main contractor from the subcontractor's view.	Interviews	The study revealed the top three relationship factors that most affect subcontractors' relationships with general contractors are: bid shopping, project manager relationship and superintendent capability, respectively. The study also showed that subcontractors tend to adjust pricing on their bids based on their treatment from general contractors. Thus general contractors that treat the subcontractor well would receive lower pricing on bids and those that do not treat them well receive higher bids or no bid at all.
M.M.A. Khalfan, P E. Eriksson,	2005	Listening to The Voices of Suppliers And	The paper is set out to raise awareness within the construction industry about the importance of subcontractors,	Case study	The researchers advocated for early involvement of subcontractors in a manner similar to early contractor involvement in

Author	Year	Title	Objectives	Methodology	Conclusions/Comments
M.Dickinson, and P. McDermott		Subcontractors!	suppliers, and other small and medium size enterprises which carry out most of the work on behalf of main contractors on a project		projects. The early involvement would give an opportunity for the subcontractors to offer their expertise which could result in potential cost savings. The researchers suggested partnering for main contractors and subcontractors in order to establish high levels of trust and cooperation between the parties.
Xianhai Meng	2012	The Effect of Relationship Management On Project Performance in Construction	To study the specific characteristics of supply chain relationships in a construction project and to assess their impact on the project performance.	Questionnaire survey	The study revealed that the deterioration of the relationship between project parties is likely to increase the probability of poor performance. Moreover, the poor performance can be effectively reduced by improving some aspects of the relationship. Problems can be solved by the adopting of supply chain collaboration and partnering.
Dr K.W. Andy NG, Prof D.F. Andrew Price	2010	Causes Leading to Poor Site Coordination in Building Projects	To collect the views from the industrial practitioners on the amount of productivity that had been wasted due to poor site coordination and rank the essential causes leading to poor site coordination by main contractors.	Questionnaire survey	The Importance of management system related problems is well above technical related causes and staffing related causes thus main contractors should focus their efforts in the management systems, especially communications, in order to develop more efficient and effective site coordination and this is likely going to lead to improved subcontractor performance in building projects.

Author	Year	Title	Objectives	Methodology	Conclusions/Comments
Chong Jun Fah	2006	A Study on Domestic Subcontractor	To study works generally carried out by domestic subcontractor, the problems faced by domestic contractor and the sources of encouragement and funding to undertake work.	Interviews and Questionnaire	The study found out that the problems often experienced by subcontractors are financial and late payment from main contractor. The main factor that encourages subcontractors to undertake work for a main contractor is their relationship with that main contractor.

2.6. Chapter summary

This chapter presented a review of relevant literature on subcontracting. It showed how subcontractors are a necessary resource in the construction industry and also how subcontracting can give rise to various issues if not done accordingly. The chapter discussed the importance of a good interface between the main contractor and subcontractor. The various reasons that contribute to contention between subcontractors and main contractors were highlighted. The next chapter discusses the research methods used in this study. It also discusses the justification of chosen research methods and also its disadvantages.

CHAPTER 3:
RESEARCH METHODOLOGY

3.1. Introduction

The previous chapter presented reviewed literature on subcontracting, factors that affect the contractor-subcontractor relationship and finally general solutions to interface problems, proposed by various researchers. This chapter presents the methodology used to execute the research reported in this dissertation. The qualitative and quantitative research approaches were used simultaneously in this research. Mixed method approach was to collect primary data provide insights not possible when only qualitative or quantitative data are collected. Primary data was collected through interviews and questionnaires. Primary data was collected along with secondary data in order not to over rely on primary data and also to validate primary data finding.

3.2. Research methodology

Research methodology is an approach to systematically solve a research problem. It can be understood as a science of studying how research is done (Kothari, 2004). It describes the steps taken by the researcher to study the research problem and the justification. It describes the research design, the techniques and methods. Kothari, (2004) further explained that methodology enables research results to be evaluated either by the researcher himself or by others. This is done by providing answers to why a research study has been undertaken the way it has, how the research problem has been defined, in what way the hypothesis has been formulated, what data have been collected, what particular method has been adopted, and how the data collected was analysed. The methodology for this research was designed to ensure sufficient information is obtained in order to answer research questions.

3.3. Research approaches

Kothari, (2004) identified that there are two basic approaches to research, quantitative approach and the qualitative approach. Quantitative research involves the generating of numerical data or data that can be transformed into useable

statistics in order to explain, predict, and/or control phenomena of interest. The data collection methods are much more structured than qualitative data collection methods. This data is then used to formulate facts and uncover patterns in research. Quantitative approach attempts to maximize objectivity, replicability, and generalisability of findings and is normally interested in prediction.

The qualitative approach involves the collection of extensive narrative data in order to gain insights into phenomena of interest. Its methods were developed initially for social science to enable researchers to study social and cultural phenomenon. Qualitative research takes an inductive approach hence data analysis includes coding of the data and production of a verbal synthesis. Data collected during qualitative research is usually not numerical therefore this method does not use numbers and statistical methods as key research indicators however it takes into account words as a unit of analysis (Bryman, 2004). A communal view on qualitative research is that it tends to highlight on discovery rather than proof.

These research approaches were used simultaneously in this research. The use of mixed method approach was to allow for the opportunity to compensate for inherent method weaknesses, exploit on integral method strengths, and finally offset inevitable method biases (Greene, 2007). Qualitative methods were used in the research to gain an understanding of underlying reasons, opinions, and motivations. This provided the understanding of the Zambian construction environment and provided a basis of issues that were further probed using quantitative methods. Quantitative methods were used to provide more precise, numerical data that can be generalised.

3.4. Research design

Research design essentially refers to the plan or organisation of scientific investigation. It shows how the study is to be carried out, where the data comes from, what sort of data gathering techniques are used, and how the information is to be analysed. A research design is the arrangement of conditions for data collection and analysis in way that uncovers relevant information for the research in an economic

and effective manner. Research design is important because it enables the smooth sailing of the various research processes to be conducted. With a well fashioned research design, the research is made as efficient as possible yielding maximal information with minimal expenditure of effort, time and money (Kothari, 2004).

Designing a research involves the outlying of an adequate plan that will be followed as a guide to collect and analyse data. Formulation of the research design should be done with great care as any error in it may upset the entire project (Wellington, 2015). This is because research design, has a great bearing on the reliability of the results. This research was designed in order to address the problem identified in the previous chapters and achieve the objectives stated. It was considered reasonable that in order to obtain a full understanding of the study, the research plan should have various procedures arranged in logical sequence, so as to avoid misunderstanding at any point in the research. Figure 3.1 illustrates the framework by which the research was conducted.

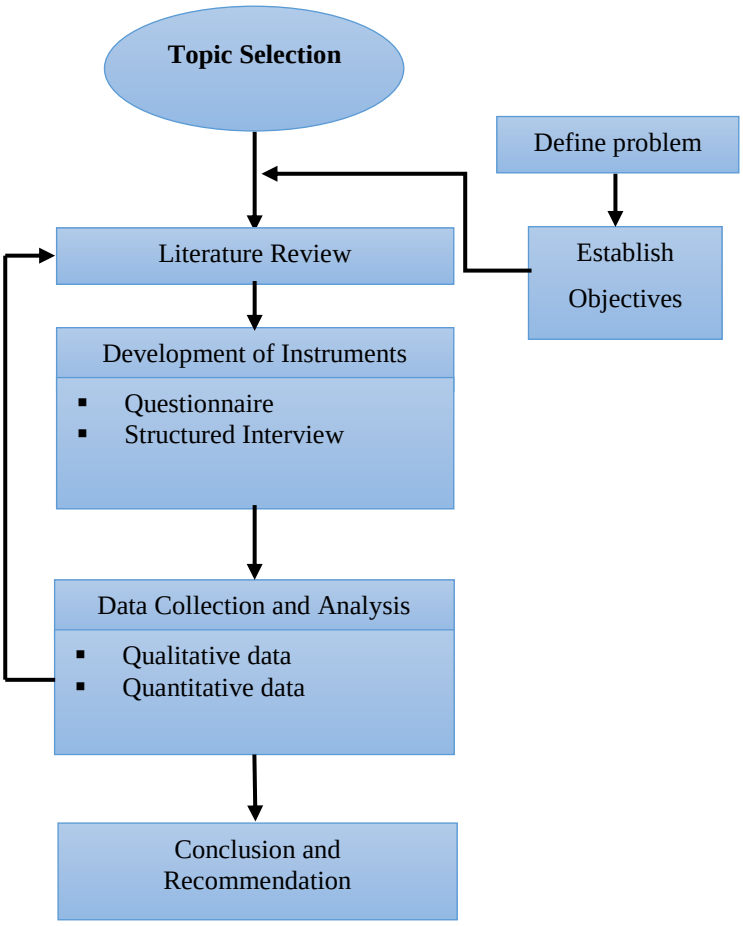

Figure 3.1: Flow Chart of Research Process.

3.5. Research strategy

A research strategy is a general plan of how a researcher will go about answering the research question. The choice of a research strategy is directed by the research questions and objectives, the amount of existing knowledge, the extent of available time and other resources, as well as the researcher's own philosophical underpinnings (Saunders et al ,2009). Saunders et al (2009) identified seven research strategies: experiment; action research, archival research, survey, grounded theory, case study and ethnography.

3.5.1. Experiment

This research owes much to the natural sciences, although it also features regularly in social science research. The principal purpose of an experiment is to study causal links, whether there is a link between two variables and in more complex experiments, the size of the change and the relative importance of two or more independent variables (Saunders et al, 2009). This strategy was not chosen for this research because it would have been expensive, problematic and time consuming to undertake controlled experiments in order to study the relationships between subcontractors and main contractor in the construction industry.

3.5.2. Action research

This strategy is a form of collective self-reflective enquiry with an attempt to actively solve a problem, change methods or improve situations (Wellington, 2015). The distinction between action research and other research strategies is that it has an explicit focus on action, in particular promoting change. An action research strategy therefore combines both data gathering and facilitation of change therefore it is especially useful when answering "how" questions. This strategy was found not suitable for this as it will be difficult to implement.

3.5.3. Archival research

Archival research, makes use of historical documents for example administrative records, as the principal sources of data. Archival research is especially useful when answering research questions which focus upon the past (Saunders et al, 2009). The

ability of the researcher to answer research questions is inevitably constrained by the nature of the records and documents available. Even where the records exist, they may not contain the precise information relevant to the research and needed to answer the research questions. This strategy was not selected for this research because accessing documentation on project occurrences would be very difficult or documents will simply be non-existent.

3.5.4. Survey

In survey research the researcher selects a sample from a population then asks the respondents questions often by using questionnaires, and the data is standardised, allowing easy comparison and analysis. Surveys are popular in research due to the ease of collecting large amounts of data from a sizeable population in a very economical way (Wellington, 2015). This strategy was employed in this study. This strategy was chosen because it is perceived as one of the imperative strategies in applied social research and also that it is easy to conduct and provides more control over the research process. A structured questionnaire and interviews were employed to collect data.

3.5.5. Grounded theory

Grounded theory is an inductive methodology involving the construction of theory through the analysis of data. This research strategy is especially beneficial in research to predict and elucidate behaviour, the emphasis being upon developing and constructing theory (Saunders et al, 2009). This theory is often criticised for ignoring existing theories by paying less attention to the literature review and theory being developed from data generated by a series of observations. This strategy was not selected for this research as it is more appropriate with theory development.

3.5.6. Case study

Case study research is basically an empirical investigation of a particular existing phenomenon within its real-life framework. It involves an in-depth analysis of a particular situation of interest. Case studies often present information that is collected using a variety of means including, but not limited to interviews, observations and

document collection. The information is collected through various means in order to provide additional assertions made by researchers or participants (Saunders et al, 2009). This method was not used in this study because no detailed, accurate data of cases in Zambian projects were available to the researcher.

3.5.7. Ethnography

This research strategy emanates from the field of anthropology and is rooted firmly in the inductive research approach. Ethnography is most appropriate if the researcher wants to gain insights about a particular context with the idea of understanding and interpreting it from the perspectives of those involved (Wellington, 2015). This strategy was found to be not suitable for this study, as it is expensive and takes place over an extended time period.

3.6. Data collection

Research involves the collection of data. There are two types of data that a researcher can collect, primary data and secondary data. Primary data are those which are collected first-hand and for the first time, and consequently they are original in character. Secondary data, alternatively, are those which have already been collected by other people and have already been passed through the statistical process (Kothari, 2004). The methods of collecting primary and secondary data differ since primary data is originally collected, while secondary data involve compilation of existing data. For this research primary and secondary data methods were used simultaneously.

3.6.1. Primary research

Primary research is where a researcher collects data first-hand, using collection methods such as observation, interviews and questionnaire. Therefore, primary data are those which are collected afresh and for the first time by the researcher, thus happen to be original in nature. Primary research is especially advantageous when the topic of study is relatively new or few publications exist on the subject. In addition, it supplements the secondary research. However primary research, possesses some disadvantages these include over-generalization of the results, biased methodology

and non-consideration of other related factors. There are several methods that can be used to collect primary data. The choice of a method depends upon factors like, the purpose of the study, resources and required skills to use the method. The following are some of the common methods used in primary research (Kumar, 2011);

- observation;
- interview; and
- questionnaire.

a) Observation

Observation is a method where the researcher watches and listens to an interaction or phenomenon as it takes place in a purposeful, systematic and selective manner (Wellington, 2015). It involves carefully taking notes and recording the event or occurrences of interest, then analysing the information in an appropriate manner to achieve set objectives. There are many situations in which observation is most appropriate for example when the researcher wants to learn about the interaction in a group, study the behaviour or traits of an individual and when full or accurate information about something cannot be elicited by questioning. Basically observation is useful when the study is more interested in the behaviour than the perceptions of individuals, and also when subjects are unable to provide objective information about the phenomenon of interest. There are two types of observation: participant observation and non-participant observation.

i) Participant observation

In participant observation, the researcher is part of the participants. The researcher gets involved in the activities of the group, create an affiliation with group members, after gaining their consent, the researcher will keenly observe the situation, interaction, site or phenomenon (Kumar, 2011). This method is popular in research aimed to study another community, culture or context. The researchers will be immersing themselves within the culture, hence it might take months or years for a lasting, trusting relationship to be built with the people being studied.

ii) Non-participant observation

This is when the observer observes as a detached emissary without any attempt on his part to experience through participation what others feel. The researcher does not get involved in the activities of the group however they remain a passive observer, watching and listening to activities and drawing conclusions from this (Kothari, 2004).

The observation method was not chosen as a method of collecting primary data in this research. This is because this study aimed to study the behaviour between main contractors and subcontractors, the flaws and also the good practices. However, when using observation methods, the individuals or groups become aware that they are being observed, hence they may change their behaviour meaning the data collected might not correctly reveal how main contractors and subcontractors are interacting with each other.

b) Interview

The other research instrument used to gather primary data is interviews. Interviews are oral interactions where oral questions are presented to the respondent to elicit an oral response from the interviewee (Wilkinson and Birmingham, 2003). By having a direct systematic conversation between an interviewer and the interviewee, relevant information to answer the research problem would be obtained. In order to conduct the interview a potential candidate who can be a source of information is identified. Then a structured plan is made describing how the interaction will be conducted in a manner that will bring out relevant information from the respondents. Interviews can vary from formal, informal and semiformal. Besides face to face interaction interviews can also be conducted electronically via, telephone or computer using video conferencing. There are four popular types of interviews used in research these structured interviews, unstructured interviews, semi structured interviews and focus group interviews (Dawson, 2007).

i) Structured interviews

Structured interviews involve the researcher having written down, fixed questions which are asked to interviewees. Each respondent is asked the same series of questions which often have limited set of response categories. This method ensures a quick interview and easy comparison of responses. It does not require the development of rapport between interviewer and interviewee, and consistent data can be obtained that can be compared across a number of respondents (Dawson, 2007).

ii) Unstructured interviews

Here there is no structured interview guide even though the interviewer will possess a clear plan in mind regarding the focus and goal of the interview. The interviewer will build a rapport with the respondents, getting respondents to open-up and express themselves in their own way. The questions asked are open-ended and responses are not restricted and usually provide in-depth data (Wellington, 2015).

iii) Semi-structured interviews

Here the interviewer and respondents engage in a formal interview. Semi structured interviews incorporate a list of questions and topics that need to be covered during the conversation however topical trajectories in the conversation may stray from the guide when further probing is required (Wellington, 2015).

iv) Focus group interviews

These are interviews where several respondents are interviewed together (Wellington, 2015). Focus groups are moderated by a group leader and are generally used to collect data on a specific topic. The participants in the interviews are purposively selected, although not necessarily a representative sample of a specific population. Participants in this type of research are, therefore, selected on the criteria that they would have a relevant contribution to the topic of discussion (Rabiee, 2004).

Using interviews to collect information comes with its own advantages and disadvantages to be considered by the researcher. The advantages are that they;

- allow the clarification and elaboration of questions or issues that the respondents may not understand fully;
- give a higher response rate than written questionnaires;
- allow flexibility hence permit the restructuring of questions especially in unstructured interviews;
- provide more information as they allow the probing of a certain issue to greater depth;
- allow the obtaining of personal information about the respondents easily; and
- can incorporate illiterate respondents.

However, interviews also possess disadvantages that need consideration. The following are some of the important weaknesses;

- they can be costly especially if the sample is very big and is widely spread geographically;
- they can be time consuming especially if there are many respondents involved and a requirement for vast amount of information being collected;
- they are prone to misuse as the interviewer can influence responses from the interviewees;
- they require high skill and training to avoid bias; and
- they accommodate a smaller sample compared to questionnaires.

The study reported in this dissertation employed the use of interviews to gather primary data. Semi-structured interviews were conducted with construction industry experts who are dealing with various projects. The interviews were done together with questionnaires to allow for data triangulation. This was done, since there was very limited literature concerning the relationship between main contractors and subcontractors in Zambia. The population sample was relatively small, with participants purposefully selected to provide the required information. The selected participants were experts in the field projected to various viewpoints of the client, main contractor and subcontractor in the Zambian construction industry. The interviews were limited to participants based in the capital city, Lusaka due to financial constraints and also the limited time available to obtain data.

c) Questionnaire

A questionnaire is one of the most popular ways of collecting primary data research. It is an instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. Questionnaires are especially useful to collect the appropriate data and to make data comparable and amenable to analysis. Using of questionnaires minimise bias in formulating and asking question which can occur in interviews. In general form, a questionnaire can either be a structured or unstructured questionnaire (Kothari, 2004).

i) Structured questionnaires,

Structured questionnaires have definite and concrete questions that are prepared well in advance. The questions are presented with exactly the same wording and in the same sequence to all respondents (Kothari, 2004). It initiates a formal inquiry that supplements and checks the data, previously accumulated therefore they are not suitable when a problem is being first explored and working hypotheses sought;

ii) Unstructured questionnaires,

Unstructured questionnaires are ordinarily formulated around open questions (Kothari, 2004). The use of open questions is likely to give more valid data, as respondents are free to express what is important to them and convey it in their own words. Unstructured questionnaires are used at the time of the interview and acts as a guide for the interviewer when asking the question however it is very flexible in working.

Questionnaires are especially beneficial instruments that possess many advantages to the researcher however the designing of a questionnaire should be conducted with care. The advantages of using a questionnaire are that;

- large amounts of data can be collected from many respondents in a short period of time and in a relatively cost effective way. This is important when the research has a specific period of time in which it is to be completed and a specific budget allocated to it;

- questionnaires can collect both qualitative and quantitative data simultaneously. Exploiting both quantitative and qualitative data can provide an anecdotal and numerical representation of participant's opinions and experiences. Merging research methods can mitigate bias and allow salient viewpoints to emerge while providing a solid basis of numerical data for a better understanding of the topics;
- questionnaires allow anonymity thus ensuring confidentiality. When respondents are anonymous they are likely to provide more honest answers and information is more dependable. The respondents are also able to answer potentially embarrassing areas; and
- questionnaires eliminate bias that may arise from a face to face conversation. For example, the interviewer can phrase or frame questions in certain way as to bring out a desired answer from the respondents. On the contrary, the questions in the questionnaire are phrased in the same way to all respondents thus reducing bias.

However, questionnaires possess disadvantages which need to be considered when choosing and developing research instruments. Questionnaires possess the following disadvantages;

- the response rate can be very low as there is often no strong motivation for respondents to respond;
- they can be misused and if the questionnaire is incorrectly designed, it can be misleading;
- they do not provide deeper information especially on issues that require further probing; and
- they can be difficult to use when information required, is to be collected from respondents who are not educated.

A structured questionnaire was adopted for this research as a method of collecting primary data. It was adopted for this study to collect the actual, perceptive and attitudes of the respondents. The questionnaire was used as a quantitative approach to gather information and gain insights and to understand on relationship between contractors and their subcontractors in Zambia. The questionnaire was chosen because it is a fast and relatively easy method of collecting data and is more accurate

when starting processing and analysing of the data. The questionnaires were delivered to respondents by hand and via email.

3.6.2. Secondary research

Secondary research involves the collection of information from studies that other researchers have done on a particular subject of interest (Dawson, 2007). Secondary data is typically used to complement primary data. Secondary research is especially useful in analysis of social and economic change, since it is impossible to conduct a new survey that can adequately capture past change or developments. The advantages of secondary data are that, secondary data collection is relatively easy compared to primary data which may be difficult to collect, time consuming, requiring too much skill and expensive. Secondary research can provide larger and higher-quality databases that would be unfeasible for any individual researcher to collect on their own.

The limitations of secondary research are that the data found could have been for a different purpose in a different environment and it could not relate adequately to current study. In addition, it can be less useful in a study, as data may be outdated or inaccurate for example in market studies (Saunders, 2009). Secondary data may either be published data or unpublished data. Therefore, the researcher must be very careful in using secondary data. The researcher must make a minute scrutiny to ensure that the secondary data is suitable, adequate and in the context of the problem which the researcher wants to study. Some of the popular sources of secondary data include, journals, government publications, books, newspapers, dissertations, conference proceedings and the internet.

Journals, scholarly journal are peer-reviewed periodical publications in which information relating to a particular academic discipline is published. Journals are preferred in literature review as they provide relatively concise, up-to-date information. In addition, Information in scientific journals is generally specific, meticulously cited and peer-reviewed (Dawson, 2007). Journals were used as the main source of information in this research as they provided recent, detailed

information on main contractor-subcontractor relationship that other sources could not provide. Journals provided information about what other researchers have done, their results and analysis.

Government publications, these are official publication issued by a government publishing facility for example statutes, acts, government gazette, debates of parliament and national budget. Government publications were used in this research because they provided statistics difficult or impossible for private studies to acquire (Saunders, 2009). Government publications were also utilised because they provided information specific to Zambia.

Books, books are one of the main types of sources used in a research. This is because they provide in-depth coverage of a topic, put topics on context with other related topics and may contain historical information about the topic at hand (Wellington, 2015). Books are usually authoritative sources of information as they are written by experts in the field and they deal comprehensively with a specific subject. Advantages of using books are that they provide a balanced, chronological presentation of information, they provide a thorough overview of a topic, their quality is checked by publishers, they are usually well-researched and include references to other sources you can use. Books were used in this research because they provide authoritative information since they have undergone some form of peer review process. Another reason they were chosen is because books are permanent hence books used can easily be traced by other researchers.

Newspaper articles, newspapers are published regularly, containing information on international, national and local news events. They can also contain editorials and opinion pieces, advertisements and other subjects related to current affairs (Wellington, 2015). Newspapers are useful in research as they provide useful information about current events and developments. Typically, newspapers provide valuable current information however further research is often necessary to dig dipper about a matter therefore, they can help a researcher discover problems that

will need further research. Newspapers were used in this research to acquire recent views on the happenings in the Zambian construction industry.

Theses and dissertations, these are research work prepared as part of an academic course for a higher degree. They can provide an extensive amount of information concerning a certain field however they are to be used with care as the researcher may not be an experienced researcher or an expert in the field being studied. Dissertations and thesis are relatively difficult to obtain they are not always published. Most of them can be found in school libraries and academic institutions websites. Dissertations were used in this research to identify and evaluate the methods used by other researchers to tackle similar research, their findings, analysis and suggestions (Wellington, 2015). Dissertations were used because information in the dissertations is arranged in a standard format which made the collection of data easier. The information is also extensive and specific on the topic of interest.

Conference proceedings, these are a collection of technical papers presented at a professional association meeting (Wellington, 2015). They provide a wide range and depth of up-to-date research for libraries, technical institutes, individual researchers, and corporations. Conference proceeding are important to a researcher as they provide the latest research, or research that has not yet been published and they are also helpful in tracking down the work done by a specific researcher or a specific subject. Conference proceedings were used in this research as they provided a breadth and depth of up-to-date information.

Internet, the internet is a global system of interconnected computer networks that allows people to exchange information. It carries an extensive range of information and it is the fastest growing source of information. The internet is helpful for researchers as it provides recent, up to date information, including up to the minute updates (Saunders, 2009). It provides a vast amount of information from different sources in various formats including video and audio. Conversely there are some disadvantages of using the internet. There is a lot of information to sieve through, this makes it difficult and time consuming to find relevant information. Information

on the internet is relatively recent hence more historical information is difficult to find and is likely to be found in print resources and from specialised library databases. Information from the internet is to be treated with care as anyone with a computer and Internet access can put information on the Internet. Therefore, it is important to make sure the information collected is from a reputable, qualified source before it is used. This study used the internet as a source of secondary data because it has tremendous amount of information available for virtually any subject. It was also used because of its flexibility, convenience, and accessibility anywhere through a wireless device (Saunders, 2009).

3.7. Processing and analysis

When data is collected it will need to be processed and analysed in accordance with the outlined research plan in order to answer research questions. Processing is basically the editing, coding, classification and organisation of collected data so that they are acquiescent to analysis. While analysis means the computation of certain procedures along with strategic searching for patterns of relationship that exist among data-groups (Kothari, 2004). The processing and analysis of data in this research brings forth the important factors influencing the relationship between main contractors and subcontractors in Zambia. The results of the analysis will also reveal how projects were affected by interface problems and what attributes can enhance the relationship between main contractors and subcontractors in Zambia.

3.7.1. Relative importance index

The respondents were asked, based on their experience to attach a rating on a Likert scale to a factor they see as causing a major interface problem between the main contractors and subcontractors. The same was applied to factors that can improve the interface. The contribution of each of the factors to relationship was examined and ranked in terms of their criticality as perceived by the respondents using the Relative Importance Index (RII). The Relative Importance Index (RII) was computed using the following formula: (Eq. 3.1) (Okunlola, 2015).

$$RII = \frac{\sum W}{AN} = \frac{5n_5+4n_4+3n_3+2n_2+1n_1}{5N} \quad \text{(Eq. 3.1)}$$

Where:

RII = relative importance index

W = the weighting given to each factor by respondents. (ranges from 1 to 5)

n_1 = number of respondents for very important, n_2 = number of respondents for important, n_3 = number of respondents for neutral, n_4 = number of respondents for not important, n_5 = number of respondents for least important.

A = the highest weight (which is 5 in this case)
N = sample number

3.7.2. Average rating

In the questionnaire the respondents were asked, based on their experience to indicate the likely outcome when the relationship between main contractors and subcontractors is poor. The respondents had to choose from a number of likely outcome provided in the questionnaire. These outcomes were obtained from literature review. Average rating was used to determine which outcome is likely to occur. Average rating was calculated using the following formula (Eq. 3.2) (White and Marasini, 2014):

$$Z = \frac{\sum X_i L_i}{N} \quad \text{(Eq. 3.2)}$$

Where:
Z = Average Rating,
i = 1,2,3,4,5
Xi = No of responses in the category i

Li = Rating for 'i' (e.g. 5-Very Important, 4- Important, 3-Neutral, 2- Not Important and 1-Least Important)

N= Number of responses.

Microsoft Excel software was used to do relevant calculations. Finally, the findings were presented using graphs and charts to provide a clear view of the survey.

3.8. Sampling

Sampling is the process of selecting a sample from the study population to become the basis for estimating or predicting the prevalence of an unknown piece of information, situation or outcome regarding the population (Kumar, 2011). A sample is a part of the total population that represents this population meaning, sampling allows a representative section of a population to be studied and the results extrapolated back to the population as a whole (Kothari, 2004).

The advantages of using sampling are that, it reduces time and investment on a study. Sampling can be more accurate than studying the entire population because it affords the researcher a lot more control over the subjects and also statistical manipulations are much easier with smaller data set. On the contrary the disadvantage of using a sample is that the research will not find out the information about the population's characteristics of interest but only estimate or predict them (Kumar 2011). There are a wide variety of sampling methods that can be used in research. These can be classified into two major groups, random/probability sampling designs and non-random/non-probability sampling.

3.8.1. Probability sampling

In probability sampling each element in the population has an equal and independent chance of selection. The choice of an element in the sample is not influenced by other considerations such as personal preference however each element in the population has the same probability of being selected (Kumar, 2011). In probability sampling the choice of one element is not dependent upon the choice of another element in the sampling therefore the selection or rejection of one element does not

affect the inclusion or exclusion of another. Some of the popular random sampling designs are as follows (Kothari, 2004):

- simple random sample – randomly selecting an item;
- systematic random sample – selecting every *i*th item on the list;
- stratified random sample – dividing the population into sub-populations, then sample the sub-populations using simple random sampling;
- multistage sample – complex form of cluster sampling whereby two or more levels of units are embedded one in the other;
- cluster sample – dividing the population into clusters of homogeneous units, then study all units of clusters randomly selected; and
- area sampling – cluster sampling where the primary sampling unit represents a cluster of units based on geographic area.

3.8.2. Non-probability sampling

This is a sampling procedure that does not give any basis for estimating the probability that each item in the population has of being incorporated in the sample (Kothari, 2004). Non-probability sampling designs are usually used when the number of items in a population is either unknown or cannot be individually identified. The following are some of the popular non-probability sampling designs (Kumar, 2011);

- quota sampling – elements are selected from a location convenient to researcher, and whenever a person with a visible relevant characteristic is seen that person is asked to participate in the study;
- accidental sampling – similar quota sampling but different in the sense that quota sampling attempts to include people possessing an obvious characteristic while accidental sampling makes no such attempt;
- judgemental sampling or purposive sampling – using own judgement to select those people who are likely to have the required information and are willing to share it; and
- expert sampling – similar to judgemental sampling however respondents must be known experts in the area of interest; and

- snowball sampling – selecting a sample using networks.

Saunders et al, (2009) defined a research population a set of cases or group members that are to be studied or of whom information is desired. Because this study was investigating the relationship between main contractors and subcontractors, the population included main contractors and subcontractors in the construction industry. To select the sample in this study non-probability sampling was used. Purposive sampling was used in order to obtain data from selected parties that were seen as best to provide information that will enable the answering of the research questions and meet research objectives. Purposive sampling was also selected because it is convenient and economic and is beneficial to pilot studies. However, its limitations include higher subjectivity and bias as compared to probability sampling techniques.

Kothari, (2004) noted that a sample should neither be excessively large as to waste resources, nor too small until no reliable data can be obtained. In addition, Kothari, (2004) added that, limited resources or the inability to specify a sampling frame dictate the sample size. Saunders et al, (2009) advocated that in non-probability sampling, the issue of sample size is ambiguous and, unlike probability sampling, there are no rules however the sample size is dependent on research question and objectives. Therefore, it was determined that a sample of 50 respondents will be sufficient to answer the research questions. This sample size was also selected because it was feasible and cost effective. The sample for contractors is larger in this study than clients and consultants because the contractors were the focus of this study. The breakdown of this research sample is shown in Table 3-1.

Table 3.2: *Breakdown of research sample size*

Group	**Minimum sample size**	**Required sample size**
Contractors	30	50
Client	10	17
Consultants	10	17
Total	50	84

In order to ensure that the margin of error is within acceptable limits, it is essential to estimate the likely response rate and increase the sample size accordingly. The response rate was estimated based on similar research previous conducted by other researchers. The minimum sample will need to be increased to accommodate the respondents that are likely to not respond. The increased sample, or the actual sample size required is calculated using the following formula (Eq.3) (Saunders et al, 2009:221):

$$n^a = \frac{n \times 100}{re\%}$$

Where:

n^a = the actual sample size required

n = the minimum sample size

$re\%$ = the estimated response rate in percentage (Estimated at 60% in this study)

After adjusting the sample size, the actual sample size became 84. This was sufficient as it was close to the sample size in previous research done on similar topic by Okunlola, (2015).

3.8.3. Response rate

Response rate is basically the number of participants who correctly completed a questionnaire divided by the total number of administered questionnaires. In research it is essential to ensure an adequate response rate is achieved because an inadequate response rate can limit the usefulness of the results. There is no universal adequate response rate however the determination of an adequate response rate is based on the evaluation design, how the results will be used, and standard practice. The University of Texas at Austin Centre for Teaching and Learning, (2007), developed a table with acceptable response rates according to the mode of the survey. This is shown in table 3.3.

Table 3.3: *Response rates according to the mode of the survey*

Survey Mode	Response rate
Mail	50% adequate, 60% good, 70% very good
Phone	80% good
Email	40% average, 50% good, 60% very good
In person	80-85% good

Lack of responses to the questionnaire by potential respondents in the population is referred to as nonresponse bias. Nonresponse bias is the condition where people of a certain character are systematically not represented in the sample because are likely not to respond. Nonresponse bias reduces the reliability and validity of survey study. If a survey achieves only a 30% response rate, the study has a nonresponse bias of 70%. Similarly, if the response rate to a survey is 20%, the study suffers from a nonresponse bias of 80%. Therefore, it is important to employ strategies that can help increase response rates (Sivo et al, 2006) . To improve the response rate in this study the following was done:

- using of university letterhead;
- using signed cover letters;
- providing clear and easy-to-follow instructions and questions;
- limiting the number of questions to only a few important ones; and
- sending a reminder email.

3.9. Chapter summary

This chapter described the methodology used to conduct this research. It brought forward the various methodologies that could be adopted for research purposes. The chapter presented aspects of the methodology chosen and their justification. Aspects of the methodology including population, sampling method, data collection instruments were discussed. The chapter further presented an explanation of how the research problem was investigated and described the tools used to carry out the

investigation. It illustrates what was done, justifies the research design, and explains how results found were analysed. The next chapter will provide an analysis and discussion of the data collected.

CHAPTER 4:
ANALYSIS AND DISCUSSION OF RESULTS

4.1. Introduction

The previous chapter presented the methodology used to execute the research and generate the data reported in this dissertation. This chapter discussed the research strategy, sample size, data collection, instrument design and the method of data processing and analysis used in the research. This chapter presents the analysis of the research findings. The research utilised structured interviews and questionnaire survey to collect primary data. Utilising a combination of quantitative and qualitative methods made the research more reliable and more useful. The use of questionnaires facilitated for the collection of large amounts of data from a sizeable population in a highly economical way. Structured interviews allowed the collection of qualitative information that ensured an in depth probe of matters.

4.2. Questionnaire data and analysis

In order to ensure that the sample well represented the broader population of the Zambian construction industry, respondents were not only contractors however, clients and consultants were included to reveal their perspective of the main contactor-subcontractor relationship. Because of financial and time constraints the sample only included respondents in Lusaka, the capital city of Zambia.

Questionnaires were distributed to 80 respondents by hand and also via email. Out of the targeted 80 respondents 56 responded, giving a response rate of 70%. There is no universally agreed upon figure to describe an ideal or even a minimally acceptable survey response rate. However, The University of Texas, (2007) stated that an acceptable response rate can be determined by the how the survey was administered, 50% response rate is good for questionnaires administered through email and 80 % is good for those administered face to face. Since this research used a combination of email and face to face a 70% response rate is acceptable.

The questionnaire was designed with the research objectives in mind. The questionnaire was divided into six sections. Section one enquired all necessary background information about the respondents and their organisations. Section two sought out to bring forth general information concerning the relationship between main contractors and subcontractors in the Zambian construction industry. Section three provided the common factors that cause conflicts and relationship problems caused by main contractors. Section four provided the typical factors that cause conflicts and relationship problems caused by subcontractors. Section five provided the common factors that cause conflicts and relationship problems caused by other external factors. Section six was designed to identify recommendations from the respondents on how these relationship problems could be solved.

4.2.1. Section one: respondents' general information

Respondents were requested to provide their background information. Regarding the main business or sector in the construction industry, 52% (29) of the respondents belonged to the contractor sector, 23% (13) belonged to the client sector and 25% (14) belonged to the consultant sector as shown in Figure 4.1.

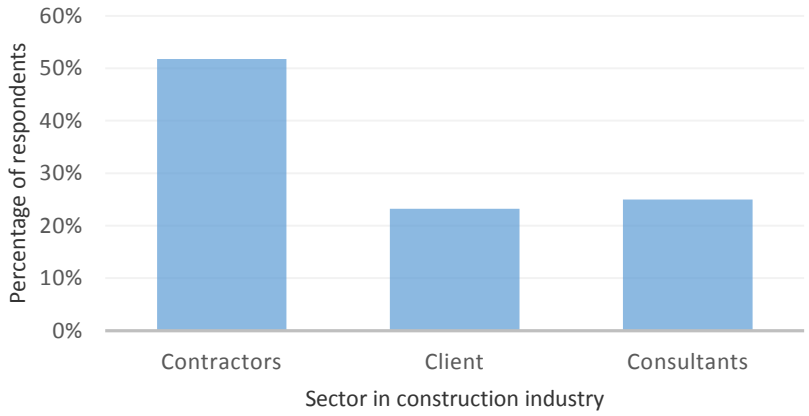

Figure 4.1: Percentage breakdown by respondents' sector in construction industry

Figure 4.2 displays the percentage breakdown of respondents by management position. The majority of respondents at 41% (23) belonged to senior management.

Junior management accounted for 30% (17) while middle management accounted for 29% (16) of the respondents. Figure 4.2 portrays the distribution of the respondents in terms of management position.

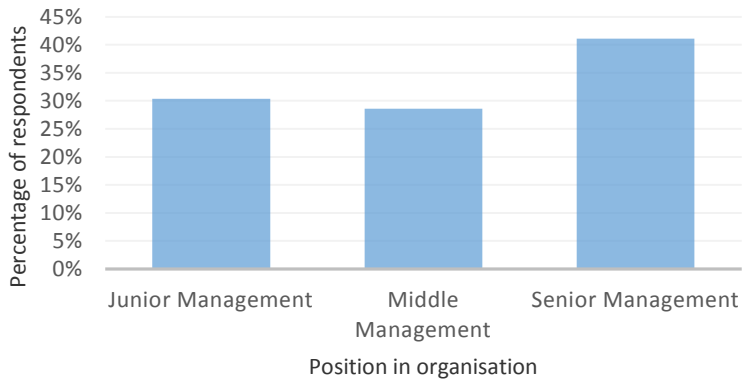

Figure 4.2: Percentage breakdown by respondents' management position

Another important characteristic used to categorise the respondents was the number of years in the construction industry. The majority of respondents at 41% (23) had between 5 to 10 years of experience in the construction industry. 11% (6) had 10 to 15 years of experience, 34% (19) had above 15 of experience and the rest, 14% (8) had below 5 years of experience. Figure 4.3 shows the distribution of the respondents in terms of years of experience.

Figure 4.3: Percentage breakdown by respondents' experience in construction industry

The respondents were required to indicate their highest level of education and among the respondents the majority at 59% (33) had a bachelor's degree, 20% (11) had a master's degree, 11% (6) had a diploma, 7% (4) had a doctorate and 4% (2) had a certificate. Figure 4.4 illustrates these results.

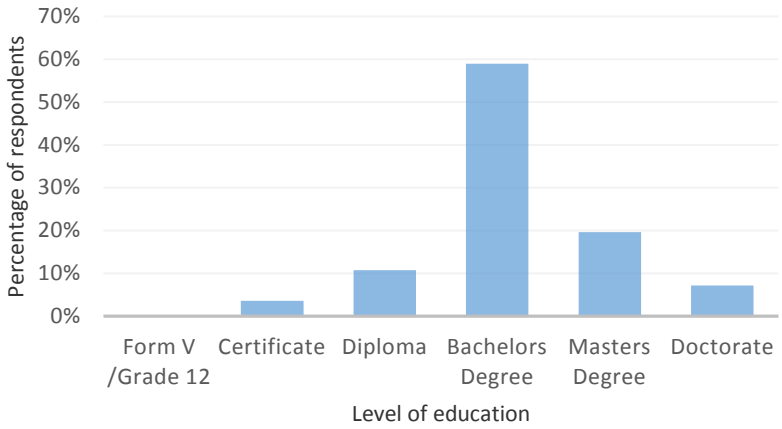

Figure 4.4: Percentage breakdown by respondents' academic qualification

Therefore, the background data indicated that most of the respondents were contractors. This was done purposively to ensure that the individuals who were directly involved in the relationship provided their views. 85% of the respondents had over 5 years of experience in the construction industry therefore the information submitted by the respondents would be reliable and based on actual experience. High responses from middle and senior managers indicate that the questionnaire were answered by respondents with more access to their organisations information. Lastly in terms of educational qualifications, all the respondents had at least a certificate meaning the respondents theoretically had enough basic knowledge and understanding of the topic being discussed. Therefore, the information provided by the respondents is credible to answer the research questions.

4.2.2. The main contractor-subcontractor relationship

The survey focused on how the relationship between main contractor and subcontractors is perceived in Zambia construction industry. Figure 4.5 illustrates the results on how the respondents perceived the relationship between main contractors and subcontractors in Zambia.

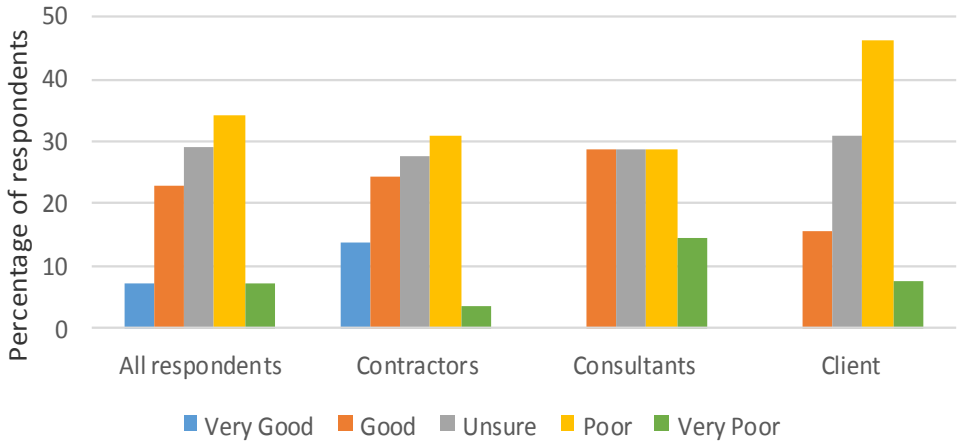

Figure 4.5: Respondents perception on the relationships between main contractors and subcontractors

Figure 4.5 indicates that, among all the respondents 7% indicated that the relationship was very poor, 34% indicated that it was poor, 29% indicated that they were not sure, 23% indicated that the relationship was good and 7% thought it was

very good. This indicates that the overall sentiment among the total respondents is that the relationship between main contractors and subcontractors in the Zambian construction industry is poor, therefore needing attention. Among the respondents, clients had the most respondents advocating that the relationship is poor. This could be due to the fact that clients run and oversee many projects mostly simultaneously as a result they are able to critically from a neutral point of view observe the relationship.

Figure 4.6 portrays the ranking of basic attributes in terms of their importance to the main contractor-subcontractor relationship in Zambia.

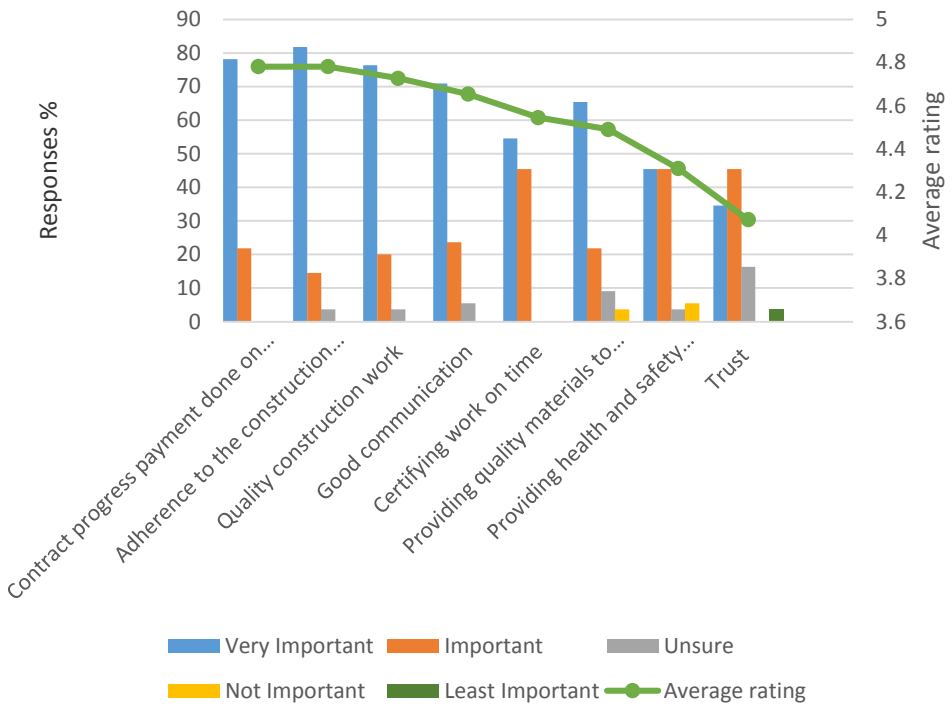

Figure 4.6: Rating of relationship attributes

The average rating which ranks from 1 to 5, indicates which factor were ranked high by the respondents. Figure 4.6 indicates that the relationship is mostly affected by

contract progress payment being done on time and the adherence to construction schedule, which had a rating of 4.8. These were followed by quality work with a rating of 4.7 and good communication between the parties with a rating of 4.6. Providing health and safety measures was ranked as the least important item because during the time of this study there was no safety code of practice implemented yet in the Zambian construction industry. Other suggestions from respondents included the engaging of qualified stuff, monitoring subcontractors work progress, team work, work package ownership, work break down structure (WBS) accountability, clear contract documents.

A question was included in questionnaire to ask the effects of a poor relationship between main contractors and subcontractors on a construction project. These effects were rated by respondents on a Likert scale and analysed using their average rating. Figure 4.7 shows the results.

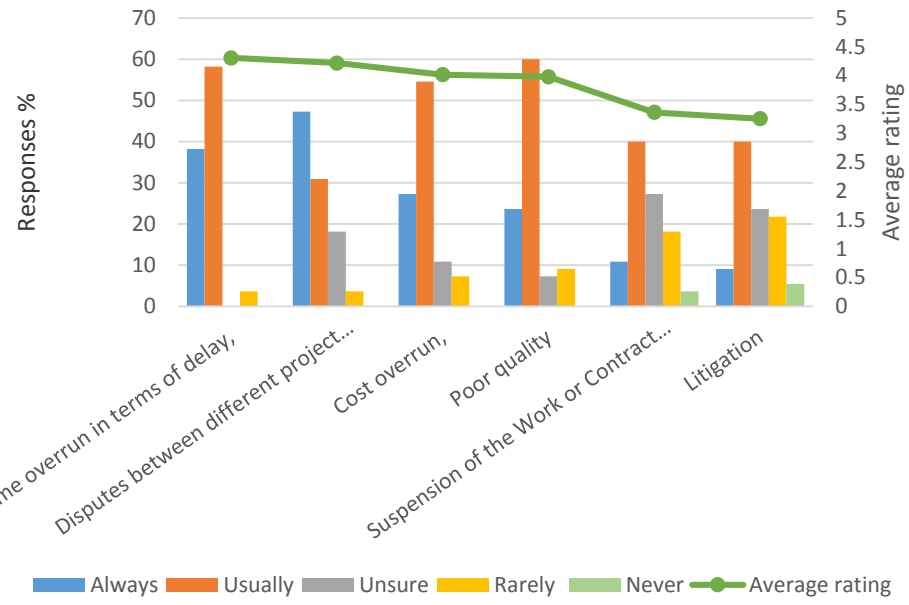

Figure 4.7: Effects of a poor relationship between the main contractors and subcontractors

As indicated in Figure 4.7, project time overruns in terms of delay, are likely to occur if there are problems in the relationship. These results concur with results adduced by Okunlola, (2015) demonstrating that, projects with interface problems are prone to project time overruns. Results in Figure 4.7 indicate that suspension of work and litigations rarely occur due interface problems between main contractors and subcontractors. Other suggestions from respondents were counter accusations, scope change of subcontract and termination of work without following legal steps

4.2.3. Interface problem caused by main contractors

In order to determine the factors causing interface problems in Zambia, respondents were asked to rank factors according to their importance in the Zambian construction environment. The respondents were asked to attach a weight to the factors on a Likert scale where 1 indicates least important, 2 indicates not important, 3 indicates unsure, 4 indicates important and 5 indicates very important. The factors were then ranked using their Relative Importance Index (RII). The ranking provides construction organisations with a prioritisation of the relationship factor to consider for improving their relationships in pursuit of better time, cost and quality performance. Table 4.1 shows the ranking of factors causing interface problems emanating from the main contractor.

Table 4.1: *Factors causing interface problems between main contractors and subcontractors caused by main contractors*

Factor	All		Contractor		Client		Consultant	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Delay in contract progress payment	0.924	1	0.975	1	0.867	4	0.933	1
Failure to provide necessary clarifications to subcontractors	0.903	2	0.950	2	0.889	3	0.883	3
Avoiding to pay the final payment for as long as possible	0.903	2	0.950	2	0.911	2	0.867	4
Delay in providing necessary materials to the subcontractors	0.883	4	0.875	6	0.844	8	0.917	2
Delay in certifying work	0.869	5	0.875	6	0.867	4	0.867	4
Providing low-quality materials to subcontractor	0.848	6	0.900	5	0.800	10	0.850	6

Factor	All		Contractor		Client		Consultant	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Absence of main contractor from site	0.841	7	0.850	9	0.933	1	0.767	10
Non-adherence to construction schedule	0.834	7	0.800	12	0.867	4	0.833	7
Not providing subcontractor essential services such as water and electricity	0.821	9	0.925	4	0.800	10	0.767	10
Assigning of work to new subcontractors without informing the original subcontractors	0.807	10	0.775	14	0.867	4	0.783	9
Interruption and termination of subcontractor work	0.800	11	0.875	6	0.778	14	0.767	10
Disclosing a subcontractor's bid price to another, so as to obtain a lower bid price	0.793	12	0.775	14	0.800	10	0.800	8
Failure to provide health and safety measures on site	0.793	12	0.825	11	0.822	9	0.750	13
Lack of trust	0.752	14	0.800	12	0.800	10	0.683	15
Failure to provide security on the site	0.752	14	0.850	9	0.711	15	0.717	14

As indicated in Table 4.1, delay in progress payment with an RII of 0.924, was ranked by the respondents as the most important factor causing interface problems. Failure to provide necessary clarifications to subcontractor and avoiding to pay the final payment for as long as possible both with RII of 0.903 were also ranked very high among factors leading to interface problems. This further corroborates the significates of swift financial management and communication to the relationship. Failure to provide security on site and lack of trust, both with RII of 0.752, were recognised as the least important factors in the relationship. Other suggestions from respondents included the sudden changing of subcontractor's responsibilities and scope of work, providing minimal rates which are no feasible for work to be executed.

4.2.4. Interface problem caused by subcontractors

Respondents were also asked to rank the importance of factors caused by subcontractors. Results are displayed in Table 4.2.

Table 4.2: *Factors causing interface problems between main contractors and subcontractors caused by subcontractors*

Factor	All		Contractor		Client		Consultant	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Not following main contractor's instructions	0.931	1	0.950	2	0.956	1	0.900	3
Lack of proper equipment	0.917	2	0.950	2	0.889	7	0.917	2
Work delays	0.910	3	0.925	6	0.867	8	0.933	1
Lack of construction quality work	0.910	4	0.875	11	0.956	1	0.900	3
Subcontractor's absence from site	0.903	5	0.900	7	0.911	5	0.900	3
Subcontractor not informing the main contractor when there is a problem	0.897	6	0.950	2	0.911	5	0.850	7
Subcontractor not communicating regularly with main contractor	0.869	7	0.975	1	0.778	12	0.867	6
Subcontractor not adhering to the condition of contract	0.869	8	0.900	7	0.933	3	0.800	11
Shortage of skilled labour	0.869	9	0.900	7	0.867	8	0.850	7
Poor management of cash flow	0.848	10	0.800	14	0.933	3	0.817	10
Failure to preserve and take care of materials	0.848	11	0.850	12	0.867	8	0.833	9
Subcontractor insolvency	0.821	12	0.900	7	0.800	11	0.783	12
Partnering the work with another subcontractor without getting the approval of the main contractor.	0.807	13	0.950	2	0.733	14	0.767	13
Poor health and safety compliance by subcontractors	0.786	14	0.850	12	0.778	12	0.750	14
Subcontractor involved in more than one project at a time	0.648	15	0.700	15	0.578	15	0.667	15

As indicated in table 4.2 not following main contractor's instructions was ranked as the most important factor with an RII of 0.931. Other important factors were lack of proper equipment with an RII of 0.917, work delays with 0.910, lack of construction quality work with 0.910 and subcontractor's absence from site with an RII of 0.903. Respondents highlighted that poor health and safety compliance by subcontractors with an RII of 0.786 was not very important in the relationship. As specified in table 4.2 subcontractors involved in more than one project at a time with an RII of 0.648 was the least important factors affecting the interface between main contractors and subcontractors.

4.2.5. Interface problem caused by other factors

Table 4.3 show the opinion of the respondents about the important factors leading to interface problems caused by the external factors.

Table 4.3: *Factors causing caused by the external factors*

Factor	**All**		**Contractor**		**Client**		**Consultant**	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Price escalation of material and labour	0.952	1	0.925	1	0.956	1	0.967	1
Change of governmental regulations and laws	0.862	2	0.925	1	0.867	2	0.817	2
Extreme weather conditions	0.772	3	0.825	4	0.822	4	0.700	5
Geological conditions of site not as expected	0.772	3	0.850	3	0.733	5	0.750	4
Political interference	0.766	5	0.675	5	0.844	3	0.767	3

As indicated in Table 4.3, the respondents showed that "price escalation of material and labour" with an RII of 0.952 caused interface problems. The next factor was change of governmental regulations and laws with an RII of 0.862. Political influence with an RII of 0.766 was deemed as having the lowest impact on the relationship. Other suggestions from respondents included the extreme delay in payments from the client and scope change.

4.2.6. Top ten factors out of all the factors combined

In order to determine the most important factor affecting the main contractor-subcontractor relationship in Zambia, all factors were sorted order of their RII, from highest to lowest and the top ten factors were deduced. Table 4.4 shows the most important factors causing contention in the relationship. The results show that there are more factors in the top ten emanating from the subcontractor than those emanating from main contractors and external factors.

Table 4.4: *Top ten factors causing interface problems between main contractors and subcontractors*

Factor	ALL		Contractor		Client		Consultant		Group
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	
Price escalation of material and labour	0.952	1	0.925	3	0.956	1	0.967	1	External
Not following main contractor's instructions	0.931	2	0.95	3	0.956	1	0.900	6	Subcontractor
Delay in contract progress payment	0.924	3	0.975	1	0.867	12	0.933	2	Main contractor
Lack of proper equipment	0.917	4	0.95	3	0.889	10	0.917	4	Subcontractor
Work delays	0.910	5	0.925	3	0.867	12	0.933	2	Subcontractor
Lack of construction quality work	0.910	6	0.875	18	0.956	1	0.900	6	Subcontractor
Failure to provide necessary clarifications to subcontractors	0.903	7	0.95	3	0.889	10	0.883	9	Main contractor
Avoiding to pay the final payment for as long as possible	0.903	8	0.95	3	0.911	7	0.867	10	Main contractor
Subcontractor's absence from site	0.903	9	0.9	13	0.911	7	0.900	6	Subcontractor
Subcontractor not informing the main contractor when there is a problem	0.897	10	0.95	3	0.911	7	0.850	13	Subcontractor

As shown in Table 4.4, the factor ranked number one was price escalations for materials and labour with an RII of 0.952. This emphasizes that, this is the most

important factor leading to interface problems. In most developing countries prices of materials and labour can rise due to inflation, this results in subcontractor not having enough funds to finance work and buying of materials. If his revised estimation costs are not approved by the owner, losses will be experienced and problems will develop between the contractor and his subcontractor. This agrees with results by Tayeh, (2009) who also ranked this factor very high.

As illustrated in table 4.4, not following main contractor's instruction was ranked as the second most important factor with an RII of 0.931. This is when the subcontractor performs work which is not in accordance with the directives of the main contractor. When this occurs problems will arise between the main contractor and subcontractor as they will likely be requirements for revision of work.

Table 4.4 shows that delay in contract progress payment was ranked in third position with RII of 0.924. This means the respondents recognised delay in payments as causing problems to the relationship between main contractors and subcontractors. When payments are delayed, the subcontractor is not able to perform work or the work performed will be below standards. If this occurs the relationship between main contractors and subcontractors is likely to be strained. These results agree with results from Okunlola (2015) and research by (Enshassi et al, 2012) who also rated this factor as very important in causing friction between main contractors and subcontractors.

Lack of proper equipment was ranked in fourth position with RII of 0.917 as indicated in table 4.4. This shows that respondents considered this factor as a major factor that is affecting the relationship between main contractors and subcontractors. This factor was also recognised and ranked high by Rajput and Agarwal (2015). They noted that frequent equipment breakdown and slow mobilization of equipment can lead to issues between main contractors and subcontractors.

As shown in table 4.4, work delays is ranked in fifth position with RII of 0.910. This means that this factor is regarded as very important to the relationship, therefore

needing attention. Subcontractors often delay work due to delay in obtaining materials or attaining skilled labour. When this occurs the whole project can be delayed and other works being done by the main contractor can also be delayed causing conflicts between the parties. These results agree within Haseeb et al, (2011) delaying work can cause disputes, between project parties and even the abandonment of projects.

Table 4.4 shows that lack of construction quality work was also ranked in fifth position with an RII of 0.910. The reason for this is that there a number of contractors in Zambian construction industry without the proper know-how and machinery who when awarded work will perform poorly. These results agree with research done by (Enshassi et al, 2012) who also ranked this factor among the top factors

Failure to provide necessary clarifications to subcontractors was ranked as the seventh most important factor. As indicated in table 4.4 this factor had RII of 0.903 showing that the respondent thought this factor was very important in the relationship. When the main contractor fails to provide necessary clarifications, problems will arise between the main contractor and subcontractor as there will likely be to be wrong work done or there can be work delays. These results agree with Huang et al, (2008) who stressed how this ineffective type of communication can lead to an adversarial relationship.

As shown in table 4.4 avoiding to settle the final payment for as long as possible was also ranked in seventh position with RII of 0.903. This means this factor was regarded as very important in the relationship by the respondents. These results agree with Manu et al, (2015) who indicated that such delays hinder the development of a good relationship between main contractors and subcontractors. Delaying of payments to improve margins creates a contractual, transactional rather than relational environment, making subcontractors suspicious about the main contractor's intention.

Table 4.4 indicates that subcontractor's absence from site had an RII of 0.903 and was also ranked seventh out of 10 factors. This factor is therefore very important in the main contractor-subcontractor relationship. Subcontractors can be absent from site because they are working on other projects simultaneously. If this occurs work will be delayed and main contractor will regard the subcontractor as not being fully committed to their project. This will cause contentions between the main contractor and the subcontractor.

As indicated in table 4.4 a subcontractor not informing the main contractor when there is a problem was ranked as the tenth factor with RII of 0.897. It is common that subcontractors will not communicate when they face a difficulty or there is a problem in their work. However, if the subcontractors fail to solve the problem it might be too late to explore other means of solving the problem. This will in turn cause poor quality of work and project delay leading conflicts main contractors and subcontractors. These results agree with Manu et al, (2015) who found that it is important that subcontractors are honest and open in communicating whenever there was an imminent problem related to their work package.

4.2.7. Improving the interface between main contractors and subcontractor

Respondents were asked to rate attributes that they think can enhance the relationship between the main contractors and subcontractors. All the factors were finally ranked according to their RII from highest to lowest in order to adduce the most crucial factors that can help improve the main contractor-subcontractor relationship in Zambia. Table 4.5 shows the top ten factors that can improve the relationship.

***Table 4.5**: Top ten attributes that can enhance the relationship between the main contractors and subcontractors by respondent category*

Factor	ALL		Contractor		Client		Consultant	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Communicating regularly	0.966	1	0.975	1	0.956	3	0.967	1
Complete and clear contract documents	0.966	1	0.975	1	0.978	1	0.950	5

Factor	ALL		Contractor		Client		Consultant	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Information communicated in time	0.959	3	0.950	5	0.956	3	0.967	1
Timely progress payment to subcontractor	0.959	3	0.975	1	0.933	6	0.967	1
Communicating when there is a problem	0.952	5	0.950	5	0.956	3	0.950	5
Good construction work quality	0.952	5	0.975	1	0.933	6	0.950	5
Subcontractor possess enough skilled labour	0.938	7	0.950	5	0.978	1	0.900	10
Adherence to the construction schedule	0.938	7	0.950	5	0.889	9	0.967	1
Adherence to the conditions of the contract	0.931	9	0.950	5	0.911	8	0.933	8
Accuracy of the project cost estimate	0.883	10	0.925	11	0.867	11	0.867	12

As shown in table 4.5, Communicating regularly was ranked first with an RII of 0.966. This means the respondents saw communication regularly as being very important to the relationship. This is because when communication is not regular there is breakdown of information flow which can result in the performing of wrong work on a project. These results agree with findings by Huang et al, (2008) who stressed the importance of communication in the relationship.

Complete and clear contract documents had an RII of 0.966 meaning it was also ranked in first position as indicated in table 4.5. This means respondents saw this factor as very important to the interface between main contractors and subcontractors. This result agrees with Rajput and Agarwal (2015) advocated that in

order to improve the relationship between main contractors and subcontractor, the documentation between main contractors and subcontractors regarding designs, drawings, plans, schedules and management systems should be clear and complete. Clear well stated document can help with the avoidance of disputes early in the project cycle.

Table 4.5 shows that information communicated in time was ranked in third position with RII of 0.959. This result means that respondent thought this was a very important factor. This is because information on a construction project is subjected to change at any moment, therefore it is important that information flow in time in order to avoid execution of the wrong work. These results agree with Fah (2008) who stated it is important to ensure information is transmitted timely, not too early or too late.

From table 4.5 it is shown that timely progress payment to subcontractor is also has an RII of 0.959 meaning it is also ranked in third position. This means this factor is deemed very important in the construction sector. The significance of this factor is due to the fact that without payment the subcontractor is not able to acquire raw materials and pay workers. This makes the performance of the work very problematic. These results agree with (Enshassi et al, 2012) who saw timely payment as a crucial factor to the main contractor-subcontractor relationship.

Table 4.5 shows that information communicating when there is a problem was ranked in fifth position with RII of 0.952. This means this factor was deemed by the respondent as very important to the relationship. These results agree with Manu et al, (2015) who found that project teams considered it important that subcontractors are honest and open in communicating to all concerned parties, whenever there was an imminent problem related to their work package.

Another factor with RII of 0.952 is good construction work quality therefore it is ranked fifth as shown in table 4.5. This means that respondents thought this factor was very important in the relationship. These results agree with research done by

(Enshassi et al, 2012) who also ranked this factor among the top factors. In addition, Enshassi et al, (2012) noted that the importance of this factor is due to the fact that lack of quality usually leads to redoing or work. Funds and time is lost in removing the poor work done and doing new work. Conflicts often come when there is an increase in financing such works.

As illustrated in Table 4.5, in seventh position is the factor of subcontractor possessing enough skilled labour with RII of 0.938. This shows that this factor is very important in enhancing the relationship between main contractors and subcontractors. This factor is important because shortage of critical labour will affect the quality of the finished work which might not be accepted hence fostering conflicts problem between the contractor and his subcontractor. These results agree with Huang et al, (2008) who noted that interface problems can occur due to lack know-how.

Table 4.5 shows that another factor with RII of 0.938 is adherence to the construction schedule. This factor is also rated as the seventh most important factor. This indicates that this factor is very important to the interface. This factor is important because project delays can lead to penalties. Haseeb et al, (2011) stated that not following the construction schedule and delaying can cause disputes, lawsuits, total desertions, litigations and abandonment of projects.

As indicated in table 4.5, the factor adherence to the conditions of the contract was ranked in the ninth position with RII of 0.931. Since it is in the top ten it means respondents perceived it as a crucial factor to the relationship. These results agree with Enshassi et al, (2012) who concluded that non adherence to conditions of the contract is one of the most important causes of interface problems. If the subcontractor skips or neglects to implement some conditions of the agreed contract, a dispute can rise if the main contractor notices this omission.

Lastly accuracy of the project cost estimate with an RII of 0.883 was ranked in the tenth place as indicated in table 4.5. This shows that this factor is very important to

ensuring a good relationship between main contractors and subcontractors. This is due to the fact that if the costs are not estimated correctly before the work commences, the costs during the project can go over the projected ones. When this occurs it can be difficult to obtain materials and pay workers hence difficult to continue with the project.

4.3. Interview data and analysis

Structured interviews were carried out to enhance and validate questionnaire results as part of data triangulation. Compared to the quantitative questionnaire survey, the qualitative expert interview provides a direct, more in-depth interaction with the respondents. The structured interview targeted 15 professionals working for contractors, subcontractors, consultants and clients. The interviews had some questions which were not included in the questionnaire in order to obtain more information specific to the Zambian subcontracting practice that could not be obtained using questionnaires and from literature review. The interviewees were sampled using purposive sampling in order to obtain data from selected parties that were seen as best to provide the needed information. The selection of an individual was based on the experience in the construction industry, the level of education and the extent to which they were involved in subcontracting. The purpose was to obtain an in-depth understanding as well as background information on the Zambian subcontracting environment.

4.3.1. Interviewee general information

Out of the targeted 15 respondents 12 participated in the interviews. The interviewees were asked to state the sector of the construction industry they belonged, their position in their organisation, the number of years of experience and their highest level of education.

Regarding the main business or sector in the construction industry, interviewees were from the contractor sector, the consultancy sector and the client sector. This is shown in Figure 4.8.

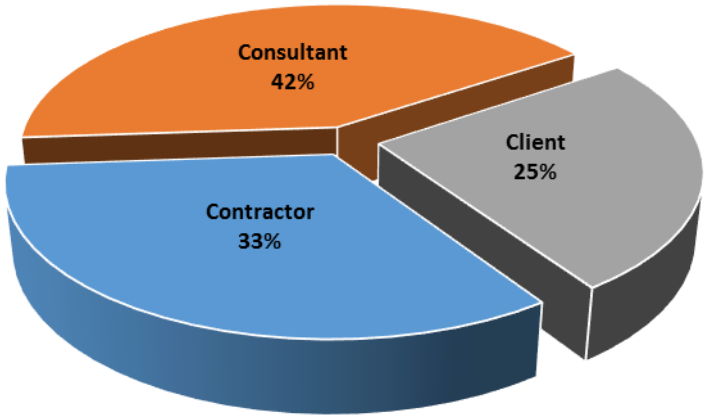

Figure 4.8: Percentage breakdown by respondents' sector in construction industry

As indicated in Figure 4.8, 33% (4) of the interviewees were from the contractor sector, 42% (5) from the consultancy sector and 25% (3) from the client sector.

Figure 4.9 displays the percentage breakdown of respondents by management position. The majority of respondents at 50% (6) belonged to senior management group, while 33% (4) were in middle management. Junior management accounted for 17% (2) of the total interviewees.

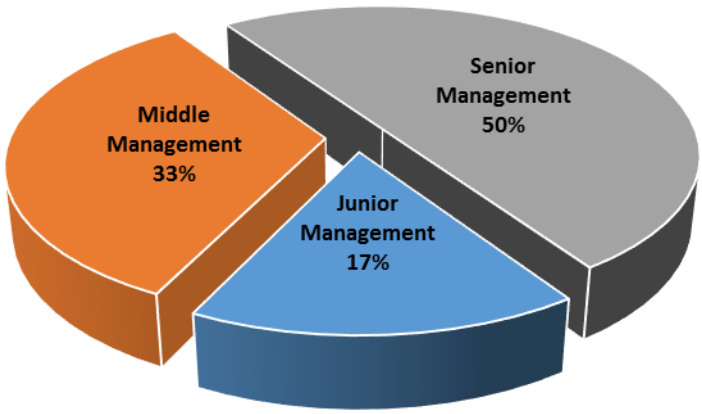

Figure 4.9: Percentage breakdown by respondents' managerial position

All the respondents, selected to participate in the interviews had substantial experience in the construction industry. All the participants had more than 5 years of experience with 33% (4) of the participants having over 15 years of experience in the construction industry. 42% (5) with between 5 to 10 years of experience and

25% (3) with 10 to 15 years of experience. Figure 4.10. shows the distribution of years of experience in the construction industry among the respondents.

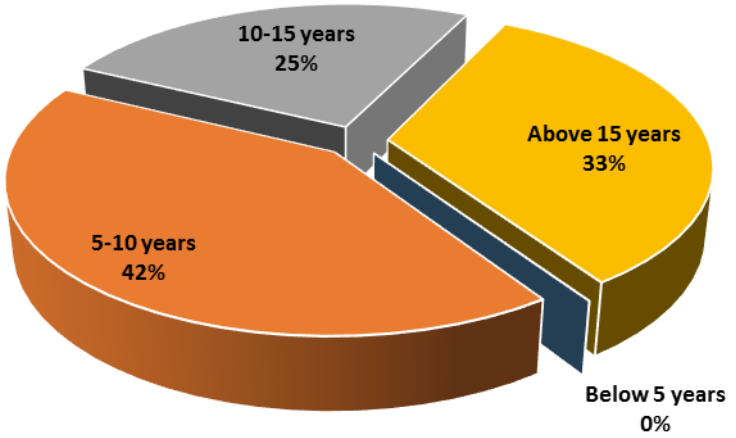

Figure 4.10: Percentage breakdown by respondents' experience in construction industry

Figure 4.11 displays the academic qualifications of the respondents. 43% (5) of the respondents had a bachelor's degree, 25% (3) had a master's degree, 25 % (3) had a doctorate and 8 % (1) had a diploma. All the respondents had adequate qualifications to be able to provide sufficient information.

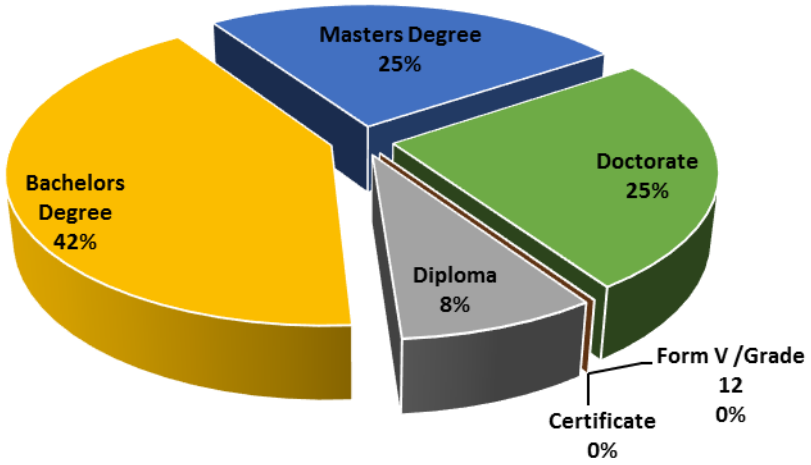

Figure 4.11: Percentage breakdown of respondents academic qualifications

4.3.2. Involvement in a project affected by main contractor-subcontractor relationship.

All the interviewees acknowledged that they have been part of a project affected by the relationship between main contractors and subcontractors. One interviewee went on further to state that "All projects that are subcontracted are bound to have main contractor-subcontractor problems of some sort."

4.3.3. Factors that contribute to relationship problems.

The interviewees highlighted a number of factors that would cause problems between the main contractor and subcontractor. The factors were compared and analysed to assess which ones would be the most common hence needing more attention. The most common factors put forward by the interviewees were, communication and payment issues. Other factors found to cause interface problems include, not providing subcontractor materials on site, poor understanding of work, and lack of skilled labour. Figure 4.12 presents the ranking of the factors based on the number of interviewees that identified them as common instigators to an ineffective relationship between main contractors and subcontractors.

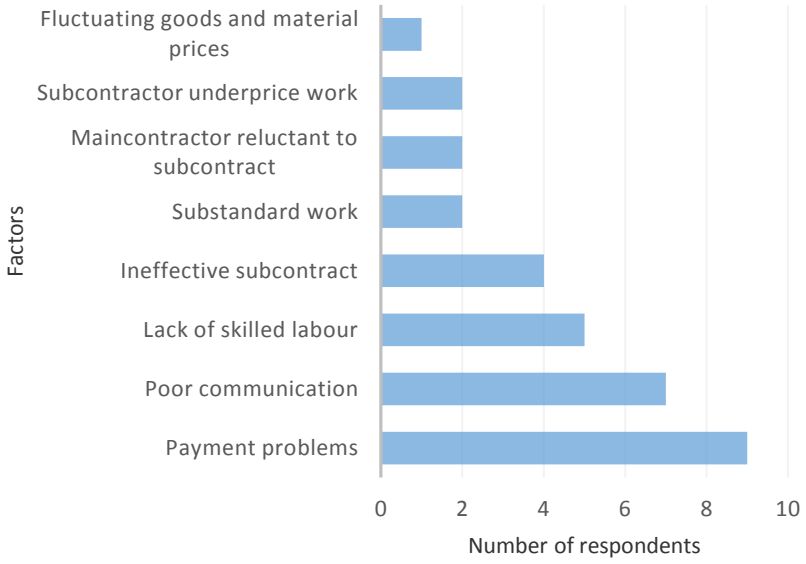

Figure 4.12: Ranking of factors

As indicated in Figure 4.12 the main issues raised by interviewee were related to payment and communication. In terms of communication, the study discovered that the imparting of information between main contractor and subcontractor is so ineffective to the extent that the subcontractors will not understand the instructions from the main contractor correctly and end up doing the wrong work or procuring the wrong materials. When wrong work is done and incorrect materials are procured friction will rise, because the subcontractor's work affects the main contractor's work. The results also agree with Huang et al (2008) who emphasized that communication problems lead to interface problems between contractors and subcontractors.

The interviewees advocated that issues of payments are notorious contributors to misunderstandings between main contractors and subcontractors. This would commonly occur when the client does not pay the main contractor. If the main contractors do not receive their payment they will in turn not pay the subcontractors. In some cases, the main contractors might have other sources of finance or better management of finances hence they will be able to ensure liquidity throughout the project. When a subcontractor notices that a main contractor is able to sustain liquidity they will assume the main contractor has received payment and is withholding funds from them. This will cause contention and distrust in the parties' relationship. These results agree with Okunlola (2015) who found that financial and payment problems lead to an adversarial relationship between project parties.

4.3.4. Factors that can improve the relationship

A number of the interviewees handled the improvement question by stating the opposite of what was stated in the factors that contribute to relationship problems question. As a result, more effective communication and timely payments were the most common solutions to interface problems. Other enablers of a good relationship include: better contracts; subcontractor's early involvement in project and contractors' financial soundness.

To improve the communication respondents advocated for more meetings on site and clear requirements and scope of work. The main contractor should ensure that the subcontractor is capable of doing his work and understands his responsibilities before executing work. A good contract would ensure requirements are clearly stated and understood. These results agree with White and Marasini, (2014) who stated that to improve the relationships, the interface requires more coordination with efficient communication from the main contractor management.

Since payment issues usually stem from the client, the respondents suggested that the client should before the project commences, ensure they are capable of administering funds to contractors in time as agreed in the contract. In addition, when the main contractor is paid they should in turn pay the subcontractor in time. Interviewees noted that subcontractors don't usually plan carefully on their cash flow during the project. Subcontractors would often rely on a payment from another project to finance a different project. On the contrary respondents suggested that the subcontractors should ensure that they manage their funds well to ensure cash flow during the project even when they have not yet received payment from the client. The results agree with Rajput and Agarwal (2015) who stressed the importance of making payments in time and also recommended contractors to take considering of their financial situation so that during execution they should not face problem.

Other factors suggested to improve the relationship were: respecting of contract agreements; including the subcontractor in the initial signing of the contract between the main contractor and the client; mutual trust; honesty between the parties

4.3.5. Contractual factors

The study showed that there is no standard contract between main contractors and subcontractors that is used in projects except for road projects under RDA. However main contractor indicated that they require performance bond in order to ensure that the subcontractor will perform. One interviewee stated that the subcontractors are a risk as there are a lot of uncertainties when subcontracting hence it would be foolish to engage with a subcontractor without proper insurance. However, another

interviewee stated that the subcontractors should not be obliged to provide a performance bond since it is already provided by the main contractor. In terms of contract termination main contractors tend to issue warning but will not go to the extent of terminating the contract. An interviewee noted that when parties terminate the contract it is usually terminating the agreement by mutual assent. An example was given where the termination agreement was made. The subcontractor was not given advance payment for a long period of time. Part of the work was executed with their own financing however they could not continue with the works with that limited financing and was under pressure from the suppliers hence the contract was terminated.

4.3.6. Effect of nominated subcontractors

Most of the interviewees advocated that the relationship that the main contractor has with a domestic subcontractor is different to that with a nominated subcontractor, however this relationship does not affect the project significantly. The clients considered nominated to be more effective than the domestic subcontractors. Nominating a subcontractor can also eliminate some unethical activities such as subcontracting a company which is actually controlled by the same main contractor, shopping work from the scope of one subcontractor and selling to another subcontractor in order to gain more profit.

4.3.7. Effect of the 20% subcontracting policy

During the period just after the policy was implemented there was reluctance from the main contractors to cooperate with subcontractors. As a result, main contractors would create an environment where the subcontractor would not be able to perform so that the subcontract can be terminated. The policy did not affect the relationship to a greater extent however most of the respondents highlighted that the policy itself and its monitoring is not effective.

4.3.8. Subcontracting practice in Zambia

Subcontractors are contracted by main contractors to reduce work load and allow the main contractor to concentrate on other aspects of the project including project

management. Some interviewees concluded that the motive for contractors to subcontract works in the construction industry is because the contract states so. Main contractors are in fact reluctant to subcontract work. This is due to the fact that subcontractors in Zambia are not necessarily specialist meaning a main contractor can perform the work themselves without contracting subcontractor to do that work.

4.3.9. Improving the Zambian subcontracting environment

The majority of the interviewees advocated for a system that helps local subcontractors increase capacity. This can be done by allowing the subcontractors to participate in various projects from which they can gain experience. In order to build the capacity, the government should ensure the 20% subcontracting policy is improved. An interviewee stated that the work that is given to the subcontractors is not monitored and that the subcontractors are given work that is insufficient for them to improve and increase capacity. Most of the interviewees reasoned that there should exist a law that enforces the main contractor to work in accord with the subcontractor and put in force that the main contractor actually assists the subcontractor with work and in the transfer of knowledge. Since only the road sector has a standard contract most interviewees suggested the implementation of a standard subcontractor contract that can help tackle the common subcontracting issues. An operation framework that gives guidelines on subcontracting can also improve subcontracting practice in Zambia.

Subcontractors should focus on one area of specialisation where they will be able to perform well. This will enable them to concentrate on a discipline hence be able to do well on that area of work. This will additionally help the subcontractor have experience in that work and become very good in that specialty hence increasing reputation and ultimately capacity. Since the subcontractor will become specialist in an area, main contractors will not be unwilling to subcontract as they will need the services of the subcontractor. Subcontractors should consider merging to create a stronger firm where they can combine their knowledge and experience. When subcontractors start a company they should ensure they have adequate knowledge

regarding the construction work they will be performing and also knowledgeable in project management.

4.4. Summary of top factors

The top factors obtained from questionnaires and those from interviews were consolidated to provide an overview of the factors causing interface problems and improvement factors. The factors were then categorised in groups namely: financial; communication; work; contract; and other. The classification was done in order to simplify the analysis of the factors and in order to suggest solutions to interface problems that are in a certain group. Figure 4.13 shows the factors causing interface problems.

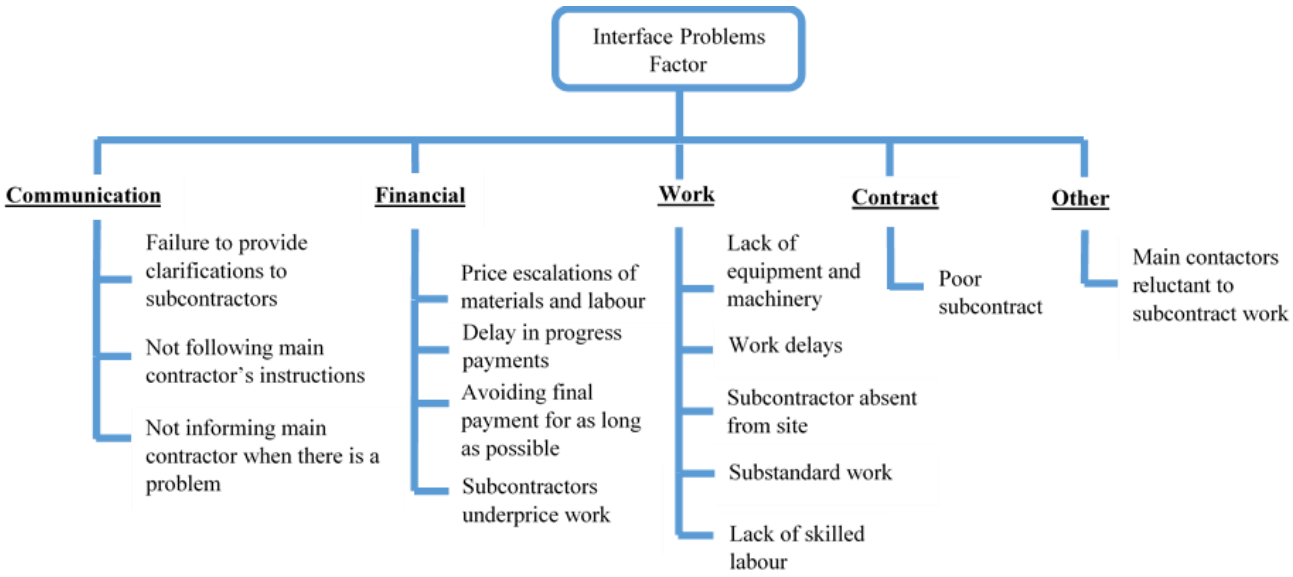

Figure 4.13: Summary of factors causing interface problems

Figure 4.14 shows the factors that can help improve the main contractor and subcontractor relationship in Zambia.

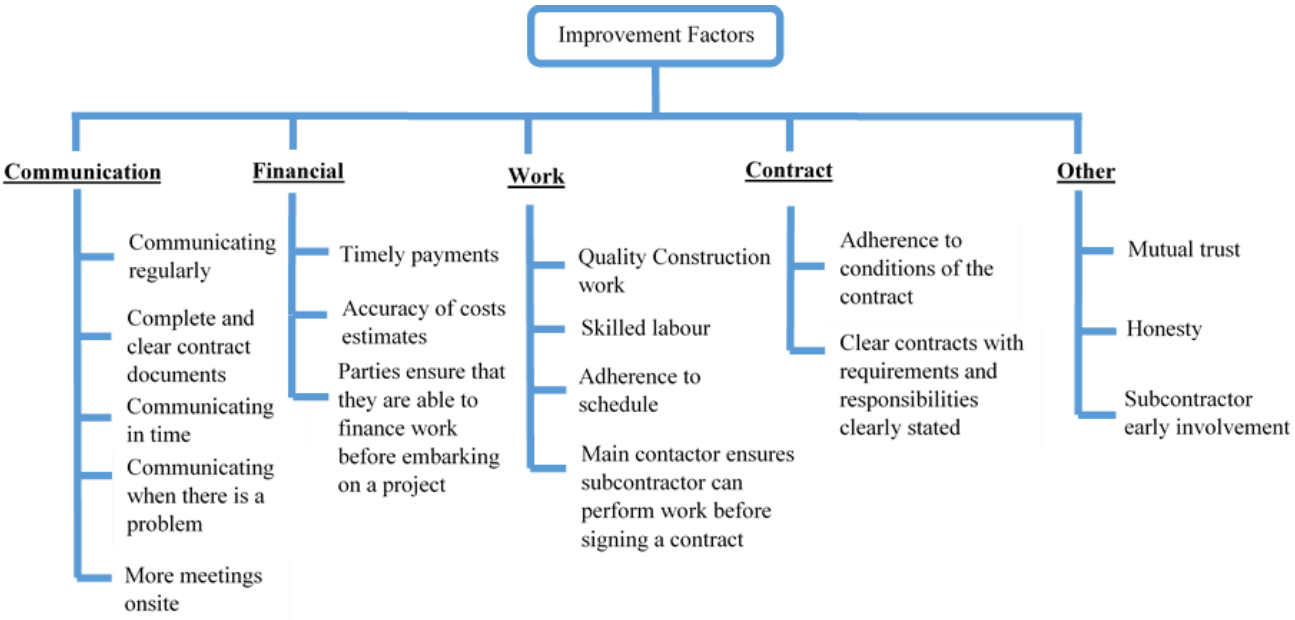

Figure 4.14: Summary of attributes that can improve the relationship

4.5. Chapter summary

This chapter presented the results of the research and their analysis. The data presented was gathered using structured interviews and questionnaires. The presentation of results was done using tables and charts. The analysis of the data elaborated the top factors most affecting the relationship between main contractors and subcontractors and factors that can improve the relationship. Among the top factors most affecting the relationship were, price escalation of material and labour, not following main contractor's instructions, delay in contract progress payment, lack of proper equipment and work delays. The top factors that can improve the relationship were, communicating regularly, complete and clear contract documents, information communicated in time, timely progress payment to subcontractor and communicating when there is a problem. The next chapter provides a model that integrates the results to assist the improvement of the relationship between main contractor and subcontractors in Zambia.

CHAPTER 5:
THE PARTNERING PROCESS FLOWCHART MODEL

5.1. Introduction

The previous presented the data obtained from the questionnaire survey and structured interviews. The chapter also presented the analysis and discussion of the data obtained. The major aspects affecting the interface between main contractors and subcontractors in Zambia were deduced. Suggestions were also provided on how the relationship can be improved. This chapter endeavours to present the development of a conceptual flowchart model of non-contractual project partnering process that can be implemented in Zambia. The model will utilise basic steps that are presented in literature while incorporating results in this study. This is done in order to provide a relevant model to enhance the relationship between main contractors and subcontractors in the Zambian construction industry.

5.2. Development of the partnering model

Partnering was determined as the suitable framework to be utilised in order to enhance the main contractor-subcontractor relationship. This is because partnering incorporates most the improvement factors identified in this study. In terms of communication, partnering fosters better communication by providing methods to discuss and share information freely through regular meetings and daily updates (Ghaffari and Jane, 2012). Nevada Department of Transportation (2010) highlighted that partnering provides better risk management that enables an improved ability to look forward, anticipate and avoid problems therefore providing better cost estimations and financial management. In addition, Ohio Department of Transportation (2013) found that when project participants in projects truly adopt the partnering concept, the projects are more likely to meet safety, cost, schedule, and quality goals and few, if any, unresolved disputes at project close out. In terms of work, Meng, (2012) revealed that poor project performance can be reduced by replacing the traditional approach with partnering arrangements. A project that performs exceedingly, usually conforms to the contract agreements. Furthermore,

partnering encourages the early involvement of stakeholders on a project and encourages trust among parties (Eriksson, 2014).

For this model a non-contractual project partnering approach was adopted. By employing non-contractual project partnering over a series of projects, main contractors and subcontractor will learn more about partnering from experience. From this experience, contractors will be able to embark on full contractual partnering that is beneficial on complex major projects. Success in partnering between main contractors and subcontractors will also encourage partnering between clients and main contractors in the Zambian construction industry.

Since partnering is not yet extensively used in the Zambian construction industry therefore, non-contractual partnering was chosen because project parties are deemed to be unwilling to abandon the usual traditional contract and embark on full partnering contract. Non-contractual partnering allows parties to have the contract as a contingency plan in case there is a major dispute that cannot be solved through partnering means. Project partnering was chosen because it allows main contractors to partner with different subcontractors in different projects allowing subcontractors to experience and learn partnering from experience.

The non-contractual project partnering approach was adopted with guidelines from the Hong Kong Construction Industry Council, (2012) partnering framework. The Hong Kong Construction Industry Council, (2012) highlighted that following the partnering framework can foster open communication, timely escalation of critical issues for resolution, early involvement, trust and honesty between project parties and lastly help improve project performance. The results from the questionnaire survey and interviews advocated for the need for these factors in the Zambian construction industry therefore it became necessary to implement the framework. However, the Hong Kong Construction Industry Council framework did not have self-assessment process, making offer to partner process and the facilitated dispute resolution session.

Construction Excellence UK, (2004) advocated the importance of self-assessment in the partnering process as it enables an organisation to understand its own readiness for the partnering journey. Self-assessment provides information for an organisation to determine if staff requires training before embarking on a partnering journey. Therefore, self-assessment reduces the possibility of the organisation reverting to the contract during the project as a result, the process was included in the non-contractual project partnering model.

California Department of Transportation Division of Construction, (2013), highlighted the importance of including a facilitated dispute resolution session in a partnering process hence the option for a facilitated dispute resolution session was added to the non-contractual project partnering model. The facilitated dispute resolution is held in lieu of a follow-up partnering session if a conflict or dispute arises and cannot be resolved in the follow-up meetings. The session provides a further step towards dispute resolution before resorting back to the contract. California Department of

Transportation Division of Construction, (2013), included making the offer to partner as a crucial step to the partnering process. This step is important as it does not involve just the making of the offer to partner but also the partner selection. Selection of a partner needs to be conducted carefully through a structured selection process (Construction Excellence UK, 2004). Consequently, making the offer to partner was added to the non-contractual project partnering process. Figure 5.1 illustrates the proposed model.

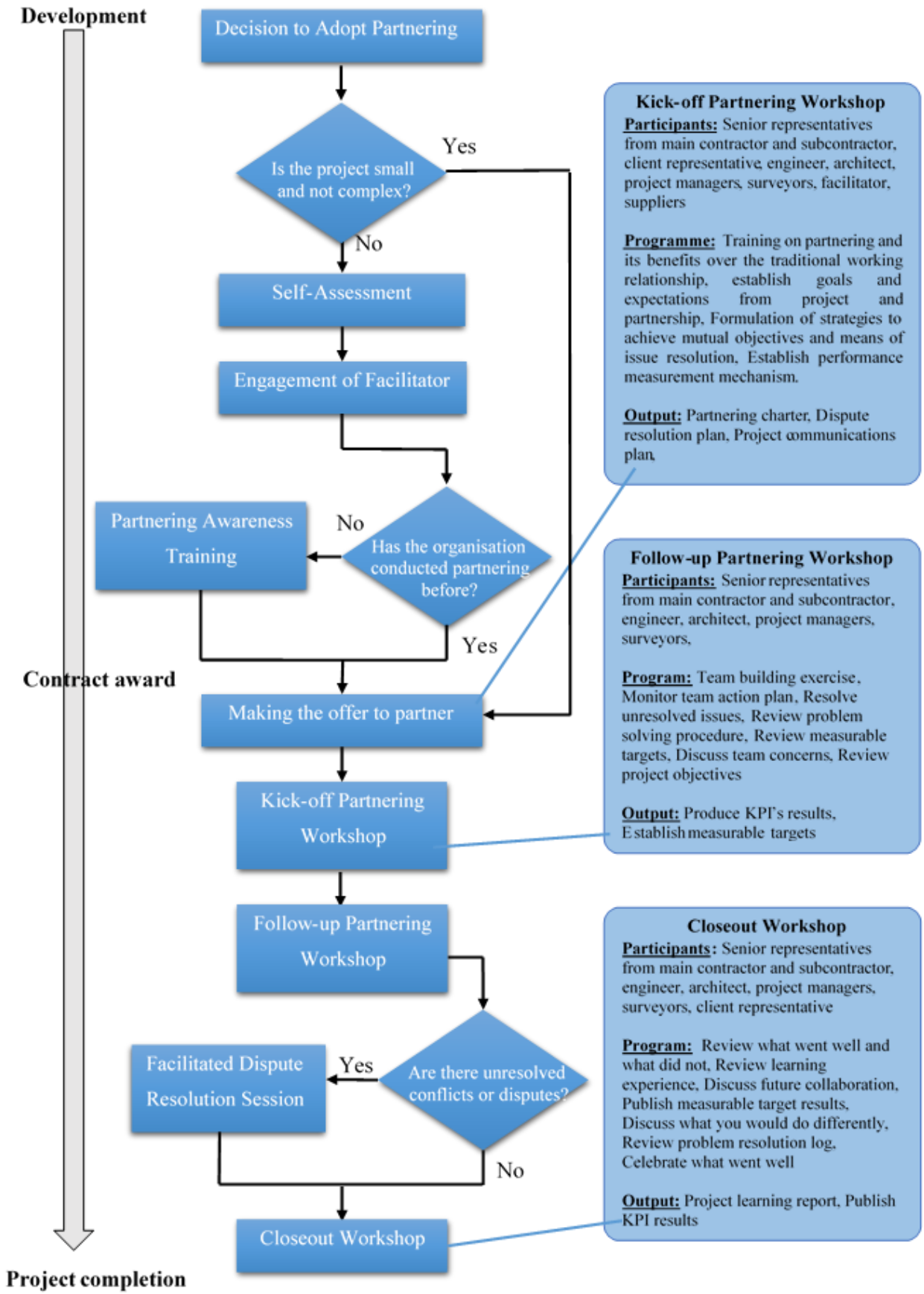

Figure 5.1: Non-contractual project partnering model

5.2.1. Decision to adopt partnering

This is the first step of the partnering process. The decision to adopt partnering must be backed with commitment from the highest level of the organisation management and is continually communicated and reinforced throughout the organisation. The organisation must be willing and prepared to adopt a culture change from the usual way of conducting work to a more collaborative approach.

5.2.2. Self-assessment

Before embarking on the search for a facilitator and partners, the organisation needs to assess itself to understand its own readiness for a partnering approach (Construction Excellence UK, 2004). This means understanding:

- if the organisation is sufficiently flexible and prepared to respond to a cultural change;
- if there any concerns from people in the organisation towards partnering;
- if the decision to partner was backed by a satisfactory reason that will not become irrelevant as the project progresses; and
- if people in the organisation are knowledgeable about partnering.

These factors will help determine if the organisation is ready for partnering and if training is required.

5.2.3. Engagement of facilitator

A partnering facilitator is an independent professional trained to assists in developing an effective partnering process and partnering workshops for the project (Hong Kong CIC, 2012). However, the facilitator is not the leader of the partnering effort. The parties should engage a partnering facilitator that is experienced in partnering and understand the various aspects of partnering, including its potential benefits, requirements and process of partnering. If the project is small and not complex the project can be internally facilitated meaning the facilitator is not used. Here the facilitation responsibilities are jointly shared by the parties.

5.2.4. Partnering awareness training

If an organisation is going to embark on a partnering relationship it is important that the staff of that organisation understands what they will be involved in and how to make it successful. Self-assessment will determine whether the organisation knowledgeable about partnering and to what extent (Ohio Department of Transportation, 2013). Therefore, an internal training session can be conducted as per organisational requirements. The internal staff should understand the potential benefits of partnering to the project and the organisation and how to practice partnering. Key project staff including engineers, architects and surveyors should be present. If the organisation has conducted partnering before this might not be necessary.

5.2.5. Making the offer to partner

The offer will be in the form of a letter of invitation. Before the party can make an offer it is important that they possess important information and understand about the other party's work culture. If possible a background check should be done to determine the following factors: management style, the understanding of partnering, previous partnering experience, health and safety procedures, customer care and environmental policy. Knowing these attributes can help decide if a party is ready for partnering (California Department of Transportation Division of Construction, 2013).

5.2.6. Kick-off partnering workshop

The kick-off workshop is an important step in creating the partnering relationship as it is the first formal step towards partnering (Washington Department of Transport, 2009). This is where a party officially signals their intention to adopt a partnering approach from the outset of the project by arranging a kick-off partnering workshop. The workshop enables the partnering parties to meet, build relationships, set expectations, roles, and develop team processes that support the oncoming project. The team processes to be established include: mitigation strategies for project challenges; communication protocols; procedure for decision making and issue resolution; and establish the partnering plan for the project.

5.2.7. Follow-up partnering workshops

Follow-up partnering workshops are held at various intervals throughout the project life cycle. Follow-up partnering workshops are short hence they can easily be handled in a few hours. These workshops allow the facilitator and the partnering teams to monitor the success of their partnering efforts (Hong Kong CIC, 2012). The project team as a whole is able to monitor the collaboration, communication, risk management, and dispute prevention efforts of the team. Since subcontracting is Zambia is also conducted with the aim of assisting small subcontractors to learn and develop, these sessions provide the opportunity for subcontractors to gain knowledge from main contractors. The frequency of these workshops depends on the size and complexity of the project. However, it is essential that the parties conduct the follow-up workshops at least twice on a project. The facilitator will monitor the performance of the partnering relationship based on the initial goals made during the kick-off partnering workshop in order to assess goal progress and identify potential issues.

5.2.8. Facilitated dispute resolution session

This is a session or workshop done with the sole purpose of team repairing when there is a dispute between the partnering parties (Nevada Department of Transportation, 2010). During the kick-off partnering workshop a dispute resolution plan is devised to deal with disputes. The plan contains dispute resolution ladder where a dispute if unresolved can be raised from one level to another. At the top of the ladder are the two primary parties to the contract, and behind these two are all of the other project stakeholders. When an issue is elevated it is essential that a special face to face meeting between parties at that level is held to discuss the dispute at hand. However, if the issue cannot be resolved through this method, the issue is scheduled to be discussed when all the parties meet during the follow-up partnering workshop. If the issue is not solved during the workshop a facilitated dispute resolution session is scheduled where a discussion is done with all the parties and a neutral facilitator present. The facilitated dispute resolution session will be different to the follow-up session in the sense that the facilitated dispute resolution session is solely dedicated to resolving the issue at hand and only the people concerned will be present.

5.2.9. Closeout workshop

The closeout workshop is the final workshop held at the end of the project. It is not a requirement that a professional facilitator must be present for this meeting. The closeout workshop is primarily structured as a means of reflecting and learning (California Department of Transportation Division of Construction, 2013). Therefore, this workshop should create a "lessons learned" and means on how to implement those lessons in future projects. The closeout workshop shop to review the results, celebrate project successes and celebrate the completion of the project.

5.2.10. Continuous improvement

In a partnering arrangement it is important that the team members are always seeking ways to enhance their relationship to ensure successful project delivery (Nevada Department of Transportation, 2010). Procedures should be formulated that will enable the exhaustion of potential opportunities for better project delivery this can be in terms of costs, quality or duration. An organisation should have relevant indicators determined and used to measure performance. These can be compared with internal or external benchmarks to see if the project is performing well and if there are improvements required. In addition, not all stakeholders will participate in the initial workshop for example subcontractors that are contracted after the project commences. Continuous improvement can allow such stakeholders to be identified and progressively integrated into the partnering process as the project progresses this can be done during the review workshop.

5.3. Chapter summary

The chapter presented a developed project partnering model that can be used by main contractors and subcontractors in order to have a better relationship for the good of the project. The model highlighted the steps to be taken in order to implement non-contractual project partnering in the Zambian construction industry. The next chapter outlines the limitations of the study, conclusion and recommendations.

CHAPTER 6:
CONCLUSIONS, STUDY LIMITATIONS AND RECOMMENDATIONS

6.1. Introduction

The previous chapter presented the flowchart showing the processes to be followed in order to implement a project partnering approach. The non-contractual project partnering approach was designed with the aim of improving the relationship between main contractors and subcontractors in Zambia. This chapter presents the conclusion of the study drawn from the analysis of results from the questionnaire survey and structured interviews. In addition, it presents recommendations for improving the practice of subcontracting in the Zambian construction industry. This chapter further highlights limitations of the study and areas for further research. The aim of the research was to investigate the nature of relationship between the main contractors and subcontractors in the Zambian construction industry.

6.2. Conclusions

All the objectives of this study were achieved. The conclusion will be discussed according to the study objectives.

6.2.1. Nature of the relationship between main contractors and subcontractors in Zambia and how it was affecting projects

The first objective was to determine the nature of the relationship between main contractors and subcontractors in Zambia and how it was affecting projects. The study found that the relationship between main contractors and subcontractors in the Zambian construction industry is poor on many projects. It was also revealed that a poor interface between main contractors and subcontractors is likely to cause project delays.

6.2.2. Establish the factors leading to contention between subcontractors and main contractors in Zambia

The second objective was to establish the factors that are leading to contention between subcontractors and main contractors in Zambia. The study revealed that the

10 factors most affecting the relationship are: price escalation of material and labour; subcontractors not following main contractor's instructions; delay in contract progress payment; subcontractors' lack of proper equipment; work delays; subcontractors performing poor construction work; failure by main contractors to provide necessary clarifications to subcontractors; avoiding to pay the final payment for as long as possible; subcontractor's absence from site; and subcontractor not informing the main contractor when there is a problem.

6.2.3. Establish factors that contribute to an effective interface between subcontractors and main contractors in Zambia

The third objective was to establish factors that contribute to an effective interface between subcontractors and main contractors in Zambia. The 10 most important attributes were: communicating regularly; complete and clear contract documents; information communicated in time; timely progress payment to subcontractor; communicating when there is a problem; good construction work quality; subcontractor possess enough skilled labour; adherence to the construction schedule; adherence to the conditions of the contract; and accuracy of the project cost estimate.

6.2.4. Options to ensure relationship between main contractors and subcontractors in Zambia support the attainment of project goals.

The last objective was to suggest possible options that can be followed to ensure relationship between main contractors and subcontractors in Zambia support the attainment of project goals. To fulfil this objective, a non-contractual project partnering model was developed for main contractors and subcontractors to implement. The model was developed with the aim of improving main contractor-subcontractor relationship to a more collaborative relationship that works for the good of the project. The flowchart provided steps that the contractors should follow when embarking on a partnering relationship. In addition, recommendations were provided on how the main contractor-subcontractor relationship can be improved in Zambia.

6.3. Recommendations

The following are the main recommendations directed at improving the subcontracting practice in the Zambian construction industry:

- main contractors and subcontractors are recommended to implement in their practice the attributes adduced in this research, that can enhance the main contractor-subcontractor relationship;
- there is need to make improvements to the 20% subcontracting policy in order to improve the practice of subcontracting in Zambian. The policy should advocate for better relationships between main contractors and subcontractors through partnering. The policy should include instructions for preferential treatment to contractors who have had partnering training or have practiced partnering before. A person to be appointed as a sub-contract manager should have undergone partnering training before;
- the construction industry should have annual lessons learnt meetings or workshops where project participants can discuss and learn from the success and failures of subcontracting on various projects;
- through annual meetings, awards should be given to contractors recognised to have completed partnered projects successfully and best optimised principles of partnering;
- the NCC should implement partnering training courses for contractors and other professionals in the construction industry; and
- the construction industry through professional and regulatory bodies should adopt a standard contract for subcontracting.

6.4. Limitations of the study

The study reported in this dissertation had some limitations that need consideration when interpreting the results. The main aspects that constrained the research are time and funds. The research had to be under a set budget within a specific period of time that would permit for the submission of the report before due date. Due to time and accessibility restrictions, the study population was only limited to Lusaka the capital city of Zambia. In addition, time and funds restriction made it unfeasible to validate the developed model on an actual construction project. Therefore, further studies are

recommended to implement the partnering model suggested in this study on a construction project and determine its feasibility, benefits and implications. Another major limitation of the study was the scarcity of literature on subcontracting in the Zambian construction industry, as a result this research provided some of the much needed literature in the area.

REFERENCES

1. Abdullahi, A.H. (2014) Review of subcontracting practice in the construction industry, *Journal of Environmental Sciences and Resources Management*, 6(1), p. 23-33.

2. Akintan, A. and Morledge R. (2013) Improving the Collaboration between Main Contractors and Subcontractors within Traditional Construction Procurement, *Journal of Construction Engineering*, 2013, p.11.

3. Andy NG K. W and Andrew Price, D. F. (2010). Causes leading to poor site coordination in building projects, *An International Journal Technology and Management in Construction*, 2(2), p.167-172.

4. Arditi D., and Chotibhongs R. (2005) Issues in subcontracting practice, *Journal of Construction Engineering and Management*, 131, p. 866.

5. Alaghbari W. E., Kadir M. R. A., and Salim A. (2007) The significant factors causing delay of building construction projects in Malaysia, *Engineering, Construction and Architectural Management,* 14, p.192-206.

6. Arslan, G., Kivrak, S., Birgonul, M. and Dikmen, I. (2008) Improving Sub-Contractor Selection Process in Construction Projects, Web-based Sub-Contractor Evaluation System (WEBSES), *Automation in Construction*, 17, p.480-488.

7. Assaf S.A. and S. Al-Hejji, (2006). Causes of delay in large construction projects, International Journal of Project Management, 24, p.349–357.

8. Bankvall, L., Bygballe, L.E., Dubois, A. and Jahre, M. (2010) Interdependence in supply chains and projects in construction. *Supply Chain Management*, 15(5), p.385-393.

9. Beach A, M. Webster, K.M. Campbell., (2005) An evaluation of partnership development in the construction industry, *International Journal of Project Management*, 23 (2005) p.611–621.

10. Bryman, A. (2004) *Social research methods*, 2nd edition, Oxford: Oxford University Press.

11. Briscoe, G. and Dainty, A., (2005). Construction supply chain integration: an elusive goal?, *Supply Chain Management*, 10 (3/4), p.319-326.

12. California Department of Transportation Division of Construction, (2013). *Field Guide to Partnering on Caltrans Construction Projects*, California Department of Transportation Division of Construction, California

13. Chiang, Y. H. (2009). Subcontracting and its ramifications: A survey of the building industry in Hong Kong. *International Journal of Project Management*, 27(1), p.80-88.

14. Chileshe, N. and Berko P.D. (2010). Causes of project cost overruns within the Ghanaian road construction sector, In *Proceedings 5th Built Environment Conference 18-20 July 2010.*

15. Clough, R H., Sears, G A., and Sears, S. K., (2005). *Construction Contracting Seventh Edition A Practical Guide to Company Management.* Hoboken, NJ: John Wiley & Sons, Inc.

16. Construction Industry Development Board, South Africa (2013). *Subcontracting In The South African Construction Industry*; Opportunities For Development, CIBD, South Africa

17. Construction Excellence United Kingdom, (2004). [Online] *Partnering*, available from: http://constructingexcellence.org.uk/wp-content/uploads/2015/03/partnering.pdf [Accessed 23 June 2016]

18. Dossick, C.S. and Schunk, T.K. (2007) Subcontractor Schedule Control Method. *Journal of Construction Engineering and Management*. 133(3), p.262-265.

19. Dawson, C. (2007) *A Practical Guide to Research Methods, A User Friendly Manual for Mastering Research Techniques and Projects* 3rd , How To Content: Oxford

20. Dlungwana, S. and Rwelamila P.D. (2005) Contractor Development Models For Promoting Sustainable Building – A Case For Developing Management Capabilities Of Contractors, *In Proceedings The 2005 World Sustainable Building Conference*, Tokyo

21. El-Sayegh, S.M. (2008) Risk assessment and allocation in the UAE construction industry, *International Journal of Project Management*, 26, p. 431–438.

22. Enshassi, A., Arain, F. and Tayeh, B. (2012). Major causes of problems between contractors and subcontractors in the Gaza Strip, *Journal of Financial Management of Property and Construction*, 17 (1) p.92 - 112.

23. Enshassi, A., and Medoukh, Z. (2007) The contractor–subcontractor relationship: the general contractor's view. *In Proceedings of the International Conference in Building Education and Research (BEAR 2008)*, Sri Lanka, February 2008, p. 1520-1527.

24. Eom, S.J., Kim, S.C. and Jang, W.S., (2015). Paradigm shift in main contractor-subcontractor partnerships with an e-procurement framework. *KSCE Journal of Civil Engineering*, 19(7), p.1951-1961.

25. Eriksson, P. E. (2015). Partnering in engineering projects: Four dimensions of supply chain integration. *Journal of Purchasing and Supply Management*, 21(1), 38-50.

26. Eriksson, P. E., and Westerberg, M. (2011). Effects of cooperative procurement procedures on construction project performance: A conceptual framework. *International Journal of Project Management*, 29(2), 197-208.

27. Fearne, A. and Fowler, N., (2006). Efficiency versus effectiveness in construction supply chains: the dangers of lean thinking in isolation. *Supply Chain Management*: An International Journal, 11(4), 283-287

28. Fah, C. (2006) A study on domestic subcontractor, [online] Available from: http://www.efka.utm.my/thesis/IMAGES/3PSM/2006/JSB/PART2/CHONGJUNFAHAA010080D06TTP.pdf [Accessed on 4 May 2015]

29. Gadde, L. E. and Dubois, A. (2010). Partnering in the construction industry: Problems and opportunities. *Journal of Purchasing and Supply Management*, 16(2010) p.254-263.

30. Ghaffari, A., and Jane, R. K. (2012). Concept of partnering in construction projects. *Advances in Civil Engineering and Building Materials*, 301.

31. Greene, J. C. (2007). *Mixed methods in social inquiry*. New York: Wiley.

32. Hartmann, A., and Caerteling, J. (2010) Subcontractor procurement in construction: the interplay of price and trust. *Supply Chain Management*, 15(5), pp.354-362.

33. Haksever, A.M. Demir, I.H. and Giran, O. (2001) Assessing the benefits of long-term relationships between contractors and subcontractors in the UK, *International Journal for Construction Marketing*,

34. Humphreys, P., Matthews, J., and Kumaraswamy, M. (2003) Pre-construction project partnering: from adversarial to collaborative relationships. *Supply Chain Management: An International Journal*, 8(2), p.166-178.

35. Harald, B. (2013) Choice of subcontractor in markets with asymmetric information: reputation and price effects, *Journal of Business & Industrial Marketing*, 28 (1) p.60-71.

36. Huang, R.Y., Huang, C.T., Lin, H. and Ku, W.H. (2008) Factor analysis of interface problems among construction parties a case study of MRT, *Journal of Marine Science and Technology*, 16 (1), p.52-63.

37. Haseeb, M., Xinhai-Lu, Aneesa Bibi, A., and Maloof-ud-Dyian, Rabbani, W. (2011) Problems of projects and effects of delays in the construction industry of Pakistan. *Australian Journal of Business and Management Research*, 1 (5) p.41-50.

38. Hong Kong Construction Industry Council, (2012). *Guidelines on partnering*, The Construction Industry Council, Hong Kong

39. Jin X, P. Zhang G., Xia B and Feng Y. (2013). Relationship between Head Contractors and Subcontractors in the Construction Industry: A Critical Review, In, *Proceedings of the Seventh International Conference on Construction in the 21st Century (CITC-VII), December 19-21, 2013*, Bangkok, Thailand

40. Kadir M. R, W. P. Lee, M.S. Jaafar, S. M. Sapuan, and A. A. A. Ali, (2005). Factors affecting construction labour productivity for Malaysian residential projects, *Structural Survey*, 23, p.42-54.

41. Kaliba, C. (2010) *Cost Escalation, Schedule Overruns And Quality Shortfalls On Construction Projects*. Dissertation (Meng), The University of Zambia

42. Kadefors, A. (2004) Trust in project relationships-inside the black box, International Journal of Project Management, 22(3), p.175-182.

43. Kothari, C.R., (2004). *Research Methodology: Methods and Techniques*. 2nd Edition. New Delhi: New Age International Limited.

44. Khalfan, M.M., Eriksson, P., Dickinson, M. and McDermott, P. (2006) Listening to the voices of suppliers and subcontractors. *In 3rd International SCRI Symposium*, 3rd-4th April, p.509-520.

45. Khalfan, M. and Swan, W. (2007) Mutual objective setting for partnering projects in the public sector, *Engineering, Construction and Architectural Management*, 14(2), p.119-130.

46. KPMG, (2015). *Construction & Infrastructure in Africa 2015*, Sector Report

47. Ko, C., Cheng, M. and Wu, T. (2007). Evaluating Subcontractors Performance Using EFNIM, *Automation in Construction*, 16, p.525-530.

48. Kumar R, (2011). Research methodology, a step-by-step guide for beginners. 3rd London: SAGE Publications Ltd

49. Manu, E., Ankrah, N., Chinyio, E. and Proverbs, D. (2015). Trust influencing factors in main contractor and subcontractor relationships during projects, *International Journal of Project Management*, 33 (2015), p.1495-1508.

50. Matthews, J., Pellew, L., Phua, FTT and Rowlinson, S. (2000). Quality Relationships: Partnering in the Construction Supply Chain, *International Journal of Quality & Reliability Management*, 2000, 17 (4/5), p. 493-510.

51. Mbachu, J. (2008) Conceptual Framework for the Assessment of Subcontractors Eligibility and Performance in the Construction Industry, *Construction Management & Economics*, 26, p.471-484.

52. McCord, J., (2010) *Subcontractor perspectives: Factors that most affect their relationships with general contractors*, [online], Available from: http://spokane.wsu.edu/academics/Design/ResearchService/P_McCord_042110.pdf [Accessed on 24 March 2015].

53. Meng. X, (2012). The effect of relationship management on project performance in construction, *International Journal of Project Management*, 30 (2012), p.188-198.

54. Mignot A, (2011) "Alliancing benefits and challenges in infrastructure projects. Project Manager," [online] 2011, Available from: http://projectmanager.com.au/managing/cost/alliancing-benefits-and-challenges-in-infrastructure-projects/3/ , [Accessed on 24 March 2015]

55. Mihara,H., Yoshida,T., and Hojo, T.,(2015). A Study on the Method and Contents of Construction Management Education in UK and Japan. In: *Proceedings of the 19th International Symposium on Advancement of Construction Management and Real Estate 2015*, p.1103-1109.

56. Miller, C., Packham, G., and Thomas, B. (2002). Harmonization between MCs and SCs: a prerequisite for lean construction? *Journal of Construction Research*, 3(1), p.67-82.

57. Miller, K R. and Degn E. (2003). Bid Shopping, *Journal of Construction Education Spring 2003*, Vol. 8, No. 1, p.45-55.

58. Mirawati, N. A., Othman, S. N. & Risyawati, M. I. (2015) Supplier-Contractor Partnering Impact on Construction Performance: A Study on Malaysian

Construction Industry, *Journal of Economics, Business and Management*, 3(1), p.29-33.

59. Mortaheb, M.M., Zardynezhad, S., and Rahimi, M. (2010) Interface Management in Mega Oil Refinery Projects. In: *Proceedings of the 6th International Project Management Conference. Tehran, Iran, 26–27 October 2010*. p.1-19.

60. Muijs, D. (2010) *Doing Quantitative Research in Education with SPSS, LN*: SAGE Publication Ltd.

61. National Council for Construction (2012) *Annual Report 2012*. Lusaka: National Council for Construction.

62. Ohio Department of Transportation (2013). *Partnering Facilitator Standards and Expectations Guide, Division of Construction Management*, Ohio Department of Transportation, Ohio

63. Okunlola O. S. (2015) The Effect of Contractor-Subcontractor Relationship on Construction Duration in Nigeria, *International Journal of Civil Engineering and Construction Science 2015*; 2(3), p.16-23.

64. Potter, S. (2006) *Doing Postgraduate Research.* New Delhi: SAGE Publications.

65. Rabiee, F. (2004) Focus-group interview and data analysis: *Proceedings of the Nutrition Society (2004),* 63, p.655-660.

66. Rajput, B.L. and A.L. Agarwal, (2015) Study of Pros and Cons of Subcontracting System Adopted in Executing Indian Construction Projects, *International Journal of Modern Trends in Engineering*, No.:2349-9745, Date: 2-4 July, 2015.

67. Ramanathan, C. SP Narayanan and A B Idrus (2012) Construction delays causing risks on time and cost – a critical review, *Australasian Journal of Construction Economics and Building*, 12 (1), p.37-57.

68. Republic of Zambia (2006) *Vision 2030, A Prosperous middle income nation by 2030*.

69. Rhodes, C., (2015). *Construction industry: statistics and policy*, Briefing Paper Number 01432, 6 August 2015

70. Sambasivan, M. and Soon, Y.W. (2007). Causes and effects of delays in Malaysian construction industry, International Journal of Project Management, Vol. 25, p.517–526.

71. Saunders, M., Lewis, P. and Thornhill, A. (2009). *Research methods for business students*. 5th ed. Harlow: Pearson

72. Sears, S. K., Sears, G. A., Clough, R. H., (2008). *Construction Project Management -A Practical Guide to Field Construction Management*. 5th ed. Hoboken, NJ: John Wiley and Sons, Inc

73. Shehu, Z., Endut, R.I., kintoye, A., and Holt, G., (2014). Cost overrun in the Malaysian construction industry projects: A deeper insight. International Journal of Project Management. 32, p.1471-1480.

74. Skeggs, C. (2003). Project partnering in the international construction industry. International Construction Law Review, 20(4), p.456-482.

75. Smith, J.G. and Hinze, J. (2011) *Construction Management: Subcontractor Scopes of Work*. Broken Sound Parkway: Taylor & Francis Group

76. Sivo, A.S., Saunders, C., Chang, Q., and Jiang, J.J. (2006) How Low Should You Go? Low Response Rates and the Validity of Inference in IS Questionnaire Research, *Journal of the Association for Information Systems*, 7(6), p. 351-414.

77. Tayeh A B., (2009) *The Relationship Between Contractors and Their Subcontractors in The Gaza Strip*, Master's Thesis, The Islamic University, Gaza

78. Tserng, H.P. and Lin, P.H. (2002) An accelerated subcontracting and procuring model for construction projects. *Automation in construction*, 11(1), p.105-125.

79. Ujene, A,O., Achuenu, E and Abakadang O E. (2011) The Nature And Effects Of Subcontracting On The Performance Of Building Projects In South-South Zone Of Nigeria, *Journal Of Architecture, Planning & Construction Management*, 1(2), p.1-20.

80. University of Texas at Austin Center for Teaching and Learning (2007) *Response rates*. [Online] Available from: https://learningsciences.utexas.edu/sites/default/files/response_rates.pdf [Accessed 09 May 2016]

81. Vilasini, N., Neitzert, T. R., Rotimi, J. O. B., and Windapo, A. O., (2012) A framework for subcontractor integration in alliance contracts. *International Journal of Construction Supply Chain Management*. 2(1), p.17-33.

82. Washington Department of Transport, (2009) Partnering field guide for WSDOT Projects, Washington Department of Transport, Washington. [Online] Available from: http://www.wsdot.wa.gov/nr/rdonlyres/7d728e3d-a69f-4edf-8a92-39f8740ac72e/0/jlarcstudyonscopingandestimating.pdf [Accessed 06 May 2016]

83. Wellington, J. (2015) *Educational Research: Contemporary Issues and Practical Approaches*, London: Bloomsbury Publishing Plc

84. White H. and Marasini R. (2014). Management of Interface between Main Contractor and Subcontractors for Successful Project Outcomes, *Journal of Engineering, Project, and Production Management*, 2014, 4(1), p.36-50.

85. Wibowo, A (2009) *The Contribution of the Construction Industry to The Economy of Indonesia: A Systemic Approach. Discussion Paper*. Construction Management, Civil Engineering, Department, Diponegoro University, Indonesia.

86. Widen, E. and Úlfarsson, A. K. (2014) *Effects of partnering on construction projects: The cultural, collaborative and contractual aspects*. Dissertation (Msc), Royal Institute of Technology in Stockholm.

87. Wilkinson, P. and Birmingham, D. (2003) *Using Research Instruments: A Guide For Researchers*. London: RoutledgeFalmer

88. Winch, C. (2012) *A guide to undergraduate dissertation: Methodologies.* [Online] Available from: http://www.socscidiss.bham.ac.uk/methodologies.html [Accessed 06 May 2015]

89. Yik, F, Lai J, K T Chan and Yiu .E, (2006) *Best Practices in Managing Specialist Subcontracting Performance, Construction Industry Institute*, Hong Kong

90. Yoke-Lian L, S. Hassim, R. Muniandy, and Law Teik-Hua, (2012) Review of Subcontracting Practice in Construction Industry IACSIT *International Journal of Engineering and Technology*, 4(4), p.442-445.

APPENDICES

APPENDIX 1: Questionnaire Cover Letter

The University of Zambia
School of Engineering
Dept of Civil & Environmental Engineering
P.O. Box 32379, Lusaka.
Cell:+260977619877, Email: cjicax@yahoo.com

Dear Sir/Madam

RE: AN EVALUATION OF INTERFACE BETWEEN THE MAIN CONTRACTORS AND SUBCONTRACTORS IN ZAMBIAN CONSTRUCTION INDUSTRY

I am a student at the University of Zambia studying for a Master of Engineering degree in Project Management. My research topic is, An evaluation of interface between the main contractors and subcontractors in Zambian construction industry. The study is aimed at improving the relationship between main contractors and subcontractors by determining the factors that affect their relationship and also determining the factors that help improve the relationship.

Find attached a questionnaire, and based on your experience as a professional, kindly answer all questions provided. The research is purely for academic purposes and all information gathered will be kept strictly confidential. You are therefore not required to include your personal details or company name.

If you have any queries or if you would like to know the findings of this research, please do not hesitate to get in touch using the contact details provided below.

Yours faithfully

Tafadzwa Mudzvokorwa**, (MEng Student)**
Email: tafmud@gmail.com
Cell: 0973688195

Supervised by:

Dr. E.M. Mwanaumo (Erastus.mwanaumo@unza.zm)
Ms. B. Mwiya (mwiyab49@gmail.com)

APPENDIX 2: Questionnaire

SECTION ONE: GENERAL INFORMATION

This section of the questionnaire refers to background or biographical information. Please tick the box corresponding to your answer.

1.1. Which construction sub-sector do you belong ***(Please tick one)***?

Contractor ☐ Subcontractor ☐ Client ☐ Consultant ☐ Other (specify) ☐.....

1.2. What is your position in your organization *(Please tick one)*?

Junior management ☐ Middle management ☐ Senior management ☐

1.3. How long have you been dealing with construction projects *(Please tick one)*?

Below 5 Years ☐ 5-10 Years ☐ 10-15 Years ☐ Above 15 Years ☐

1.4. What is your highest level of education *(Please tick one)*?

Form V /Grade 12 ☐ Certificate ☐ Diploma ☐ Bachelors Degree ☐ Masters Degree ☐ Doctorate ☐

SECTION TWO: MAINCONTRACTOR-SUBCONTRACTOR RELATIONSHIP INFORMATION

This section of the questionnaire seeks to obtain general information on the relationship between main contractors and subcontractors.

2.1. From your experience how do you consider the relationships between main contractors and subcontractors?

Very Good ☐ Good ☐ Unsure ☐ Poor ☐ Very Poor ☐

2.2. How would you rate the following attributes to a good relationship between main contractors and subcontractors?

No	Please indicate the significance of the following factors	Very Important	Important	Unsure	Not Important	Least Important
2.2.1.	Contract progress payment done on time	☐	☐	☐	☐	☐
2.2.2.	Quality construction work	☐	☐	☐	☐	☐
2.2.3.	Providing quality materials to subcontractor	☐	☐	☐	☐	☐
2.2.4.	Good communication	☐	☐	☐	☐	☐
2.2.5.	Adherence to the construction schedule	☐	☐	☐	☐	☐
2.2.6.	Trust	☐	☐	☐	☐	☐
2.2.7.	Providing health and safety measures on site	☐	☐	☐	☐	☐
2.2.8.	Certifying work on time	☐	☐	☐	☐	☐
2.2.9.	Other*(State)*.....	☐	☐	☐	☐	☐

2.3. Which of the following is likely to occur if there is a bad relationship between the main contractors and subcontractors?

No.	Please indicate the likelihood of occurrence	Always	Usually	Unsure	Rarely	Never
2.3.1.	Time overrun in terms of delay,	☐	☐	☐	☐	☐
2.3.2.	Cost overrun,	☐	☐	☐	☐	☐
2.3.3.	Poor quality	☐	☐	☐	☐	☐
2.3.4.	Disputes between different project parties,	☐	☐	☐	☐	☐
2.3.5.	Litigation	☐	☐	☐	☐	☐
2.3.6.	Suspension of the Work or Contract Termination	☐	☐	☐	☐	☐
2.3.7.	Other*(State)*……	☐	☐	☐	☐	☐

SECTION THREE: INTERFACE PROBLEM CAUSED BY MAIN CONTRACTORS

This section of the questionnaire explores the main contractor- subcontractor relationship problems ***caused by main contractors***. Please indicate the criticality or importance of the following attributes to the relationship by ticking the appropriate box of your choice.

No	From your experience please indicate the significance of the following factors	Very Important	Important	Unsure	Not Important	Least Important
3.1.	Delay in contract progress payment	☐	☐	☐	☐	☐
3.2.	Interruption and termination of subcontractor work	☐	☐	☐	☐	☐
3.3.	Delay in providing necessary materials to the subcontractors	☐	☐	☐	☐	☐
3.4.	Failure to provide necessary clarifications to subcontractors	☐	☐	☐	☐	☐
3.5.	Providing low-quality materials to subcontractor	☐	☐	☐	☐	☐
3.6.	Assigning of work to new subcontractors without informing the original subcontractors	☐	☐	☐	☐	☐
3.7.	Not providing subcontractor essential services such as water and electricity	☐	☐	☐	☐	☐
3.8.	Non-adherence to construction schedule	☐	☐	☐	☐	☐
3.9.	Lack of trust	☐	☐	☐	☐	☐
3.10.	Failure to provide security on the site	☐	☐	☐	☐	☐
3.11.	Disclosing a subcontractor's bid price to another, so as to obtain a lower bid price	☐	☐	☐	☐	☐
3.12.	Absence of main contractor from site	☐	☐	☐	☐	☐
3.13.	Failure to provide health and safety measures on site	☐	☐	☐	☐	☐
3.14.	Delay in certifying work	☐	☐	☐	☐	☐
3.15.	Avoiding to pay the final payment for as long as possible	☐	☐	☐	☐	☐
3.16.	Other*(State)*……	☐	☐	☐	☐	☐

SECTION FOUR: INTERFACE PROBLEM CAUSED BY SUBCONTRACTORS

This section of the questionnaire explores the main contractor- subcontractor relationship problems ***caused by subcontractors.*** Please indicate the criticality or importance of the following attributes to the relationship by ticking the appropriate box of your choice.

No	From your experience please indicate the significance of the following factors	Very Important	Important	Unsure	Not Important	Least Important
4.1.	Work delays	☐	☐	☐	☐	☐
4.2.	Not following main contractor's instructions	☐	☐	☐	☐	☐
4.3.	Subcontractor's absence from site	☐	☐	☐	☐	☐
4.4.	Partnering the work with another subcontractor without getting the approval of the main contractor.	☐	☐	☐	☐	☐
4.5.	Lack of proper equipment	☐	☐	☐	☐	☐
4.6.	Subcontractor insolvency	☐	☐	☐	☐	☐
4.7.	Poor health and safety compliance by subcontractors	☐	☐	☐	☐	☐
4.8.	Subcontractor not communicating regularly with main contractor	☐	☐	☐	☐	☐
4.9.	Subcontractor not informing the main contractor when there is a problem	☐	☐	☐	☐	☐
4.10.	Subcontractor not adhering to the condition of contract	☐	☐	☐	☐	☐
4.11.	Lack of construction quality work	☐	☐	☐	☐	☐
4.12.	Subcontractor involved in more than one project at a time	☐	☐	☐	☐	☐
4.13.	Shortage of skilled labour	☐	☐	☐	☐	☐
4.14.	Poor management of cash flow	☐	☐	☐	☐	☐
4.15.	Failure to preserve and take care of materials	☐	☐	☐	☐	☐
4.16.	Other *(State)*……	☐	☐	☐	☐	☐

SECTION FIVE: OTHER FACTORS

This section of the questionnaire explores other factors that can cause main contractor and subcontractor problems. Please indicate the criticality or importance of the following factors to the relationship by ticking the appropriate box of your choice.

No	From your experience please indicate the significance of the following factors	Very Important	Important	Unsure	Not Important	Least Important
5.1.	Change of governmental regulations and laws	☐	☐	☐	☐	☐
5.2.	Extreme weather conditions	☐	☐	☐	☐	☐
5.3.	Price escalation of material and labour	☐	☐	☐	☐	☐
5.4.	Geological conditions of site not as expected	☐	☐	☐	☐	☐
5.5.	Political interference	☐	☐	☐	☐	☐
5.6.	Other *(State)*……	☐	☐	☐	☐	☐

SECTION SIX: IMPROVING THE INTERFACE BETWEEN MAIN CONTRACTORS AND SUBCONTRACTOR

This section of the questionnaire explores ***the improvements*** that can be done to enhance the main contractor – subcontractor relationship. Please indicate the importance of the following attributes to the relationship by ticking the appropriate box of your choice.

No.	From your experience which of the following attributes are important to ensure a good relationship between main contractors and subcontractors?	Very Important	Important	Unsure	Not Important	Least Important
	Communication					
6.1.	Communicating regularly	☐	☐	☐	☐	☐
6.2.	Communicating when there is a problem	☐	☐	☐	☐	☐
6.3.	Information communicated in time	☐	☐	☐	☐	☐
6.4.	Complete and clear contract documents	☐	☐	☐	☐	☐
6.5.	Other*(State)*……	☐	☐	☐	☐	☐
	Financial					
6.6.	Timely progress payment to subcontractor	☐	☐	☐	☐	☐
6.7.	Accuracy of the project cost estimate	☐	☐	☐	☐	☐
6.8.	Subcontractor/Main contractor financial stability	☐	☐	☐	☐	☐
6.9.	Other*(State)*……	☐	☐	☐	☐	☐

	Work performance					
6.10.	Subcontractor possess enough skilled labour	☐	☐	☐	☐	☐
6.11.	Subcontractor possess adequate machinery	☐	☐	☐	☐	☐
6.12.	Health and safety performance	☐	☐	☐	☐	☐
6.13.	Good construction work quality	☐	☐	☐	☐	☐
6.14.	Adherence to the construction schedule	☐	☐	☐	☐	☐
6.15.	Removing stereotypical thinking	☐	☐	☐	☐	☐
6.16.	Other*(State)*……	☐	☐	☐	☐	☐
	Contract					
6.17.	Fair contract -	☐	☐	☐	☐	☐
6.18.	Adherence to the conditions of the contract	☐	☐	☐	☐	☐
6.19.	Other*(State)*……	☐	☐	☐	☐	☐
	Other					
6.20.	Early involvement of subcontractor in a project	☐	☐	☐	☐	☐
6.21.	Involvement of subcontractor in decision making process	☐	☐	☐	☐	☐
6.22.	Mutual objectives	☐	☐	☐	☐	☐
6.23.	Trust between the parties	☐	☐	☐	☐	☐
6.24.	Other*(State)*……	☐	☐	☐	☐	☐

END!

Thank You

APPENDIX 3: Structured interview guide

Semi-structured Interview Questions

1. Which construction sub-sector do you belong?

Contractor	Subcontractor	Client	Consultant
☐	☐	☐	☐

2. What is your position in your organization?

Junior management	Middle management	Middle management
☐	☐	☐

3. How long have you been dealing with construction projects?

Below 5 Years	5-10 Years	10-15 Years	Above 15 Years
☐	☐	☐	☐

4. What is your highest level of education?

Form V /Grade 12	Diploma	Bachelors Degree	Masters Degree	Doctorate
☐	☐	☐	☐	☐

5. Have you been in a project that did not go well because of problems between main contractors and subcontractor?

6. What contributed to the problems between main contractors and subcontractors?

……

……

……

7. What are the important factors to ensure an effective Main Contractor /Subcontractor relationship?

……

……

……

8. Does the takeover of equipment clause affect the relationship between the main contractor and subcontractor?

……

……

……

9. Do retention release requirements affect the relationship?

……

……

……

10. Do insurance requirements affect the relationship?

……

……

……

11. Does the performance bond requirement affect the relationship?

……

……

……

12. To what extend does the “termination for convenience” clause affect the relationship?

……

……

……

13. How do nominated subcontractors affect the relationship?

……

……

……

14. Has the 20% subcontracting policy affected the relationship between the main contractors and subcontractors?

……

……

……

15. How do you understand the way subcontractors are approached and selected in Zambia?

……

……

……

16. In your opinion what can be done to improve the Zambian subcontracting environment?

……

……

……